SCIENTIFIC OPINION

efsa JOURNAL

APPROVED: 26 January 2023

doi: 10.2903/j.efsa.2023.7845

Pest categorisation of *Urocerus albicornis*

EFSA Panel on Plant Health (PLH),
Claude Bragard, Paula Baptista, Elisavet Chatzivassiliou, Francesco Di Serio, Paolo Gonthier, Josep Anton Jaques Miret, Annemarie Fejer Justesen, Christer Sven Magnusson, Panagiotis Milonas, Juan A Navas-Cortes, Stephen Parnell, Roel Potting, Philippe Lucien Reignault, Emilio Stefani, Hans-Hermann Thulke, Wopke Van der Werf, Antonio Vicent Civera, Jonathan Yuen, Lucia Zappalà, Jean-Claude Grégoire, Chris Malumphy, Virag Kertesz, Andrea Maiorano and Alan MacLeod

Abstract

The EFSA Panel on Plant Health performed a pest categorisation of *Urocerus albicornis* (Hymenoptera: Siricidae), the black horntail sawfly, for the territory of the EU. *U. albicornis* is not listed in Annex II of Commission Implementing Regulation (EU) 2019/2072. *U. albicornis* occurs throughout Canada and continental USA and has established in northern Spain, and probably in southern France (based on two specimens caught in two sites) and Japan (based on one individual caught in one site). It attacks mostly stumps or fallen or weakened trees of at least 20 species of Pinaceae (*Abies* spp., *Larix* spp., *Picea* spp., *Pinus* spp., *Pseudotsuga menziesii*, *Tsuga* spp.) and of Cupressaceae (*Thuja plicata*). In Spain, the females fly between May and September with a peak in August and September. The eggs are deposited into the sapwood, together with mucus containing a venom and a white-rot wood-decay basidiomycete, either *Amylostereum chailletii* or *A. areolatum.* Each fungus is symbiotic with the insect. The larvae feed on wood infected by the fungus. All immature stages live in the host sapwood. In British Columbia, the lifecycle of the pest lasts 2 years but has not been fully characterised elsewhere. The wood of the host trees is impacted by decay due to the fungus, and structurally impaired by the larval galleries. *U. albicornis* can be carried in conifer wood, solid wood packaging material (SWPM) or plants for planting. Wood from North America is regulated by 2019/2072 (Annex VII) while SWPM is managed according to ISPM 15. The pathway plants for planting is largely closed by prohibition, with the exception of *Thuja* spp. Climatic conditions in several EU member states are conducive for establishment and the main host plants are widespread in those areas. Further spread and introduction of *U. albicornis* is likely to decrease the quality of host wood and may influence forest diversity by selectively affecting conifers. Phytosanitary measures are available to reduce the likelihood of additional entry and further spread, and there is a potential for biological control. Despite uncertainty regarding potential damage, *U. albicornis* 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: pest risk, plant health, quarantine, Siricidae, conifers, *Amylostereum chailletii*, *Amylostereum areolatum*

Requestor: European Commission

Question number: EFSA-Q-2022-00762

Correspondence: plants@efsa.europa.eu

Panel members: Claude Bragard, Paula Baptista, Elisavet Chatzivassiliou, Francesco Di Serio, Paolo Gonthier, Josep Anton Jaques Miret, Annemarie Fejer Justesen, Alan MacLeod, Christer Sven Magnusson, Panagiotis Milonas, Juan A Navas-Cortes, Stephen Parnell, Roel Potting, Philippe L Reignault, Emilio Stefani, Hans-Hermann Thulke, Wopke Van der Werf, Antonio Vicent Civera, Jonathan Yuen and Lucia Zappalà.

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

Acknowledgements: EFSA wishes to acknowledge the contribution of Oresteia Sfyra to this opinion.

Suggested citation: EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Baptista P, Chatzivassiliou E, Di Serio F, Gonthier P, Jaques Miret JA, Justesen AF, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Stefani E, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Grégoire J-C, Malumphy C, Kertesz V, Maiorano A and MacLeod A, 2023. Scientific Opinion on the pest categorisation of *Urocerus albicornis*. EFSA Journal 2023;21(3):7845, 20 pp. https://doi.org/10.2903/j.efsa.2023.7845

ISSN: 1831-4732

The EFSA Journal is a publication of the European Food Safety Authority, a European agency funded by the European Union.

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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 albicornis is one of a number of pests listed in Annex 1D 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

This pest categorisation was initiated as a result of media monitoring, PeMoScoring and subsequent discussion in PAFF, resulting in it being included in the current mandate within the list of pests identified by horizon scanning and selected for pest categorisation.

