SCIENTIFIC OPINION

EFSA Journal

ADOPTED: 22 November 2018

doi: 10.2903/j.efsa.2018.5516

Pest categorisation of *Carposina sasakii*

EFSA Panel on Plant Health (PLH),
Claude Bragard, Katharina Dehnen-Schmutz, Francesco Di Serio, Paolo Gonthier, Marie-Agnès Jacques, Josep Anton Jaques Miret, Annemarie Fejer Justesen, Christer Sven Magnusson, Panagiotis Milonas, Juan A Navas-Cortes, Stephen Parnell, Roel Potting, Philippe Lucien Reignault, Hans-Hermann Thulke, Wopke Van der Werf, Antonio Vicent Civera, Jonathan Yuen, Lucia Zappalà, Ewelina Czwienczek and Alan MacLeod

Abstract

The EFSA Panel on Plant Health performed a pest categorisation of the peach fruit moth, *Carposina sasakii* Matsumura (Lepidoptera: Carposinidae) for the EU. *C. sasakii* is not currently regulated in the EU although *C. niponensis,* a valid species of no economic significance that was previously mistakenly synonymised with *C. sasakii,* is regulated in Annex IIAI of 2000/29 EC. *C. sasakii* is a well-defined species that is recognised as a major pest of apples, peaches and pears in eastern China, Japan, Korea and Far East Russia. *C. sasakii* is not known to occur in the EU. Adult *C. sasakii* emerge in the spring or early summer. Eggs are laid on host fruits. Larvae burrow into the fruit to develop. Infested fruits often drop early. Larvae exit fruit and overwinter in the soil. In the more southern areas of distribution, there can be two or more generations per year. Import of host fruit provides a potential pathway into the EU. *C. sasakii* occurs in a range of climates in Asia, some of which occur in the EU. Wild and commercially grown hosts are available within the EU. *C. sasakii* has the potential to establish within the EU where there could be one or two generations per year. Impacts could be expected in apples, pears and other rosaceous fruit crops. The level of impacts would be uncertain. Phytosanitary measures are available to reduce the likelihood of introduction of *C. sasakii*. *C. sasakii* meets all the criteria assessed by EFSA PLHP to satisfy the definition of a Union quarantine pest. *C. sasakii* does not meet the criteria of occurring within the EU, nor plants for planting being the principal means of spread, so does not satisfy all the criteria for it to be regarded as a Union regulated non-quarantine pest (RNQP).

Keywords: European Union, peach fruit moth, pest risk, plant health, plant pest, quarantine

Requestor: European Commission

Question number: EFSA-Q-2018-00027

Correspondence: alpha@efsa.europa.eu

Panel members: Claude Bragard, Katharina Dehnen-Schmutz, Francesco Di Serio, Paolo Gonthier, Marie-Agnès Jacques, Josep Anton Jaques Miret, Annemarie Fejer Justesen, Alan MacLeod, Christer Sven Magnusson, Panagiotis Milonas, Juan A. Navas-Cortes, Stephen Parnell, Roel Potting, Philippe Lucien Reignault, Hans-Hermann Thulke, Wopke Van der Werf, Antonio Vicent Civera, Jonathan Yuen and Lucia Zappalà.

Suggested citation: EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Dehnen-Schmutz K, Di Serio F, Gonthier P, Jacques M-A, Jaques Miret JA, Fejer Justesen A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Czwienczek E and MacLeod A, 2018. Scientific Opinion on the pest categorisation of *Carposina sasakii.* EFSA Journal 2018;16(12):5516, 24 pp. https://doi.org/10.2903/j.efsa.2018.5516

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 categorisations 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

Carposina niponensis Walsingham 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 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. However, as explained in EPPO Reporting Service (2000), the listing of *C. niponensis* in EU plant health legislation followed *Carposina sasakii* Matsumura (the peach fruit moth) being identified as a quarantine pest in the USSR, then *C. sasakii* being mistakenly synonymised with *C. niponensis.* The EU included *C. niponensis* in Annex II/A1 of EU Directive 2000/29. However, a taxonomic review by Diakonoff (1989) concluded that *C. niponensis* and *C. sasakii* were distinct and valid species. *C. niponensis* is of no economic importance whereas *C. sasakii* is known as a major pest of rosaceous fruits in eastern Asia (CABI, 2008). This categorisation therefore assumes that the organism to be categorised is the pest originally identified as a threat by USSR plant health authorities, namely *C. sasakii* Matsumura.

2. Data and methodologies

2.1. Data

2.1.1. Literature search

A literature search on *C. niponensis* and *C. sasakii* 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 Plan Protection Organization (EPPO) Global Database (EPPO, 2018) and relevant publications.

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 *C. sasakii* following guiding principles and steps in the International Standard for Phytosanitary Measures No 11 (FAO, 2013) No 21 (FAO, 2004) and EFSA PLH Panel (2018).

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 terms of reference 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.

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, *Carposina sasakii* is a clearly defined insect species in the order Lepidoptera (moths and butterflies), family Carposinidae.

Carposina sasakii Matsumura, 1898 has the common name peach fruit moth. Nasu et al. (2010) reports *Carposina persicana* Matsumura, 1897, is the oldest available name for the peach fruit moth but the name was used in only a few publications whereas *C. sasakii* has been used in many more recent publications. Following the rules in the International Code of Zoological Nomenclature (ICZN, 1999) Nasu et al. (2010) reviewed the taxonomic changes and presented a case concluding that to avoid confusion and to maintain stability, the synonym C. *sasakii* Matsumura be used as the valid name for peach fruit moth.

3.1.2. Biology of the pest

Most literature reports *C. sasakii* as having one to two generations per year in China and Korea, e.g. Han et al. (2000). Adults fly at night with peak population activity occurring around the end of June with a second, more variable, peak of activity between early August and early September, representing the second adult generation (Kim and Lee, 2002). Diakonoff (1989) states that there are two or three generations each year in Japan, depending on climate. In Far East Russia, there is only one generation, except in the extreme south of Primor'e territory (CABI, 2008).

