Adopted: 27 March 2025

DOI: 10.2903/j.efsa.2025.9382

efsa JOURNAL

SCIENTIFIC OPINION

Pest categorisation of *Selenaspidus articulatus*

EFSA Panel on Plant Health (PLH) | Antonio Vicent Civera | Paula Baptista | Anna Berlin | Elisavet Chatzivassiliou | Jaime Cubero | Nik Cunniffe | Eduardo de la Peña | Nicolas Desneux | Francesco Di Serio | Anna Filipiak | Paolo Gonthier | Beata Hasiów-Jaroszewska | Hervé Jactel | Blanca B. Landa | Lara Maistrello | David Makowski | Panagiotis Milonas | Nikos Papadopoulos | Roel Potting | Hanna Susi | Dirk Jan van der Gaag | Vasiliki Evangelou | Alex Gobbi | Virag Kertesz | Andrea Maiorano | Dimitrios Papachristos | Oresteia Sfyra

Correspondence: plants@efsa.europa.eu

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

Abstract

Following the commodity risk assessment of *Jasminum polyanthum* unrooted cuttings from Uganda, in which *Selenaspidus articulatus* (Hemiptera: Diaspididae) was identified as a pest of possible concern, the European Commission requested the EFSA Panel on Plant Health to conduct a pest categorisation of *S. articulatus* for the territory of the European Union (EU). *S. articulatus* originates probably from sub-Saharan Africa. It is present in Africa, North and South America, as well as in parts of Asia and Oceania. Within the EU, the pest has been recorded in the Netherlands in greenhouses on ornamental plants, however, it appears not to be able to establish outside of a greenhouse under the environmental conditions of the Netherlands. *S. articulatus* is polyphagous, feeding on plants assigned to 158 genera in 68 plant families. Important crops of the EU that may be affected by this insect are avocado, citrus, grape and olive. Host availability and climate suitability would support its establishment in the southern EU countries. Indoor establishment in greenhouses can occur in colder areas of the EU. Reintroduction and spread of this scale insect would likely have an economic impact in the EU as it feeds on plant leaves and fruit, injects toxic saliva, reduces photosynthesis, and overall may cause yield loss and even death of entire plants. *S. articulatus* is not listed in Annex II of Commission Implementing Regulation (EU) 2019/2072. Phytosanitary measures are available to reduce the likelihood of entry, establishment and spread of the pest into the EU. All criteria assessed by EFSA for consideration as a potential quarantine pest are met.

KEYWORDS

citrus, coffee, Diaspididae, non-regulated pest, pest risk, plant health, plant pest, West Indian red scale

CONTENTS

1 | INTRODUCTION

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

1.1.1 | Background

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

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

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

1.1.2 | Terms of Reference

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

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

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

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

1.2 | Interpretation of the Terms of Reference

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

1.3 | Additional information

This pest categorisation was initiated following the commodity risk assessments of *J. polyanthum* unrooted cuttings from Uganda (EFSA PLH Panel, 2022), in which *S. articulatus* was identified as a relevant non-regulated EU pest of possible concern, which could potentially enter the EU on cuttings of *J. polyanthum*.

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 an 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 Member States. To obtain information on the official pest status for *S. articulatus*, EFSA consulted the NPPOs of Croatia and the Netherlands. The results of this consultation are presented in Section 3.2.2.

2.1.2 | Literature search

A literature search on *S. articulatus* was conducted at the beginning of the categorisation (initially on 22/8/2024 and additionally on 24/10/2024) in the ISI Web of Science and Scopus bibliographic database, using the scientific name of the pest, the synonyms, other scientific names and the international common names 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 relevant papers identified in scientific literature databases as referred above in Section 2.1.2. The CABI Database and the EPPO Global Database were used to integrate the information retrieved through the data extraction.

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 Union).

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 to 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 *S. articulatus* which could be used as reference material for molecular diagnosis. GenBank® (www.ncbi.nlm.nih.gov/genbank/) is a comprehensive publicly available database that as of October 2024 (release version 263.0) contained over 36.5 trillion base pairs from over 5.13 billion nucleotide sequences representing a wide range of formally described species (Sayers et al., 2024).

2.2 | Methodologies

The Panel performed the pest categorisation for *S. articulatus* 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 et al., 2017), the protocol for pest categorisations as presented in the EFSA standard protocols for scientific assessments (EFSA PLH Panel, 2024; Kertesz et al., 2024) and the International Standards for Phytosanitary Measures No. 11 (FAO, 2013).

The criteria to be considered when categorising a pest as a potential Union quarantine pest (QP) are given in Regulation (EU) 2016/2031 Article 3 and Annex I, Section 1 of the Regulation. Table 1 presents the Regulation (EU) 2016/2031 pest categorisation criteria on which the Panel bases its conclusions. In judging whether a criterion is met the Panel uses its best professional judgement (EFSA Scientific Committee et al., 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 an expert knowledge elicitation about potential 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 clearly defined and *Selenaspidus articulatus* (Morgan) is the accepted name.

The West Indian red scale, *S. articulatus* (Morgan, 1889) is an armoured scale insect within the order Hemiptera, suborder Sternorrhyncha, family Diaspididae. It was first described as *Aspidiotus articulatus* by Morgan in 1889, on *Dictyospermum album* in the region Demerara of Guyana (Matile-Ferrero, 1978). In 1891, Cockerell described it as *A. rufescens*, when found on olive trees. After some misspellings of the genus and species names through the years and changes in the genus composition, which led to different names such as *Pseudaonidia articulatus* (Nakahara, 1982), *Selenaspidus rufescens* and *S. articulatus* (Waltman et al., 2016), the scientific name *S. articulatus* is the accepted name (Garcia Morales et al., 2016). Its synonym name is *A. articulatus* (EPPO, online) and the additional common name is the rufous scale (McKenzie, 1956). The EPPO code[1] (EPPO, 2019; Griessinger & Roy, 2015) for this species is: SELSAR (EPPO, online).

3.1.2 | Biology of the pest

The life cycle of *S. articulatus* includes egg, two nymphal instars and adult for females, while egg, two nymphal instars, prepupa, pupa and adult for males (Rosen, 1990). Individuals are frequently found in aggregations. The first instar nymphs are the crawlers, which are the primary dispersal stage and move to new parts of the plant or are dispersed by wind or by hitchhiking on animals. It is ovoviviparous and reproduces sexually. Each female produces 71–142 eggs on *Citrus* spp. (Bartra, 1974). High population densities are found most often at times of high rainfall and temperature (Watson, 2002).

There are limited studies on the phenology of *S. articulatus*. On *Hevea brasiliensis* (rubber tree) the greater abundance of its population in Goiás, Brazil was observed from March to July (Silva et al., 2020). In Peru, four generations per year have been reported (Herrera Aranguena, 1964). Development from egg to adult male and female on orange fruits takes 30 and 45 days respectively (Beingolea, 1969). Reproduction started 45 days after egg hatching and reached a maximum of 122

[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 (EPPO, 2019; Griessinger & Roy, 2015).

female offsprings. The reproductive period lasts more than 30 days. The optimum temperature for the survival of *S. articulatus* is considered to be between 17 and 35°C (Bartra, 1974; Perruso & Cassino, 1993).

Loayza et al. (2003) estimated the immature (from 1st nymphal instar to adult) developmental time of *S. articulatus* on the fruits of the orange cultivars 'Hamlin', 'Natal', 'Pêra' and 'Valência', and the cucurbit *Citrullus silvestris* under laboratory conditions at 25 ± 2°C, 60 ± 10% RH and a photoperiod of 14h. The developmental duration for females lasted 26.5, 32.9, 28.4, 40.7 and 41.2 days at each orange cultivar and *C. silvestris*, while males completed their development within 25.4, 31.8, 26.8, 38.9 and 40.5 days, respectively. In all cases, immature mortality for both males and females, was around 60%–65%.

3.1.3 | Host range/species affected

Selenaspidus articulatus is polyphagous, as it is reported feeding on 212 different plant species belonging to 158 genera assigned in 68 families. The list of host plant species is presented in Appendix A. There are many important crops in the EU that are potential host plants of *S. articulatus* such as avocado (*Persea americana*) (Williams & Watson, 1988), banana (*Musa paradisiaca*) (Silva et al., 2020), citrus (*Citrus* spp.) (Dekle, 1976; Garcia Morales et al., 2016), grape (*Vitis vinifera*) (Bartra, 1974; Williams & Watson, 1988), olive (*Olea europaea*) (Bartra, 1974; Dekle, 1976) and many other fruits and ornamentals.

3.1.4 | Intraspecific diversity

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

3.1.5 | Detection and identification of the pest

Are detection and identification methods available for the pest?

Yes, there are methods available for the detection and identification of *S. articulatus*.

Detection

Careful visual examination of the fruits, leaves, stems, bark and growing points of plants for circular, flat, semitransparent, yellowish-brown scales for females and white for males, could be conducted for the detection of *S. articulatus* (Dekle, 1965). Nymphs and adult females are often difficult to detect, due to their small size (Watson, 2002). Usually it is found to feed on the upper surface of leaves (Kondo & Muñoz, 2016). Thus, inspections may not be successful when insect density is low and the signs of its presence are scarce.

Identification

The identification of *S. articulatus* requires microscopic examination of slide-mounted adult females and verification of the presence of key morphological characteristics. A detailed morphological description and illustration of the adult female can be found in McKenzie (1956), Mamet (1958), Ramos-Portilla and Caballero (2017) and a colour photograph in Watson (2001) (Garcia Morales et al., 2016).

Molecular diagnostic protocols for species identification have been suggested by Schneider et al. (2018), Normark et al. (2019) and Peterson et al. (2020) based on sequences of Carbamoylphosphate synthetase (*CAD*), Cytochrome Oxidase I (*COI*), Cytochrome Oxidase II (*COII*), 28S ribosomal RNA (*28SrDNA*) and Elongation Factor 1 alpha (*EF1a*) gene segments. Sequences are available in the NCBI and BOLD databases (NCBI, online; Ratnasingham et al., 2024).

Symptoms

Selenaspidus articulatus feeds on the stems, foliage, flowers and fruits of its hosts, causing early ripening, stains, discoloration of fruits, drying of plant tissues and loss of leaves and fruits. The main damage is caused by continuous sap sucking from plant tissues, causing chlorosis. This leads to a reduction of photosynthesis and decrease in fruit size. Furthermore, *S. articulatus* introduces toxins during feeding that cause leaf fall and influence fruit quality (Bartra, 1974; Williams & Watson, 1988).

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

Description

The main morphological character that distinguishes *S. articulatus* from the other species of the genus is the presence of perivulvar pores (McKenzie, 1956). The scale of the adult female is flat, approximately circular, about 2–2.5 mm in diameter, pale brown and its centrally placed exuviae is darker. The male scales reach 1.25–1.8 mms in length, they are almost white, irregularly shaped, elongate-oval and their exuviae appears to be subcentral (Dekle, 1965; Garcia Morales et al., 2016; McKenzie, 1956). Moreover, the scale cover of females and males appears to have white or yellow margin (Davidson & Miller, 1990). The eggs are small (0.2 mm long), oval and flat (McKenzie, 1956).

Descriptions and illustrations of the adult female is available by McKenzie (1956), Watson (2002), Garcia Morales et al. (2016) and Ramos-Portilla and Caballero (2017).

3.2 | Pest distribution

3.2.1 | Pest distribution outside the EU

Selenaspidus articulatus probably originated in sub-Saharan Africa (Rosen, 1990) or Madagascar (Watson, 2002). It is currently distributed throughout sub-Saharan Africa and Madagascar. It is also present in North and South America, ranging from the southern United States (Alabama, Florida) to South America, as well as in some areas of Asia and Oceania (Figure 1). The species is considered eradicated in California (Gill, 1997).

The list of countries where the presence of *S. articulatus* is confirmed is shown in Appendix B, with details provided for sub-national units.

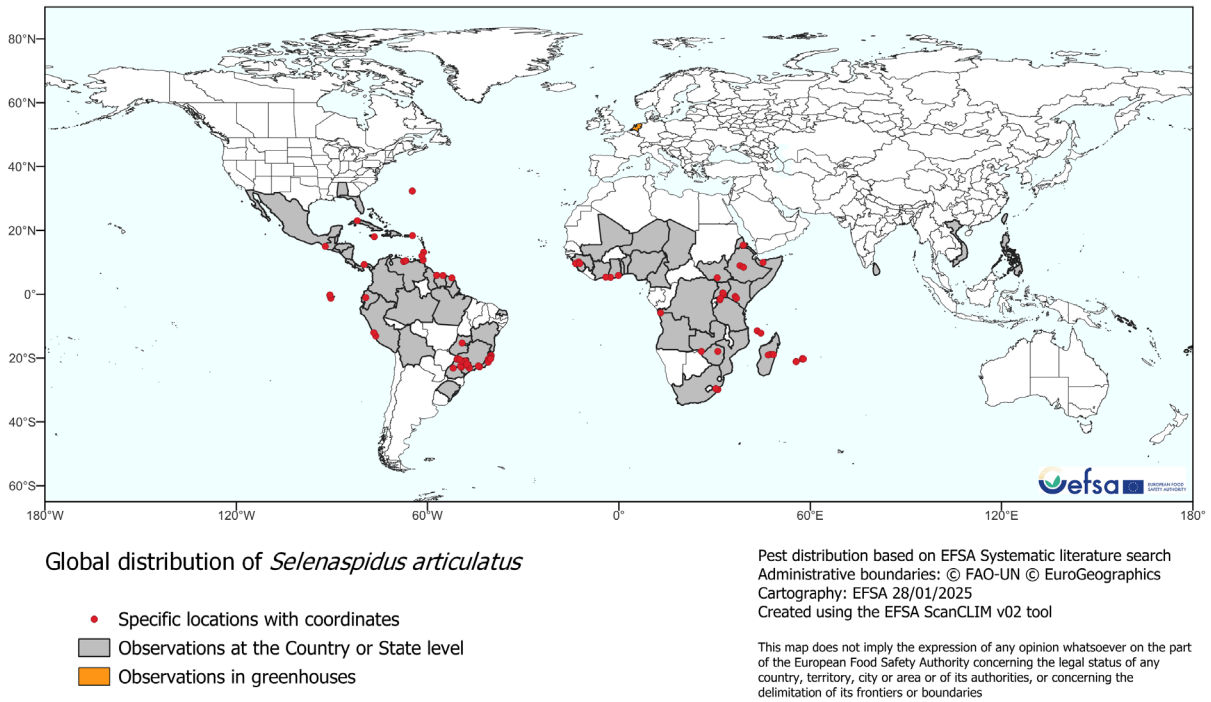


FIGURE 1 Global distribution of *Selenaspidus articulatus* (*Source:* EFSA literature search; for details see Appendix B). The different colour of the Netherlands indicates that the pest has been found only in greenhouses.