2. Data and methodologies

2.1. Data

2.1.1. Information on pest status from NPPOs

In the context of the current mandate, EFSA is preparing pest categorisations for new/emerging pests that are not yet regulated in the EU. When official pest status is not available in the European and Mediterranean Plant Protection Organization (EPPO) Global Database (EPPO, online), EFSA consults the NPPOs of the relevant MSs. To obtain information on the official pest status for *U. albicornis*, EFSA consulted the NPPOs of Spain, France and the Czech Republic. The results of this consultation are presented in Section 3.2.2.

2.1.2. Literature search

A literature search on *U. albicornis* 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.

2.1.3. Database search

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

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

2.2. Methodologies

The Panel performed the pest categorisation for *U. albicornis*, 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. While the Panel may quote impacts reported from areas where the pest occurs in monetary terms, the Panel will seek to express potential EU impacts in terms of yield and quality losses and not in monetary terms, in agreement with the EFSA guidance on quantitative pest risk assessment (EFSA PLH Panel, 2018). Article 3 (d) of Regulation (EU) 2016/2031 refers to unacceptable social impact as a criterion for 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 albicornis* (Fabricius) is the accepted name.

Urocerus albicornis (Fabricius, 1781) is an insect within the family Siricidae and order Hymenoptera, commonly known as the black horntail sawfly or the white-horned urocerus. Synonyms of this species are *Sirex albicornis* Fabricius, *Xanthosirex albicornis* (Fabricius) and *Sirex latifasciata* Westwood.

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

[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 and Roy, 2015; EPPO, 2019)

3.1.2. Biology of the pest

U. albicornis attacks mostly stumps or fallen or weakened trees of at least twenty species of Pinaceae (*Abies* spp., *Larix* spp., *Picea* spp., *Pinus* spp., *Pseudotsuga menziesii*, *Tsuga* spp.) as well as *Thuja plicata* (Cupressaceae) (Schiff et al., 2012). In Spain, both in the Basque Country and in Galicia, two areas with similar climate, the females were recorded to fly between May and September with a peak in August and September (Goldarazena, 2015; Rey-Muñiz et al., 2022). The eggs are deposited into the sapwood, together with mucus containing a venom and a white-rot wood-decay basidiomycete fungus, either *Amylostereum chailletii* or *A. areolatum*. Each fungus is symbiotic with the insect (Hajek et al., 2018). The fungus acts as 'external rumen' allowing the larvae to feed on the wood (Thompson et al., 2014). *A. chailletii* was isolated from attacked *P. sylvestris* logs in Galicia (Rey-Muñiz et al., 2022). All immature stages live in the hosts sapwood. In British Columbia, the pest has a two-year lifecycle (Morris, 1967); the lifecycle has not yet been entirely studied in any other country where it is present. The wood of the attacked parts of the hosts is structurally impaired by larval galleries and decays because of the activity of the fungus.

3.1.3. Host range/species affected

The pest attacks at least twenty species of Pinaceae (*Abies* spp., *Larix* spp., *Picea* spp., *Pinus* spp., *Pseudotsuga menziesii*, *Tsuga* spp.), as well as *Thuja plicata* (Cupressaceae) (Schiff et al., 2012). A detailed list is provided in Appendix A.

3.1.4. Intraspecific diversity

No subspecies or varieties have been described (Schiff et al., 2012).

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. albicornis attacks mainly freshly felled or weakened trees. There are two symptoms allowing detection. The most obvious symptom is the round emergence holes (usually several mm in diameter; emergence holes of Siricidae are very variable in size, according to the variable sizes of the emerging adults, see Ayres et al., 2009 for *Sirex noctilio*). A second symptom is the presence of larval galleries in the sapwood, containing larvae with a small sclerotized 'horn' at the end of the abdomen. The adults are attracted by α- and β-pinene and ethanol and can be trapped using these lures (Goldarazena, 2015; Noblecourt, 2019). As these symptoms are inconspicuous (the holes) or cryptic (the galleries), detection is difficult.

Identification

A complete, illustrated morphological taxonomic key of the North American Siricidae has been published by Schiff et al. (2012). These authors also developed a barcoding method based on sequences of more than 600 COI mitochondrial DNA base pairs allowing to identify all stages of the 31 taxa described in their key. The respective sequence of *U. albicornis* is deposited in GenBank (accession number: JQ619803) and can also be downloaded from the Center for Bottomland Hardwoods Research Web Site (http://www.srs.fs.usda.gov/cbhr/products/downloads/2012_nms_SiricidFASTA.zip).

3.2. Pest distribution

3.2.1. Pest distribution outside the EU

The pest is distributed throughout Canada and continental USA (Schiff et al., 2012). A detailed distribution table for *U. albicornis* is presented in Appendix B.

In Japan, one female was collected in a forest stand, while ovipositing on a *Larix kaempferi* log in Nagano (Honshù) (Kuramitsu et al., 2019) (Figure 1).

