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# Pest categorisation of *Diaprepes abbreviatus*

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## Abstract

The EFSA Panel on Plant Health performed a pest categorisation of the citrus root weevil *Diaprepes abbreviatus* (L.) (Coleoptera: Curculionidae) for the European Union (EU) following the commodity risk assessment of *Ligustrum delavayanum* topiary grafted on *L. japonicum* plants from the UK in which *D. abbreviatus* was identified as a relevant non-regulated EU pest which could potentially enter the EU. This species is native to the Caribbean and was introduced to the continental USA in 1964, to Gran Canaria (Spain) in 2014 and to Madeira Island (Portugal) in 2018. It is a polyphagous insect, associated with more than 270 species in 60 plant families. Female *D. abbreviatus* can lay up to 5,000 eggs in clusters within leaves folded and glued together. Neonate larvae drop off the leaves onto the ground and enter the soil, where they feed on roots for several months. The mature larvae pupate in the soil. After emergence, adults usually stay on the first host plant they encounter and can move long distances on nursery stock. *D. abbreviatus* is not a regulated pest in the EU. It could enter and spread within the EU via the import and movement of host plants for planting, cut flowers and soil. Some host plants for planting (e.g. *Vitis* spp., *Citrus* spp.), and soil are prohibited from entering the EU from countries where this weevil is known to occur. The import of other host plants for planting and cut flowers is subject to phytosanitary certificate and that of soil attached to machinery is regulated. Host availability and climate suitability suggest that the southernmost coastal areas of southern EU MSs would be suitable for establishment of *D. abbreviatus*. Temporary establishment in greenhouses in other EU territories would be possible. The introduction of *D. abbreviatus* would likely cause impacts. Measures to prevent entry, spread and impact are available. *D. abbreviatus* satisfies all the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest.



**Keywords:** pest risk, plant health, plant pest, quarantine, root weevil

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# 1. Introduction

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

### 1.1.1. Background

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

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

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

### 1.1.2. Terms of reference

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

EFSA is requested to deliver 53 pest categorisations for the pests listed in Annex 1A, 1B, 1D and 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

*Diaprepes abbreviatus* is one of a number of pests listed in Annex 1C to the Terms of Reference (ToRs) to be subject to pest categorisation to determine whether it fulfils the criteria of a potential Union quarantine pest (QP) 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 QP, risk reduction options will be identified.

### 1.3. Additional information

This pest categorisation was initiated following the commodity risk assessment of *Ligustrum delavayanum* topiary grafted on *Ligustrum japonicum* plants from the UK performed by EFSA (EFSA PLH Panel, 2022), in which *D. abbreviatus* was identified as a relevant non-regulated EU pest which could potentially enter the EU on *Ligustrum* spp.

## 2. Data and methodologies

### 2.1. Data

#### 2.1.1. Information on pest status from NPPOs

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

#### 2.1.2. Literature search

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

#### 2.1.3. Database search

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

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

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

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

### 2.2. Methodologies

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

The criteria to be considered when categorising a pest as a potential Union QP is given in Regulation (EU) 2016/2031 Article 3 and Annex I, Section 1 of the Regulation. Table 1 presents the Regulation (EU) 2016/2031 pest categorisation criteria on which the Panel bases its conclusions. In judging whether a criterion is met the Panel uses its best professional judgement (EFSA Scientific Committee 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 a judgement about potential likely impacts in the EU. While the Panel may quote impacts reported from areas where the pest occurs in monetary terms, the Panel will seek to express potential EU impacts in terms of yield and quality losses and not in monetary terms, in agreement with the EFSA guidance on quantitative pest risk assessment (EFSA PLH Panel et al., 2018). Article 3 (d) of Regulation (EU) 2016/2031 refers to unacceptable social impact as a criterion for QP 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?<br>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. Its scientific name is *D. abbreviatus* L.

*D. abbreviatus* (L.), 1758, is an insect of the family Curculionidae (Coleoptera). Synonyms include *Curculio abbreviatus* L. (Dmitriev, 2023), *D. spengleri* L. and *Exophthalmus abbreviatus* (L.) (EPPO, online). It has been commonly known as the citrus root weevil, the West Indian sugarcane rootstock borer weevil and the diaprepes root weevil.

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

### 3.1.2. Biology of the pest

Key biological features of *D. abbreviatus* are summarised in Table 2.

**Table 2:** Important features of the life history strategy of *Diaprepes abbreviatus* (mostly based on Weissling et al., 2012 with additional citations)

| Life stage | Phenology and relation to host | Other relevant information |
|---|---|---|
| Egg | Eggs are laid in clusters of 30 to more than 250 and enclosed within leaves folded and glued together. One female can lay up to 5,000 eggs during her lifetime. Hatching occurs within 1 week. | The lower developmental threshold for eggs was estimated to be 12°C (Lapointe, 2001). Eggs are highly susceptible to cold, with 95% mortality ($LT_{95}$) occurring in 4.2 days at 12°C. Egg mortality was complete after 24 h at 0°C (Lapointe et al., 2007). |
| Larva | Newly hatched larvae drop off the leaves onto the ground and enter the soil, where they search for and feed on roots. After feeding for several months, the mature larvae pupate in the soil. | The lower threshold for neonate larval development was estimated to be 15°C (Lapointe, 2000a). |
| Pupa | Pupation takes place in the soil. | Pupal mortality was 100% after 24 h and all longer durations at 0 and 3°C and after 6.5 and 12.5 days at 6 and 9°C, respectively (Lapointe et al., 2007). |
| Adult | Adults emerge from the soil, seek a host where they gather and feed on the leaves before mating. The complete life cycle varies in time depending on nutritional and environmental factors.<br>Adults can emerge year-round in the Caribbean. However, in Central Florida, emergence peaks from mid-spring to mid-autumn with two peaks, which suggest that this species is bivoltine in that area. In California, adults show one single peak emergence during the warmer months from July to October. Therefore, this weevil is considered univoltine in California (Bates et al., 2015). | Adults do not fly far from the emergence site (estimated to be less than 300 m). Long-distance dispersal is through the movement of infested soil and containerised plants containing potentially all life stages of the weevil. In addition, soil residues on vehicles may be infested with larvae or pupae.<br>A lower threshold for oviposition was estimated as 14.9°C. Adult weevils exposed to 12°C for 2 weeks survived and resumed oviposition when the temperature was returned to 30°C. However, the eggs produced during the post-12°C treatment period at 30°C were nonviable (Lapointe et al., 2007).<br>Females may lay eggs on leaves of artificial plants, as observed in California (J.E. Peña, University of Florida-TREC, personal communication) |