Mature larvae overwinter in larval-cocoons a few cm below the soil surface. Larvae emerge in the spring and early summer, May to June (Zhang et al., 2016b), and make pupal-cocoons on the soil surface. Adults emerge from the cocoons after about 12 days (CABI, 2008). Adults can mate on the day they emerge and females lay eggs, usually at the calyx or by the stalk (Narita, 1986), or occasionally on leaves (Diakonoff, 1989) or on the surface of host fruit (Huang et al., 1995; Ishiguri and Shirai, 2004). Females lay an average of about 100 eggs although up to 350 eggs have been reported (CABI, 2008). In Japan, eggs are generally laid in June, July and August. Eggs hatch after approximately 10 days. In a field trial in Korea, approximately 8–16% of eggs failed to hatch (Kim and Lee, 2002). After eggs hatch, larvae bore into fruits to continue their development (Zhang et al., 2016a). Larvae will either burrow through the fruit flesh to feed on seeds, or feed just below the fruit surface and do not penetrate deeply into the fruit (Ishiguri and Toyoshima, 2006). Kim and Lee (2002) report larval survival of 0 to 28% in a late apple cultivar (Fuji) and 43% survival in an early peach cultivar (Kurakatawase). Concentrations of phenolic compounds in fruits might affect the larval survivorship (Kim and Lee, 2002). There can be multiple larvae in a single fruit; up to 13 have been recorded in a single pear. The more larvae in a fruit, the smaller the size of the larvae (Ishiguri and Toyoshima, 2006). Larvae have not been reported to move from one fruit to another (Huang et al., 1995; CABI, 2008). There are five larval instars (Narita, 1986). Mature larvae emerge from fruit 30 to 100 days after oviposition (Ishiguri and Toyoshima, 2006). The larvae then drop to the ground and either burrow into the soil to make larval cocoons, enter diapause and overwinter or they make pupal-cocoons directly on the soil surface, and emerge as adults later in the summer, forming a late summer generation (Kim et al., 2000). Both types of cocoon are formed within 24 h (Cho and Park, 1990). Larvae developing in early host cultivars give rise to the second late summer generation (Kim and Lee, 2002). Larvae are induced into diapause when daylight falls below 14 h (Zhang et al., 2016b). Overwintering larval cocoons begin being formed in early August (Kim et al., 2000). In Japan and Korea, 50% of the mature larvae enter diapause in mid-August (Kim and Lee, 2002). In north China, larvae begin to diapause in September and have a high level of cold tolerance from November (Zhang et al., 2016b). Huang et al. (1995) measured the distribution of overwintering cocoons in a plum orchard and found that the majority of overwintering cocoons form under the canopy of the host up to 115 cm from the base of the trunk with 75% being found within 50 cm of the trunk. Diapause allows *C. sasakii* to survive freezing winter conditions (Zhang et al., 2016b). In the spring and early summer,

larvae become active again and make their way up through the soil to create pupal cocoons on the soil surface from which adults emerge. Heavier, larger larvae take longer to develop into adults than lighter larvae, e.g. cocoons weighing 25 mg take around 25 days to reach adult emergence at 25°C whereas cocoons weighing 50 mg take around 40 days (Kim et al., 2000). Kim et al. (2001) estimated larvae required 270 degree days above a threshold of 9.4°C to complete development.

When reared in the laboratory, adult females lived for approximately 13 days (range 5–27 days) and males for 16 days (5–26) (Ishiguri and Shirai, 2004).

3.1.3. Intraspecific diversity

Diakonoff (1989) describes *Carposina viduana* as a melanic form of *C. sasakii* and relegates it to the (unofficial) rank of forma, below a subspecies, using the name *C. sasakii* forma *viduana* Caradja status novo (Cho and Park, 1990). Other than morphological differences, no other differences were reported. However, the ICZN does not recognise ranks below subspecies.

From studying the mitochondrial cytochrome c oxidase I (*COI*) gene from various locations in China Wang et al. (2015) report two sympatric and cryptic mtDNA lineages within *C. sasakii*. However, the differentiation was insufficient to regard lineages as distinct species or subspecies.

3.1.4. Detection and identification of the pest

Are detection and identification methods available for the pest?

Yes, adults can be detected and populations monitored using sex pheromone traps (Boo, 1998; Boo and Park, 2005). Light traps are not effective at trapping adult *C. sasakii* (Han et al., 2000).

Infested fruit exhibit symptoms which can be detected through visual inspections. Fruit suspected of being infested can be cut open to detect larvae.

Conventional morphological keys can identify species, e.g. Cho and Park (1990). Detailed descriptions of the species and life stages are also available, e.g. Diakonoff (1989); Cho and Park (1990).

Detection

Eggs are laid on the surface of fruit, usually around the calyx. Using a hand lens (x10) will aid in detecting eggs (Kim and Lee, 2002). Larval feeding just beneath the surface of fruits, such as apple, is detectable due to the damaged part of the fruit not growing normally. However, those larvae that feed in the apple core on seeds are much more difficult to detect (Ishiguri and Toyoshima, 2006).

Symptoms of infested fruit are the frass from larvae deposited on the fruit surface; fruit discolouration; abnormal shape, and a drop of fruit liquid that exudes from the entry site a day or two after larval penetration (Ishiguri and Toyoshima, 2006). Exit holes < 3 mm diameter are a sign that mature larvae have left the fruit (Kim and Lee, 2002). Fruit suspected on being infested should be cut open and inspected.

Identification

Diakonoff (1989) provides a key to the genera of the Carposinidae and describes the life stages of *C. sasakii*. Cho and Park (1990) also provides detailed descriptions of each life stage and the morphological features for species identification.

Eggs are spherical, 0.5 mm diameter; bright red when freshly laid, and turn deep red as they age and are visible on the surface of fruits (Kim and Lee, 2002).

Larvae are 12–15 mm, yellowish white becoming red as they develop to exit fruit.

Adults are 13–17 mm (males) and 14–20 mm (females), brownish. For detailed descriptions see literature referred to above.