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, *S. articulatus* is present in a limited part of the EU territory.

According to the Dutch NPPO, the pest status of *S. articulatus* is 'present, few occurrences' as it has been found incidentally in greenhouses in the Netherlands on ornamental *Citrus* sp. and *Dypsis* sp. 'The most recent finding was in November 2023. As the impact is low, and the pest appears not to be able to establish outside of a greenhouse, no official measures have

been undertaken to eradicate this pest' (NPPO of Netherlands, 2024). *S. articulatus* has also been found on plants for planting of *Phoenix* in the Netherlands (Jansen & Alferink, 2023).

The Croatian NPPO informed EFSA that *S. articulatus* 'was intercepted in Croatia only once in 2008 on key lime fruits imported from Chile. There were no further findings of the pest since 2008'. The pest status is considered: 'absent, intercepted only' (NPPO of Croatia, 2024).

3.3 | Regulatory status

3.3.1 | Commission Implementing Regulation 2019/2072

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

3.3.2 | Hosts or species affected that are prohibited from entering the Union from third countries

TABLE 2 List of plants, plant products and other objects on which *Selenaspidus articulatus* is reported and 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**
8.	Plants for planting of […] *Prunus* L., […] and *Rosa* L., other than dormant plants free from leaves, flowers and fruits	ex 0602 10 90 ex 0602 20 20 ex 0602 20 80 ex 0602 40 00 ex 0602 90 41 ex 0602 90 45 ex 0602 90 46 ex 0602 90 47 ex 0602 90 48 ex 0602 90 50 ex 0602 90 70 ex 0602 90 91 ex 0602 90 99	Third countries other than: Albania, Andorra, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Canary Islands, Faeroe Islands, Georgia, Iceland, Liechtenstein, Moldova, Monaco, Montenegro, North Macedonia, Norway, Russia (only the following parts: Central Federal District (Tsentralny federalny okrug), Northwestern Federal District (Severo-Zapadny federalny okrug), Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug)), San Marino, Serbia, Switzerland, Türkiye, Ukraine and the United Kingdom
10.	Plants of *Vitis* L., other than fruits	0602 10 10 0602 20 10 ex 0604 20 90 ex 1404 90 00	Third countries other than Switzerland
11.	Plants of *Citrus* L., *Fortunella* Swingle, […] and their hybrids, other than fruits and seeds	ex 0602 10 90 ex 0602 20 20 0602 20 30 ex 0602 20 80 ex 0602 90 45 ex 0602 90 46 ex 0602 90 47 ex 0602 90 50 ex 0602 90 70 ex 0602 90 91 ex 0602 90 99 ex 0604 20 90 ex 1404 90 00	All third countries
13.	Plants of *Phoenix* spp. 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 90 ex 1404 90 00	Algeria, Morocco

(Continues)

TABLE 2 (Continued)

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**
20.	Growing medium as such, other than soil, consisting in whole or in part of solid organic substances, other than that composed entirely of peat or fibre of *Cocos nucifera* L., previously not used for growing of plants or for any agricultural purposes	ex 2530 10 00 ex 2530 90 00 ex 2703 00 00 ex 3101 00 00 ex 3824 99 93	Third countries other than Switzerland

Plants for planting of *Acacia* Mill., *Annona* L., *Bauhinia* L., *Cassia* L., *Diospyros* L., *Ficus carica* L., *Jasminum* L., *Ligustrum* L., *Nerium* L., *Persea* Mill., *Prunus* sp. and *Tilia* L. which are hosts of *S. articulatus* (Appendix A), are considered High-Risk Plants for the EU and their import is prohibited pending risk assessment (EU 2018/2019).

3.4 | Entry, establishment and spread in the EU

3.4.1 | Entry

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

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

Comment on plants for planting as a pathway.

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

Potential pathways for *S. articulatus* to enter the EU territory are listed in Table 3.

TABLE 3 Potential pathways for *Selenaspidus articulatus* into the EU.

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

Selenaspidus articulatus has a wide range of host plants (Appendix A), and many of them are imported into the EU from areas where the pest occurs. Although there are some prohibitions on imports of some host plants for planting from third countries (*Citrus* L., *Phoenix* spp.) (Regulation 2019/2072, Annex VI), there are many hosts that can be imported into the EU.

Fruits of some host plants (citrus, coffee, etc.) are imported into the EU from areas where the pest occurs. A phytosanitary certificate for fruits that are imported into the EU is required (Regulation 2019/2072, Annex XI, Part A). However, fruits may carry insects, and this may be a pathway for their entry. Banana (*Musa* L.), coconut (*Cocos nucifera* L.), and pineapple (*Ananas comosus* (L.) Merill), which might host *S. articulatus*, are exempt by Regulation 2019/2072, Annex XI, Part C and a phytosanitary certificate is not required for their introduction into the Union territory. Of note, a derogation for unrooted cuttings of plants for planting of *Jasminum polyanthum* Franchet in Uganda is in place since October 2022 ((EU) 2022/1942

amended by (EU) 2020/1213), allowing the imports from Uganda into the EU, following the commodity risk assessment performed by EFSA (EFSA PLH Panel, 2022).

Detailed data of the annual imports of host plant commodities into the EU from countries where the pest occurs are provided in Appendix C).

Notifications of interceptions of harmful organisms began to be compiled in EUROPHYT in May 1994 and in TRACES in May 2020. As of 30 October 2024, three cases of interceptions of *S. articulatus* in the EU were recorded on *Citrus sinensis* fruits imported from Peru in 2008, and in one case on plants for planting of *Areca* sp. imported into the United Kingdom from the Netherlands in 2002 (EUROPHYT, online; TRACES-NT, online). *S. articulatus* was intercepted in the Netherlands in 1951 on *Citrus* from Cuba, Dominican Republic and Guatemala, on *Citrus* x reticulata from Mexico and Peru, on *Citrus maxima* from Suriname, on *Beaucarnea guatemalensis* and *Ficus nitida* from Guatemala, on *Ardisia* and *Phoenix* from Honduras and on *Phoenix roebelenii* from Costa Rica (Jansen, 1995; Jansen & Alferink, 2023). Jansen (1995) also reports that it was found on plants for planting of *Phoenix* in a commercial greenhouse in the Netherlands, in 1993. In 2008, it was found in Croatia during inspections of *Citrus aurantiifolia* fruits from Chile in a supermarket (Masten Milek et al., 2009). *S. articulatus* has been intercepted on imported plant material in 70 occasions in England and Wales between 1996 and 2019 (Defra, unpublished data). Most interceptions were on Citrus fruit (including *C. aurantifolia*, *C. latifolia*, *C. paradisi*, *C. reticulata* and *C. sinensis*), and occasionally on *Annona*, *Mangifera* and *Musa* fruit (Malumphy C., Fera Science Ltd., confirmed this by email on 2 December Malumphy, 2024).

3.4.2 | Establishment

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

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

Climatic mapping is the principal method for identifying areas that could provide suitable conditions for the establishment of a pest taking key abiotic factors into account (Baker, 2002). The approach used in EFSA pest categorisations is based on the Köppen–Geiger climate classification (version of Kottek et al., 2006; Rubel et al., 2017) which identifies potentially suitable areas based on the climate types present in Europe. 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*

Selenaspidus articulatus is a polyphagous pest feeding on a relatively wide range of crop plants (Appendix A). The main hosts of the pest cultivated in the EU are shown in Table 4. The main cultivated host plants of the pest which are economically important in the EU are citrus, grape and olive.

TABLE 4 Crop area of *Selenaspidus articulatus* hosts in the EU (1000 ha, EUROSTAT accessed on 08/11/2024).

Crop	Code	2019	2020	2021	2022	2023
Citrus	T0000	512.83	522.10	519.96	520.94	521.58
Grapes	W1000	3155.20	3146.24	3120.22	3109.86	3098.46
Olives	O1000	5071.59	5104.20	5007.50	4987.25	5002.60

3.4.2.2 | *Climatic conditions affecting establishment*

Selenaspidus articulatus occurs mainly in tropical and sub-tropical areas of Africa, Asia and both North and South America. Figure 2 shows the world distribution of selected Köppen–Geiger climate types (Kottek et al., 2006) that occur in the EU, and where *S. articulatus* has been reported. Climate types Cfb and Cfc were removed from the figure due to their very limited occurrence in countries where *S. articulatus* is present. Köppen–Geiger climate matching indicates that climate types BSh (hot semi-arid), BSk (cold semi-arid), Cfa (humid subtropical) and Csb (warm-summer Mediterranean), which are found in Southern Europe, are suitable. The climate type Csa (hot-summer Mediterranean), that occurs in the Mediterranean countries, was not identified by the Köppen–Geiger climate matching, However, this climate is characterised by the same precipitation patterns as Csb, and by an average maximum temperature ≥ 22°C which is included between the temperature conditions of Csb (average maximum temperature < 22°C) and BSh (average annual temperature ≥ 18°C). Therefore, it is reasonable to consider this climate as suitable for the establishment of the pest.

Based on the current distribution, establishment is most likely to occur in areas of the south of the EU. The Mediterranean countries provide suitable climatic conditions for the establishment of *S. articulatus*. It could also establish inside glasshouses, and indoor plantings in cooler areas. It has been found incidentally inside greenhouses in the Netherlands with the most recent finding in November 2023, but it appears not to be able to establish outside of a greenhouse.

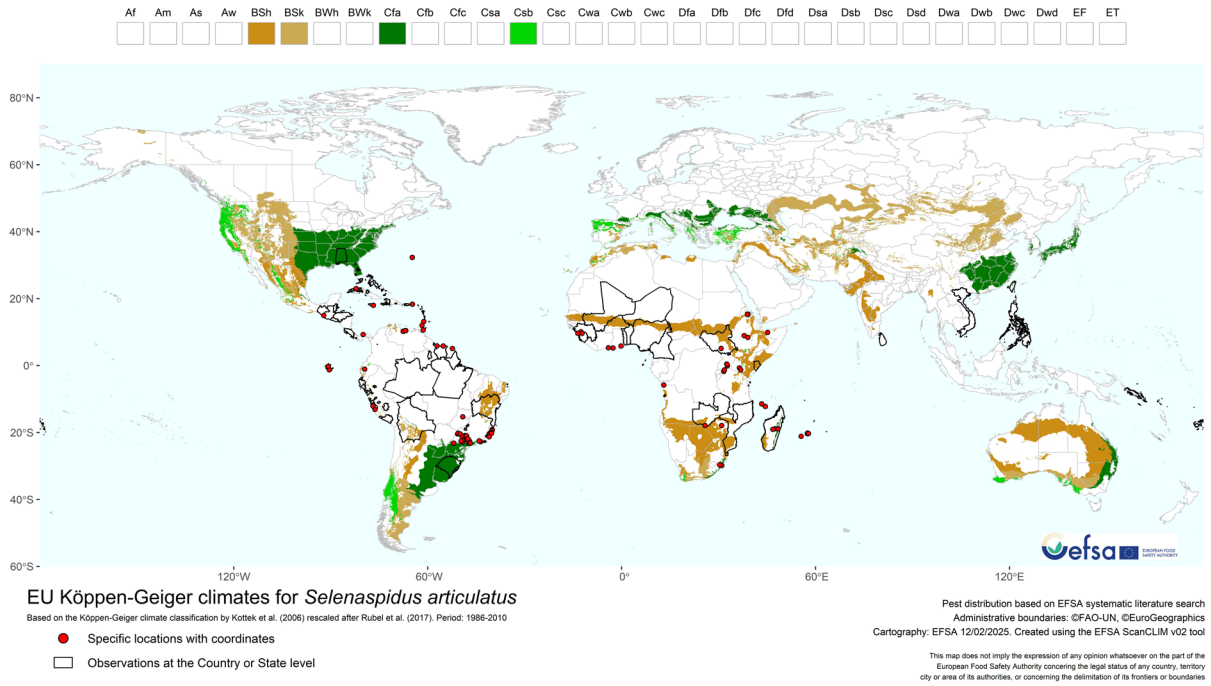


FIGURE 2 World distribution of Köppen–Geiger climate types that occur in the EU and which occur in countries where *Selenaspidus articulatus* has been reported (Red dots indicate precise locations where the insect has been observed). Climate types Cfb and Cfc were removed due to their very limited occurrence in the distribution area of *S. articulatus*.

3.4.3 | Spread

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

Selenaspidus articulatus could spread over short distances naturally on air currents or by hitchhiking by first instar crawlers.

Comment on plants for planting as a mechanism of spread.

The trade of infested plants for planting is the main pathway of *S. articulatus* spread within the EU territory.

The first instar nymphs (crawlers) of the pest are mobile and they can spread over short distances by walking and colonise new areas or transported by the wind or by hitchhiking on humans and animals due to their tiny size (Magsig-Castillo et al., 2010). On the other hand, mortality due to abiotic factors is high in this stage (Bartra, 1974). Trade/movement of infested plants for planting and other plant material is the main pathway of the long distance dispersal of *S. articulatus* (Watson, 2002).

3.5 | Impacts

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

Yes, if *S. articulatus* established in the EU, it would most probably have an economic impact on its host species.