### 3.1.3. Host range/species affected

*D. abbreviatus* is associated with a wide range of plants, including around 270 species in 157 genera across 59 plant families (Simpson et al., 1996; Spanish NPPO, Appendix C) (see Appendix A). Simpson et al. (1996) compiled all available information about the plants associated with *D. abbreviatus*. In addition, these authors performed no choice feeding laboratory assays with adults. They proved that *D. abbreviatus* adults could feed on 60 out of 62 plants in the family Rutaceae tested in the genera *Aegle*, *Aeglopsis*, *Afraegle*, *Amyris*, *Atalantia*, *Casimiroa*, *Citropsis*, *Citrus*, *Clausena*, *Eremocitrus*, *Fortunella*, *Glycosmis*, *Limonia*, *Microcitrus*, *Murraya*, *Naringi*, *Pamburus*, *Severinia*, *Swinglea*, *Triphasia* and *Zanthoxylum*. Only two exceptions were found: *Citrus ichangensis* and *Eremocitrus glauca*. The 430 specimen identification records collected by Simpson et al. (1996) and those provided by the Spanish NPPO (Appendix C) can be grouped within the four categories below, based on the life stages observed, assuming that the observation of feeding larvae in the roots implies

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

previous oviposition on the foliage of that plant (see Section 3.1.2 Biology of the pest), even if no egg masses or adults were found when observations were made. In Appendix A, all hosts are shown in one single table first (Table A.1). Then, separate tables for each of the categories listed below are also shown (Tables A.2–A.5):

A) **Host plants supporting the whole life cycle** (where all life stages, including feeding adults, have been observed), where EU relevant plant species such as *Morus alba* L., *Citrus aurantifolia* (Christm.) Swingle, Vitis sp. or *Zea mays* L. are included (Appendix A, Table A.2).
B) **Host plants most probably supporting the whole life cycle** (where larvae but not all life stages have been observed), where EU relevant plant species such as *Capsicum annuum* L., *Phaseolus vulgaris* L or *Solanum melongena* L., as well as the genus *Citrus*, are found (Appendix A, Table A.3).
C) **Plants that could act as a trap crop** (where egg masses, but no larvae, have been observed), including plant species like *Mangifera indica* L., or *Ficus* sp. (Appendix A, Table A.4).
D) **Adult feeding plants** (plant species where adults but no immature stages have been observed) This category includes more than 150 plant species (Appendix A, Table A.5)

### 3.1.4. Intraspecific diversity

Adults may display diversity in forewing colour (intraspecific polymorphism), which typically exhibit black lines on a yellowish to brownish background (Figure 1). These differences, though, do not make any difference in relation to the risk they pose to plants.

**Figure 1:** Colour and pattern diversity of the forewings of adult *Diaprepes abbreviatus* (Image courtesy of Chris Malumphy, DEFRA, UK)

### 3.1.5. Detection and identification of the pest

*Are detection and identification methods available for the pest?*

**Yes,** visual detection is possible, morphological and molecular identification methods are available.

**Detection**

According to Weissling et al. (2019), the symptoms caused by adult feeding include notching along the margins of young leaves (Figure 2). However, as this symptom can be caused by other phytophagous insects (i.e. grasshoppers, caterpillars) or other weevils, this should be confirmed by observation of *D. abbreviatus* adults during the day on the canopy. Shaking the plant may aid in detection as adults drop off the plant onto the ground. A light-coloured piece of canvas placed

beneath the plant before shaking is useful. Further confirmation can be gathered from the observation of larval feeding on the roots. Root rot infections by *Phytophthora* spp. usually follow larval damage.

According to UC IPM (2020), two types of traps can be used to collect soil-emerging adults. The first type consists of a base of black vanes that rest on the ground and, as a tree trunk, induces adults to walk up and be caught in an inverted cup. The second type consists of tent-like metal screens placed under the canopies. Both traps should be regularly inspected for captured adults that emerge from soil.

**Figure 2:** Notching along the leaf margins is a typical symptom of the presence of *Diaprepes abbreviatus*. (Image courtesy of Prof. J.E. Peña, University of Florida-TREC)

**Identification**

The weevil genus *Diaprepes* Schoenherr is native to the Caribbean region with 15 species from the West Indies and one from Trinidad, Tobago and Venezuela. They belong to the group of weevils known as 'broad-nosed weevils' (University of Florida, 2011). O'Brien and Wibmer (1982) and Wibmer and O'Brien (1986) in their annotated checklists of the weevils of the Americas provide a key for the identification of the adults of *D. abbreviatus*.

**Morphological description**

According to Thomas et al. (2019), adult weevils are 0.95 to 1.90 cm long. They are black, and overlaid by minute white, red orange and/or yellow scales on the elytra (Figures 1 and 2). These scales are often rubbed off the tops of ridges on the elytra giving the appearance of black stripes on a light-coloured background. Adults emerging from pupae in the soil are armed with a pair of deciduous mandibles which break off as they tunnel through the soil to get above ground. Scars at the site where the deciduous mandibles break off are visible under a microscope. The eggs are usually laid in an irregularly shaped cluster in a single layer. They are oblong-oval in shape (about 1.2 × 0.4 mm) and smooth, pale yellowish-white and glistening. The larvae are white, legless and C-shaped. Mature larvae reach a length of about 2.5 cm. The head capsule has variable light and dark areas. Pupae occur in the soil and are protected within an earthen cell.