3.2. Pest distribution

C. sasakii occurs in temperate Far East Asia (the Far East of Russia, north-east and eastern China, Korea and Japan) (Figure 1).

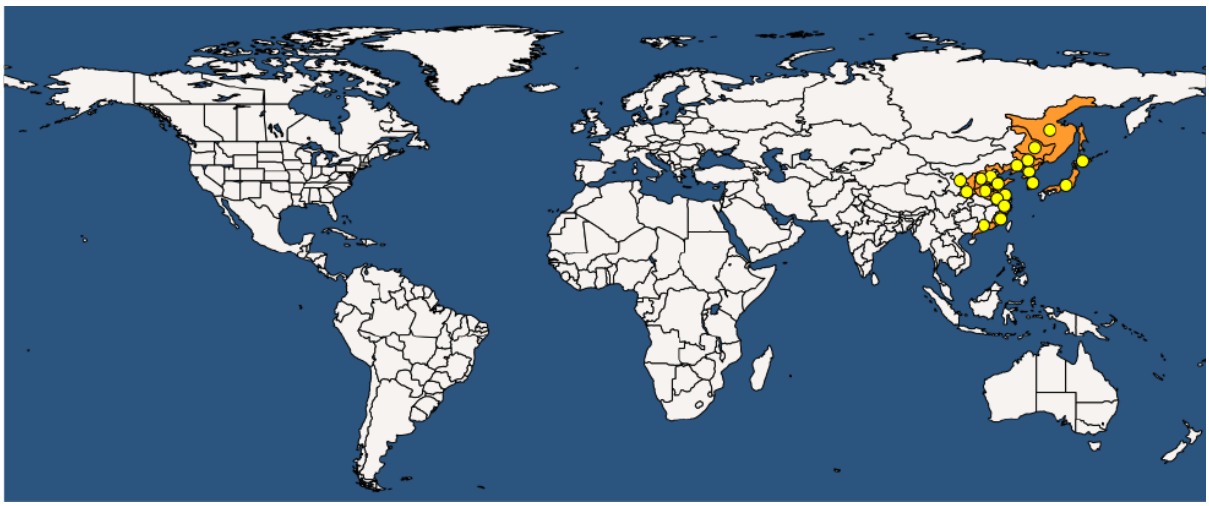

Figure 1: Global distribution map for *Carposina sasakii* (extracted from the EPPO Global Database accessed on 15 September 2018)

3.2.1. Pest distribution outside the EU

The distribution of *C. sasakii* outside of the EU is detailed in Table 2.

Table 2: Distribution of *Carposina sasakii* outside the EU

Region	Country	Subnational distribution (e.g. states/provinces)	Occurrence
Asia	China		Present, restricted distribution
		Anhui	Present, no details
		Fujian	Present, no details
		Guangdong	Present, no details
		Hebei	Present, no details
		Heilongjiang	Present, no details
		Henan	Present, no details
		Jiangsu	Present, no details
		Jilin	Present, no details
		Liaoning	Present, no details
		Ningxia	Present, no details
		Shaanxi	Present, no details
		Shandong	Present, no details
		Shanxi	Present, no details
		Zhejiang	Present, no details
	Japan		Present, widespread
		Hokkaido	Present, widespread
		Honshu	Present, widespread
	North Korea		Present, no details
	South Korea		Present, no details
	Russia		Present, restricted distribution
		Far East	Present, only in Amur, Evreu, Khabarovsk and Primor'e provinces

Both CABI (2008) and EPPO (2018) report that *C. sasakii* is not known to occur in the USA and no peer reviewed literature reports it from North America. There is no official record of *C. sasakii* occurring in the USA. However, reports and images of what are claimed to be *C. sasakii* from Kentucky (2011), Louisiana (2014), Missouri (2014) and Texas (2017) are available at the website Butterflies and

Moths of North America. It is possible that records on websites could be misidentifications, particularly recognizing the issues around taxonomy of Carposinidae.

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, *C. sasakii* is not known to occur in the EU.

Slovenia declares that *C. sasakii* is absent from its territory on the basis that there are no records of it in the country (EPPO, 2018).

3.3. Regulatory status

3.3.1. Council Directive 2000/29/EC

As noted in 1.2 (interpretation of ToR) *Carposina niponensis* Walsingham is an organism that is listed in 2000/29 EC although the organism that was intended to be regulated is assumed to have been *C. sasakii* Matsumura. Details of the listing relating to *C. niponensis* are presented in Tables 3 and 4.

Table 3: *Carposina niponensis* 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
9.	*Carposina niponensis* Walsingham	Plants of *Cydonia* Mill., *Malus* Mill., *Prunus* L. and *Pyrus* L., other than seeds, originating in non-European countries

3.3.2. Legislation addressing the hosts of *Carposina sasakii*

Table 4: Regulated hosts and commodities that may involve *Carposina sasakii* 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**
9.	Plants of *Chaenomeles* Ldl., *Cydonia* Mill., *Crataegus* L., *Malus* Mill., *Prunus* L., *Pyrus* L., and *Rosa* L., intended for planting, other than dormant plants free from leaves, flowers and fruit	Non-European countries
18.	Plants of *Cydonia* Mill., *Malus* Mill., *Prunus* L. and *Pyrus* L. and their hybrids, [. . .], intended for planting, other than seeds	Without prejudice to the prohibitions applicable to the plants listed in Annex III A (9), where appropriate, non-European countries, other than Mediterranean countries, Australia, New Zealand, Canada, the continental states of the USA
Annex IV		
Part A	**Special requirements which must 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 1	Plants, plant products and other objects originating outside the community	
	The special requirements on those plants listed in Annex IV that can host *C. sasakii* do not relate specifically to *C. sasakii* (or *C. niponensis*) but to other pests of those host plants.	

