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Pest categorisation of *Urocerus japonicus*

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Abstract

The EFSA Panel on Plant Health performed a pest categorisation of *Urocerus japonicus* (Hymenoptera: Siricidae), the Japanese horntail, for the territory of the EU. *U. japonicus* is not listed in Annex II of Commission Implementing Regulation (EU) 2019/2072 but was identified as an actionable pest in a commodity risk assessment of *Pinus thunbergii* artificially dwarfed plants from Japan. *U. japonicus* occurs across Japan and on the Korean Peninsula. It attacks fallen or weakened Japanese cedars, *Cryptomeria japonica* and Japanese cypresses, *Chamaecyparis obtusa*. It has also been observed attacking *Pinus* spp., *Abies* spp., *Larix kaempferi* and *Picea jezoensis*. The females oviposit into the sapwood. Eggs are deposited together with a symbiotic basidiomycete fungus, *Amylostereum laevigatum*. The larvae feed on wood infected by the fungus. All immature stages live in the hosts sapwood. The lifecycle of the pest lasts 1 year, sometimes 2 years. The wood of the host trees is discoloured by the fungus and therefore loses much of its economic value. *U. japonicus* can be carried in conifer wood, solid wood packaging material (SWPM) or plants for planting. Wood from Japan is regulated by 2019/2072 (Annexes VII and XI) whilst SWPM is managed by ISPM 15. The pathway plants for planting is largely closed by prohibition, with the exception of *Cryptomeria* spp. and specified bonsai plants for planting. Climatic conditions in several EU Member States are conducive for establishment, but the main host plants are not very common in those areas, being only amenity trees, although the other hosts mentioned in the literature, *Pinus* spp., *Abies* spp., *Picea* spp. and *Larix* spp., are widespread. The introduction of *U. japonicus* is likely to decrease the quality of host wood, as in Japan. Phytosanitary measures are available to reduce the likelihood of entry and further spread, and there is a potential for biological control. *U. japonicus* satisfies all the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest.

Keywords: Japanese horntail, Siricidae, conifers, *Amylostereum laevigatum*, plant health, plant pest, quarantine

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1. Introduction

1.1. Background and terms of reference as provided by the requestor

1.1.1. Background

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

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

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

1.1.2. Terms of Reference

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

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

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

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

1.2. Interpretation of the terms of reference

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

1.3. Additional information

U. japonicus was identified as a potential regulated pest in a commodity risk assessment of *Pinus thunbergii* artificially dwarfed plants from Japan (EFSA PLH Panel, 2019).

2. Data and methodologies

2.1. Data

2.1.1. Literature search

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

2.1.2. Database search

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

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

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

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

The EC Joint Research Centre (JRC) European Atlas of Forest Trees species (https://forest.jrc.ec.europa.eu/en/european-atlas/) was checked to determine whether hosts were grown in EU forestry (Appendix A).

2.2. Methodologies

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

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

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

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

Criterion of pest categorisation	Criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest (article 3)
Identity of the pest (Section 3.1)	Is the identity of the pest clearly defined, or has it been shown to produce consistent symptoms and to be transmissible?
Absence/presence of the pest in the EU territory (Section 3.2)	Is the pest present in the EU territory? If present, is the pest in a limited part of the EU or is it scarce, irregular, isolated or present infrequently? If so, the pest is considered to be not widely distributed.
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	Is the pest able to enter into, become established in, and spread within, the EU territory? If yes, briefly list the pathways for entry and spread.
Potential for consequences in the EU territory (Section 3.5)	Would the pests' introduction have an economic or environmental impact on the EU territory?
Available measures (Section 3.6)	Are there measures available to prevent pest entry, establishment, spread or impacts?
Conclusion of pest categorisation (Section 4)	A statement as to whether (1) all criteria assessed by EFSA above for consideration as a potential quarantine pest were met and (2) if not, which one(s) were not met.