**Molecular identification**

A barcoding technique based on the PCR amplification and sequencing of the mitochondrial COI gene was developed to use in identification of eggs, larvae and adults of *D. abbreviatus*. This molecular tool provides accurate species identification for management and quarantine decisions about this pest (Ascunce et al., 2009).

## 3.2. Pest distribution

### 3.2.1. Pest distribution outside the EU

The current distribution of *D. abbreviatus* is shown in Figure 3 and in Appendix B. This is a neotropical species native to Caribbean from where it was introduced to Florida (USA) in 1964. Southern USA states were subsequently colonised from east to west (Mississippi, Louisiana, Texas and California) (see Appendix B). It has been reported in the west Palearctic and Macaronesia three times during the last 20 years.

It was first found in the Amazonia area of the Tropical biome greenhouse, Eden Project, Cornwall in the UK (Treseder et al., 2011). *D. abbreviatus* was breeding there for approximately 17 years (1997 onwards). In 2004, it was abundant and considered a serious pest. Action (non-statutory) was taken to manage the population and by 2014, it was rarely found, and since then, there have been no further reports (DEFRA, unpublished data). The commodity risk assessment of *Ligustrum delavayanum* topiary grafted on *L. japonicum* plants from the UK performed by EFSA (EFSA PLH Panel, 2022) reports that *D. abbreviatus* was last found there in 2014, and the pest may no longer be present. Although the status in the UK was 'present: transient' by the UK NPPO (EFSA PLH Panel, 2022), there has not been any finding since 2014.

It was also found on the island of Gran Canaria (Canary Islands, Spain) in 2014. According to the Spanish NPPO, 10 additional outbreaks have been detected on that Island since then (Appendix C). Nine of them were eradicated and two of them remain active and are subject to eradication measures. As a consequence, the current status in the Canary Islands, which are considered as a third country according to Regulation 2016/2031, is 'present, restricted distribution'.

Finally, the insect was found in Madeira (Portugal) in 2018 (see Section 3.2.2).

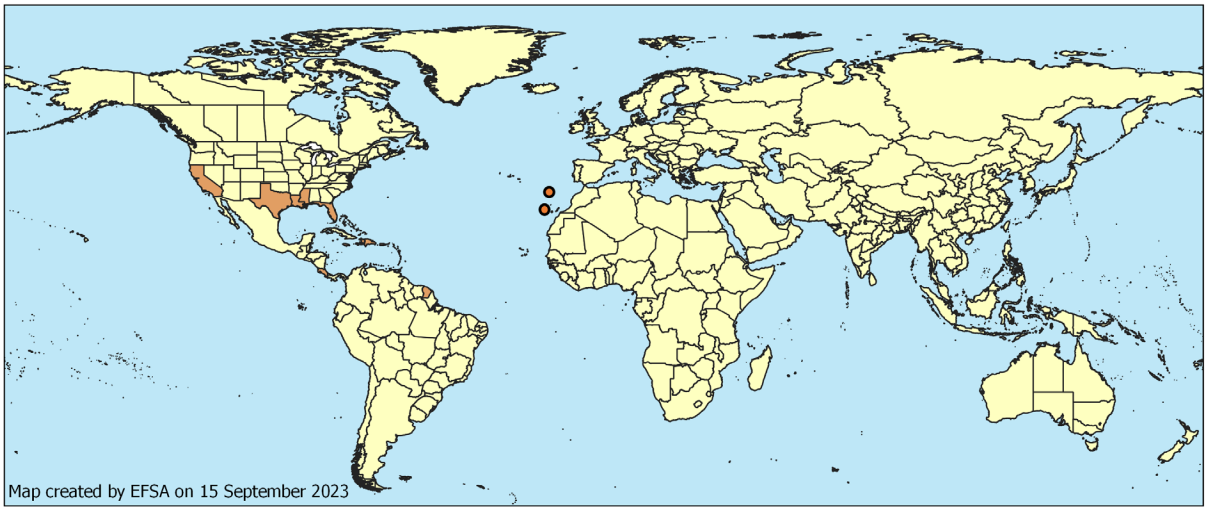


**Figure 3:** Global distribution of *Diaprepes abbreviatus* (data source: EPPO Global Database, CABI CPC accessed on 15 September 2023, and literature)

### 3.2.2. Pest distribution in the EU

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

**Yes**, the insect was found in 2018 in Madeira (Portugal), where the pest is considered present.

One adult specimen was collected sitting on a wall in the island of Madeira (Portugal), in west Funchal, near Praia Formosa (N32°38′19″ W16°56′57″, 10 m) in September 2018 (Andrade and Stueben, 2020). According to the Portuguese PPO (see Appendix E), the pest is present in that island, where the insect has been observed feeding on plants in the genera *Hibiscus* and *Schefflera*.

According to the CABI Compendium and supported by the paper of Seebens et al. (2017), *D. abbreviatus* was considered present in Sweden (introduced in 1993). However, the Swedish PPO, after consultation with the Swedish plant health risk assessors at SLU, Uppsala (see Appendix D), confirmed that the official pest status of *D. abbreviatus* in Sweden is 'Absent, invalid record'.

## 3.3. Regulatory status

### 3.3.1. Commission Implementing Regulation 2019/2072

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

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

Table 3 lists regulated articles prohibited from entering the EU and relevant to the entry of *D. abbreviatus*.