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 A	**Plants, plant products and other objects originating in 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 [...] *Prunus* L.,[...]
2.	Parts of plants, other than fruits and seeds of: [...] – *Prunus* L., originating in non-European countries, – Cut flowers of [...] *Rosa* L. and [...], originating in non-European countries,
3.	Fruits of [...]: – [...] *Cydonia* Mill. [...], *Malus* Mill. [...], *Prunus* L. [...], *Pyrus* L.[...], originating in non-European countries.
7. (a)	Soil and growing medium as such, which consists in whole or in part of soil or solid organic substances such as parts of plants, humus including peat or bark, other than that composed entirely of peat.
(b)	Soil and growing medium, attached to or associated with plants, consisting in whole or in part of material specified in (a) or consisting in part of any solid inorganic substance, intended to sustain the vitality of the plants, originating in: [...] non-European countries, other than Algeria, Egypt, Israel, Libya, Morocco, Tunisia.

3.4. Entry, establishment and spread in the EU

3.4.1. Host range

C. sasakii is mainly regarded as a pest of apples, pears and peaches although it does occur on a wide range of cultivated fruits e.g. plums, and wild fruits, especially within Rosaceae. However, plants in other families can also be attacked. Appendix A lists hosts reported in CABI (2008) and EPPO (2018).

The legislation detailed in Section 3.3.2 does represent the major hosts of *C. sasakii* but there are other host genera that are not included in current legislation, e.g. *Aronia, Cornus* and *Ziziphus*.

Table 5 shows the harvest area of the main *C. sasakii* hosts grown in the EU.

Table 5: Harvested area of major *Carposina sasakii* hosts in EU (28) Member States 2013–2016 (ha). Source EUROSTAT (apples F1110; plum F1250; peaches F1210)

	2013	2014	2015	2016	2017
Apples	536,770	524,500	538,500	523,700	523,610
Peaches	163,870	:	157,810	156,380	154,210
Pear	120,400	117,010	117,800	117,260	116,240
Plum	162,010	157,360	154,790	152,730	:

: data not available.

3.4.2. Entry

Is the pest able to enter into the EU territory?

Yes, *C. sasakii* could enter the EU as larvae in infested fruit or as larvae or pupae with soil.

There are no records of *Carposina sasakii* in the EUROPHYT interceptions database (searched 20 September 2018) nor are there any records of *C. sasakii* in the EUROPHYT outbreaks database (searched 20 September 2018).

Although there has been no interceptions of *C. sasakii* in the EU, between 1984 and 2016 there were 14 interceptions of *C. sasakii* in the USA. Interceptions consisted on 32 larvae, 1 pupa and 1

adult and were associated with various commodities (USDA, 2016). The USDA (2016) report does not identify the commodities or the source of commodities. We assume the commodities were host fruits. Regarding the finding of a single pupa, although soil could not be excluded as a pathway, the pupa could have been found in a box of fruits.

The main potential pathway is:

- infested host fruit.

Fruits of major hosts imported into the EU 28 from China, South Korea and Japan 2013–2017 are shown in Table 6.

Table 6: EU 28 imports of fruit of major *Carposina sasakii* hosts from China, South Korea and Japan 2013–2017 (hundreds of kg). Source: EUROSTAT

Host fruit (CN code)	Source	2013	2014	2015	2016	2017
Fresh pears (080830)	China	103,518	63,020	94,541	113,845	112,007
	South Korea	450	1,156	815	909	1,227
	Japan	1	–	6	2	57
	Sum:	103,969	64,176	95,362	114,756	113,291
Fresh apples (080810)	China	77,550	16,398	8,897	20,231	9,929
	South Korea	2	60	105	–	26
	Japan	2	2	2	8	123
	Sum:	77,554	16,460	9,004	20,239	10,178
Fresh peaches (080930)	China	–	56	–	–	41
	South Korea	–	–	–	–	2
	Japan	2	–	4	–	10
	Sum:	2	56	4	–	53

Fruits listed in Table 6 provide potential pathways which are regulated. Fruits of pear (*Pyrus*), apples (*Malus*) and peaches (*Prunus*) from non-European countries require inspection when entering the EU (2000/29 EC, Annex V, B 3.).

Because *C. sasakii* larvae are internal feeders, they can be difficult to detect. In addition, because the larvae feed inside of the fruit, they would not be affected by packinghouse measures such as washing, brushing, and waxing, which treat the fruit surface only (USDA, 2016).

Plants for planting with soil are a potential pathway but probably not a main pathway. Plants for planting are likely to be sourced not from fruit producing orchards but fruit tree nursery sites. If the plants have not yet been fruit bearing, there is little likelihood that eggs would be present on leaves or larvae in soil around the plants. As such there is little likelihood of plants for planting being a main pathway although the pathway cannot be ruled out entirely. For example, a nursery site may be located close to orchards.

As noted in Section 3.3.2, plants for planting of *Cydonia*, *Malus*, *Prunus* and *Pyrus* are banned from many countries, including all those where *C. sasakii* occurs (2000/29 EC, Annex III A 18.). Hence, plants for planting of these major hosts can be considered as closed potential pathways.

Plants for planting of *Chaenomeles*, *Crataegus* and *Rosa* are regulated and are allowed into the EU as dormant plants, free from leaves, flowers and fruit from non-European countries (2000/29 EC, Annex III A 9.) Hence, plants for planting of these hosts can be considered as regulated but open potential pathways if they come with soil infested with larvae of *C. sasakii*.

Plants for planting of other hosts such as *Aronia, Cornus* and *Ziziphus* remain unregulated and open if they come with leaves (possibly with *C. sasakii* eggs), fruit (with larvae) or soil (with larvae).

3.4.3. Establishment

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

Yes. Considering its distribution in eastern Asia within climate zones that also occur in the EU, and the availability of hosts outdoors in Europe, *C. sasakii* has the potential to establish in the EU.

3.4.3.1. EU distribution of main host plants

Carposina sasakii hosts such as apples, pears, peaches and plums occur widely over the EU, growing as commercial crops and in small orchards and home-gardens (de Rougemont, 1989). Hosts also occur as wild plants (e.g. *Crataegus*) (Table 7).