3. Pest categorisation

3.1. Identity and biology of the pest

3.1.1. Identity and taxonomy

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

Yes, the identity of the pest is established and *Urocerus japonicus* (Smith) is the accepted name.

Urocerus japonicus (Smith, 1874) is an insect within the family Siricidae and Order Hymenoptera, commonly known as the Japanese horntail. Synonyms of this species are *Sirex japonicus* Smith and *Xanthosirex japonicus* Semenov.

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

3.1.2. Biology of the pest

The immature stages of *U. japonicus* develop in the sapwood of their hosts. Adults emerge between June and October (Sano, 1992) with the majority emerging between July and September. Females have an eggload of 70–540 eggs (mean of 322) when they emerge. Males and females copulate rapidly after emergence, and the females oviposit mostly into the stems of freshly cut or fallen hosts but also of weakened trees. Ovipositing through bark and approximately 7 mm into the wood of hosts requires significant energy and females can die before all eggs are laid (Sano, 1992).

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

The adults are attracted by alpha-pinene and other volatiles from the host trees (Sato and Maeto, 2006; Matsumoto and Sato, 2007; Tabata et al., 2012). Sano (1992) reported females living up to 5 days and males up to 12 days.

Adult female *U. japonicus* vector *Amylostereum laevigatum* (Fries) Boidin, a basidiomycete fungus involved in symbiosis with *U. japonicus*. The fungus is carried in abdominal mycangia (Fukuda and Hijii, 1997; Tabata and Abe, 1997) and is injected into a host tree by females when eggs are oviposited. Subsequently developing larvae feed on wood infected by the fungus (Fukuda and Hijii, 1997). The immature development lasts in general 1 year, although some individuals take 2 years to develop (Fukuda and Hijii, 1997; Tabata and Abe, 1997; Tabata et al., 2012).

3.1.3. Host range/species affected

All publications report that *U. japonicus* attacks two conifer species, the Japanese cedar (*Cryptomeria japonica* D. Don) and the Japanese cypress (*Chamaecyparis obtusa*) (Sieb. et Zucc.) (Fukuda and Hijii, 1997; Fujiwara et al., 2001; Fukuda and Maeto, 2002; Inada and Inoue, 2002; Inada, 2003; Sato, 2007). Japanese literature and personal communications with Japanese researchers also report *U. japonicus* from *Pinus*, *Abies*, *Picea* and *Larix* spp. (Sano, 1992; Lee et al., 2019; Naito et al., 2020; Masanobu Tabata, confirmed this by email on 24 October 2022; Naoto Kamata, confirmed this by email on 12 October 2022). A detailed list of hosts is shown in Appendix A.

3.1.4. Intraspecific diversity

No intraspecific diversity has been reported.

3.1.5. Detection and identification of the pest

Are detection and identification methods available for the pest?

Yes, detection and identification methods are available.

Detection

U. japonicus attacks mainly freshly felled or weakened trees. The most obvious symptoms are the emergence holes of the adults, and the larval galleries containing larvae with a small sclerotised 'horn' at the end of the abdomen (hence the name Japanese horntail). The wood of attacked trees shows strong discolouration due to *A. laevigatum* (Fukuda and Maeto, 2002; Tabata et al., 2012; see Figure 1).

The adult females can be trapped using sticky traps baited with alpha-pinene (Sato and Maeto, 2006).

Figure 1: A cross section of a *Cryptomeria japonica* stem showing discolouration due to *U. japonicus* and *A. laevigatum* (Tabata et al., 2012)

Identification

A description with photographs of an adult male and female is provided by Sano (1992). Morphological keys have been published by Takeuchi (1962) (in Fukuda and Hijii, 1997) and by Naito et al. (2020).

Sano (1992) provides a brief description of each life stage.

Egg: oblong, approximately 1.2 mm × 0.2 mm.

Larvae: cylindrical 19 mm long milky-white with small legs.

Pupae: Milky-white and wrapped in a thin cocoon.