Selenaspidus articulatus is considered as one of the important pests of citrus and olive orchards in Peru (Watson, 2002). It is reported to cause significant damage to bananas, citrus and coffee trees and a variable number of plant species, as both

adult and immature stages feed on their leaves and fruit (Oliveira et al., 2013; Williams & Watson, 1988). The damage is caused by sap-depletion, and through injection of toxic saliva, which causes chlorosis and death of plant tissue in the area of penetration. This leads to a reduction of photosynthesis, decrease in fruit size, death of entire plants, reducing the overall yield and provoking economic losses. Oliveira et al. (2013) estimated that the economic losses caused by *S. articulatus* in citrus fruits in Sao Paulo State-Brazil was 118 million US dollars per year (Ceron et al., 2024). *S. articulatus* has a quarantine status in Morocco, Argentina, Chile and China (EPPO, online). The pest has been found incidentally in greenhouses in the Netherlands on ornamental *Citrus* sp., *Dypsis* sp. and *Phoenix* sp. without causing significant impact (NPPO of Netherlands, 2024; Jansen & Alferink, 2023).

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, although the existing phytosanitary measures identified in Section 3.3.2 do not specifically target *S. articulatus*, they mitigate the likelihood of its entry into, establishment and spread within the EU (see also Section 3.6.1).

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	As a pest with low mobility, a risk reduction option could be to source plants from a pest free area, or place of production or production site	Entry/spread
Growing plants in isolation	Plants could be grown in insect-proof places such as glass or plastic greenhouses or in places with complete physical isolation. That measure could mitigate the likelihood of entry and spread of *S. articulatus*	Entry (reduce contamination/infestation)/spread
Roguing and pruning	Roguing (removal of infested plants) and pruning (removal of infested plant parts only without affecting the viability of the plant) can reduce the population density of the pest	Entry/spread/impact
Biological control and behavioural manipulation	There are several parasitoids that can parasitise on *S. articulatus* *Aphytis lingnanensis* was introduced in 1962 in Peru but failed to establish (Beingolea, 1969). *Aphytis roseni* (DeBach and Gordh) has been introduced from Uganda into Peru for the control of the scale insect in various localities along the coast; it provided sufficient control of the pest (Bartra, 1974; Greathead, 1976). The rate of parasitism was about 47% in the laboratory, but considerably higher percentages (more than 70%) have been recorded in the field. Successful biological control was obtained in coastal areas by 1975 (Rosen & DeBach, 1978) Gravena et al. (1992) noted that the main control agent of *S. articulatus* (Morgan), in a citrus grove near São Paulo, Brazil, was the fungus *Aschersonia aleyrodis* (Dematiaceae) There are also reports of predators capable of controlling *S. articulatus* (de Azeredo et al., 2004; Soares et al., 1998) Moraes et al. (1995) are referring to the effect of different mineral oil formulations and beneficial arthropods in citrus crops. After spraying mineral oils, the presence of natural enemies was not affected	Entry/impact

(Continues)

TABLE 5 (Continued)

Control measure/risk reduction option (blue underline = Zenodo doc, blue = WIP)	RRO summary	Risk element targeted (entry/establishment/spread/impact)
Chemical treatments on crops including reproductive material	In the EU Pesticide Database, there are approved insecticides for controlling other Diaspididae species in the EU Application of insecticides might kill all stages of *S. articulatus* although they are protected by a wax scale and difficult to reach. In the past, insecticides have been used that provided satisfactory results	Entry/establishment impact
Chemical treatments on consignments or during processing	Chemical compounds that may be applied to plants or to plant products after harvest, during process or packaging operations and storage could mitigate the likelihood of infestation of pests susceptible to chemical treatment	Entry/spread
Physical treatments on consignments or during processing	Brushing, washing and other mechanical cleaning methods can be used to reduce the likelihood of the presence of the pest in consignments (especially fruit)	Entry/spread
Heat and cold treatments	Controlled temperature treatments aimed to kill or inactivate pests without causing any unacceptable prejudice to the treated material itself	Entry/spread
Controlled atmosphere	Treatment of plants by storage in a modified atmosphere (including modified humidity, O_2, CO_2, temperature, pressure) could mitigate the likelihood of entry and spread of the pest Controlled atmosphere storage can be used in commodities such as fresh and dried fruits, cut flowers and vegetables	Entry/spread (via commodity)

3.6.1.2 | *Additional supporting measures*

Potential additional supporting measures are listed in Table 6.

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

Supporting measure (blue underline = Zenodo doc, Blue = WIP)	Summary	Risk element targeted (entry/establishment/spread/impact)
Inspection and trapping	ISPM 5 (FAO, 2023) defines inspection as the official visual examination of plants, plant products or other regulated articles to determine if pests are present or to determine compliance with phytosanitary regulations The effectiveness of sampling and subsequent inspection to detect pests may be enhanced by including trapping and luring techniques. However, there are not yet traps or lures available specifically for *S. articulatus*	Entry/establishment/spread
Laboratory testing	Examination, other than visual, to determine if pests are present using official diagnostic protocols. Diagnostic protocols describe the minimum requirements for reliable diagnosis of regulated pests	Entry/spread
Sampling	According to ISPM 31 (FAO, 2008), it is usually not feasible to inspect entire consignments, so phytosanitary inspection is performed mainly on samples obtained from a consignment. It is noted that the sampling concepts presented in this standard may also apply to other phytosanitary procedures, notably selection of units for testing For inspection, testing and/or surveillance purposes the sample may be taken according to a statistically based or a non-statistical sampling methodology	Entry/spread
Phytosanitary certificate and plant passport	According to ISPM 5 (FAO, 2023) a phytosanitary certificate and a plant passport are official paper documents or their official electronic equivalents, consistent with the model certificates of the IPPC, attesting that a consignment meets phytosanitary import requirements: (a) export certificate (import) (b) plant passport (EU internal trade)	Entry/spread
Certified and approved premises	Mandatory/voluntary certification/approval of premises is a process including a set of procedures and of actions implemented by producers, conditioners and traders contributing to ensure the phytosanitary compliance of consignments. It can be a part of a larger system maintained by the NPPO in order to guarantee the fulfilment of plant health requirements of plants and plant products intended for trade. Key property of certified or approved premises is the traceability of activities and tasks (and their components) inherent the pursued phytosanitary objective. Traceability aims to provide access to all trustful pieces of information that may help to prove the compliance of consignments with phytosanitary requirements of importing countries	Entry/spread

TABLE 6 (Continued)

Supporting measure (blue underline = Zenodo doc, Blue = WIP)	Summary	Risk element targeted (entry/establishment/spread/impact)
Certification of reproductive material (voluntary/official)	Plants come from within an approved propagation scheme and are certified pest free (level of infestation) following testing; Used to mitigate against pests that are included in a certification scheme	Entry/spread
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*

- *Selenaspidus articulatus* adults, immature stages and eggs are tiny and difficult to detect by visual inspection.
- Some insecticide treatments may not be effective because of the waxy cover.

3.7 | Uncertainty

No key uncertainties have been identified in the assessment.

4 | CONCLUSIONS

Selenaspidus articulatus satisfies all criteria assessed by EFSA for consideration as a potential quarantine pest. Table 7 provides a summary of the PLH Panel conclusions.

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

Criterion of pest categorisation	Panel's conclusions against criterion in regulation (EU) 2016/2031 regarding union quarantine pest	Key uncertainties
Identity of the pest (Section 3.1)	The identity of the pest is clearly defined and *S. articulatus* (Morgan) is the accepted name	None
Absence/presence of the pest in the EU (Section 3.2)	The pest is present in the EU but has a limited distribution (only known to be present in greenhouses in the Netherlands)	None
Pest potential for entry, establishment and spread in the EU (Section 3.4)	*S. articulatus* is able to enter into, become established and spread within the EU territory The main pathways are plants for planting and fruits	None
Potential for consequences in the EU (Section 3.5)	If *S. articulatus* were to spread further or would become introduced into new localities in the EU, impact on several crops e.g. citrus, olive, grape, would be expected	None
Available measures (Section 3.6)	There are measures available to prevent the entry, establishment and spread of *S. articulatus* within the EU	None
Conclusion (Section 4)	All criteria assessed by EFSA for consideration as a potential quarantine pest are met	None
Aspects of assessment to focus on/scenarios to address in future if appropriate:		

ABBREVIATIONS

EPPO European and Mediterranean Plant Protection Organization
FAO Food and Agriculture Organization
IPPC International Plant Protection Convention
ISPM International Standards for Phytosanitary Measures
MS Member State
PFA pest free area

PFPP	pest free production place
PFPS	pest free production site
PLH	EFSA Panel on Plant Health
PZ	Protected Zone
TFEU	Treaty on the Functioning of the European Union
ToR	Terms of Reference

GLOSSARY

Containment (of a pest)	Application of phytosanitary measures in and around an infested area to prevent spread of a pest (FAO, 2023)
Control (of a pest)	Suppression containment or eradication of a pest population (FAO, 2023)
Entry (of a pest)	Movement of a pest into an area where it is not yet present or present but not widely distributed and being officially controlled (FAO, 2023)
Eradication (of a pest)	Application of phytosanitary measures to eliminate a pest from an area (FAO, 2023)
Establishment (of a pest)	Perpetuation for the foreseeable future of a pest within an area after entry (FAO, 2023)
Greenhouse	A walk-in static closed place of crop production with a usually translucent outer shell which allows controlled exchange of material and energy with the surroundings and prevents release of plant protection products (PPPs) into the environment.
Hitchhiker	An organism sheltering or transported accidentally via inanimate pathways including with machinery shipping containers and vehicles; such organisms are also known as contaminating pests or stowaways (Toy & Newfield, 2010).
Impact (of a pest)	The impact of the pest on the crop output and quality and on the environment in the occupied spatial units
Introduction (of a pest)	The entry of a pest resulting in its establishment (FAO, 2023)
Pathway	Any means that allows the entry or spread of a pest (FAO, 2023)
Phytosanitary measures	Any legislation regulation or official procedure having the purpose to prevent the introduction or spread of quarantine pests or to limit the economic impact of regulated non-quarantine pests (FAO, 2023)
Quarantine pest	A pest of potential economic importance to the area endangered thereby and not yet present there or present but not widely distributed and being officially controlled (FAO, 2023)
Risk reduction option (RRO)	A measure acting on pest introduction and/or pest spread and/or the magnitude of the biological impact of the pest should the pest be present. A RRO may become a phytosanitary measure action or procedure according to the decision of the risk manager
Spread (of a pest)	Expansion of the geographical distribution of a pest within an area (FAO, 2023)

ACKNOWLEDGEMENTS

EFSA wishes to acknowledge the contribution of Ana Guillem Amat, Malayka Picchi, Erika Soldi and Stella Papanastasiou to this opinion.

REQUESTOR

European Commission

QUESTION NUMBER

EFSA-Q-2024-00039

PANEL MEMBERS

Antonio Vicent Civera, Paula Baptista, Anna Berlin, Elisavet Chatzivassiliou, Jaime Cubero, Nik Cunniffe, Eduardo de la Peña, Nicolas Desneux, Francesco Di Serio, Anna Filipiak, Paolo Gonthier, Beata Hasiów-Jaroszewska, Hervé Jactel, Blanca B. Landa, Lara Maistrello, David Makowski, Panagiotis Milonas, Nikos Papadopoulos, Roel Potting, Hanna Susi and Dirk Jan van der Gaag.

REFERENCES

Abate, T. (1991). *Entomophagous Arthropods of Ethiopia: A catalog*. Technical manual, No 4. Institute of Agricultural Research.

Agudelo, F., & Falcon, L. A. (1977). Some naturally occurring insect pathogens in Colombia. *Turrialba*, *27*, 423–424.

Almeida, L. F. V., Peronti, A. L. B. G., Martinelli, N. M., & dos Santos Wolff, V. R. (2018). A survey of scale insects (Hemiptera: Coccoidea) in citrus orchards in São Paulo, Brazil. *Florida Entomologist*, *101*(3), 353–363. https://doi.org/10.1653/024.101.0324

Almeida, M. D. (1971). Diaspididae (Homoptera – Coccoidea) of Mozambique, with the description of a new species. *Novos Taxa Entomológicos*, *90*, 3–17.

Almeida, M. d. D. (1973). Coccoidea de Angola. 1- Revisao das especies conhecidas. *Boletim do Instituto de Investigacao Cientifica de Angola, Luanda*, *10*, 1–23.

Baker, R. H. A. (2002). Predicting the limits to the potential distribution of alien crop pests. In G. J. Hallman & C. P. Schwalbe (Eds.), *Invasive Arthropods in agriculture: problems and solutions* (pp. 207–241). Science Publishers Inc.

Bartra, P. C. E. (1974). Biology of *Selenaspidus articulatus* Morgan and its principal biological control agents. *Revista Peruana de Entomologia*, *17*(1), 60–68.

Beingolea, G. O. (1969). Notas sobre la biologia de *Selenaspidus articulatus* Morgan (Hom.: Diaspididae), "Queresa redonda de los citricos". *Revista Peruana de Entomologia*, *12*(1), 119–129.

Beingolea, G. O. (1994). Role of *Aphytis roseni* DeBach and Gordh in the biological control of the rufous scale, *Selenaspidus articulatus* (Morgan). In D. Rosen (Ed.), *Advances in the study of Aphytis (Hymenoptera: Aphelinidae)* (pp. 105–118). Intercept Limited.

Bergmann, E. C., Stradioto, M. F., & Brisolla, A. D. (1988). Occurrence of *Selenaspidus articulatus* (Morgan, 1889) in rubber (*Hevea brasiliensis* Muell. Arg.) plantations in Olimpia, Sao Paulo state. *Biologico*, *54*, 27–28.

Bodkin, G. E. (1914). The scale-insects of British Guiana. *Journal of the Board of Agriculture of British Guiana*, *7*, 106–124.

Brain, C. K. (1918). The Coccidae of South Africa – II. *Bulletin of Entomological Research*, *9*, 107–139.

CABI. (1981). *Distribution maps of plant pests. Selenaspidus articulatus* [Distribution map]. #volume#:419-Map 419.

Campos, M. S. (1993). Effect of biotic and abiotic factors on the settling percentage of *Selenaspidus articulatus* (Morg) (Coccoidea: Diaspididae). *Revista de Proteccion Vegetal*, *8*, 129–132.