Table 7: Crop production area in EU28 (cultivation/harvested/production) of the main hosts of *Carposina sasakii* (ha) Source: Eurostat (accessed on 13/7/2018 and 21/9/2018)

Crop	2013	2014	2015	2016	2017
Apples	536,770	524,500	538,480	523,100	523,610
Pears	120,400	117,010	117,800	117,260	116,240
Peaches	163,870	:	157,810	156,380	154,210

':' data not available.

3.4.3.2. Climatic conditions affecting establishment

C. sasakii is distributed in areas of China, Japan and Korea (see Figure 1 and Table 2) within a variety of Köppen–Geiger climate zones. The global Köppen–Geiger climate zones (Kottek et al., 2006) describe terrestrial climate in terms of average minimum winter temperatures and summer maxima, amount of precipitation and seasonality (rainfall pattern). In eastern Asia, *C. sasakii* occurs in, for example, climate zone Cfa (humid subtropical, uniform precipitation) and Dfb (continental, uniform precipitation, warm summer). These climate zones occur in the EU, e.g. Cfa in Croatia and Italy; Dfb in Austria, Czech Republic, Germany, Poland, Romania, Slovakia and other eastern EU Member States. We assume that climatic conditions in the EU will not limit the ability of *C. sasakii* to establish.

3.4.4. Spread

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

Yes, as a free-living organism, adults can disperse naturally, e.g. by flying.

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

No. Plants for planting are not likely to provide the main means of spread (see Section 3.4.2).

Although a free-living lepidopteran, with adults capable of flight, *C. sasakii* does not show a great dispersal potential. Using a mark-release-recapture technique, Sun et al. (1987) showed that the movement of adults was random in an orchard; 80% of marked adults were found within 100 m of the release site, and the greatest dispersal distance was 225 m. Adults fly at night with peak flight activity occurring 4–5 h after dark (Han et al., 2000). Adult males and females fly between 14°C and 26°C (Ishiguri and Shirai, 2004) with most flight activity at 20°C.

Flight mill studies during which individuals were assessed during 24 h of darkness (hence artificial conditions) indicate adults can fly 8 to 24 km (Ishiguri and Shirai, 2004). However, while *C. sasakii* has the potential to fly relatively long distances, it usually flies only within and between canopies of fruit trees (CABI, 2008).

If introduced into the EU, adults could spread naturally but probably relatively slowly. Larvae could spread within the EU via infested fruits. *C. sasakii* could also spread in soil moved from orchards and possibly with plants for planting although such mechanisms of spread are considered less likely.

3.5. Impacts

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

Yes, larval damage to host fruit could reduce yield and quality.

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. Although probably unlikely to be closely associated with plants for planting, the occurrence of *C. sasakii* on plants for planting would have an impact. Infested fruit plants, planted in orchards would be introducing a potentially major pest that could affect future fruit yield and quality.

In China, Japan and Korea, *C. sasakii* is a major pest on apple and other fruits, including peach, pear and jujube (Wang et al., 2015). *C. sasakii* is the most destructive insect pest of apple, peach and pear in Korea (Kim and Lee, 2002). In Japan, *C. sasakii* is the most destructive insect pest in apple orchards (Ishiguri and Toyoshima, 2006). It causes severe damage to fruits in the Russian Far East (Khabarovsk area) (EPPO, 2018). Wang (1993) (cited in Kaya et al., 2006) reported that *C. sasakii* caused more than $1.7 billion losses in apples per year in China.

In 1987, *C. sasakii* was reported for the first time in plum orchards in Fujian. Surveys over the next few years indicated up to 94% of plums were infested during the ripening stage (Huang et al., 1995).

Management intervention is required to reduce the impact of *C. sasakii* in orchards. However, in orchards, where insecticide use is reduced or stopped, 26% to 63% of fruit can be damaged by *C. sasakii* larvae after 1 or 2 years. In orchards using frequent insecticide applications, impacts can be reduced such that 1% of fruit are damaged by *C. sasakii* (Kim et al., 2000).

Extensive and frequent pesticide use to control *C. sasakii* is likely to have environmental impacts.

Apple production in China now involves labour intensive wrapping of fruit to protect it from pests such as *C. sasakii*, and to produce high quality apples (Kaya et al., 2006).

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, existing measures designed to prevent entry are shown in Section 3.3.2. Such measures could be extended to all other hosts.

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 PFA would mitigate the risk.

3.6.1. Identification of additional measures

Phytosanitary measures are currently applied to the main *C. sasakii* hosts (see section 3.3.2). The potential pathway via plants for planting of major hosts is regulated and considered closed (see Section 3.4.2). Some other hosts (*Chaenomeles*, *Crataegus* and *Rosa*) are also regulated as plants for planting whilst allowing import of dormant plants (Section 3.4.2). Remaining host plants for planting are unregulated.

Potential additional measures:

- The existing measures for *Chaenomeles, Crateagus* and *Rosa* could be applied to host plants for planting that are currently unregulated (import only when dormant, free from leaves, flowers and fruit).

The pathway of fruit is open and regulated, with inspections required (Section 3.4.2).

3.6.1.1. Additional control measures

Potential additional control measures are listed in Table 8. Control measures are measures that have a direct effect on pest abundance.

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

Table 8: Selected control measures (a full list is available in EFSA PLH Panel et al., 2018) for *Carposina sasakii* to reduce likelihood of entry in relation to currently unregulated hosts and pathways

Information sheet title	Risk Reduction Option (RRO) summary	Risk component
Growing plants in isolation	As a pest that is a poor flyer and which does not disperse widely, growing plants in isolation is a measure to consider. Non-orchard hosts (i.e. plants in nurseries) could be grown within physical protection, e.g. a dedicated structure such as glasshouse or polytunnel	Entry
Physical treatments on consignments or during processing	Removal of soil from plants for planting	Entry
Controlled atmosphere	Treatment of apple fruit in controlled atmosphere and temperature treatment system (1% O_2, 15% CO_2, 44°C for 60 min) can achieve 100% mortality of larvae in apples (Son et al., 2012)	Entry

3.6.1.2. Additional supporting measures

Potential additional supporting measures to limit the likelihood of entry of *C. sasakii* on unregulated hosts and pathways are listed in Table 9. Supporting measures are organisational measures or procedures supporting the choice of appropriate risk reduction options that do not directly affect pest abundance.