Adults: Abdomen black or dark brown; legs yellowish brown, antennae yellowish brown. Males 14–27 mm; females 15–38 mm. Naito et al. (2020) report females can be up to 40 mm long.

3.2. Pest distribution

3.2.1. Pest distribution outside the EU

U. japonicus is distributed all over Japan (Takeuchi, 1962 in Fukuda and Hijii, 1997; Sano, 1992; Naito et al., 2020) and on the Korean peninsula (Sano, 1992; Lee et al., 2019) (Figure 2).

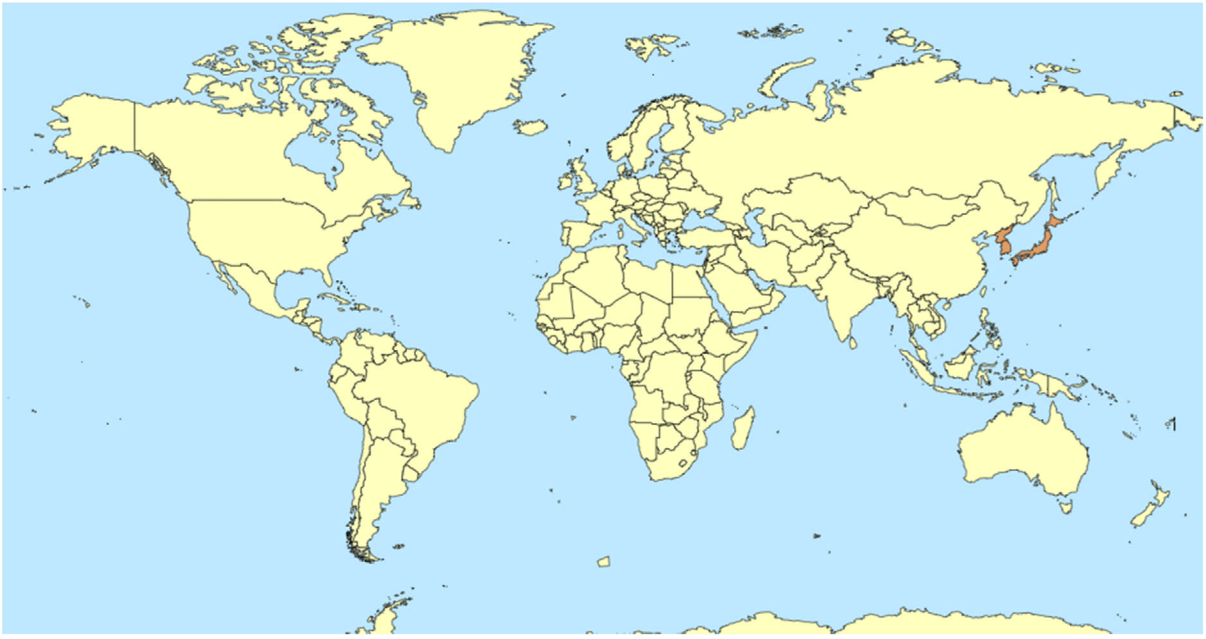

Figure 2: Global distribution of *Urocerus japonicus* (Data source: Sano, 1992; Fukuda and Hijii, 1997; Naito et al., 2020)

3.2.2. Pest distribution in the EU

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

No. The pest is not known to be present in the EU.

3.3. Regulatory status

U. japonicus is included in a list of pests of concern in relation to naturally or artificially dwarfed *Pinus parviflora* and *P. thunbergii* plants for planting from Japan in Commission Implementing Regulation (EU) 2020/1217. The regulation provides for a derogation from Article 7, point 1 of Annex VI of Implementing Regulation (EU) 2019/2072 if the plants comply with the conditions set out in EU 2020/1217.