**Table 3:** List of plants, plant products and other objects that are *Diaprepes abbreviatus* hosts whose introduction into the Union from certain third countries is prohibited (Source: Commission Implementing Regulation (EU) 2019/2072, Annex VI)

| **List of plants, plant products and other objects whose introduction into the Union from certain third countries is prohibited** | | | |
|---|---|---|---|
| | **Description** | **CN code** | **Third country, group of third countries or specific area of third country** |
| 10. | Plants of *Vitis* L., other than fruits | 0602 10 10 | Third countries other than Switzerland |
| | | 0602 20 10 | |
| | | ex 0604 20 90 | |
| | | ex 1404 90 00 | |
| 11. | Plants of *Citrus* L., *Fortunella* Swingle, *Poncirus* Raf., and their hybrids, other than fruits and seeds | ex 0602 10 90 | All third countries |
| | | ex 0602 20 20 | |
| | | ex 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 | |
| 14. | Plants for planting of the family Poaceae, other than plants of ornamental perennial grasses of the subfamilies Bambusoideae and Panicoideae and of the genera *Buchloe*, *Bouteloua* Lag., *Calamagrostis*, *Cortaderia* Stapf., *Glyceria* R. Br., *Hakonechloa* Mak. ex Honda, *Hystrix*, *Molinia*, *Phalaris* L., *Shibataea*, *Spartina* Schreb., *Stipa* L. and *Uniola* L., other than seeds | ex 0602 90 50 | Third countries other than Albania, Algeria, Andorra, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Canary Islands, Egypt, Faeroe Islands, Georgia, Iceland, Israel, Jordan, Lebanon, Libya, Liechtenstein, Moldova, Monaco, Montenegro, Morocco, North Macedonia, Norway, Russia (only some parts), San Marino, Serbia, Switzerland, Syria, Tunisia, Türkiye, Ukraine and the United Kingdom |
| | | ex 0602 90 91 | |
| | | ex 0602 90 99 | |
| 18. | Plants for planting of Solanaceae other than seeds and the plants covered by entries 15, 16 or 17 [= *Solanum tuberosum* L. tubers and plants for planting of stolon- or tuber-forming species of *Solanum* L. or their hybrids] | ex 0602 10 90 | Third countries other than: Albania, Algeria, Andorra, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Canary Islands, Egypt, Faeroe Islands, Georgia, Iceland, Israel, Jordan, Lebanon, Libya, Liechtenstein, Moldova, Monaco, Montenegro, Morocco, North Macedonia, Norway, Russia (only some parts), San Marino, Serbia, Switzerland, Syria, Tunisia, Türkiye, Ukraine and the United Kingdom |
| | | ex 0602 90 30 | |
| | | ex 0602 90 45 | |
| | | ex 0602 90 46 | |
| | | ex 0602 90 48 | |
| | | ex 0602 90 50 | |
| | | ex 0602 90 70 | |
| | | ex 0602 90 91 | |
| | | ex 0602 90 99 | |

### 3.3.3. Legislation addressing the organisms vectored by *D. abbreviatus* (Commission Implementing Regulation 2019/2072)

The bacterium *Xanthomonas phaseoli* pv. *phaseoli* (EPPO code: XANTPH) (EPPO GD, online) can be disseminated on the bodies of insects such as *D. abbreviatus*, which also creates wounds when feeding, thus producing favourable infection sites for the pathogen (Kaiser and Vakili, 1978). This

bacterium is a regulated non-QP (under the non-preferred scientific name of *Xanthomonas axonopodis* pv. *phaseoli*). This bacterium is mentioned in Annex IV Part F (RNQP concerning vegetable seed) and in Annex V Part E (measures to prevent the presence of the RNQPs on vegetable seed). Because seeds do not provide a plausible entry or spread pathway for this weevil (see Sections 3.4.1 and 3.4.2), this legislation is not relevant for the current categorisation.

## 3.4. Entry, establishment and spread in the EU

### 3.4.1. Entry

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

**Yes**, the pest is able to enter the EU. Entry pathways include plants for planting (either bare-root or potted with soil/growing medium), cut flowers, cut branches with leaves and soil. Fruit is considered an unlikely entry pathway.

*Comment on plants for planting as a pathway*.

Plants for planting, especially potted with growing medium or with soil/growing medium attached to their roots, could provide the most relevant entry pathway for *D. abbreviatus*.

Potential pathways for *D. abbreviatus* are presented in Table 4.

**Table 4:** Potential pathways for *Diaprepes abbreviatus* into the EU

| **Pathways (e.g. host/ intended use/source)** | **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 with soil | All life stages | Annex VI prohibits the import of plants for planting of *Vitis* L., *Citrus* L., *Fortunella* Swingle, *Poncirus* Raf., and the families Poaceae and Solanaceae other than fruit and/or seeds from all third countries where *D. abbreviatus* is known to occur (Table 3).<br>Annex VII (1.) apply to growing medium attached to plants for planting from third countries other than Switzerland, and Annex VII (6) for certain host plant for planting originating in certain third countries.<br>Annex XI requirements for plants, plant products and other objects subject to phytosanitary certificate for their introduction into the Union territory apply.<br>Annex I of commission implementing regulation (EU)2018/2019 includes *Diospyros* L. and *Ficus carica* L., which are considered as 'High Risk Plants' and are hosts of *D. abbreviatus*. These plants could be imported from countries where *D. abbreviatus* is known to occur should a derogation be granted. |
| Bare-root plants for planting | Adults and eggs | Same as above |
| Cut flowers | Eggs | Annex XI requirements for plants, plant products and other objects subject to phytosanitary certificate for their introduction into the Union territory apply, e.g. cut flowers and flower buds of a kind suitable for bouquets or for ornamental purposes, fresh. |
| Cut branches with leaves | Eggs | Same as above (Annex XI) |
| Soil/growing medium | Larvae and pupae | Annex VI (19. and 20.) bans the introduction of soil and growing media as such into the Union from third countries other than Switzerland. |
| Soil on machinery | Larvae and pupae | Annex VII (2.) Official statement that machinery or vehicles are cleaned and free from soil and plant debris.<br>Annex XI requirements for plants, plant products and other objects subject to phytosanitary certificate for their introduction into the Union territory apply, e.g. for machinery and vehicles which have been operated for agricultural or forestry purposes. |