Cassino, P. C. R., & Rodrigues, W. C. (2005). Distribuiçao de insetos fitofagos (Hemiptera: Sternorrhyncha) em plantas citricas no estado do Rio de Janeiro [Distribution of phytophagous insects (Hemiptera: Stemorrhyncha) in citrus orchards located in Rio de Janeiro State, Brazil]. *Neotropical Entomology*, *34*(6), 1017–1021.

Ceballos, M., & Hernández, M. (1986). *Aspidiotiphagus* sp. (Hymenoptera: Aphelinidae): Artificial host test for massive rearing. *Revista de Protección Vegetal*, *1*, 137–140.

Ceballos, M. I., & Hernández, M. (1988). *Coccophagus pulvinariae* Compere (Hymenoptera: Chalcidoidea) nuevo biorregulador para cóccidos de cítricos en Cuba [*Coccophagus pulvinariae* Compere (Hymenoptera: Chalcidoidea) a new bioregulator for citrus coccids in Cuba]. *Revista de Protección Vegetal*, *3*(3), 209–211.

Ceron, K., Santana, D. J., & Pires, M. M. (2024). The economic risk of the losses in pest control as frogs decline. *EcoEvoRxiv*. https://doi.org/10.32942/X2SP79

Clavijo, A. S. (1977). Scale insects (Homoptera: Coccoidea) on nursery plants in the region of Maracay, Aragua State, Venezuela. *Revista de la Facultad de Agronomia, Universidad Central de Venezuela*, *9*, 113–122.

Culik, M. P., dos Santos Martins, D., Ventura, J. A., & dos Santos Wolff, V. R. (2008). Diaspididae (Hemiptera: Coccoidea) of Espírito Santo, Brazil. *Journal of Insect Science*, *8*(17), 1–6. https://doi.org/10.1673/031.008.1701

Dash, J. S. (1916). *Report of the assistant superintendent of agriculture on the entomological and mycological work carried out during the season under review. Rept. Dept. Agric*., Barbados 1914-15: 38–44.

Davidson, J. A., & Miller, D. R. (1990). *Ornamental plants. Armored scale insects, their biology, natural enemies and control [Series title: World Crop Pests, Vol. 4B]*. Elsevier.

de Albuquerque, F. A., Pattaro, F. C., Borges, L. M., Lima, R. S., & Zabini, A. V. (2002). Insects associated to Barbados cherry (*Malpighia glabra* L.) in the region of Maringá PR. *Acta Scientiarum*, *24*(5), 1245–1249. In: *Review of Agricultural Entomology*, *94*(4), April 2004, abst. 3295, p. 516.

de Azeredo, E. H., Rodrigues, W. C., & Cassino, P. C. R. (2004). Occurrence of *Selenaspidus articulatus* (Morgan) (Hemiptera, Diaspididae) and of the predator *Pentilia egena* (Mulsant) (Coleoptera, Coccinelidae) on *Myrtus communis* L. (Myrtaceae), in Pinheiral County, Rio de Janeiro, Brazil. *Revista Brasileira de Entomologia*, *48*, 569–576. https://doi.org/10.1590/S0085-56262004000400021

de la Hoz González, M. T. (1983). Desarrollo posembrionario de *Selenaspidus articulatus* (Homoptera: Diaspididae) en condiciones ambientales. [Post-embryonic development of *Selenaspidus articulatus* (Homoptera: Diaspididae) under ambient conditions]. *Agrotécnica de Cuba*, *15*, 21–33.

de Seabea, A. F. (1917). Studies on the diseases and parasites of the cacao-tree and other plants cultivated at S. Thome. *Memoires Soc, Portugaise Des Sciences Naturelles*, *3*, 28.

de Seabea, A. F., & Vayssiere, P. (1918). The coccids of the Island of San Thome. *Bulletin de la Societe Entomologique de France*, *10*, 162–164.

de Seabra, A. (1919). *Studies of the diseases and parasites of cacao and other plants cultivated in the Island of San Thome*. The New Disease of Cacao in S. Thome. Lisbon. xviii. 43 pp.

Dekle, G. W. (1965). *Florida armored scale insects*. Arthropods of Florida and Neighboring Land Areas. Fla. Dept. Agr. Div. Plant Indus., Gainesville, Florida V. 3: 265 pp.

Dekle, G. W. (1976). *Florida armored scale insects* (revised). In Arthropods of Florida and neighboring land areas. Fla. Dept. Agric. Consumer Serv. Div. Plant Ind. 3: 345 pp.

Deslandes, R., & Chalot, C. (1913). Lime cultivation in Dominica. *L'Agriculture pratique des Pays Chauds*, *13*, 306–327.

Dziedzicka, A., & Karnkowski, W. (1990). The contribution to knowledge of *Selenaspidus articulatus* (Morgan) (Homoptera, Coccinea, Diaspididae). *Acta Biologica Cracoviensia: Series Zoologia*, *32*, 39–43.

EFSA PLH Panel (EFSA Panel on Plant Health), Jeger, M., Bragard, C., Caffier, D., Candresse, T., Chatzivassiliou, E., Dehnen-Schmutz, K., Gregoire, J.-C., Jaques Miret, J. A., Mac Leod, A., Navajas Navarro, M., Niere, B., Parnell, S., Potting, R., Rafoss, T., Rossi, V., Urek, G., Van Bruggen, A., Van Der Werf, W., … Gilioli, G. (2018). Guidance on quantitative pest risk assessment. *EFSA Journal*, *16*(8), 5350. https://doi.org/10.2903/j.efsa.2018.5350

EFSA PLH Panel (EFSA Panel on Plant Health), Bragard, C., Chatzivassiliou, E., Di Serio, F., Baptista, P., Gonthier, P., Jaques Miret, J. A., Justesen, A. F., MacLeod, A., Magnusson, C. S., Milonas, P., Navas-Cortes, J. A., Parnell, S., Reignault, P. L., Stefani, E., Thulke, H. H., Van der Werf, W., Civera, A. V., Yuen, J., … Potting, R. (2022). Commodity risk assessment of *Jasminum polyanthum* unrooted cuttings from Uganda. *EFSA Journal*, *20*(5), 7300. https://doi.org/10.2903/j.efsa.2022.7300

EFSA PLH Panel (EFSA Panel on Plant Health), Bragard, C., Baptista, P., Chatzivassiliou, E., Di Serio, F., Gonthier, P., Jaques Miret, J. A., Justesen, A. F., MacLeod, A., Magnusson, C. S., Milonas, P., Navas-Cortes, J. A., Parnell, S., Potting, R., Reignault, P. L., Stefani, E., Van der Werf, W., Vicent Civera, A., Yuen, J., … Thulke, H.-H. (2024). Standard protocols for plant health scientific assessments. *EFSA Journal*, *22*(9), 8891. https://doi.org/10.2903/j.efsa.2024.8891

EFSA Scientific Committee, Hardy, A., Benford, D., Halldorsson, T., Jeger, M. J., Knutsen, H. K., More, S., Naegeli, H., Noteborn, H., Ockleford, C., Ricci, A., Rychen, G., Schlatter, J. R., Silano, V., Solecki, R., Turck, D., Benfenati, E., Chaudhry, Q. M., Craig, P., … Younes, M. (2017). Scientific Opinion on the guidance on the use of the weight of evidence approach in scientific assessments. *EFSA Journal*, *15*(8), 4971. https://doi.org/10.2903/j.efsa.2017.4971

EPPO. (2019). *EPPO codes*. https://www.eppo.int/RESOURCES/eppo_databases/eppo_codes

EPPO (European and Mediterranean Plant Protection Organization). (online). *EPPO global database*. https://gd.eppo.int

EUROPHYT. (online). *Interceptions of harmful organisms in imported plants and other objects*. https://food.ec.europa.eu/plants/plant-health-and-biosecurity/europhyt/interceptions_en

FAO (Food and Agriculture Organization of the United Nations). (2008). *ISPM (international standards for Phytosanitary measures) 31-Methodologies for sampling of consignments*. FAO. https://www.ippc.int/static/media/files/publication/en/2016/11/ISPM_31_2008_Sampling_of_consignments_EN.pdf

FAO (Food and Agriculture Organization of the United Nations). (2013). *ISPM (international standards for Phytosanitary measures) 11-Pest risk analysis for quarantine pests*. FAO. https://www.ippc.int/sites/default/files/documents/20140512/ispm_11_2013_en_2014-04-30_201405121523-494.65%20KB.pdf

FAO (Food and Agriculture Organization of the United Nations). (2023). *ISPM (international standards for Phytosanitary measures) 5-Glossary of phytosanitary terms*. FAO. https://assets.ippc.int/static/media/files/publication/en/2023/07/ISPM_05_2023_En_Glossary_PostCPM-17_2023-07-12_Fixed.pdf

Fennah, R. G. (1941). *Citrus pests of St. Vincent*. Rep. agric. Dep. St Vincent. 1942:p-9 p.

Fischer, I. H., Sposito, M. B., Lourenco, S.d. A., & Amorim, L. (2009). Pests damages in citrus fruits from packinghouses in Sao Paulo state. *Laranja*, *30*, 1–12.

Fleury, A. C. (1932). *Report of the, Division of Quarantine Administration. Monthly Bulletin* (Vol. *20*). California Department of Agriculture.

Garcia Morales, G., Denno, B. D., Miller, D. R., Miller, G. L., Ben-Dov, Y., & Hardy, N. B. (2016). *ScaleNet: A literature-based model of scale insect biology and systematics*. Database. https://doi.org/10.1093/database/bav118

Gill, R. J. (1997). *The Scale Insects of California: Part 3. The Armored Scales (Homoptera: Diaspididae)*. California Department of Food & Agriculture.

Gómez-Menor, O. J. (1941). Cóccidos de la República Dominicana (Hom. Cocc.). *Eos, Transactions of the American Geophysical Union*, *16*(1940), 125–143.

González, C., Hernandez, D., Sibat, R., & Rodriguez, J. L. (1991). Citrus coccids and their natural enemies in Cuba. *INRA Colloquia; Caribbean Meetings on Biological Control*, *58*, 433–441.

Gowdey, C. C. (1921). The Coccidae of Jamaica. *Entomological Bulletin, Jamaican Department of Science and Agriculture*, *1*, 1–46.

Gowdey, C. C. (1924). *Citrus cultivation*. Jamaica Dept. Agric. Ent.

Gravena, S., Yamamoto, P. T., Fernades, O. D., & Benetoli, I. (1992). Effect of ethion and aldicarb against *Selenaspidus articulatus* (Morgan), *Parlatoria ziziphus* (Locas) (Hemiptera: Diazspididae) and influence on beneficial fungus. *Anais da Sociedade Entomológica do Brasil*, *24*(2), 101–111.

Greathead, D. J. (1976). An east African parasite (*Aphytis roseni* Debach and Gordh, Aphelinidae) for the control of *Selenaspidus articulatus* Morgen (Diaspididae) in Peru. *East African Agricultural and Forestry Journal*, *41*(4), 349–349.

Griessinger, D., & Roy, A.-S. (2015). *EPPO codes: A brief description*. https://www.eppo.int/media/uploaded_images/RESOURCES/eppo_databases/A4_EPPO_Codes_2018.pdf

Hargreaves, E. (1927). *Some insect pests of Sierra Leone*. Proc. 1st W. Afr. Conf. Ibadan, Nigeria, 113–128.

Hargreaves, E. (1936). *Entomological work*. Rep. Dep. Agric. S. Leone. 20–22.

Herrera Aranguena, J. M. (1964). Life cycles of citrus insects on the central coast. Methods for their control. *Revista Peruana de Entomología*, *7*(1), 1–8.

Houser, J. S. (1918). The Coccidae of Cuba. *Annals of the Entomological Society of America*, *11*, 157–172.

Jansen, M. G. M. (1995). Scale insects (Homoptera: Coccinea) from import interceptions and greenhouses in the Netherlands. *Israel Journal of Entomology*, *29*, 131–146. https://doi.org/10.12976/jib/2023.44.2.1

Jansen, M. G. M., & Alferink, L. P. (2023). An updated list of scale insects (Hemiptera, Coccomorpha) from import interceptions and greenhouses in the Netherlands. *Journal of Insect Biodiversity*, *44*(2), 21–40.

Kertesz, V., Pautasso, M., Gobbi, A., Golic, D., Maiorano, A., Sfyra, O., & Stancanelli, G. (2024). EFSA standard protocol for pest categorisation. *Zenodo*. https://doi.org/10.5281/zenodo.12909423

Kondo, T., & Muñoz, J. A. (2016). Scale insects (Hemiptera: Coccoidea) associated with avocado crop, *Persea americana* Mill. (Lauraceae) in Valle del Cauca and neighboring departments of Colombia. *Insecta Mundi*, *465*, 1–24.

Kottek, M., Grieser, J., Beck, C., Rudolf, B., & Rubel, F. (2006). World map of the Köppen_Geiger climate classification updated. *Meteorologische Zeitschrift*, *15*, 259–263. https://doi.org/10.1127/0941-2948/2006/0130

Laranjeira, F. F. (1997). Infestation of rofous scale *on Mimosa caesalpiniaefolia* Benth. Used as windbreak of orange groves. *Bragantia*, *56*, 289–290.

Lincango, M. P., Hodgson, C. J., Causton, C., & Miller, D. R. (2010). An updated checklist of scale insects (Hemiptera: Coccoidea) of the Galapagos Islands, Ecuador. *Galapagos Research*, *67*, 3–7.

Loayza, R. M., Parra, J. R., & Vendramim, J. D. (2003). Biologia Comparada de *Selenaspidus articulatus* Morgan Hemiptera Diaspididae em Cultivares de *Citrus sinensis* e em *Citrullus silvestris*. *Neotropical Entomology*, *32*(3), 493–496.

Magsig-Castillo, J., Morse, G., Walker, G. P., Bi, J. L., Rugman-Jones, P. F., & Stouthamer, R. (2010). Phoretic dispersal of armored scale crawlers (Hemiptera: Diaspididae). *Journal of Economic Entomology*, *103*(4), 1172–1179. https://doi.org/10.1603/ec10030

Malenotti, E. (1916). Diaspinae collected in South Italian Somaliland. *Redia*, *11*, 321–358.