Table 9: Selected supporting measures (a full list is available in EFSA PLH Panel, 2018) in relation to currently unregulated hosts and pathways.

Information sheet title	Supporting measure summary	Risk component
Inspection and trapping	If plants are sourced from PFA, PFPP or PFPS, inspection and trapping will be required to show pest freedom	Entry
Sampling (work in progress)	Required to audit compliance of plants that become regulated	Entry
Phytosanitary certificate and plant passport (work in progress)	Required to indicate compliance with import requirements	Entry
Surveillance (work in progress)	Required to provide evidence if sourcing plants from pest free areas, or areas where they are isolated	Entry

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

- Given the potential occurrence of wild hosts around orchards, it can be difficult to produce fruit in isolation.
- Some orchards are becoming abandoned and hence un-managed allowing populations of *C. sasakii* to spread into sites of production close by.
- Adults can be difficult to control as they emerge over a long period during spring and late summer making timing of applications difficult or requiring several applications (Kim et al., 2000).
- Because *C. sasakii* larvae are internal feeders, they can be difficult to detect.
- As internal feeders, larvae are not affected by packinghouse measures such as washing, brushing, and waxing, which treat the fruit surface only (USDA, 2016).

3.7. Uncertainty

By its very nature of being a rapid process, there are uncertainties in a pest categorisation. However, the uncertainties listed below are insufficient to affect the conclusions of the categorisation.

- Reports of *C. sasakii* adults being found in USA are available online although there is no official confirmation that *C. sasakii* is established in North America.
- If *C. sasakii* were to establish in the EU, the number of generations that would develop each year is uncertain.

- The magnitude of potential impacts is uncertain. Factors such as pest population sizes given EU crop husbandry regimes, varietal susceptibility and quality tolerance are likely to influence impacts.
- There may be differences in susceptibility to *C. sasakii* damage amongst fruit varieties grown in the EU compared varieties grown in China, Korea and Japan.

4. Conclusions

Considering the criteria within the remit of EFSA to assess its regulatory plant health status, *C. sasakii* meets the criteria for consideration as a potential Union quarantine pest (it is absent from the EU, potential pathways exist, and its establishment would cause an economic impact). Given that *C. sasakii* is not known to occur in the EU, it fails to meet some of the criteria required for RNQP status. Table 10 provides a summary of the conclusions from each part of this pest categorisation.

Table 10: 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)	*Carposina sasakii* Matsumura is a clearly defined insect species in the order Lepidoptera (moths and butterflies), family Carposinidae	*Carposina sasakii* Matsumura is a clearly defined insect species in the order Lepidoptera (moths and butterflies), family Carposinidae	No uncertainty
Absence/ presence of the pest in the EU territory (Section 3.2)	*C. sasakii* is not known to occur in the EU. It is an Asian species occurring in Japan, Korea, Far East Russia and eastern China	*C. sasakii* not known to occur in the EU. As such it fails to meet this criterion as a RNQP	No uncertainty
Regulatory status (Section 3.3)	Whilst we assume the EU intended to regulated peach fruit moth, the organism listed in 2000/29 EC is *Carposina niponensis* Walsingham, a valid species of limited phytosanitary importance and not the peach fruit moth (*Carposina sasakii*)	Whilst we assume the EU intended to regulated peach fruit moth, the organism listed in 2000/29 EC is *Carposina niponensis* Walsingham, a valid species of limited phytosanitary importance and not the peach fruit moth (*Carposina sasakii*)	No uncertainty
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	*Carposina sasakii* has potential to enter into, become established and spread within the EU. The main pathway is host fruit	Spread via plants for planting is not the main means of spread	No uncertainty
Potential for consequences in the EU territory (Section 3.5)	The pests' introduction is likely to have an economic impact in the EU, especially on hosts such as pear, apples and peaches	Although unlikely to be closely associated with plants for planting, the occurrence of *C. sasakii* on plants for planting would have an impact, i.e. introducing a potentially major pest into a production site	The magnitude of potential impacts is uncertain. Factors such as pest population sizes given EU crop husbandry regimes, varietal susceptibility and quality tolerance are likely to influence impacts
Available measures (Section 3.6)	There are measures available to prevent the likelihood of entry into the EU (i.e., import plants for planting whilst dormant and free from leaves, flowers and fruit)	There are measures available to prevent pest presence on plants for planting (e.g. source plants from PFA)	No uncertainties

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
Conclusion on pest categorisation (Section 4)	*Carposina sasakii* meets all of the criteria assessed by EFSA PLHP to satisfy the definition of a Union quarantine pest	*Carposina sasakii* does not meet the criteria of (a) occurring within the EU, and (b) plants for planting being the principal means of spread. Hence it does not satisfy all of the criteria that are within the remit of EFSA to assess for it to be regarded as a Union RNQP	No uncertainties
Aspects of assessment to focus on/ scenarios to address in future if appropriate	No particular aspect of this categorisation stands out as regards requiring particular attention in any future risk assessment		

References

Boo KS, 1998. Variation in sex pheromone composition of a few selected Lepidopteran species. Journal of Asia-Pacific Entomology, 1, 17–23.

Boo KS and Park KC, 2005. Insect semiochemical research in Korea: overview and prospects. Applied Entomology and Zoology, 40, 13–29.

CABI, 2008. Datasheet report for *Carposina sasakii* (peach fruit moth). CABI Invasive Species Compendium. Available online: https://www.cabi.org/isc/datasheet/11401 [Accessed 2nd January 2008].

Cho SW and Park KT, 1990. The Systematics of Korean Carposinidae (Lepidoptera) Insecta Koreana, Series 7, 87–103.