Adult females vector a basidiomycete fungus, *A. laevigatum*, involved in symbiosis with *U. japonicus*. The fungus is widely distributed in Europe and North America on various conifers (*Abies*, *Juniperus*, *Cupressus*) (Slippers et al., 2003) and is not regulated. To our knowledge, there is no information about European Siricidae vectoring the fungus.

3.3.1. Commission Implementing Regulation 2019/2072

U. japonicus is not listed in Annex II of Commission Implementing Regulation (EU) 2019/2072, an implementing act of Regulation (EU) 2016/2031, or in any emergency plant health legislation.

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

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

List of plants, plant products and other objects whose introduction into the Union from certain third countries is prohibited			
	Description	**CN Code**	**Third country, group of third countries or specific area of third country**
1.	Plants of *Abies* Mill., [. . .] *Chamaecyparis* Spach, [. . .]., *Larix* Mill., *Picea* A. Dietr., *Pinus* L., [. . .], other than fruit and seeds	ex 0602 20 20 ex 0602 20 80 ex 0602 90 41 ex 0602 90 45 ex 0602 90 46 ex 0602 90 47 ex 0602 90 50 ex 0602 90 70 ex 0602 90 99 ex 0604 20 20 ex 0604 20 40	Third countries other than: specified European third countries (see Annex VI for details)

Note that *Cryptomeria* spp. are not listed in Annex VI of 2019/2072.

3.3.3. Legislation addressing the organisms vectored by *U. japonicus* (Commission Implementing Regulation 2019/2072)

Adult *U. japonicus* females vector *A. laevigatum*, a Basidiomycete fungus causing white rot. This fungal species is native to the EU (Slippers et al., 2003; Tabata et al., 2012) and is not regulated by plant health legislation.

3.4. Entry, establishment and spread in the EU

3.4.1. Entry

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

Yes, the pest is able to enter into the EU territory, either with infested wood, wood packaging material or with plants for planting.

Comment on plants for planting as a pathway.

Although eggs are normally laid in weakened, freshly cut or fallen hosts, some eggs could be laid on growing trees and so plants for planting could be a possible pathway. However, the pathway plants for planting is regulated and largely closed, except for a derogation regarding the import of artificially dwarfed Japanese black pine (*Pinus thunbergii* Parl.) from Japan (Commission Implementing Regulation (EU) 2020/1217).

Cryptomeria spp. are not mentioned in the Annexes of Commission Implementing Regulation 2019/2072.

U. japonicus can spread over long distances through infested plants for planting, conifer wood and wood packaging material (Table 3).

Table 3: Potential pathways for *U. japonicus* into the EU

Pathways	Life stage	Relevant mitigations [e.g. prohibitions (Annex VI), special requirements (Annex VII) or phytosanitary certificates (Annex XI) within Implementing Regulation 2019/2072]
Plants for planting	Eggs, larvae and pupae	Other than specified artificially dwarfed pines (Regulation 2020/1217) specified host plants, are prohibited from entering the EU from third countries (Regulation 2019/2072, Annex VI, see also Table 3).
Conifer wood	Eggs, larvae and pupae	Wood of conifers from Japan (and other third countries) need to fulfil special requirements (Annex VII, 76–77., Annex XI, part A.)
Wood packaging material	Larvae and pupae	ISPM 15

Cryptomeria spp. are not included in the Annexes of Commission Implementing Regulation 2019/2072.

Notifications of interceptions of harmful organisms began to be compiled in Europhyt in May 1994 and in TRACES in May 2020. As on 15November, 2022, there were no records of interception of *U. japonicus* in the Europhyt and TRACES databases.

3.4.2. Establishment

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

Yes, the pest able to become established in the EU territory. However, its main host plants, *C. japonica* and *C. obtusa* are not widely distributed and are grown mostly as amenity trees. Other host species (*Pinus* spp., *Larix* spp., *Abies* spp. and *Picea spp*.) are widely distributed in the EU territory.

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

3.4.2.1. EU distribution of main host plants

Pinus spp., *Larix* spp., *Abies* spp. and *Picea spp*. are widely distributed in the EU.