Malumphy, C. (2014). An annotated checklist of scale insects (Hemiptera: Coccoidea) of Saint Lucia, Lesser Antilles. *Zootaxa*, *3846*, 69–86.

Malumphy, C. (2024). *Re: Status of Selenaspidus articulatus in the UK*. Message to Dimitrios Papachristos, 2 December 2024.

Mamet, R. J. (1958). The *Selenaspidus* complex (Homoptera, Coccoidea). Annales du Musée Royal du Congo Belge. *Zoologiques, Miscellanea Zoologica, Tervuren*, *4*, 359–429.

Marlatt, C. L. (1908). The genus *Pseudaonidia*. *Proceedings of the Entomological Society of Washington*, *9*(1907), 131–141.

Martinez, F. R. H., Guanche, H. L., & Sanchez, A. C. (2021). Plagas forestales del arbolado urbano "Reparto Hermanos Cruz", Pinar del Rio, Cuba. *Avances*, *23*, 220–233.

Martins, D. D. S., Culik, M. P., & Wolff, V. R. D. S. (2004). New record of scale insects (Hemiptera: Coccoidea) as pests of papaya in Brazil. *Neotropical Entomology*, *33*, 655–657.

Martins, D. S., Fornazier, M. J., Culik, M. P., Ventura, J. A., Ferreira, P. S. F., & Zanuncio, J. C. (2014). Scale insect (Hemiptera: Coccoidea) pests of papaya (*Carica papaya*) in Brazil. *Annals of the Entomological Society of America*, *108*, 1–8.

Martins, D. S., Wolff, V. R. S., Culik, M. P., Santos, B. C., Fornazier, M. J., & Ventura, J. A. (2022). Diversity, distribution and host plants of armored scale insects (Hemiptera: Diaspididae) in Espírito Santo, Brazil. *Biota Neotropica*, *22*(2), e20211248. https://doi.org/10.1590/1676-0611-bn-2021-1248

Masten Milek, T., Šimala, M., & Koric, B. (2009). *The scale insects (Hemiptera: Coccoidea) of imported fruits in Croatia*. Zbornik predavanj in referatov 9. slovenskega posvetovanja o varstvu rastlin. Nova Gorica. 4-5. Marec, 2009. Ljubljana. 2009, 385–388.

Matile-Ferrero, D. (1978). Homoptères Coccoidea de l'Archipel des Comores. In L. Matile (Ed.), *Faune Entomologique de l'Archipel des Comores* (Vol. *109*, pp. 39–70). [Coccoidea Homoptera of the Comoro archipelago, Malagasy Republic.]. Mémoires du Museum National d'Histoire Naturelle (N.S.) Serie A, Zoologie.

Matile-Ferrero, D., & Étienne, J. (2006). Cochenilles des Antilles françaises et de quelques autres îles Caraïbes [Hemiptera, Coccoidea]. *Revue Française d'Entomologie*, *28*(4), 161–190.

McKenzie, H. L. (1956). The armored scale insects of California. *Bulletin of the California Insect Survey*, *5*, 1–209.

McKenzie, H. L. (2023). *The armored scale insects of California* (Vol. *5*). University of California Press.

Merrill, G. B., & Chaffin, J. (1923). Scale insects of Florida. *Quarterly Bulletin of the Florida State Plant Board*, *7*, 177–298.

Mestre Novoa, N., Hamon, A. B., Evans, G. A., Kondo, T., Oliver, P. H., Marrero, A. H., & Alonso, A. (2011). Los cocoideos (Hemiptera: Sternorrhyncha: Coccoidea) presentes en la Cordillera de Guaniguanico, Pinar del Rio, Cuba, y la relación con sus hospedantes. *Insecta Mundi*, *183*, 1–25.

Moraes, L. A. H., Porto, O. M., & Braun, J. (1995). Controle químico da cochonilha escama farinha dos citros *Unaspis citri* (Comstock, 1883) (Homoptera, Diaspididae). *Pesquisa Agropecuária Gaúcha, Porto Alegre*, *1*(1), 13–16.

Munro, J. A. Entomology problems in Bolivia. *Plant Protection Bulletin* F.A.O. 1954, 2:97-101.

Nakahara, S. (1982). *Checklist of the armored scales (Homoptera: Diaspididae) of the conterminous United States*. United States Department of Agriculture, Animal and Plant Health Inspection Service.

National Plant Protection Organisation (NPPO) of Croatia. (2024). *Re: EFSA request of information on pest status*. 27 November 2024.

National Plant Protection Organisation (NPPO) of Netherlands. (2024). *Re: EFSA request of information on pest status*. 26 November 2024.

NCBI (National Center for Biotechnology Information). (online). National Library of Medicine. https://www.ncbi.nlm.nih.gov
Newstead, R. (1901). Observations on Coccidae (no. 19). *Entomologist's Monthly Magazine*, *37*, 81–86. https://doi.org/10.5962/bhl.part.27060
Normark, B. B., Morse, G. E., Krewinski, A., & Okusu, A. (2014). Armored scale insects (Hemiptera: Diaspididae) of San Lorenzo National Park, Panama, with descriptions of two new species. *Annals of the Entomological Society of America*, *107*, 37–49.
Normark, B. B., Okusu, A., Morse, G. E., Peterson, D. A., Itioka, T., & Schneider, S. A. (2019). Phylogeny and classification of armored scale insects (Hemiptera: Coccomorpha: Diaspididae). *Zootaxa*, *4616*(1), 1–98. https://doi.org/10.11646/zootaxa.4616.1.1
Oliveira, C. M., Auad, A. M., Mendes, S. M., & Frizzas, M. R. (2013). Economic impact of exotic insect pests in Brazilian agriculture. *Journal of Applied Entomology*, *137*, 1–12.
Perruso, J. C., & Cassino, P. C. R. (1993). Population dynamics of *Selenaspidus articulatus* (Morg.) (Homoptera: Diaspididae) on *Citrus sinensis* (L.) in Rio de Janeiro. *Anais da Sociedade Entomologica do Brasil*, *22*, 401–404.
Peterson, D. A., Hardy, N. B., Morse, G. E., Itioka, T., Wei, J., & Normark, B. B. (2020). Nonadaptive host-use specificity in tropical armored scale insects. *Ecology and Evolution*, *10*(23), 12910–12919. https://doi.org/10.1002/ece3.6867
Pickles, A. (1942). *Plant Pests*. Administration Report Director Agricultural Trinidad & Tobago. 1942:11.
Pickles, A. (1946). *Entomology*. Administration Report Director Agricultural Trinidad & Tobago. 1946:17–18.
Ramos-Portilla, A. A., & Caballero, A. (2017). Diaspididae on *Citrus* spp. (Rutaceae) from Colombia: New records and a taxonomic key to their identification. *Revista Facultad Nacional de Agronomía—Medellín*, *70*(2), 8139–8154. https://doi.org/10.15446/rfna.v70n2.64519
Ratnasingham, S., Wei, C., Chan, D., Agda, J., Agda, J., Ballesteros-Mejia, L., Ait Boutou, H., El Bastami, Z. M., Ma, E., Manjunath, R., Rea, D., Ho, C., Telfer, A., McKeowan, J., Rahulan, M., Steinke, C., Dorsheimer, J., Milton, M., & Hebert, P. D. N. (2024). Chapter 26. BOLD v4: A centralized bioinformatics platform for DNA-based biodiversity data. In *DNA barcoding: Methods and protocols* (pp. 403–441). Springer US. https://bench.boldsystems.org/index.php
Ritchie, A. H. (1929). *Control of plant pests and diseases*. *Report. Department of Agriculture*, Tanganyika Territory 1927–1928, pp. 34–40.
Rosen, D. (1990). *Armored scale insects, their biology, natural enemies and control World Crop Pests* (Vol. *4A*,*B*). Elsevier.
Rosen, M., & DeBach, P. (1978). *Diaspididae in introduced parasites and predators of arthropod pests and weeds: A world review*, USDA Agriculture Hand Book No. 480, pp. 78–128.
Rubel, F., Brugger, K., Haslinger, K., & Auer, I. (2017). The climate of the European Alps: Shift of very high resolution Köppen-Geiger climate zones 1800–2100. *Meteorologische Zeitschrift*, *26*(2), 115–125.
Russo, G. (1927). Dominican Republic: Chief insects harmful to crops. *International Bulletin of Plant Protection*, *1*, 108–110.
Sayers, E. W., Cavanaugh, M., Clark, K., Pruitt, K. D., Sherry, S. T., Yankie, L., & Karsch-Mizrachi, I. (2024). GenBank 2024 update. *Nucleic Acids Research*, *52*(D1), D134–D137. https://doi.org/10.1093/nar/gkad903
Schneider, S. A., Okusu, A., & Normark, B. B. (2018). Molecular phylogenetics of Aspidiotini armored scale insects (Hemiptera: Diaspididae) reveals rampant paraphyly, curious species radiations, and multiple origins of association with Melissotarsus ants (Hymenoptera: Formicidae). *Molecular Phylogenetics and Evolution*, *129*, 291–303. https://doi.org/10.1016/j.ympev.2018.09.003
Silva, J. F., Pereira, J. M., das Chagas, D. F., Cardoso, V. P., & Rodrigues, O. D. (2020). Population fluctuation of *Selenaspidus articulatus* Morgan (Hemiptera: Diaspididae) in rubber tree. *Floresta e Ambiente*, *27*(1), e20170735. https://doi.org/10.1590/2179-8087.073517
Silvestri, F. (1914). A contribution to the knowledge of the insects of the olive in Eritrea and South Africa. *Bollettino del Laboratorio di Zoologia Generale e Agrarian Della R. Scuola Superiore d'agricoltura in Portici*, *9*, 240–334.
Skeete, C. C. (1925). *The Cotton Industry; entomological work*. Report. Agricultural Department, Barbados, 1924–25: 5–6; 9–10 pp.
Smith, M. R. (1942). The relationship of ants and other organisms to certain scale insects on coffee in Puerto Rico. *Journal of Agriculture of the University of Puerto Rico*, *26*, 21–27.
Soares, M. A., Marchior, L. C., & Cassino, P. C. R. (1998). Seasonal variation of *Selenaspidus articulatus* (Morgan, 1889) (Homoptera, Diaspididae) in Citrus reticulata Blanco, at the UFRRJ campus. *Floresta e Ambiente*, *5*, 124–129.
Suh, S.-J. (2009). Intercepted armored scales (Hemiptera: Diaspididae) on imported plants at the ports of entry in the Republic of Korea. *Acta Entomologica Sinica*, *52*, 1039–1053.
Suh, S.-J. (2016). Armoured scale insects (Hemiptera: Diaspididae) intercepted at the ports of entry in the Republic of Korea over the last 20 years. *EPPO Bulletin*, *46*, 313–331.
Toy, S. J., & Newfield, M. J. (2010). The accidental introduction of invasive animals as hitchhikers through inanimate pathways: A New Zealand perspective. *Revue scientifique et technique (International Office of Epizootics)*, *29*(1), 123–133.
TRACES-NT. (online). *TRADE control and expert system*. https://webgate.ec.europa.eu/tracesnt
Waltman, K. G., Ray, C. H., Jr., & Williams, M. L. (2016). *The armored scale insects (Hemiptera Diaspididae) of Alabama, USA*. http://www.redia.it/images/stories/pdf2016/32%20Waltman%20corr%201__pdf
Watanabe, M. A., Yoshii, C., & Siloto, R. C. (1994). Parasitism of the scale insect *Selenaspidus articulatus* (Morgan, 1889) (Hemiptera/Homoptera, Diaspididae) on *Citrus* in the regions of Jaguariuna and Limeira, SP. *Revista de Agricultura (Piracicaba)*, *69*, 193–200.
Watson, G. W. (2001). A pictorial key to important Diaspididiae (Hemiptera: Coccoideea) of the world. *Bollettino di Zoologia Agraria e di Bachicoltura (Milano) (Ser. II)*, *33*(3), 175–178.
Watson, G. W. (2002). Arthropods of economic importance – Diaspididae of the World. https://diaspididae.linnaeus.naturalis.nl/linnaeus_ng/app/views/species/taxon.php?id=113131
Wester, P. J. (1918). The coconut, its culture and uses. *Philippine Agricultural Review*, *11*, 5–57.
Williams, D. J., & Watson, G. W. (1988). *The scale insects of the tropical South Pacific region. Pt. 1. The Armoured sScales (Diaspididae)*. CAB International.

How to cite this article: EFSA PLH Panel (EFSA Panel on Plant Health), Vicent Civera, A., Baptista, P., Berlin, A., Chatzivassiliou, E., Cubero, J., Cunniffe, N., de la Peña, E., Desneux, N., Di Serio, F., Filipiak, A., Gonthier, P., Hasiów-Jaroszewska, B., Jactel, H., Landa, B. B., Maistrello, L., Makowski, D., Milonas, P., Papadopoulos, N., … Sfyra, O. (2025). Pest categorisation of *Selenaspidus articulatus*. EFSA Journal, *23*(5), e9382. https://doi.org/10.2903/j.efsa.2025.9382

APPENDIX A

Selenaspidus articulatus host plants/species on which it has been found

Host plant records based on literature.