According to EFSA PLH Panel (2022), 'live plants with soil are pathways for all life stages of *D. abbreviatus*'. Indeed, *D. abbreviatus* is frequently intercepted in the USA on both live plants and nursery containers, where adults may be also found as hitchhikers (Grafton-Cardwell et al., 2004; Jetter and Godfrey, 2009). Although cut branches and flowers could carry both eggs and adults of *D. abbreviatus* (EFSA PLH Panel, 2022), adults usually drop from the feeding substrate when disturbed. Therefore, these entry pathways are considered as highly unlikely for adults (hitchhikers) and only considered for eggs in this categorisation. Soil, either as such, on imported machinery, or with plants for planting, could also provide an entry pathway for larvae and pupae (Table 4). Although Grafton-Cardwell et al. (2004) noted that on rare occasions, adults feed on fruit (only for citrus and papaya), as the import of citrus fruit with leaves (where *D. abbreviatus* eggs could be present) from third countries into the EU is prohibited and, same as before, adults usually drop from the feeding substrate when disturbed (during harvest), the fruit entry pathway, which was considered as uncertain by EPPO (DROPSA, 2016), is considered as highly unlikely and not further considered in this categorisation either. Some host plants are prohibited from entering into the EU (*Vitis* L., *Citrus* L., *Fortunella* Swingle, *Poncirus* Raf., and the families Poaceae and Solanaceae other than fruit and/or seeds), while others could be imported but subject to a phytosanitary certificate for their introduction into the Union territory. In some cases, a derogation would be needed (*Diospyros* L. and *Ficus carica* L.) as these are considered 'High Risk Plants'. Finally, soil as such from countries where *D. abbreviatus* is known to occur is prohibited from entering into the EU, while that attached to roots or on machinery is regulated.

Although detailed information on the different types of plants for planting imported into the EU27 from countries where *D. abbreviatus* is known to occur is not available, according to Eurostat imports of HS 06 (live trees and other plants; bulbs, roots and the like, cut flowers and ornamental foliage) from the USA reached 11,000 to 19,000 tons per year during 2018–2022. Much smaller amounts (< 1 ton per year) were imported from other Caribbean countries.

Notifications of interceptions of harmful organisms began to be compiled in Europhyt in May 1994 and in TRACES in May 2020. As of 24 August 2023, there was no records of interception of *D. abbreviatus* in the Europhyt and TRACES databases. However, in 1998 one adult was found by a member of the public associated with banana in the UK (DEFRA).

### 3.4.2. Establishment

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

**Yes**, the pest can establish in the EU. Establishment would be possible in small areas located in the southernmost tips of regions of southern EU MS.

Because plants for planting provide the most plausible entry pathway, transfer to a suitable host post-entry and establishment is likely to occur provided that climate is warm enough during winter (areas with a minimum of 15–20 day with a mean daily soil temperature of 12°C in winter).

#### 3.4.2.1. EU distribution of main host plants

Table 5 provides a list of different host plants of *D. abbreviatus* cultivated in the EU.

**Table 5:** Harvested area of host plants of *Diaprepes abbreviatus* in EU 27, 2017–2021 (1,000 ha). Source EUROSTAT (accessed on 8 June 2023)

| Commodity | Code | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|
| Sorghum | C1700 | 135.66 | 147.85 | 190.32 | 217.57 | 152.64 |
| Green maize | G3000 | 5,985.90 | 6,134.91 | 6,210.36 | 6,325.30 | 6,054.31 |
| Eggplants | V3410 | 20.73 | 21.24 | 20.61 | 20.65 | 21.85 |
| Small citrus fruits | T2000 | 149.99 | 151.05 | 156.38 | 156.40 | 152.37 |
| Pomelos and grapefruits | T4000 | 3.30 | 3.49 | 3.68 | 3.86 | 4.05 |
| Peppers (*Capsicum*) | V3600 | 59.50 | 58.92 | 59.60 | 57.63 | 60.67 |
| Grapes | W1000 | 3,134.93 | 3,137.17 | 3,160.68 | 3,194.61 | |

### 3.4.2.2. Climatic conditions affecting establishment

Given the wide host range of *D. abbreviatus* and the broad distribution of their hosts north of latitude 29° N in Florida, the lack of dispersal at higher latitudes there made Lapointe et al. (2007) suggest that climate plays a dominant role in determining the geographic range of *D. abbreviatus*. Based on the critical lower thresholds for neonate larval development and eggs (15 and 12°C, respectively, see Table 2), these authors predicted the geographical areas of California and Texas susceptible to infestation based on climate mapping of the distribution of *D. abbreviatus* in Florida at that time. Probability maps examined the frequency of at least 10, 15, 20, 25 or 30 days per winter when soil temperature was 12°C. The geographic area that experienced between 15 and 20 days per winter with mean daily soil temperature 12°C closely approximated the northern limit of *D. abbreviatus* in Florida. Using the same approach (see Appendix D) and based on the soil temperatures registered during the last 30 years (1993–2022), establishment within the EU would be possible in small areas located in the southernmost tips of regions of southern EU MS (Cyprus, Greece, Malta, Portugal and Spain), including the archipelagos of Madeira and Azores (Portugal) or the islands of Crete and Rhodes (Greece) (Figure 4). Temporary establishment in greenhouses in other territories of the EU would also be possible, as observed in the UK (see Section 3.2.1).