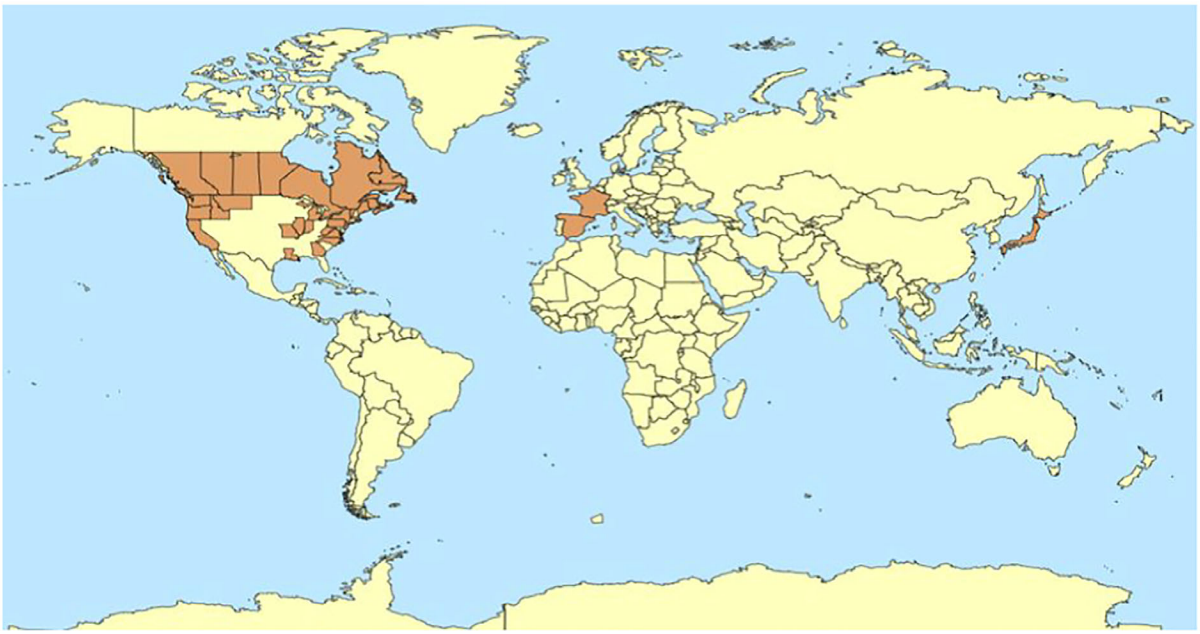

Figure 1: Global distribution of *Urocerus albicornis* (Sources: López et al., 2012; Schiff et al., 2012; Noblecourt, 2019; Rey-Muñiz et al., 2022)

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.

Yes, the pest is present in northern Spain and probably in southern France (Figure 2). Given its reported distribution, *U. albicornis* can be considered as 'not widely distributed' in the EU.