3.4.2.2. Climatic conditions affecting establishment

The climate in large parts of Japan is similar to that of large parts of the EU, in particular the Cfa and Cfb Köppen–Geiger climate types (Kottek et al., 2006) (Figure 3).

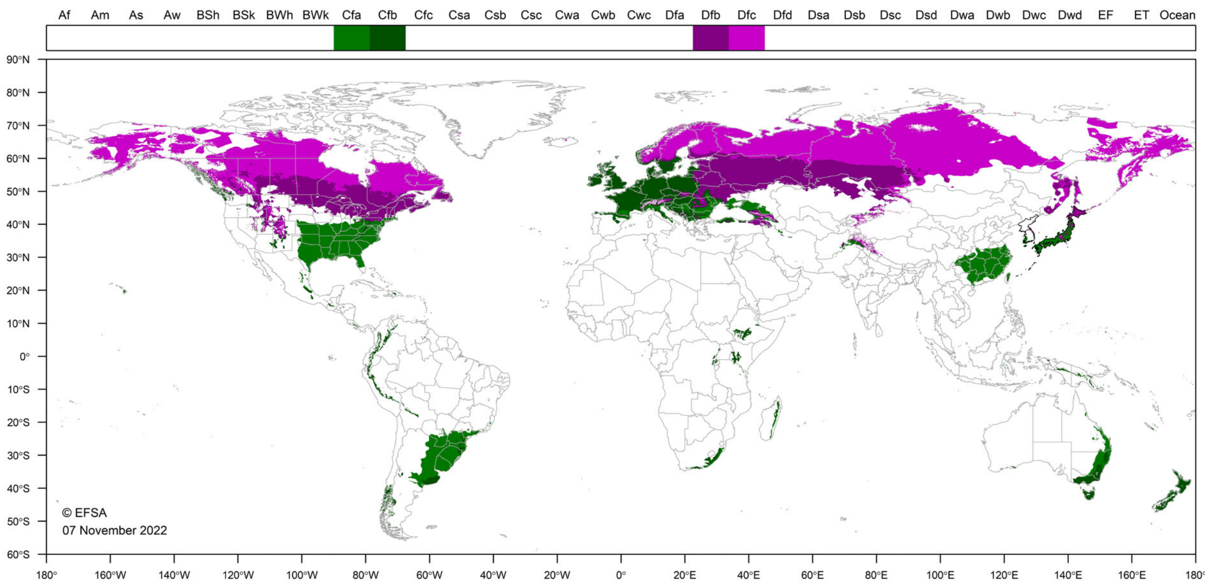

Figure 3: World distribution of selected Köppen–Geiger climate types that occur in the EU and in countries where *Urocerus japonicus* has been reported

3.4.3. Spread

Describe how the pest would be able to spread within the EU territory following establishment?
Adults have been observed to fly from 10 to 100 m.
Comment on plants for planting as a mechanism of spread.
The pest could travel long distances in plants for planting of *C. obtusa*, *Pinus* spp., *Larix* spp., *Abies* spp. and *Picea spp*. and of *C. japonica*.

Females have been observed to fly over a maximum distance of 105 m and males 10 m (Sato et al., 2000).

3.5. Impacts

Would the pests' introduction have an economic or environmental impact on the EU territory?
Yes. The timber attacked by *U. japonicus* and infected by *A. laevigatus* is discoloured (Figure 1), which reduces its commercial value. Discolouration, however, does not modify the wood's mechanical properties (Fujiwara et al., 2001).
As the pest only attacks felled or weakened trees, its environmental impact would remain low.

Of all wood wasp species in Japan, Sano (1992) reports that *U. japonicus* is the most important. *U. japonicus* – induced discolouration of *C. japonica* and *C. obtusa* occurs widely in Japan, inflicting considerable economic damage (Matsumoto and Sato, 2012). Despite being a white rot wood decay fungus, investigations regarding the strength properties and anatomical structure of the wood did not show any difference in mechanical properties between the wood of uninfested trees and that of trees artificially infected with *A. laevigatum* (Fujiwara et al., 2001). A close relative, *Sirex noctilio*, which is almost harmless in Europe, is considered a major pest following introduction in other parts of the world.