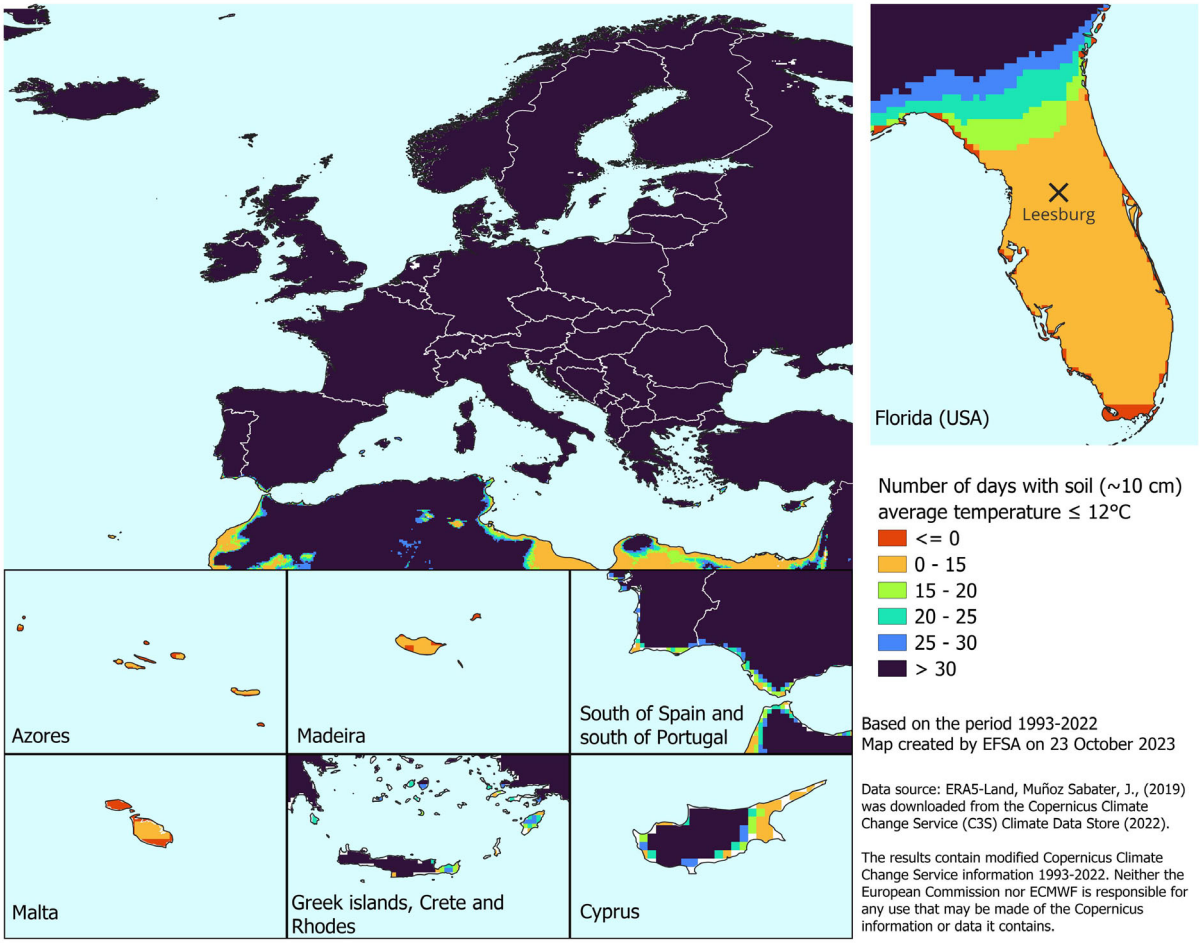


**Figure 4:** Number of days with mean soil temperature ≤ 12°C along the year (average of the period 1993–2022). Boxes at the bottom focus on areas in EU where the number of days is less than 20. According to Lapointe et al., (2007), only areas with less than 20 days at soil temperatures below 12°C per year would allow establishment of *D. abbreviatus* (see Appendix F for details).

### 3.4.3. Spread

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

Adults usually do not fly more than 300 m from the emergence site. Human-assisted movement of plants for planting (especially if containerised with soil) and soil provide the most relevant long-distance mechanism of spread.

*Comment on plants for planting as a mechanism of spread*.

Plants for planting (especially if containerised with soil) provide the most relevant long-distance mechanism of spread.

The weevils usually do not fly far from the emergence site (estimated to be less than 300 m) (Wiessling et al., 2012). Long-distance dispersal relies on the movement of infested soil and containerised plants containing potentially all life stages of the weevil. In addition, soil residues on vehicles may be contaminated with larvae.

## 3.5. Impacts

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

**Yes**, the introduction of *D. abbreviatus* into the EU would most likely result in an economic and environmental impact on those EU territories where establishment is possible.

According to DROPSA (EPPO GD), 'larval feeding on roots causes stunting and death of plants, and consequently yield reduction; adult damage to leaves is minor (CABI CPC; McCoy and Duncan, 2015). The pest also favours entry of pathogens into the roots, especially *Phytophthora* (Serrano et al., 2010). *D. abbreviatus* is considered to cause estimated annual losses of 75-100 million USD to Citrus production in the Caribbean and Florida (McCoy and Duncan, 2015). In the Caribbean, it is one of the most economically important pests; in Florida, it causes damage to citrus, ornamental plants, and some other crops and has infested more than 40,000 ha of Citrus orchards (Wiessling et al., 2012). *D. abbreviatus* has caused serious damage (decline) on Citrus in the French Antilles (Mauleon and Mademba-Sy, 1988)'. Therefore, an economic and/or environmental impact is expected in areas where establishment is possible.

## 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**, see Section 3.3.2 on current measures inhibiting entry. Additional measures are also available to inhibit entry and spread.

### 3.6.1. Identification of potential additional measures

Phytosanitary measures (prohibitions) are currently applied to some host plants for planting (see Section 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 6.