Diakonoff A, 1989. Revision of the palaearctic Carposinidae with description of a new genus and new species (Lepidoptera: Pyraloidea). Zoologische Verhandelingen, 281, 1–155.

EFSA PLH Panel (EFSA Panel on Plant Health), Jeger M, Bragard C, Caffier D, Candresse T, Chatzivassiliou E, Dehnen-Schmutz K, Gregoire J-C, Jaques Miret JA, MacLeod A, 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, Hart A, Schans J, Schrader G, Suffert M, Kertesz V, Kozelska S, Mannino MR, Mosbach-Schulz O, Pautasso M, Stancanelli G, Tramontini S, Vos S and Gilioli G, 2018. Guidance on quantitative pest risk assessment. EFSA Journal 2018;16(8):5350, 86 pp. https://doi.org/10.2903/j.efsa.2018.5350

EPPO (European and Mediterranean Plant Protection Organization), 2000. EPPO Reporting Service. 11, 177.

EPPO (European and Mediterranean Plant Protection Organization), 2018. EPPO Global Database. Available online: https://gd.eppo.int/taxon/CARSSA [Accessed: 14 September 2018].

FAO (Food and Agriculture Organization of the United Nations), 1995. ISPM (International standards for phytosanitary measures) No 4. Requirements for the establishment of pest free areas. Available online: https://www.ippc.int/en/publications/614/

FAO (Food and Agriculture Organization of the United Nations), 2004. ISPM (International Standards for Phytosanitary Measures) 21—Pest risk analysis of regulated non-quarantine pests. FAO, Rome, 30 pp. Available online: https://www.ippc.int/sites/default/files/documents/1323945746_ISPM_21_2004_En_2011-11-29_Refor.pdf

FAO (Food and Agriculture Organization of the United Nations), 2013. ISPM (International Standards for Phytosanitary Measures) 11—Pest risk analysis for quarantine pests. FAO, Rome, 36 pp. Available online: https://www.ippc.int/sites/default/files/documents/20140512/ispm_11_2013_en_2014-04-30_201405121523-494.65%20KB.pdf

FAO (Food and Agriculture Organization of the United Nations), 2017. ISPM (International standards for phytosanitary measures) No 5. Glossary of phytosanitary terms. Available online: https://www.ippc.int/en/publications/622/

Han KS, Jung JK, Choi KH, Lee SW and Boo KS, 2000. Sex pheromone composition and male trapping of the peach fruit moth, *Carposina sasakii* (Matsumura) (Lepidoptera: Carposinidae) in Korea. Journal of Asia-Pacific Entomology, 3, 83–88.

Huang JL, Xiaonan LQ, Wang Q, Zhang L, Liao Q, Hou M and Hou R, 1995. Studies on the bionomics of the peach fruit borer, a new orchard pest in Fujian province. Acta Phytophylacica Sinica, 22, 22–26.

ICZN (International Code of Zoological Nomenclature), 1999. Fourth Edition. Natural History Museum, London. Available online: http://www.nhm.ac.uk/hosted-sites/iczn/code/

Ishiguri Y and Shirai Y, 2004. Flight activity of the peach fruit moth, *Carposina sasakii* (Lepidoptera: Carposinidae), measured by a flight mill. Applied Entomology and Zoology, 39, 127–131.
Ishiguri Y and Toyoshima S, 2006. Larval survival and development of the peach fruit moth, *Carposina sasakii* (Lepidoptera: Carposinidae), in picked and unpicked apple fruits. Applied Entomology and Zooloigy, 41, 685–690.
Kaya HK, Aguillera MM, Alumai A, Choo HY, de la Torre M, Fodor A, Ganguly S, Hazir S, Lakatos T, Pye A, Wilson M, Yamanaka S, Yang H and Ehlers R-U, 2006. Status of entomopathogenic nematodes and their symbiotic bacteria from selected countries or regions of the world. Biological Control, 38, 134–155.
Kim DS and Lee JH, 2002. Egg and larval survivorship of *Carposina sasakii* (Lepidoptera: Carposinidae) in apple and peach and their effects on adult population dynamics in orchards. Environmental Entomology, 31, 686–692.
Kim DS, Lee JH and Yiem MS, 2000. Spring emergence pattern of *Carposina sasakii* (Lepidoptera: Carposinidae) in apple orchards in Korea and its forecasting models based on degree-days. Environmental Entomology, 29, 1188–1198.
Kim DS, Lee JH and Yiem MS, 2001. Temperature dependent development of *Carposina sasakii* (Lepidoptera: Carposinidae) and its stage emergence models. Environmental Entomology, 30, 298–305.
Kottek M, Grieser J, Beck C, Rudolf B and Rubel F, 2006. World map of the Koppen-Geiger climate classification updated. Meteorologische Zeitschrift, 15, 259–263.
Narita H, 1986. Studies on the ecology and control of peach fruit moth (*Carposina niponensis* Walsingham). Bulletin of the Akita Fruit-Tree Experiment Station, 17, 31–128.
Nasu Y, Tamashima K, Shibao M, Yoshimatsu S and Naito T, 2010. Rediscovery of *Carposina niponensis* Walsingham and carposinids caught by synthetic sex pheromone trap for *C. sasakii* Matsumura in Japan (Lepidoptera: Carposinidae). Japanese Journal of Applied Entomology and Zoology, 54, 115–126. [abstract only]. Available online: http://odokon.org/
de Rougemont GM, 1989. A Field Guide to the Crops of Britain and Europe. Collins Sons and Co. Ltd., London.
Son Y, Chon I, Neven L and Kim Y, 2012. Controlled atmosphere and temperature treatment system to disinfest fruit moth, *Carposina sasakii* (Lepidoptera: Carposinidae) on apples. Journal of Economic Entomology, 105, 1540–1547.
Sun L, Zhong H and Li Y, 1987. Studies on dispersal of sterile peach fruit borer (*Carposina nipponensis* Wals.) by using mark-release-recapture technique (Abstract). Acta Agriculturae Nucleatae Sinica, 1, 29–37.
USDA (United States Department of Agriculture) 2016. Importation of Fresh Jujube Fruit from China into the Continental United States, A Qualitative, Pathway-Initiated Pest Risk Assessment. Available online: https://www.aphis.usda.gov/import_export/plants/plant_imports/process/downloads/china-jujube-ra.pdf [Accessed: 15 September 2018].
Wang J, 1993. Control of the peach fruit moth, *Carposina niponensis*, using entomopathogenic nematodes. In: Bedding R, Akhurst R and Kaya H (eds.). Nematodes and The Biological Control of Insect Pests. CSIRO Publications, East Melbourne, Australia. pp. 59–65.
Wang J, Yu Y, Li LL, Guo D, Tao YL and Chu D, 2015. *Carposina sasakii* (Lepidoptera: Carposinidae) in its Native Range Consists of Two Sympatric Cryptic Lineages as Revealed by Mitochondrial *COI* Gene Sequences. Journal of Insect Science, 15, 85. https://doi.org/10.1093/jisesa/iev063
Zhang B, Zhao F, Hoffmann A, Ma G, Ding HM and Ma CS, 2016a. Warming accelerates carbohydrate consumption in the diapausing overwintering peach fruit moth *Carposina sasakii* (Lepidoptera: Carposinidae). Environmental Entomology, 45, 1287–1293.
Zhang B, Peng Y, Zhao XJ, Hoffmann AA, Li R and Ma CS, 2016b. Emergence of the overwintering generation of peach fruit moth (*Carposina sasakii*) depends on diapause and spring soil temperatures. Journal of Insect Physiology, 86, 32–39.