3.6. Available measures and their limitations

Are there measures available to prevent pest entry, establishment, spread or impacts such that the risk becomes mitigated?
Yes, prohibitions or special requirements are available (see Table 3, in Section 3.4.1).

3.6.1. Identification of potential additional measures

Phytosanitary measures are currently applied to host plants for planting (conifer prohibitions), as well as to wood (special requirements). See Table 2 in Section 3.3.2. Please note, however, that *Cryptomeria* spp. are not included in the Annexes of Commission Implementing Regulation 2019/2072.

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

3.6.1.1. Additional potential risk reduction options

Potential additional control measures are listed in Table 4.

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

Control measure/rRisk reduction option (Blue underline = Zenodo doc, Blue = WIP)	RRO summary	Risk element targeted (entry/establishment/spread/impact)
Roguing and pruning	Sanitary thinning or clear-felling.	Establishment/spread/impact
Biological control and behavioural manipulation	Biological control is successfully implemented worldwide against *S. noctilio*, and similar natural enemies of *U. japonicus* exist in its present area. Two parasitoid species have been collected from logs infested by *U. japonicus*: *Rhyssa persuasoria* (L) and *Megarhyssa praecellens* (Tosquet) (Kanamitsu, 1978). *R. persuasoria* occurs in most of the EU (de Jong et al., 2014).	Spread/impact
Chemical treatments on crops including reproductive material	Widespread use of insecticides in forestry is prohibitively expensive, environmentally damaging and inefficient against wood borers, even for eradicating a small outbreak in the EU. However, systemic insecticides could be used in nurseries.	Entry/spread/impact
Chemical treatments on consignments or during processing	Use of chemical compounds that may be applied to plants or to plant products after harvest, during process or packaging operations and storage. The treatments addressed in this information sheet are: a) fumigation; b) spraying/dipping pesticides; c) surface disinfectants; d) process additives; e) protective compounds	Entry/establishment/spread
Physical treatments on consignments or during processing	This information sheet deals with the following categories of physical treatments: irradiation/ionisation; mechanical cleaning (brushing, washing); sorting and grading, and; removal of plant parts (e.g. debarking wood). This information sheet does not address: heat and cold treatment (information sheet 1.14); roguing and pruning (information sheet 1.12). Wood chips processed into pieces of not more than specified thickness and width.	Entry/establishment/spread
Waste management	Treatment of the waste (deep burial, composting, incineration, chipping, production of bioenergy...) in authorised facilities and official restriction on the movement of waste.	Establishment/spread/impact
Heat and cold treatments	Controlled temperature treatments aimed to kill or inactivate pests without causing any unacceptable prejudice to the treated material itself. The measures addressed in this information sheet are: autoclaving; steam; hot water; hot air; cold treatment	Entry/spread
Controlled atmosphere	Treatment of plants by storage in a modified atmosphere (including modified humidity, O_2, CO_2, temperature, pressure).	Entry/spread (via commodity)
Post-entry quarantine and other restrictions of movement in the importing country	Imported plants for planting can be subject to post-entry quarantine to ensure they are free from *U. japonicus*, before they are released.	Establishment/spread

3.6.1.2. Additional supporting measures

Potential additional supporting measures are listed in Table 5.