Host status	Host name	Plant family	Common name	References
Cultivated hosts	*Acacia* sp.	Fabaceae		Dekle (1965)
	Achras sapota	Sapotaceae		Clavijo (1977)
	Aglaonema commutatum	Araceae	Chinese evergreen, silver queen aglaonema	Dekle (1965)
	Aleurites moluccanus	Euphorbiaceae	Candle nut, Indian walnut, varnish tree	Gómez-Menor (1941, as cited in Garcia Morales et al., 2016)
	Allamanda cathartica	Apocynaceae	Butter cup, common trumpetvine, golden trumpet, yellow allamanda	Clavijo (1977)
	Anacardium occidentale	Anacardiaceae	Cashew, cashew apple, cashew nut	Clavijo (1977)
	Anacardium sp.	Anacardiaceae		Watson (2002)
	Annona atemoya	Annonaceae	Pineapple sugar apple	Martins et al. (2022)
	Annona cherimola	Annonaceae	Cherimoya, custard apple, graviola, sugar apple, sweet apple	Bartra (1974)
	Annona muricata	Annonaceae	Prickly custard apple, soursop	Bartra (1974)
	Annona sp.	Annonaceae		Watson (2002)
	Annona squamosa	Annonaceae	Cachiman, Cuban sugar apple, custard apple, sugar apple, sweetsop	Dekle (1965)
	Antidesma sp.	Phyllanthaceae		Watson (2002)
	Apeiba aspera	Malvaceae		Normark et al. (2019)
	Apeiba tibourbou	Malvaceae	Tobago sandbox	Normark et al. (2019)
	Ardisia crenata	Primulaceae	Coral berry	Mamet (1958)
	Ardisia sp.	Primulaceae		Watson (2002)
	Areca sp.	Arecaceae		TRACES-NT (online); EUROPHYT (online)
	Artocarpus heterophyllus	Moraceae	Jackfruit	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Artocarpus sp.	Moraceae		Mamet (1958)
	Arundina graminifolia (= *Arundina bambusifolia*)	Orchidaceae	Bamboo orchid	Williams and Watson (1988, as cited in Garcia Morales et al. 2016)
	Arundinaria sp.	Orchidaceae		Watson (2002)
	Beaucarnea guatemalensis	Asparagaceae	Guatemala ponytail, ponytail tree, red ponytail palm	Jansen and Alferink (2023)
	Benkara scandens (= *Gardenia scandens*)	Rubiaceae		Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Bignonia sp.	Bignoniaceae		Watson (2002)
	Brosimum utile	Moraceae	Cow tree, milk tree	Normark et al. (2014)
	Brunfelsia americana	Solanaceae	Lady of the night	Dekle (1965)
	Brunfelsia nitida	Solanaceae		Merrill and Chaffin (1923, as cited in Garcia Morales et al., 2016)
	Brunfelsia sp.	Solanaceae		Watson (2002)
	Brunfelsia uniflora	Solanaceae	Manaca rain tree, vegetable mercury	Martins et al. (2022)
	Bulbostylis (= *Stenophyllus*)	Cyperaceae		Mamet (1958)

(Continued)

Host status	Host name	Plant family	Common name	References
	Bursera simaruba	Burseraceae	Gumbo limbo	Dekle (1965)
	Calathea sp.	Marantaceae		Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Calea sp.	Asteraceae		Watson (2002)
	Camellia japonica	Theaceae	Camellia, Japanese camellia	Clavijo (1977)
	Camellia sinensis	Theaceae	Tea, tea plant	Mamet (1958)
	Campsis radicans (= *Tecoma radicans*)	Bignoniaceae	Cow itch vine, hummingbird vine, red trumpet vine, trumpet creeper, trumpet vine	Mamet (1958)
	Canna generalis	Cannaceae	Canna lily	Clavijo (1977)
	Carapa guianensis	Meliaceae	Crab oil tree, Guiana crabwood	Normark et al. (2014)
	Carica papaya	Caricaceae	Papaw, papaya, pawpaw, tree melon	Martins et al. (2004)
	Carissa macrocarpa (= *Carissa grandiflora)*	Apocynaceae	Big num-num, carissa, large num-num, Natal plum	Brain (1918, as cited in Garcia Morales et al., 2016)
	Carissa sp.	Apocynaceae		Watson (2002)
	Carissa spinarum (= *Carissa edulis*)	Apocynaceae	Bush plum, conkerberry, simple-spined num-num	Mamet (1958)
	Castilla sp.	Moraceae		de Seabea (1917)
	Ceratonia siliqua	Fabaceae	Carob, carob tree, locust bean, locust tree, St John's bread	Mamet (1958)
	Ceratonia sp.	Fabaceae		Watson (2002)
	Cespedesia macrophylla	Ochnaceae		Normark et al. (2019)
	Cestrum sp.	Solanaceae	Jessamine	Dekle (1965)
	Chamaerops humilis	Arecaceae	Dwarf fan palm, Mediterranean palm palmetto	Dekle (1965)
	Chrysobalanus icaco	Chrysobalanaceae	Coco plum	Clavijo (1977)
	Chrysophyllum argenteum	Sapotaceae	Bris	Normark et al. (2019)
	Chrysophyllum oliviforme	Sapotaceae	Satin leaf	Mestre Novoa et al. (2011)
	Chrysophyllum sp.	Sapotaceae		Watson (2002) Marlatt (1908, as cited in Garcia Morales et al., 2016)
	Citrulus sinensis	Cucurbitaceae		Loayza et al. (2003, ARTIFICIAL)
	Citrus aurantifolia	Rutaceae	Lime	Ceballos and Hernández (1988)
	Citrus aurantium	Rutaceae	Bitter orange, sour orange	de la Hoz González (1983)
	Citrus japonica (= *Fortunella japonica*)	Rutaceae	Kumquat	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Citrus latifolia	Rutaceae	Tahiti lime, Persian lime	Cassino and Rodrigues (2005)
	Citrus limon	Rutaceae	Lemon	Ceballos and Hernández (1986)
	Citrus maxima (= *Citrus decumana*)	Rutaceae	Pomelo	Mamet (1958)
	Citrus nobilis	Rutaceae	Tangor	Gowdey (1921)
	Citrus paradisi	Rutaceae	Grapefruit	Ceballos and Hernández (1986)
	Citrus reticulata	Rutaceae	Mandarin orange, mandarin, mandarine, tangerine	Soares et al. (1998)
	Citrus sinensis	Rutaceae	Sweet orange	de la Hoz González (1983)
	Citrus sinensis x Citrus reticulata	Rutaceae		Fischer et al. (2009)

(Continued)

(Continued)

Host status	Host name	Plant family	Common name	References
	Citrus sp.	Rutaceae	Citrus	Campos (1993)
	Claoxylon sp.	*Euphorbiaceae*		Watson (2002)
	Cocos nucifera	Arecaceae	Coconut palm	Beingolea (1994)
	Codiaeum sp.	Euphorbiaceae		Watson (2002)
	Codiaeum variegatum	Euphorbiaceae	Croton	Dekle (1965)
	Coffea arabica	Rubiaceae	Arabian coffee, coffee tree	de la Hoz González (1983)
	Coffea canephora (= *Coffea robusta*)	Rubiaceae	Congo coffee/ robusta coffee	Mamet (1958)
	Coffea liberica	Rubiaceae	Liberian coffee	Bodkin (1914)
	Coffea macrocarpa	Rubiaceae		Mamet (1958)
	Coffea sp.	Rubiaceae		Dziedzicka and Karnkowski (1990)
	Cordyline sp.	Asparagaceae		Watson (2002)
	Cordyline fruticose (= *Cordyline terminalis*)	Asparagaceae	Common dracaena	Laranjeira (1997)
	Croton sp.	Euphorbiaceae		McKenzie (1956)
	Cucurbita ficifolia	Cucurbitaceae	Figleaf gourd, malabar gourd, malabar gourd	Herrera Aranguena (1964)
	Cucurbita pepo	Cucurbitaceae	Edible gourd, garden marrow, pumpkin, summer squash	Ceballos and Hernández (1986)
	Cupania scrobiculata	Sapindaceae		Peterson et al. (2020)
	Cycas circinalis	Cycadaceae	Cycad fern palm, false sago, fern palm	Bartra (1974)
	Cycas sp.	Cycadaceae		Watson (2002)
	Decaspermum sp.	Myrtaceae		Watson (2002) Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Dictyosperma album	Arecaceae	Hurricane palm, princess palm, Reunion white palm	McKenzie (1956)
	Dictyosperma sp.	Arecaceae		Watson (2002)
	Diospyros kaki	Arecaceae	Kaki, kaki plum, persimmon	Clavijo (1977)
	Dovyalis caffra (= *Aberia caffra*)	Salicaceae	Kei apple	Greathead (1976)
	Dovyalis sp.	Salicaceae		Watson (2002)
	Dracaena sp.	Asparagaceae		Watson (2002)
	Dussia	Fabaceae		Normark et al. (2019)
	Dypsis decaryi (= *Neodypsis decaryi*)	Arecaceae	Triangle palm	Mamet (1958)
	Dypsis lutescens (= *Chrysalidocarpus lutescens*)	Arecaceae		Martins et al. (2022)
	Dypsis sp. (= *Neodypsis* sp.)	Arecaceae		Mamet (1958)
	Elaeis guineensis	Arecaceae	African oil palm, oil palm, palm oil tree	Mamet (1958)
	Elaeis sp.	Arecaceae		Watson (2002)
	Englerophytum magalismontanum (= *Chrysophyllum argyrophyllum*)	Sapotaceae		Mamet (1958)
	Eriobotrya sp.	Rosaceae		Watson (2002)
	Eucalyptus sp.	Myrtaceae		Watson (2002)
	Eugenia jambos	Myrtaceae	Malabar plum, Malay applerose apple	Clavijo (1977)

(Continued)

Host status	Host name	Plant family	Common name	References
	Eugenia sp.	Myrtaceae	Lithomyrtus	Watson (2002) Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Eugenia uniflora	Myrtaceae	Pitanga, Surinam cherry	Martins et al. (2022)
	Ficus benjamina (= *Ficus nitida*)	Moraceae	Benjamin's fig, Benjamin tree;ficus tree, Java fig;small-leaved rubber plant, tropical laurel, weeping fig	Beingolea (1994)
	Ficus carica	Moraceae	Common fig	Dekle (1965)
	Ficus lutea (= *Ficus verrucocarpa*)	Moraceae	Giant-leaved fig	Mamet (1958)
	Ficus retusa	Moraceae	Chinese banyan, glossy-leaf fig, Malay bayan	Dekle (1965)
	Ficus sp.	Moraceae		Dziedzicka and Karnkowski (1990)
	Ficus thonningii (= *Ficus hochstetteri*)	Moraceae		Mamet (1958)
	Fortunella sp.	Rutaceae		Watson (2002) Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Furcraea sp.	Asparagaceae		Watson (2002)
	Garcinia ovalifolia	Clusiaceae		Mamet (1958)
	Garcinia sp.	Clusiaceae		Watson (2002)
	Gardenia jasminoides	Rubiaceae	Cape jasmine, Cape jessamine, common gardenia, gardenia	Clavijo (1977)
	Gardenia sp.	Rubiaceae		McKenzie (1956)
	Gliricidia sepium	Fabaceae	Mexican lilac, Nicaraguan cocoa shade tree, quick stick	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Gliricidia sp.	Fabaceae		Watson (2002)
	Gossypium sp.	Malvaceae		de la Hoz González (1983)
	Guatteria dumetorum	Annonaceae		Normark et al. (2019)
	Hedera helix	Araliaceae	Common ivy, English ivy, ivy	Mamet (1958)
	Hedera sp.	Araliaceae		Watson (2002)
	Hedychium sp.	Zingiberaceae		Watson (2002)
	Hevea brasiliensis	Euphorbiaceae	Rubber tree, Brazilian rubber tree, para rubber, para rubber tree,	Bergmann et al. (1988)
	Hevea sp.	Euphorbiaceae		Beingolea (1994)
	Hibiscus syriacus	Malvaceae	Althaea, blue hibiscus, rose of sharon	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Hibiscus spp.	Malvaceae		Mamet (1958)
	Homalocladium platycladum	Polygonaceae	Centipede plant	Houser (1918, as cited in Garcia Morales et al., 2016)
	Howea sp.	Arecaceae		Watson (2002)
	Hyphaene sp.	Arecaceae		Watson (2002)
	Hyphaene thebaica	Arecaceae	Egyptian doum palm	Mamet (1958)
	Ixora sp.	Moraceae		Watson (2002)
	Ixora coccinea	Rubiaceae	Flame of woods	Newstead (1901); Mamet (1958)
	Jacaranda acutifolia	Bignoniaceae	Fernleaf jacaranda, sharpleaf jacaranda	Dekle (1965)
	Jacquemontia sp.	Convolvulaceae		Watson (2002)
	Jasminum polyanthum	Oleaceae		EFSA PLH (2022)

(Continued)

(Continued)

Host status	Host name	Plant family	Common name	References
	Jasminum sp.	Oleaceae		Mamet (1958)
	Labramia bojeril (= *Mimusops chapelieri*)	Sapotaceae		Martins et al. (2022)
	Lagerstroemia indica	Lythraceae	Cannonball, carrion tree, crepe myrtle	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Lagerstroemia sp.	Lythraceae		Watson (2002)
	Laureola indica	Armadillidae		Merrill and Chaffin (1923, as cited in Garcia Morales et al., 2016)
	Laurelia sp.	Atherospermataceae		Merrill and Chaffin (1923, as cited in Garcia Morales et al., 2016)
	Laurus nobilis	Lauraceae	Apollo laurel, bay laurel, Grecian laurel, Greek laurel	Clavijo (1977)
	Lawsonia sp.	Lythraceae	Henna	Dekle (1965)
	Ligustrum lucidum	Oleaceae	Broad-leaf privet, Chinese privet, glossy privet	Dekle (1965)
	Ligustrum sp.	Oleaceae		Dziedzicka and Karnkowski (1990)
	Litchi chinensis	Sapindaceae	Litchee	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Lonchocarpus heptaphyllus (= *Lonchocarpus latifolius*)	Fabaceae		Peterson et al. (2020)
	Lonchocarpus sp.	Fabaceae		Watson (2002)
	Maclura sp.	Moraceae		Watson (2002)
	Magnolia grandiflora	Magnoliaceae	Bull bay, evergreen magnolia	Houser (1918, as cited in Garcia Morales et al., 2016)
	Magnolia sp.	Magnoliaceae		Dziedzicka and Karnkowski (1990)
	Malachra spp.	Malvaceae		Watson (2002)
	Malpighia emarginata	Malpighiaceae	Acerola	Martins et al. (2022)
	Malpighia glabra	Malpighiaceae	Barbados cherry	Clavijo (1977)
	Malpighia urens	Malpighiaceae	Cow havecherry	Gómez-Menor (1941, as cited in Garcia Morales et al., 2016)
	Mammea americana	Calophyllaceae	Mamey apple, mamey sapote	Bartra (1974)
	Mammea sp.	Clusiaceae		Watson (2002)
	Mangifera indica	Anacardiaceae	Mango	Bartra (1974)
	Mangifera sp.	Anacardiaceae		Dziedzicka and Karnkowski (1990)
	Manihot sp.	Euphorbiaceae		Watson (2002)
	Maquira guianensis	Moraceae		Peterson et al. (2020)
	Mascarenhasia arborescens	Apocynaceae		Mamet (1958)
	Mascarenhasia sp.	Apocynaceae		Watson (2002)
	Matayba sp.	Sapindaceae		Watson (2002)
	Maytenus oleoides (= *Celastrus laurinus*)	Celastraceae	Celastraceae	Marlatt (1908, as cited in Garcia Morales et al., 2016)
	Melaleuca sp.	Myrtaceae		Clavijo (1977)
	Melirocca bijuga	Sapindaceae		Dekle (1965)
	Metopium toxiferum	*Anacardiaceae*	Florida poisonwood	Dekle (1965)
	Mimosa caesalpiniaefolia	Fabaceae		Laranjeira (1997)
	Mimusops sp.	Sapotaceae		Watson (2002)
	Mortoniodendron anisophyllum	Malvaceae		Normark et al. (2019)
	Murraya sp.	Rutaceae	Chalcas	Dekle (1965)
	Musa paradisiaca (= *Musa sapientum*)	Musaceae	Banana	Gómez-Menor (1941, as cited in Garcia Morales et al., 2016)