**Table 6:** Selected control measures (a full list is available in EFSA PLH Panel et al., 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 | Source host plants from a pest free area, pest free place of production or pest free production site. | Entry/spread |
| **Growing plants in isolation** | Plants could be grown in dedicated structures such as glass or plastic greenhouses with *D. abbreviatus*-proof screens. | Entry/spread |
| Managed growing conditions | Plants collected directly from natural habitats, have been grown, held and trained for at least two consecutive years prior to dispatch in officially registered nurseries, which are subject to an officially supervised control regime. | Entry/spread |
| Biological control and behavioural manipulation | Natural enemies targeting the eggs (Jacas et al., 2010; Diaz Montilla et al., 2013) and the larvae/pupae in the soil (McCoy et al., 2000) have been described and used in the field in the USA. | Impact |
| Chemical treatments on crops including reproductive material | Insecticides targeting adults and/or larvae of *D. abbreviatus* have been tested and used in the USA (Bender et al., 2014). Particle film deters oviposition by *D. abbreviatus* (Lapointe, 2000b). | Impact |
| **Physical treatments on consignments or during processing** | A generic irradiation dose of 150 Gy would prevent development beyond the hatching of eggs in the F1 generation of Curculionidae (Hallman, 2016) | Entry/spread |
| **Cleaning and disinfection of facilities, tools and machinery** | The physical and chemical cleaning and disinfection of facilities, tools, machinery, transport means, facilities and other accessories (e.g. boxes, pots, pallets, palox, supports, hand tools). | Entry/spread |
| **Heat and cold treatments** | Based on the critical lower thresholds for neonate larvae and egg development (15 and 12°C, respectively, see Table 2), a thermal treatment of consignments at a temperature low enough to kill these stages but harmless to the commodity could be developed (Lapointe et al., 2007) | Entry/spread |

#### 3.6.1.2. Additional supporting measures

Potential additional supporting measures are listed in Table 7.

**Table 7:** Selected supporting measures (a full list is available in EFSA PLH Panel et al., 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** | Inspection is defined 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 (ISPM 5).<br>The effectiveness of sampling and subsequent inspection to detect pests may be enhanced by including trapping and luring techniques. | 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. | Establishment/spread |
| Sampling | According to ISPM 31, it is usually not feasible to inspect entire consignments, so phytosanitary inspection is performed mainly on samples obtained from a consignment. It is noted that the sampling concepts presented in this standard may also apply to other phytosanitary procedures, notably selection of units for testing.<br>For inspection, testing and/or surveillance purposes the sample may be taken according to a statistically based or a non-statistical sampling methodology. | Establishment/spread |
| Phytosanitary certificate and plant passport | An official paper document or its official electronic equivalent, consistent with the model certificates of the IPPC, attesting that a consignment meets phytosanitary import requirements (ISPM 5)<br>a) export certificate (import)<br>b) plant passport (EU internal trade) | Entry/establishment/ spread |
| 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. | Establishment/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

- Egg masses may be difficult to detect.
- Newly hatched larvae may be difficult to detect in the soil.

### 3.7. Uncertainty

No key uncertainties have been identified in the assessment.

## 4. Conclusions

*D. abbreviatus* satisfies all the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union QP (Table 8).

**Table 8:** 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. Its scientific name is *Diaprepes abbreviatus* L. | None |
| **Absence/presence of the pest in the EU (Section 3.2)** | The pest is known to occur in the island of Madeira (Portugal) and is considered not widely distributed in the EU. | None |
| **Pest potential for entry, establishment and spread in the EU (Section 3.4)** | *D. abbreviatus* is able to enter, establish and spread within the EU territory. Main entry and spread pathways are plants for planting, cut flowers, cut branches with leaves and soil. | None |
| **Potential for consequences in the EU (Section 3.5)** | The introduction of *D. abbreviatus* into the EU would most likely result in an economic and environmental impact on those EU territories where establishment is possible. | None |
| **Available measures (Section 3.6)** | There are measures to prevent pest entry (i.e. pest free areas), establishment, spread and impact. | None |
| **Conclusion (Section 4)** | *D. abbreviatus* satisfies all of the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest. | None |
| Aspects of assessment to focus on/scenarios to address in future if appropriate | – | |

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## Abbreviations

| | |
|---|---|
| EPPO | European and Mediterranean Plant Protection Organization |
| FAO | Food and Agriculture Organization |
| IPPC | International Plant Protection Convention |
| ISPM | International Standards for Phytosanitary Measures |
| MS | Member State |
| PLH | EFSA Panel on Plant Health |

| | |
|---|---|
| PZ | Protected Zone |
| QP | quarantine pest |
| TFEU | Treaty on the Functioning of the European Union |
| ToR | Terms of Reference |

## Glossary

| | |
|---|---|
| Containment (of a pest) | Application of phytosanitary measures in and around an infested area to prevent spread of a pest (FAO, 2021) |
| Control (of a pest) | Suppression, containment or eradication of a pest population (FAO, 2021) |
| Entry (of a pest) | Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled (FAO, 2021) |
| Eradication (of a pest) | Application of phytosanitary measures to eliminate a pest from an area (FAO, 2021) |
| Establishment (of a pest) | Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO, 2021) |
| Greenhouse | A walk-in, static, closed place of crop production with a usually translucent outer shell, which allows controlled exchange of material and energy with the surroundings and prevents release of plant protection products (PPPs) into the environment. |
| Hitchhiker | An organism sheltering or transported accidentally via inanimate pathways including with machinery, shipping containers and vehicles; such organisms are also known as contaminating pests or stowaways (Toy and Newfield, 2010). |
| Impact (of a pest) | The impact of the pest on the crop output and quality and on the environment in the occupied spatial units |
| Introduction (of a pest) | The entry of a pest resulting in its establishment (FAO, 2021) |
| Pathway | Any means that allows the entry or spread of a pest (FAO, 2021) |
| Phytosanitary measures | Any legislation, regulation or official procedure having the purpose to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests (FAO, 2021) |
| Quarantine pest | A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (FAO, 2021) |
| Risk reduction option (RRO) | A measure acting on pest introduction and/or pest spread and/or the magnitude of the biological impact of the pest should the pest be present. A RRO may become a phytosanitary measure, action or procedure according to the decision of the risk manager |
| Spread (of a pest) | Expansion of the geographical distribution of a pest within an area (FAO, 2021) |