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

Supporting measure (Blue underline = Zenodo doc, Blue = WIP)	Summary	Risk element targeted (entry/establishment/ spread/impact)
Inspection and trapping	Plant products or other regulated articles to determine if pests are present or to determine compliance with phytosanitary regulations (ISPM 5). The effectiveness of sampling and subsequent inspection to detect pests may be enhanced by including trapping and luring techniques. External symptoms on the trees do not appear until the emergence of the adults. The only symptoms are emergence holes. Inspected prior to export and no pest found or symptoms detected (could include testing).	Entry/spread/establishment
Laboratory testing	Examination, other than visual, to determine if pests are present using official diagnostic protocols. Diagnostic protocols describe the minimum requirements for reliable diagnosis of regulated pests.	Entry/spread
Sampling	According to ISPM 31, it is usually not feasible to inspect entire consignments, so phytosanitary inspection is performed mainly on samples obtained from a consignment. It is noted that the sampling concepts presented in this standard may also apply to other phytosanitary procedures, notably selection of units for testing. For inspection, testing and/or surveillance purposes, the sample may be taken according to a statistically based or a non-statistical sampling methodology.	Entry/spread
Phytosanitary certificate and plant passport	An official paper document or its official electronic equivalent, consistent with the model certificates of the IPPC, attesting that a consignment meets phytosanitary import requirements (ISPM 5) Export certificate (import)	Entry/spread
Certified and approved premises	Mandatory/voluntary certification/approval of premises is a process including a set of procedures and of actions implemented by producers, conditioners and traders contributing to ensure the phytosanitary compliance of consignments. It can be a part of a larger system maintained by the NPPO in order to guarantee the fulfilment of plant health requirements of plants and plant products intended for trade. Key property of certified or approved premises is the traceability of activities and tasks (and their components) inherent the pursued phytosanitary objective. Traceability aims to provide access to all trustful pieces of information that may help to prove the compliance of consignments with phytosanitary requirements of importing countries.	Entry

Supporting measure (Blue underline = Zenodo doc, Blue = WIP)	Summary	Risk element targeted (entry/establishment/spread/impact)
Delimitation of Buffer zones	ISPM 5 defines a buffer zone as 'an area surrounding or adjacent to an area officially delimited for phytosanitary purposes in order to minimize the probability of spread of the target pest into or out of the delimited area, and subject to phytosanitary or other control measures, if appropriate' (ISPM 5). The objectives for delimiting a buffer zone can be to prevent spread from the outbreak area and to maintain a pest-free production place (PFPP), site (PFPS) or area (PFA).	Spread
Surveillance	Surveillance to guarantee that plants and produce originate from a pest-free area could be an option.	Entry/spread

3.6.1.3. Biological or technical factors limiting the effectiveness of measures

The pest develops in the sapwood and cannot always be seen from the outside of the trees if symptoms (resin blobs, round exit holes) are lacking.

3.7. Uncertainty

Although *U. japonicus* is mainly specific to two host species in Japan, its capacity to establish on other conifer species more widely growing in the EU has been listed but details are not provided in the Japanese literature.

This uncertainty could affect the capacity of the pest to establish and spread. In addition, there is a possibility that *U. japonicus* would attack mainly weakened or freshly felled tree, which would affect timber value but not impact on forest health. However, none of these are key uncertainties.

4. Conclusions

U. japonicus satisfies all the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest (Table 6).

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

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Key uncertainties
Identity of the pest (Section 3.1)	The identity of *U. japonicus* has been established	None
Absence/presence of the pest in the EU (Section 3.2)	The pest is absent from the EU territory	None
Pest potential for entry, establishment and spread in the EU (Section 3.4)	*U. japonicus* could enter into, establish in and spread within the EU territory. The main pathways are plants for planting and conifer wood.	None
Potential for consequences in the EU (Section 3.5)	Should *U. japonicus* be introduced into the EU, an economic impact might occur although the species is not very aggressive in its original range. A close relative, *Sirex noctilio*, which is almost harmless in Europe, is considered a major pest following introduction in other parts of the world.	None

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Key uncertainties
Available measures (Section 3.6)	There are measures available to prevent the likelihood of entry into the EU (i.e. import of plants for planting and of conifer wood is prohibited or submitted to special requirements).	None
Conclusion (Section 4)	*U. japonicus* satisfies all of the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest.	
Aspects of assessment to focus on/scenarios to address in future if appropriate		