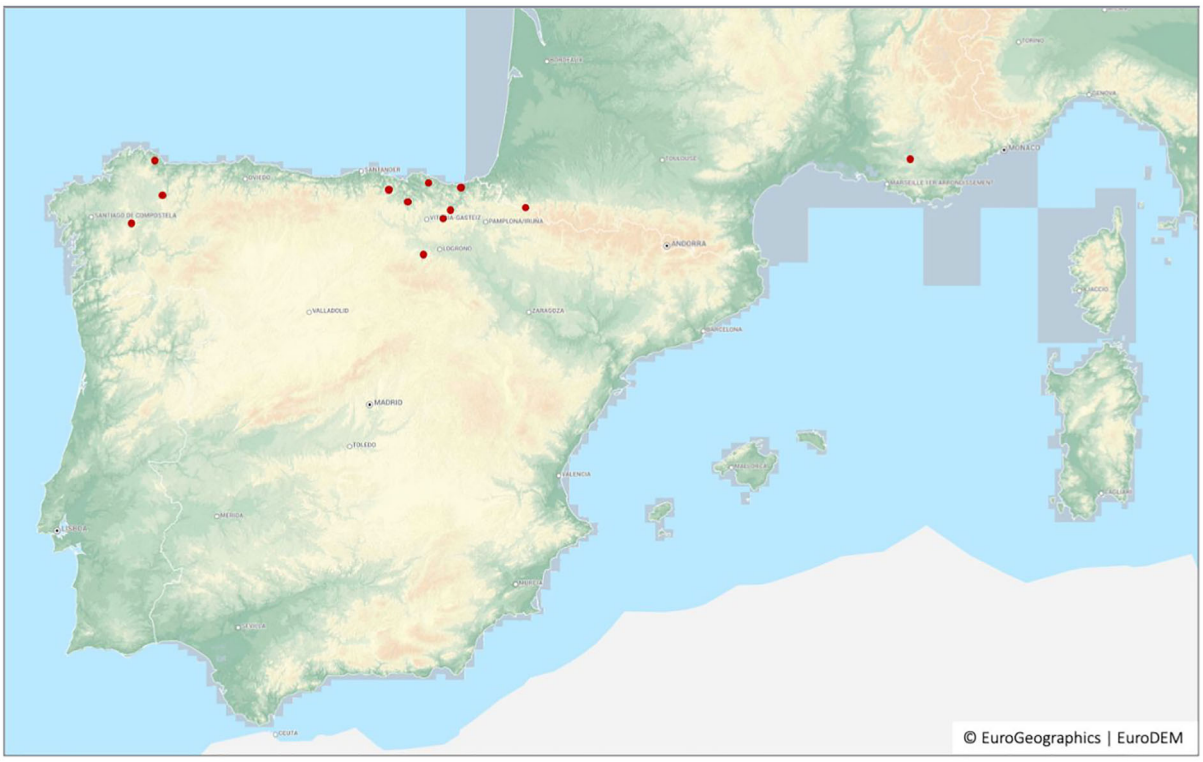

Figure 2: Distribution of *Urocerus albicornis* in the EU (Sources: López et al., 2012; Noblecourt, 2019; Rey-Muñiz et al., 2022)

Following a consultation, the NPPO of Spain confirmed the pest status of *U. albicornis* in Spain as 'present, with restricted distribution', and no phytosanitary measures have been applied. A detailed distribution table for *U. albicornis* is presented in Appendix B. *U. albicornis* is well established in northern Spain, where it has been caught in several locations up to 1,000 km apart from NW Spain to the Pyrenees (López et al., 2012; Rey-Muñiz, 2013; Goldarazena, 2015; Rey-Muñiz et al., 2022). In the Basque Country, both in flight traps and in emergence traps, *U. albicornis* was caught in larger numbers than any of the three native siricid species trapped, *U. gigas*, *Sirex noctilio* and *Xeris spectrum* (Goldarazena, 2015). The pest has also been caught in ethanol-baited traps in France, in forest stands in the Pyrénées-Atlantiques and the Vaucluse départements, suggesting that it has established in these locations (Noblecourt, 2019), but these scattered findings were not the result of a systematic, extensive survey. The French NPPO informed EFSA that the detection described by Noblecourt (2019) was made during faunistic inventories carried out in the forest. The traps were installed in the south of the Iraty forest in a *Pinus sylvestris* stand over 100 years old. To date, no new reports have been received, and no increase in tree mortality (pine trees or deciduous trees) has been observed in this forest. As the insects were trapped, it is impossible to clearly define the type of host species. No specific surveillance or monitoring actions have been taken in the two locations. López et al. (2012) suggested that first adults captured in sawmills in the Basque Country in 2012 originated from *Pinus pinaster* infested timber imported from Landes forest in Aquitaine (France) into those sawmills. Locations of *U. albicornis* records in the EU are represented in Figure 2.

There was a report of *U. albicornis* in the Czech Republic in 2018, in the vicinity of an import facility. Based on the response of the Czech NPPO (the origin of the occurrence is unknown; it is not possible to confirm the status of the pest), the Panel considers that the status of *U. albicornis* in the Czech Republic is uncertain.

U. albicornis could be more widespread than suggested by the limited records available.

3.3. Regulatory status

3.3.1. Commission implementing regulation 2019/2072

U. albicornis 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

The introduction of most *U. albicornis* hosts into the EU territory is prohibited by Annex VI of Commission Implementing Regulation (EU) 2019/2072 (Table 2).

Table 2: List of plants, plant products and other objects that are *Urocerus albicornis* 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., […], *Larix* Mill., *Picea* A. Dietr., *Pinus* L., *Pseudotsuga* Carr. and *Tsuga* Carr., 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 Albania, Andorra, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Canary Islands, Faeroe Islands, Georgia, Iceland, Liechtenstein, Moldova, Monaco, Montenegro, North Macedonia, Norway, Russia (only the following parts: Central Federal District (Tsentralny federalny okrug), Northwestern Federal District (Severo- Zapadny federalny okrug), Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug)), San Marino, Serbia, Switzerland, Turkey, Ukraine and the United Kingdom

NB. *Thuja* spp. are not listed in Annex VI of 2019/2072.

3.3.3. Legislation addressing the organisms vectored by *Urocerus albicornis* (commission implementing regulation 2019/2072)

U. albicornis adults vector *Amylostereum chailletii* and *A. areolatum*, basidiomycete fungi causing white rot. These fungal species are native to the EU (Tabata et al., 2012; https://www.gbif.org/species/2552499; https://www.gbif.org/species/8693982) and are 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, *U. albicornis* is able to enter the EU territory as illustrated by its establishment in Spain and probably in France, and its interception in The Netherlands, Poland and the Czech Republic. The pathway/s were not identified but could have been conifer wood, wood packaging material or plants for planting.

Comment on plants for planting as a pathway.

Plants for planting, large enough to host the larvae that are 2 cm long, could be infested by immature stages of *U. albicornis*.