(Continued)

Host status	Host name	Plant family	Common name	References
	Musa sp.	Musaceae		Dekle (1965) Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Myrtus communis	Myrtaceae	Myrtle	de Azeredo et al. (2004)
	Nectandra purpurea	Lauraceae		Normark et al. (2014)
	Nephelium sp.	Sapindaceae		Watson (2002) Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Nerium oleander	Apocynaceae	Oleander	Beingolea (1994)
	Nerium sp.	Apocynaceae		Watson (2002)
	Olea chrysophylla	Oleaceae	African olive, wild olive	de Azeredo et al. (2004)
	Olea europea	Oleaceae	Olive	Beingolea (1994); Mamet (1958)
	Olea sp.	Oleaceae		McKenzie (1956)
	Pandanus sp.	Pandanaceae		Dziedzicka and Karnkowski (1990)
	Passiflora edulis	Passifloraceae	Common passion fruit, granadilla, passion fruit	Bartra (1974)
	Persea americana	Lauraceae	Avocado, alligator pear	Bartra (1974)
	Persea gratissima	Lauraceae		Beingolea (1994)
	Persea sp.	Lauraceae		McKenzie (2023)
	Phaseolus spp.	Fabaceae		Watson (2002) Mamet (1958)
	Phoenix dactylifera	Arecaceae	Common date palm	Watson (2002)
	Phoenix sp.	Arecaceae	Palm	Dekle (1965)
	Phoenix roebelenii	Arecaceae	Dwarf date palm, miniature date palm	Jansen and Alferink (2023)
	Pilea sp.	Urticaceae		Watson (2002)
	Pilea urticifolia	Urticaceae		Mamet (1958)
	Pinus spp	Pinaceae	Pine	Dekle (1965)
	Piper nigrum	Piperaceae	Black pepper	Bartra (1974)
	Plumeria rubra (= *Plumeria acutifolia*)	Apocynaceae	Frangipani, red frangipani, temple tree	Mamet (1958)
	Plumeria sp.	Apocynaceae		Watson (2002)
	Poulsenia armata	Moraceae		Normark et al. (2019)
	Prunus sp.	Rosaceae	Hog plum	Dekle (1965)
	Psidium guajava	Myrtaceae	Common guava, guava, yellow guava	Marlatt (1908, as cited in Garcia Morales et al., 2016)
	Punica granatum	Lythraceae	Pomegranate	Dekle (1965)
	Rosa sp.	Rosaceae		Clavijo (1977); McKenzie (1956)
	Saccharum officinarum	Poaceae	Sugarcane	Watson (2002) Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Salvadora persica	Salvadoraceae	Mustard tree, toothbrush tree	Malenotti (1916)
	Sambucus sp.	Adoxaceae		Dziedzicka and Karnkowski (1990)
	Schinus molle	Anacardiaceae	California pepper tree, pepper tree, Peruvian mastic	Mamet (1958)
	Schinus sp.	Anacardiaceae		Watson (2002)
	Senna alata (= *Cassia alata)*	Fabaceae	Akapulko, candelabra bush, candlebush	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Simarouba glauca	Simaroubaceae	Bitterwood, paradise tree	Dekle (1965)
	Sloanea meianthera	Elaeocarpaceae		Normark et al. (2019)
	Swietenia macrophylla	Meliaceae	Broad-leaved mahogany, Honduras mahogany	Beingolea (1994)

(Continued)

(Continued)

Host status	Host name	Plant family	Common name	References
	Swietenia mahagoni	Meliaceae	Cuban mahogany, West Indies mahogany	de la Hoz González (1983)
	Swietenia sp.	Meliaceae		Watson (2002)
	Syzygium jambos	Myrtaceae	Malabar plum, Malay apple, rose apple, wax jambu	Mestre Novoa et al. (2011)
	Tabernaemontana arborea	Apocynaceae	Wild orange jessamine	Peterson et al. (2020)
	Tabernaemontana divaricata	Apocynaceae	Butterfly gardenia, Ceylon jessamine, coffee rose	Martins et al. (2022)
	Tabernaemontana sp.	Apocynaceae		Merrill and Chaffin (1923, as cited in Garcia Morales et al., 2016)
	Tamarindus indica	Fabaceae	Indian date, Indian tamarind, tamarind	Beingolea (1994)
	Tamarindus sp.	Fabaceae		Watson (2002) Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Tambourissa sp.	Monimiaceae		Watson (2002); Matile-Ferrero (1978, as cited in Garcia Morales et al., 2016)
	Tapirira guianensis	Anacardiaceae		Normark et al. (2019)
	Theobroma cacao	Malvaceae	Cacao, cacao tree, chocolate tree	Martins et al. (2022)
	Theobroma sp.	Malvaceae		Watson (2002)
	Thespesia populnea	Malvaceae	Cork tree, Indian tulip tree, milo, Pacific rosewood	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Thespesia sp.	Malvaceae		Watson (2002)
	Tilia sp.	Tiliaceae		Dziedzicka and Karnkowski (1990)
	Tocoyena pittieri	Rubiaceae		Normark et al. (2019)
	Trattinnickia aspera	Burseraceae		Peterson et al. (2020)
	Tricalysia sp.	Rubiaceae		Watson (2002)
	Trichilia emetica	*Meliaceae*	Ethiopian mahogany	Almeida (1971, as cited in Garcia Morales et al., 2016)
	Virola multiflora	Myristicaceae		Normark et al. (2014)
	Viscum tuberculatum	Santalaceae		Silvestri (1914)
	Vitis vinifera	Vitaceae	Grape, grapevine	Bartra (1974)
	Washingtonia sp.	Arecaceae	Palm tree	Watson (2002)
	Xanthosoma sagittifolium	Araceae	Micky Mouse taro, tannia, yellow ocumo, yellow yautia, arrowleaf elephant ear	Watson (2002)
	Xylocarpus granatum (= *Xylocarpus obovatus*)	Meliaceae	Apple mangrove, cannonball mangrove, cannonball tree, cedar mangrove, monkey puzzle fruit	Malenotti (1916)
	Ziziphus mauritiana	Rhamnaceae		Matile-Ferrero and Étienne (2006)
Wild weed hosts	*Acalypha* sp.	Euphorbiaceae		Watson (2002)
	Acalypha wilkesiana (= *Acalypha tricolor*)	Euphorbiaceae	Beefsteak plant, copperleaf, fire dragon, Jacob's coat, Joseph's coat	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Averrhoa bilimbi	Oxalidaceae	Bilimbi	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Averrhoa carambola	Oxalidaceae	Caramba, carambola, Chinese gooseberry, country gooseberry, star fruit	Martins et al. (2022)

(Continued)

Host status	Host name	Plant family	Common name	References
	Averrhoa sp.	Oxalidaceae		Watson (2002)
	Barringtonia sp.	Lecythidaceae		Watson (2002)
	Barringtonia asiatica	Lecythidaceae	Sea poison tree	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Bauhinia purpurea	Fabaceae	Australian orchid tree, bauhinia, bull hoof tree, butterfly tree, camel's foot tree, fall orchid tree, purple orchid tree	Mamet (1958)
	Bauhinia sp.	Fabaceae	Camel's foot	Almeida (1973, as cited in Garcia Morales et al., 2016)
	Bauhinia variegata	Fabaceae	Buddhist bauhinia, mountain ebony, orchid tree, poor man's orchid, sping orchid tree	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Calophyllum antillanun	Calophyllaceae		Martinez et al. (2021)
	Calophyllum calaba	Calophyllaceae	Brazil beauty leaf, calaba oil plant	Houser (1918, as cited in Garcia Morales et al., 2016)
	Calophyllum inophyllum	Calophyllaceae	Alexandrian laurel, beach calophyllum, beauty leaf	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Calophyllum longifolium	Calophyllaceae		Normark et al. (2014)
	Calophyllum sp.	Calophyllaceae		Watson (2002)
	Excoecaria sp.	Euphorbiaceae		Watson (2002)
	Lantana sp.	Verbenaceae		Watson (2002)
	Lantana camara	Verbenaceae	Lantana	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Spondias dulcis	Anacardiaceae	Ambarella, golden apple, great hog plum	Williams and Watson (1988, as cited in Garcia Morales et al., 2016)
	Spondias purpurea	Anacardiaceae	Purple mombin, red mombin, Spanish plum tree	Merrill and Chaffin (1923, as cited in Garcia Morales et al., 2016)
	Spondias sp.	Anacardiaceae		Watson (2002)

APPENDIX B

Distribution of *Selenaspidus articulatus*

Distribution records based on literature.

Region	Country	Sub-national (e.g. state)	Status	References
EU	Netherlands		Present (few occurrences)	NPPO of Netherlands (2024)
North America	Antigua		Present	CABI (1981); Watson (2002)
	Bahamas		Present	Watson (2002)
	Barbados		Present	CABI (1981); Dash (1916); Skeete (1925); Watson (2002)
	Belize		Present	Watson (2002)
	Bermuda		Present	CABI (1981); Watson (2002)
	Costa Rica		Present	CABI (1981); Watson (2002); Jansen and Alferink (2023)
	Cuba		Present	González et al. (1991)
	Dominica		Present	Deslandes and Chalot (1913); CABI (1981); Watson (2002)
	Dominican Republic		Present	Russo (1927)
	El Salvador		Present	CABI (1981); Watson (2002)
	Grenada		Present	CABI (1981); Watson (2002)
	Guadeloupe		Present	CABI (1981); Watson (2002)
	Guatemala		Present	CABI (1981); Watson (2002); Jansen and Alferink (2023)
	Haiti		Present	CABI (1981); Watson (2002)
	Honduras		Present	CABI (1981); Jansen (1995); Watson (2002); Jansen and Alferink (2023)
	Jamaica		Present	Gowdey (1924); CABI (1981); Watson (2002)
	Martinique		Present	CABI (1981); Watson (2002)
	Mexico	Chiapas	Present	Watanabe et al. (1994)
	Montserrat		Present	CABI (1981); Watson (2002)
	Nicaragua		Present	CABI (1981)
	Panama		Present	Normark et al. (2014)
	Puerto Rico		Present	Smith (1942)
	Saint Lucia		Present	Malumphy (2014)
	Saint Vincent and the Grenadines		Present	Fennah (1941)
	USA	Alabama	Present	Waltman et al. (2016)
	USA	Florida	Present	Normark et al. (2019)
	USA	Virgin Islands	Present	Fleury (1932)
South America	Bolivia		Present	Munro (1954); CABI (1981); Watson (2002)
	Brazil	Amapa	Present	Almeida et al. (2018); Martins et al. (2022)
	Brazil	Amazonas	Present	Almeida et al. (2018); Silva et al. (2020); Martins et al. (2022)
	Brazil	Bahia	Present	Martins et al. (2014); Martins et al. (2022)
	Brazil	Espirito Santo	Present	Culik et al. (2008); Martins et al. (2022)
	Brazil	Goiás	Present	Silva et al. (2020)
	Brazil	Minas Gerais	Present	Fischer et al. (2009)

(Continued)

Region	Country	Sub-national (e.g. state)	Status	References
	Brazil	Pará	Present	Martins et al. (2014); Almeida et al. (2018); Martins et al. (2022)
	Brazil	Paraná	Present	de Albuquerque et al. (2002)
	Brazil	Rio Grande Do Norte	Present	Martins et al. (2004); Martins et al. (2014)
	Brazil	Rio Grande do Sul	Present	Silva et al. (2020)
	Brazil	Rio Grande Do Norte	Present	Perruso and Cassino (1993)
	Brazil	Rio de Janeiro	Present	Cassino and Rodrigues (2005)
	Brazil	São Paulo	Present	Fischer et al. (2009)
	Colombia		Present	Agudelo and Falcon (1977)
	Ecuador		Present	Lincango et al. (2010)
	Guyana		Present	Cassino and Rodrigues (2005)
	Peru		Present	Herrera Aranguena (1964)
	Suriname		Present	CABI (1981); Watson (2002); Jansen and Alferink (2023)
	Trinidad and Tobago		Present	Pickles (1942); Pickles (1946); CABI (1981); Watson (2002); Normark et al. (2019)
	Venezuela		Present	Clavijo (1977); CABI (1981)
Africa	Angola		Present	CABI (1981)
	Benin		Present	CABI (1981); Watson (2002)
	Cameroon		Present	CABI (1981); Watson (2002)
	Chad		Present	Watson (2002)
	Comoros		Present	Cassino and Rodrigues (2005)
	Congo Democratic Republic		Present	Watson (2002)
	Cote d' Ivoire		Present	CABI (1981); Watson (2002)
	Eritrea		Present	Silvestri (1914)
	Ethiopia		Present	Abate (1991); CABI (1981); Watson (2002)
	Ghana		Present	Normark et al. (2019)
	Guinea		Present	CABI (1981); Watson (2002)
	Kenya		Present	Greathead (1976)
	La Reunion		Present	CABI (1981)
	Madagascar		Present	CABI (1981); Watson (2002)
	Mali		Present	CABI (1981); Watson (2002)
	Mauritius		Present	CABI (1981); Watson (2002)
	Mozambique		Present	CABI (1981); Watson (2002)
	Niger		Present	CABI (1981); Watson (2002)
	Nigeria		Present	CABI (1981); Watson (2002)
	São Tome and Principe		Present	de Seabea (1917); de Seabea and Vayssiere (1918); de Seabra (1919); CABI (1981)
	Sierra Leone		Present	Hargreaves (1927); Hargreaves (1936); CABI (1981); Watson (2002)
	Somalia		Present	Malenotti (1916)
	South Africa		Present	CABI (1981); Watson (2002)
	South Sudan		Present	CABI (1981)
	Sudan		Present	Watson (2002)
	Togo		Present	CABI (1981); Watson (2002)
	Uganda		Present	Greathead (1976)

(Continued)

(Continued)

Region	Country	Sub-national (e.g. state)	Status	References
	United Republic of Tanzania		Present	Ritchie (1929)
	Zambia		Present	CABI (1981); Watson (2002)
	Zimbabwe		Present	CABI (1981); Watson (2002)
Asia	Philippines		Present	Wester (1918); CABI (1981); Watson (2002)
	Sri Lanka		Present	CABI (1981); Watson (2002)
	Taiwan		Present	CABI (1981); Watson (2002)
	Viet Nam		Present	Suh (2009, 2016)
Oceania	Fiji		Present	CABI (1981); Watson (2002)
	Solomon Islands		Present	Watson (2002)

APPENDIX C

Import data

TABLE C1 **Fresh or dried citrus (CN code: 0805)** imported in metric tons into the EU from regions where *Selenaspidus articulatus* is known to occur (*Source*: Eurostat accessed on 17/11/2024).