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Abbreviations

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

ToR	Terms of Reference

Glossary

Containment (of a pest)	Application of phytosanitary measures in and around an infested area to prevent spread of a pest (FAO, 2021)
Control (of a pest)	Suppression, containment or eradication of a pest population (FAO, 2021)
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, 2021)
Eradication (of a pest)	Application of phytosanitary measures to eliminate a pest from an area (FAO, 2021)
Establishment (of a pest)	Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO, 2021)
Greenhouse	A walk-in, static, closed place of crop production with a usually translucent outer shell, which allows controlled exchange of material and energy with the surroundings and prevents release of plant protection products (PPPs) into the environment.
Hitchhiker	An organism sheltering or transported accidentally via inanimate pathways including with machinery, shipping containers and vehicles; such organisms are also known as contaminating pests or stowaways (Toy and Newfield, 2010).
Impact (of a pest)	The impact of the pest on the crop output and quality and on the environment in the occupied spatial units
Introduction (of a pest)	The entry of a pest resulting in its establishment (FAO, 2021)
Pathway	Any means that allows the entry or spread of a pest (FAO, 2021)
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, 2021)
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, 2021)
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, 2021)

Appendix A – *Urocerus japonicus* host plants/species affected

Host name	Common name	Plant family	Reference	Grown in EU as an amenity or ornamental plant?	Listed by JRC as a species used in European forestry?
Abies firma	Japanese fir	Pinaceae	N. Kamata confirmed this by email on 12 October 2022	Yes	No
Abies homolepis	Nikko fir	Pinaceae	N. Kamata confirmed this by email on 12 October 2022	Yes	No
Abies sachalinensis	Hokkaido pine/Sakhalin fir	Pinaceae	Sano (1992) Naito et al. (2020) N. Kamata confirmed this by email on 12 October 2022	Yes	No
Abies spp.	Fir	Pinaceae	Sano (1992) Lee et al. (2019) Naito et al. (2020) M. Tabata confirmed this by email on 24 October 2022	Yes	Yes
Chamaecyparis obtusa	Hinoki cypress	Cupressaceae	Sano (1992) Fukuda and Maeto (2002) Matsumoto and Sato (2012) Sato (2007)	Yes	No
Cryptomeria japonica	Japanese cedar	Cupressaceae	Sano (1992) Fukuda and Maeto (2002) Lee et al. (2019) Naito et al. (2020)	Yes	No
Larix kaempferi	Japanese larch	Pinaceae	Lee et al. (2019) N. Kamata confirmed this by email on 12 October 2022	Yes	No
Larix spp.	Larch	Pinaceae	Naito et al. (2020)	Yes	Yes
Picea jezoensis	Yeddo Yezo spruce	Pinaceae	Naito et al. (2020) N. Kamata confirmed this by email on 12 October 2022	Yes	No
Pinus densiflora	Japanese red pine	Pinaceae	Sano (1992) Lee et al. (2019) Naito et al. (2020) N. Kamata confirmed this by email on 12 October 2022	Yes	No
Pinus spp.	Pine	Pinaceae	Lee et al. (2019) M. Tabata confirmed this by email on 24 October 2022	Yes	Yes
Pinus thunbergii	Japanese black pine	Pinaceae	Sano (1992) Naito et al. (2020) N. Kamata confirmed this by email on 12 October 2022 'Chinese dossier section 4' within EFSA Panel on Plant Health (2022)	Yes	No

Appendix B – Distribution of *Urocerus japonicus*

Region	Country	Sub-national (e.g. State)	Status
Asia	Japan	Hokkaido, Honshu, Shikoku, Kyushu, Yakushima	Present, widespread (Takeuchi, 1962; Sano, 1992; Naito et al., 2020)
Asia	Korean Peninsula		Sano (1992); Lee et al. (2019)