Table 3: Potential pathways for *Urocerus albicornis* 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) and *Thuja* spp., specified host plants, are prohibited from entering the EU from third countries (Regulation 2019/2072, Annex VI, see also Table 2).
Conifer wood	Eggs, larvae and pupae	Wood of conifers from Canada and the USA (and other third countries) need to fulfil special requirements (Annex VII, 76–78., Annex XI, part A.)
Wood packaging material	Larvae and pupae	ISPM 15

Thuja spp. are not listed in Annex VI of 2019/2072.

From 2017 to 2021, the EU imported a few tens of tonnes of coniferous wood from USA and Canada each year (Table 4); 5 year mean is 45.63 t. Where within the USA and Canada the coniferous wood comes from is unknown. It is not certain that wood from USA came from States where *U. albicornis* is known to occur.

Table 4: EU imports of pine (*Pinus* spp.), fir (*Abies* spp.) and spruce (*Picea* spp) wood in the rough, of which any cross-sectional dimension is =>15 cm, whether or not stripped of bark or sapwood, or roughly squared (excludes wood in the form of railway sleepers; wood cut into beams, etc.; wood treated with paint, stains, creosote or other preservatives) 2017–2021 (tonnes) (Source: Eurostat)

Type of wood	HS Code	From	2017	2018	2019	2020	2021
Pine '*Pinus* spp.'	4403 2190	USA	51.07	71.15	1.85	12.43	21.89
		Canada	0.06	21.92	–	4.45	–
Fir '*Abies* spp.' and spruce '*Picea* spp.'	4403 2400	USA	0.30	–	–	0.00	0.00
		Canada	5.73	–	–	–	0.00
Other coniferous wood (excludes pine, fir and spruce)	4403 2600	USA	2.18	–	5.22	10.70	19.23
		Canada	–	–	–	–	–
		Sum	59.33	93.07	7.07	27.58	41.12

U. albicornis has been intercepted in The Netherlands (four males caught in 1939 - Witmond, 2001), in Iceland (CABI online; Ólafsson, 1991), in Poland (CABI online; Głowacki and Pisarski, 1956) and in the Czech Republic (one male caught in the grounds of a company importing foreign timber - Háva & Holuša, 2019).

Outside of the EU, the pest has also been intercepted in the United Kingdom (Benson, 1943, 1963 *in* Schiff et al., 2012).

Notifications of interceptions of harmful organisms began to be compiled in Europhyt in May 1994 and in TRACES in May 2020. As at 12 December 2022 there were no records of interception of *U. albicornis* in the TRACES database. Due to technical issues, it was not possible to access the Europhyt database. However, since *U. albicornis* is not a quarantine pest, EU member states have no obligation to notify interceptions of the pest via Europhyt.

3.4.2. Establishment

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

Yes, the pest is able to establish in the EU territory, as shown in Spain and probably France.

Large areas of the EU have climates similar to places where the pest already occurs, and hosts are widely available, thus much of the EU is suitable for establishment.

Climatic mapping is the principal method for identifying areas that could provide suitable conditions for the establishment of a pest taking key abiotic factors into account (Baker, 2002). 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

The main host plants of *U. albicornis* are widespread in the EU territory.

3.4.2.2. Climatic conditions affecting establishment

Climate types Köppen–Geiger (Kottek et al., 2006) that occur in countries where *U. albicornis* has been reported are widely distributed in the EU (Figure 3).