Abbreviations

CN	Combined nomenclature (8 digit code building on HS codes to provide greater resolution)
DG SANTÉ	Directorate General for Health and Food Safety
EPPO	European and Mediterranean Plant Protection Organization
FAO	Food and Agriculture Organization
HS	Harmonized System (6 digit World Customs Organization system to categorize goods)
ICZN	International Code of Zoological Nomenclature
IPPC	International Plant Protection Convention
ISPM	International Standards for Phytosanitary Measures
MS	Member State
PFA	Pest Free Areas
PFPP	Pest Free Production Places
PFPS	Pest Free Production Sites
PLH	EFSA Panel on Plant Health
PZ	Protected Zone
RNQP	regulated non-quarantine pest

RRO	risk reduction option
TFEU	Treaty on the Functioning of the European Union
ToR	Terms of Reference

Glossary

(terms defined in ISPM 5 unless indicated by +)

Containment (of a pest)	Application of phytosanitary measures in and around an infested area to prevent spread of a pest (FAO, 1995, 2017)
Control (of a pest)	Suppression, containment or eradication of a pest population (FAO, 1995, 2017)
Control measures+	Measures that have a direct effect on pest abundance
Entry (of a pest)	Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled (FAO, 2017)
Eradication (of a pest)	Application of phytosanitary measures to eliminate a pest from an area (FAO, 2017)
Establishment (of a pest)	Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO, 2017)
Impact (of a pest)	The impact of the pest on the crop output and quality and on the environment in the occupied spatial units
Introduction (of a pest)	The entry of a pest resulting in its establishment (FAO, 2017)
Supporting measures+	Organisational measures or procedures supporting the choice of appropriate Risk Reduction Options that do not directly affect pest abundance
Pathway	Any means that allows the entry or spread of a pest (FAO, 2017)
Phytosanitary measures	Any legislation, regulation or official procedure having the purpose to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests (FAO, 2017)
Protected zones (PZ)	A Protected zone is an area recognised at EU level to be free from a harmful organism, which is established in one or more other parts of the Union
Quarantine pest	A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (FAO, 2017)
Regulated non-quarantine pest (RNQP)	A non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party (FAO, 2017)
Risk 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, 2017)

Appendix A – *Carposina sasakii* hosts

Host plants recorded in CABI (2008) and EPPO (2018) are listed below. CABI and EPPO use different terms to describe the relationship between pest and plant (CABI: Main, Other, Wild; EPPO: Major, Minor, Incidental, Wild/Weed, Unclassified).

Plant name	Common name	Family	Host status (CABI, 2008)	Host status (EPPO, 2018)
Malus domestica	Apple	Rosaceae	Main	Major
Prunus persica	Peach	Rosaceae	Main	Major
Pyrus communis	European pear	Rosaceae	Main	Major
Pyrus pyrifolia	Asian pear	Rosaceae	–	Major
Pyrus	Pear	Rosaceae	Main	
Malus	Ornamental species	Rosaceae	Main	
Aronia arbutifolia	Red chokeberry	Rosaceae	Other	
Chaenomeles japonica	Japanese quince	Rosaceae	Other	
Crataegus cuneata	–	Rosaceae	Other	
Cydonia oblonga	Quince	Rosaceae	Other	Minor
Malus micromalus	–	Rosaceae	Other	
Malus toringo	Toringo crab-apple	Rosaceae	Other	
Phoenix dactylifera	Date-palm	Arecaceae	Other	
Prunus armeniaca	Apricot	Rosaceae	Other	Minor
Prunus domestica	Plum	Rosaceae	Other	Minor
Prunus dulcis	Almond	Rosaceae	Other	
Prunus mume	Japanese apricot tree	Rosaceae	Other	
Prunus salicina	Japanese plum	Rosaceae	Other	
Pyrus bretschneideri	Yali pear	Rosaceae	Other	
Pyrus pyrifolia	Oriental pear tree	Rosaceae	Other	
Ziziphus jujuba	Common jujube	Rhamnaceae	Other	Minor
Ziziphus mauritania		Rhamnaceae	–	Minor
Cornus mas	Cornelian cherry	Cornaceae	Wild host	
Crataegus	–	Rosaceae	Wild host	
Rosa	Roses	Rosaceae	Wild host	
Sorbus aucuparia	Mountain ash	Rosaceae	Wild host	
Corchorus	–	Malvaceae	–	Unclassified
Chaenomeles	Flowering quince	Rosaceae	–	Incidental