COUNTRY	2019	2020	2021	2022	2023
Bolivia, Plurinational State of	21,008	1,407,940	299,700	:	:
Brazil	82,213,446	90,259,026	106,211,108	117,870,096	118,009,773
Colombia	13,691,485	17,219,770	19,496,308	20,764,483	18,136,325
Costa Rica	23,120	46,160	3520	21,870	24,480
Côte d'Ivoire	:	:	:	6	:
Cuba	342,211	55,603	1870	:	:
Congo, Democratic Republic of	:	:	197	20	:
Dominica	7650	7869	4718	6149	2081
Dominican Republic	735,536	1,288,658	1,278,040	846,422	1,096,502
Ecuador	111,458	12,728	231,297	18,393	40,986
Ghana	:	:	26,157	12,986	22,139
Grenada	:	:	1	:	:
Guatemala	1,181,609	1,781,426	871,280	831,394	580,077
Guyana	:	2400	:	:	:
Haiti	3100	24,829	33,730	14,900	6615
Honduras	852,182	1,137,041	1,126,350	1,188,892	1,545,338
Jamaica	240,955	164,687	244,176	171,886	98,478
Kenya	:	3456	2000	1000	229
Madagascar	716	2216	191	269	21,481
Mauritius	:	735	:	:	:
Mexico	44,374,354	34,964,863	18,418,248	13,546,146	7,201,491
Nigeria	10	20,000	:	6	5
Panama	:	65,040	:	:	:
Peru	36,925,164	41,836,228	54,598,470	38,870,148	53,895,781
Philippines	771	10	:	8	:
Somalia	51,430	34,210	55,699	57,440	100,885
South Africa	619,683,796	783,014,760	795,085,787	790,906,599	865,130,505
Sri Lanka	20,000	6010	3	2685	2291
Suriname	10,000	:	10,900	2500	:
Togo	42	:	:	:	:
Uganda	735	1188	912	662	121
United States	17,775,545	14,860,892	11,411,050	6,451,065	5,716,377
Viet Nam	7,396,435	6,373,002	8,172,952	6,624,459	6,858,214
Zimbabwe	34,830,306	39,186,870	43,449,653	3,835,0754	45,446,036

TABLE C2 **Coffee, whether or not roasted or decaffeinated; coffee husks and skins; coffee substitutes containing coffee in any proportion (CN code: 0805)** imported in metric tons into the EU from regions where *Selenaspidus articulatus* is known to occur (*Source*: Eurostat accessed on 17/11/2024).

COUNTRY	2019	2020	2021	2022	2023
Angola	712,066,000	1,257,444,000	579,587,000	525,592,000	792,762,000
Antigua and Barbuda	:	:	:	:	43,200,000
Bahamas	19	:	:	:	:
Barbados	:	:	:	1	2
Belize	23,903	43,200	:	1566	10
Bolivia, Plurinational State of	464,875	356,532	643,930	1,233,496	947,710

(Continued)

TABLE C2 (Continued)

COUNTRY	2019	2020	2021	2022	2023
Brazil	932,262,983	932,618,975	1,033,362,449	1,042,639,996	923,500,141
Cameroon	17,179,813	15,812,740	15,339,378	9,750,970	9,339,824
Chad	:	:	56	3	:
Colombia	165,669,171	154,173,358	142,812,960	124,887,357	112,932,500
Comoros	19,970	:	:	3	
Costa Rica	12,215,962	11,244,879	13,301,510	9,296,959	12,261,772
Côte d'Ivoire	24,413,955	25,910,354	13,196,937	13,164,417	14,611,748
Cuba	559,719	477,757	766,132	665,924	566,762
Congo, Democratic Republic of	5,020,666	4,970,733	5,091,418	6,504,872	6,005,653
Dominica	12,733	98	12,021	:	2
Dominican Republic	338,315	356,122	351,054	468,256	417,271
Ecuador	391,097	565,021	480,879	300,012	394,422
El Salvador	10,246,695	6,734,109	6,951,122	8,811,204	8,885,274
Eritrea	6	:	5	:	:
Ethiopia	80,503,661	77,621,798	83,457,556	93,158,426	59,439,875
Fiji	:	:	8	1	:
Ghana	287,648	144,635	142	12	527
Guatemala	34,531,281	27,859,289	33,124,245	31,343,656	32,792,348
Guinea	682,165	186,257	149,030	3,159,774	2,438,348
Guyana	:	:	4	:	:
Haiti	2	3	886	6	309
Honduras	221,957,648	216,413,191	191,110,040	158,493,243	168,932,540
Jamaica	32,812	42,923	44,798	23,743	44,334
Kenya	24,104,570	22,143,483	17,023,386	20,470,741	26,902,894
Madagascar	35,981	432,357	846,030	43,220	1072
Mauritius	2133	3727	2071	1513	1784
Mexico	32,975,167	36,329,219	32,646,166	30,031,226	18,650,418
Mozambique	:	:	1	72	18
Nigeria	627	17,592	87	17,581	177
Panama	346,382	420,602	370,052	329,375	292,705
Peru	112,844,084	96,384,632	84,630,731	130,313,245	83,030,188
Philippines	6969	7113	7462	6495	6778
St Lucia	:	:	1472	8817	2999
St Vincent and the Grenadines	:	:	5	:	9867
Sao Tome and Principe	1775	1901	1541	1813	3907
Sierra Leone	2,562,222	2,523,639	417,622	1,327,572	810,799
Somalia	4700	98	1290	23	
South Africa	31,460	13,121	441,206	5022	1895
Sri Lanka	4236	2354	4670	2986	2441
Suriname	1696	50			
Taiwan	3534	230	1116	1589	687
Tanzania, United Republic of	30,370,646	30,631,880	40,187,229	35,303,849	44,992,330
Togo	1,908,739	969,927	584,700	2,051,176	1,389,756
Trinidad and Tobago	:	14	3	1	2
Virgin Islands, United States	:	3	:	:	:
Uganda	145,353,297	165,880,965	212,291,456	214,864,920	206,570,200
United States	4,413,486	8,282,557	4,529,305	1,467,258	644,603
Venezuela, Bolivarian Republic of	45,640	1,393,562	42,091	884,451	1,407,716
Viet Nam	673,034,599	642,070,122	549,075,821	661,407,419	652,737,571
Zambia	1,208,504	1,132,934	1,396,793	1,433,730	277,3333
Zimbabwe	181,741	67,595	20,400	53,304	15,566

TABLE C3 **Fresh or chilled olives (CN code: 070992)** imported in metric tons into the EU from regions where *Selenaspidus articulatus* is known to occur (*Source*: Eurostat accessed on 17/11/2024).

COUNTRY	2019	2020	2021	2022	2023
Côte d'Ivoire	11,048	:	:	:	:
Guatemala	:	:	:	1	:
Kenya	11	:	:	:	:
Peru	:	3	2359	1	5454
South Africa	31	1	:	16	177
Sri Lanka	:	:	:	:	7
United States	:	19	5	113	4

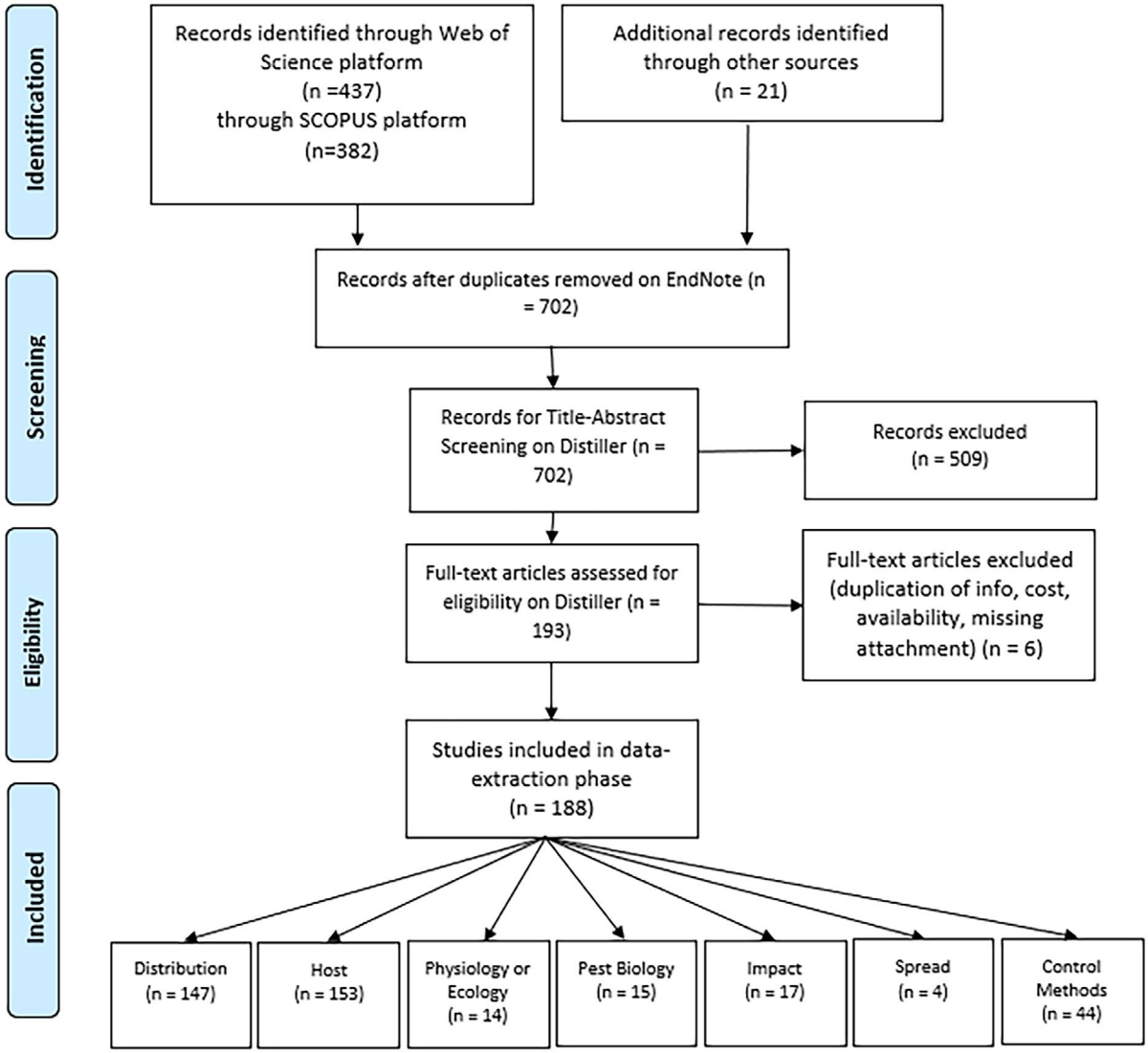
TABLE C4 **Fresh grapes (CN code: 080610)** imported in metric tons into the EU from regions where *Selenaspidus articulatus* is known to occur (*Source*: Eurostat accessed on 17/11/2024).

COUNTRY	2019	2020	2021	2022	2023
Angola	80	:	1396	285	478
Brazil	19,646,522	22,809,131	36,079,068	23,926,849	30,334,585
Cameroon	:	:	:	5	:
Colombia	66,912	18,696	:	18,702	40,965
Dominican Republic	:	:	:	:	19,680
Ecuador	180,716	226,612	290,714	439,043	389,217
Ethiopia	:	:	8	:	:
Mexico	18,671	18,462	:	:	:
Peru	75,955,428	78,284,453	107,809,355	95,934,404	19,934,333
South Africa	139,768,157	139,784,225	167,662,128	199,750,985	149,024,966
United States	186,620	107,248	459	319	2302
Viet Nam	:	:	:	31	515

APPENDIX D

PRISMA 2009 Flow Diagram

Name of the Pest: ***Selenaspidus articulatus***
Date of the search: 24/10/2024
Approved Literature Search String: "Selenaspidus articulatus" OR "Aspidiotus articulatus" OR "armoured scale" OR "West Indian rufous scale" OR "westindische Citrusschildlaus" OR "westindische Zitrusschildlaus" OR "queresa redonda"



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit www.prisma-statement.org.