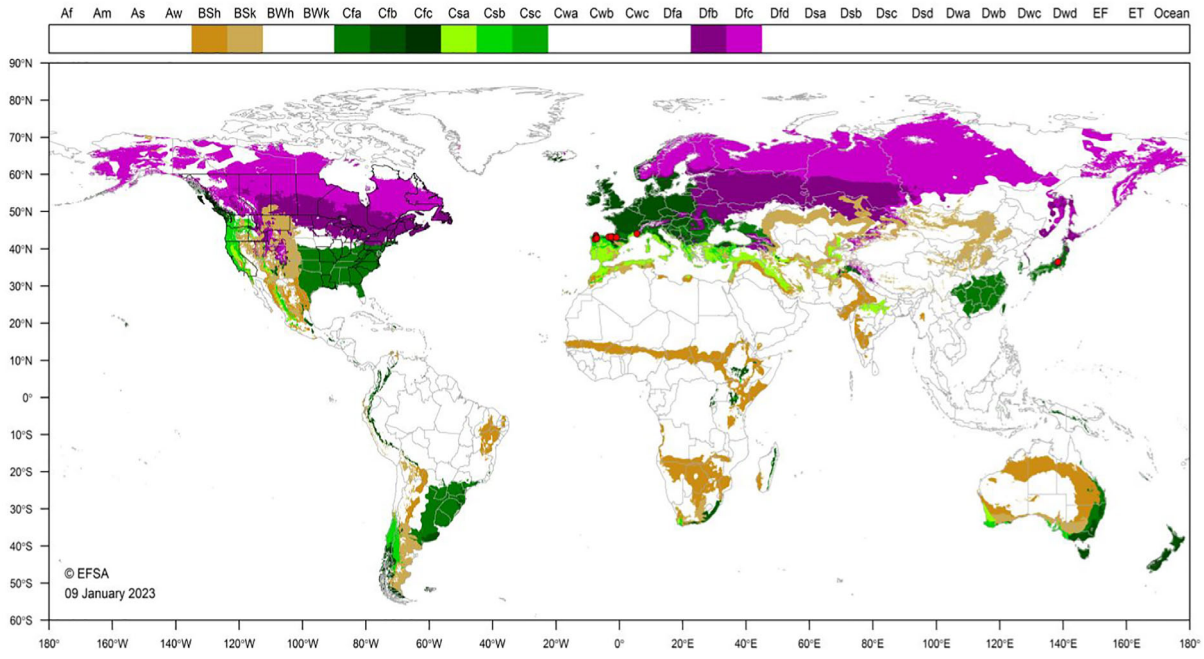

Figure 3: World distribution of selected Köppen-Geiger climate types that occur in the EU and in countries where *Urocerus albicornis* has been reported

3.4.3. Spread

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

The pest would be able to spread by flight, and with infested material (plants for planting, wood, solid wood packaging material).

Comment on plants for planting as a mechanism of spread.

For plants for planting to be potential hosts facilitating spread, they would need to be large enough to shelter *U. albicornis* in their sapwood, although no study is available to document this possibility. Coniferous trees that are several years old with root balls, stressed due to being dug up and with roots likely to be damaged could possibly become hosts.

U. albicornis are described as 'strong fliers' (Schiff et al., 2012). In addition, they can be transported in plants for planting and in infested wood, as illustrated by the finding in the Czech Republic, where an adult male was caught in the grounds of a company importing foreign timber (Háva and Holuša, 2019). The fact that, in Spain, *U. albicornis* has established in two locations 1,000 km apart also suggests that the pest was able to move with infested material or by itself. However, these two establishments could have resulted from separate introduction events.

3.5. Impacts

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

Yes, the pest could have an economic impact on native conifers, as the attacked timber is damaged by fungal activity and by larvae tunnelling the wood. Although such impact could take several decades to materialise. Natural enemies of native Siricidae could however mitigate damage.

Although *U. albicornis* attacks mostly stumps or fallen or weakened trees (Schiff et al., 2012), it is possible, although uncertain, that new 'naive' host species such as *P. sylvestris* and *P. pinaster* in Spain prove less resistant than North American hosts to the impact of *A. chailletii* or *A. areolatum*, or to the venom injected by ovipositing females. The pest presence in Spain is too recent for assessing impact (López et al., 2012). In New Zealand an interval of 20–40 years between first detection and first recorded impact was reported for *S. noctilio* (Rawlings, 1955; Bain et al., 2012). In France, only a few adults have been caught so far, in two locations. Even for the species most well-known for its impact, *S. noctilio*, comparative studies across several continents showed a strong correlation between forest practices and impact, suggesting that this pest basically attacks weakened hosts (Ayres et al., 2014; Krivak-Tetley et al., 2021). In addition to forest health, *U. albicornis* could also influence forest diversity by selectively affecting conifers.

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

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

3.6.1.1. Additional potential risk reduction options

Potential additional control measures are listed in Table 5.

Table 5: Selected control measures (a full list is available in EFSA PLH Panel, 2018) for pest entry/establishment/spread/impact in relation to currently unregulated hosts and pathways. Control measures are measures that have a direct effect on pest abundance

Control measure/Risk reduction option (Blue underline = Zenodo doc, Blue = WIP)	RRO summary	Risk element targeted (entry/establishment/spread/impact)
Require pest freedom	• Plant or plant product comes from country officially free from pest, • Pest free area, • Pest free place of production (e.g. place of production and its immediate vicinity is free from pest over an appropriate time period, e.g. since the beginning of the last complete cycle of vegetation, or past 2 or 3 cycles). • Pest free production site	Entry/Spread
Growing plants in isolation	This measure could be considered for artificially dwarfed plants. Although no information has been found on *U. albicornis*, another large wood borer, *Anoplophora chinensis* (Coleoptera: Cerambycideae) has been found in infested artificially dwarfed plants. Description of possible exclusion conditions that could be implemented to isolate the crop from pests and if applicable relevant vectors. E.g. a dedicated structure such as glass or plastic greenhouses.	Entry/Spread
Roguing and pruning	Sanitary thinning or clear-felling.	Establishment/Spread/Impact
Biological control and behavioural manipulation	Natural enemies are known to be able to control at least partly the pest's populations. Schiff et al. (2012) list the following species: *Ibalia leucospoides* (Hochenwarth) (present in the EU); *Megarhyssa nortoni* (Cresson); *Rhyssa crevieri* (Provancher); *Rhyssa lineolata* (Kirby). In Spain, Goldarazena (2015) collected *I. leucospoides*, and *Rhyssa persuasoria* (Linnaeus, 1758) from logs that yielded a large proportion of *U. albicornis* adults among other Siricidae.	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 wood, during process or packaging operations and storage. Eg. Fumigation (e.g. sulfuryl fluoride displays high efficacy against a wide range of wood-boring insect species at all stages with exception of eggs (Zhang, 2006)).	Entry/Establishment/Spread
Physical treatments on consignments or during processing	Irradiation/ionisation; sorting and grading. Wood chips processed into pieces of not more than specified thickness and width.	Entry/Spread
Waste management	Treatment of the waste (deep burial, composting, incineration, chipping, production of bio-energy…) in authorised facilities and official restriction on the movement of waste.	Establishment/Spread/Impact
Heat and cold treatments	Controlled temperature treatments.	Entry/Spread

Control measure/Risk reduction option (Blue underline = Zenodo doc, Blue = WIP)	RRO summary	Risk element targeted (entry/ establishment/ spread/impact)
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. albicornis* before they are released.	Establishment/Spread

3.6.1.2. Additional supporting measures

Potential additional supporting measures are listed in Table 6.

Table 6: Selected supporting measures (a full list is available in EFSA PLH Panel, 2018) in relation to currently unregulated hosts and pathways. Supporting measures are organisational measures or procedures supporting the choice of appropriate risk reduction options that do not directly affect pest abundance

Supporting measure (Blue underline = Zenodo doc, Blue = WIP)	Summary	Risk element targeted (entry/establishment/ spread/impact)
Inspection and trapping	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) a) export certificate (import) b) plant passport (EU internal trade)	Entry/Spread
Certified and approved premises	Mandatory/voluntary certification/approval of premises is a process including a set of procedures and of actions implemented by producers, conditioners and traders contributing to ensure the phytosanitary compliance of consignments. It can be a part of a larger system maintained by the NPPO in order to guarantee the fulfilment of plant health requirements of plants and	Entry

Supporting measure (Blue underline = Zenodo doc, Blue = WIP)	Summary	Risk element targeted (entry/establishment/ spread/impact)
	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.	
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 minimise the probability of spread of the target pest into or out of the delimited area, and subject to phytosanitary or other control measures, if appropriate' (ISPM 5). The objectives for delimiting a buffer zone can be to prevent spread from the outbreak area and to maintain a pest free production place (PFPP), site (PFPS) or area (PFA).	Spread
Surveillance	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 (round exit holes) are lacking.

3.7. Uncertainty

As the pest mostly attacks weakened or freshly fallen trees, its impact on naïve hosts is uncertain. Although the pest is known to occur in Spain since 2012 (López et al., 2012), no reports on impact have been published yet. Impacts in forestry may take longer to materialise compared to the impact of fast-growing pests in annual crops (refer back to section 3.4).

4. Conclusions

Despite uncertainty regarding potential damage, which may take several decades to materialise, *U. albicornis* satisfies all the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest (Table 7).

Table 7: The Panel's conclusions on the pest categorisation criteria defined in Regulation (EU) 2016/2031 on protective measures against pests of plants (the number of the relevant sections of the pest categorisation is shown in brackets in the first column)

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Key uncertainties
Identity of the pest (Section 3.1)	The identity of *U. albicornis* has been established	None
Absence/ presence of the pest in the EU (Section 3.2)	The pest is present in northern Spain and probably in southern France.	None
Pest potential for entry, establishment and spread in the EU (Section 3.4)	*U. albicornis* could further enter into, establish in and spread within the EU territory. The main pathways are conifer wood and plants for planting. Plants for planting are largely prohibited.	None
Potential for consequences in the EU (Section 3.5)	Should *U. albicornis* be further introduced into the EU, an economic impact might occur although the species is not very aggressive in its original range. A close relative, *Sirex*	Uncertainty regarding the susceptibility of trees of conifer species

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Key uncertainties
	noctilio, which is almost harmless in Europe, is considered a major pest following introduction in other parts of the world.	grown in the EU, and time lag for impacts.
Available measures (Section 3.6)	There are measures available to prevent or reduce the likelihood of entry into the EU and the impact under EU conditions (i.e., import of plants for planting and of conifer wood is prohibited or subjected to special requirements).	None
Conclusion (Section 4)	Despite uncertainty regarding potential damage, *U. albicornis* satisfies all the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest.	Consequences
Aspects of assessment to focus on/scenarios to address in future if appropriate:	It could be useful to determine more accurately the occurrence in the EU and the susceptibility to the pest of conifer species grown in the EU.	

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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 albicornis* host plants/species affected

Source: literature

Host status	Host name	Plant family	Common name	References
Cultivated hosts	*Abies amabilis*	Pinaceae	Pacific fir	Schiff et al., 2012
	Abies balsamea	Pinaceae	Balsam fir	Schiff et al., 2012
	Abies fraseri	Pinaceae	Fraser fir	Schiff et al., 2012
	Abies grandis	Pinaceae	Giant fir	Schiff et al., 2012
	Abies lasiocarpa	Pinaceae	Rocky Mountain fir	Schiff et al., 2012
	Abies nobilis	Pinaceae	Noble fir	Schiff et al., 2012
	Larix kaempferi	Pinaceae	Japanese larch	Kuramitsu et al., 2019
	Larix laricina	Pinaceae	Black larch	Schiff et al., 2012
	Larix occidentalis	Pinaceae	Western larch	Schiff et al., 2012
	Picea engelmannii	Pinaceae	Engelmann's spruce	Schiff et al., 2012
	Picea glauca	Pinaceae	Black Hills spruce	Schiff et al., 2012
	Picea mariana	Pinaceae	Black spruce	Schiff et al., 2012
	Picea sitchensis	Pinaceae	Coast spruce	Schiff et al., 2012
	Pinus banksiana	Pinaceae	Grey pine	Schiff et al., 2012
	Pinus contorta	Pinaceae	Beach pine	Schiff et al., 2012
	Pinus pinaster	Pinaceae	Maritime pine	López et al., 2012
	Pinus radiata	Pinaceae	Monterey pine	Goldarazena, 2015
	Pinus resinosa	Pinaceae	Red pine	Schiff et al., 2012
	Pinus strobus	Pinaceae	Northern white pine	Schiff et al., 2012
	Pinus sylvestris	Pinaceae	Scots pine	Schiff et al., 2012
	Pseudotsuga menziesii	Pinaceae	British Columbian pine	López et al., 2012
	Tsuga spp.	Pinaceae		Champlain, 1922
	Tsuga heterophylla	Pinaceae	Common hemlock	Schiff et al., 2012
	Tsuga canadensis	Pinaceae	Eastern hemlock-spruce	Schiff et al., 2012
	Thuja plicata	Cupressaceae	British Columbian red cedar	Schiff et al., 2012

Appendix B – Distribution of *Urocerus albicornis*

Distribution records based on literature.

Region	Country	Sub-national (e.g. State)	Status	References
North America	Canada	Alberta	Present, no details	López et al., 2012
		British Columbia	Present, no details	López et al., 2012
		Manitoba	Present, no details	Schiff et al., 2012
		New Brunswick	Present, no details	Schiff et al., 2012
		Newfoundland	Present, no details	Schiff et al., 2012
		Nova Scotia	Present, no details	Schiff et al., 2012
		Ontario	Present, no details	Schiff et al., 2012
		Prince Edward Island	Present, no details	Schiff et al., 2012
		Quebec	Present, no details	Schiff et al., 2012
		Saskatchewan	Present, no details	Schiff et al., 2012
	USA	California	Present, no details	Schiff et al., 2012
		District of Columbia	Present, no details	Schiff et al., 2012
		Georgia	Present, no details	Schiff et al., 2012
		Idaho	Present, no details	Schiff et al., 2012
		Illinois	Present, no details	Schiff et al., 2012
		Indiana	Present, no details	Schiff et al., 2012
		Louisiana	Present, no details	Schiff et al., 2012
		Massachusetts	Present, no details	Schiff et al., 2012
		Maine	Present, no details	Schiff et al., 2012
		Michigan	Present, no details	Schiff et al., 2012
		Missouri	Present, no details	Schiff et al., 2012
		Montana	Present, no details	Schiff et al., 2012
		North Carolina	Present, no details	Schiff et al., 2012
		New Jersey	Present, no details	Schiff et al., 2012
		New York	Present, no details	Schiff et al., 2012
		Oregon	Present, no details	Schiff et al., 2012
		Pennsylvania	Present, no details	Schiff et al., 2012
		Rhode Island	Present, no details	Schiff et al., 2012
		Virginia	Present, no details	Schiff et al., 2012
		Vermont	Present, no details	Schiff et al., 2012
		Washington	Present, no details	Schiff et al., 2012
		West Virginia	Present, no details	Schiff et al., 2012
Asia	Japan	Nagano, Honshu	Possibly present. One female collected in a forest stand, while ovipositing on a *Larix kaempferi* log.	Kuramitsu et al., 2019
EU (27)	France	Pyrénées atlantiques;	Probably present. Three females caught in a trap in a forest stand	Noblecourt, 2019
		Vaucluse	Probably present. One female caught in a trap in a forest stand	
	Spain		Present, restricted distribution	NPPO of Spain
		Basque Country	Present. Adults both caught in traps and emerged from logs	López et al., 2012; Goldarazena, 2015
		Galicia	Present. Adults caught in forest stands and emerged from attacked logs.	Rey-Muñiz, 2013; Rey-Muñiz et al., 2022