## Appendix A – *Diaprepes abbreviatus* host plants/species affected

**Table A.1:** All hosts as indicated by Simpson et al. (1996) and the Spanish NPPO

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| **ACERACEAE** | | | | | |
| *Acer rubrum* | Red maple | ■ | | | |
| **ANACARDIACEAE** | | | | | |
| *Mangifera indica* | Mango | | ■ | | ■ |
| *Rhus copallina* | Winged sumac | ■ | | | |
| *Schinus terebenthifolius* | Brazilian pepper tree | | ■ | | |
| *Spondias mombin* | Yellow mombin | ■ | ■ | | ■ |
| *Spondias purpurea* | Hog plum | | ■ | | |
| **APIACEAE (UMBELLIFERAE)** | | | | | |
| *Apium graveolens* | Celery | | ■ | | |
| **AQUIFOLIACEAE** | | | | | |
| *Ilex cassine* | Dahoon holly | ■ | ■ | | |
| *Ilex cornuta* | Chinese holly | ■ | | | |
| *Ilex glabra* | Gallberry | ■ | | | |
| *Ilex* x *attenuata* | Hybrid holly | ■ | ■ | | |
| *Ilex* sp. | Holly | ■ | | | |
| *Ilex*? *syderoxyloides* | Gongoli | | ■ | | |
| *Ilex vomitoria* | Yaupon holly | ■ | | | |
| **ARALIACEAE** | | | | | |
| *Schefflera actinophylla* | Schefflera | | ■ | ■ | |
| *Schefflera elegantissima* | False aralia | | | ■ | |
| *Schefflera arboricola* | Dwarf schefflera | ■ | | | |
| **ARECACEAE (PALMAE)** | | | | | |
| *Chrysalidocarpus lutescens* | Areca palm, butterfly palm | ■ | | | |
| *Phoenix dactylifera* | Date palm | | ■ | | |
| *Phoenix roebelinii* | Pigmy date palm | ■ | | | |
| *Roystonea regia* | Royal palm | ■ | | | |
| *Veitchia merrillii* | Adonidia palm, Christmas palm | | | ■ | |
| **ASCLEPIACEAE** | | | | | |
| *Hoya carnosa* | Wax plant | | | ■ | |
| **ASPARAGACEAE** | | | | | |
| *Dracaena compacta* | Dracaena | | | ■ | ■ |
| *Dracaena deremensis* | Janet Crig dracaena | ■ | | | |
| *Dracaena drago* | Dragon tree | ■ | ■ | ■ | ■ |
| *Dracaena cincta* | Dracaena rainbow | | | ■ | ■ |
| *Dracaena fragrans* | Corn plant | | | | ■ |
| *Dracaena sanderiana* | Ribbon plant, Belgian evergreen | ■ | | ■ | |
| **ASTERACEAE (COMPOSITAE)** | | | | | |
| *Ambrosia artemisifolia* | Ragweed | ■ | | | |
| *Baccharis halimifolia* | Groundsel bush, salt bush | ■ | | | |
| **BIGNONIACEAE** | | | | | |
| *Markhamia lutea* (*) | Nile tulip, siala tree | ■ | ■ | ■ | ■ |
| *Tabebuia aurea* | Silver trumpet tree | ■ | | | |

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| **BOMBACACEAE** | | | | | |
| *Ceiba pentandra* | Ceiba, kapok | | ■ | | |
| **BORAGINACEAE** | | | | | |
| *Cordia alliodora* | Capá prieto, laurel negro | ■ | | | |
| *Cordia lineata* | None | ■ | | | |
| *Cordia sebestena* | Ceiger tree | | ■ | | |
| **BRASSICACEAE (CRUCIFERAE)** | | | | | |
| *Brassica* sp. | Mustard | | ■ | | |
| **BURSERACEAE** | | | | | |
| *Bursera simaruba* | Gumbo limbo | ■ | ■ | | |
| **CHRYSOBALANACEAE** | | | | | |
| *Chrysobalanus icaco* | Cocoplum, icaco | ■ | ■ | | |
| **COMBRETACEAE** | | | | | |
| *Bucida buceras* | Black olive, oxhorn bucida | ■ | ■ | | |
| *Conocarpus erectus* | Buttonwood, green buttonwood | ■ | ■ | | |
| *Terminalia catappa* | Tropical almond | ■ | ■ | | |
| **CONVOLVULACEAE** | | | | | |
| *Argyreia nervosa* | Cephalic vine | | ■ | | ■ |
| *Ipomoea batatas* | Sweet potato | ■ | ■ | ■ | ■ |
| **CORYNOCARPACEAE** | | | | | |
| *Corynocarpus variegata* (*) | Karaka, New Zealand laurel | ■ | | ■ | |
| **CUPRESACEAE** | | | | | |
| *Cupressus sempervirens* | Italian cypress | ■ | | | |
| *Juniperus conferta* | Shore juniper | | | ■ | |
| *Juniperus* x media | Hetz juniper | ■ | | | |
| *Juniperus virginiana* | Red cedar | ■ | | ■ | |
| *Platycladus orientalis* | Oriental arbovitae | ■ | | | |
| **CYPERACEAE** | | | | | |
| *Cyperus* sp. | Nut grass | | | ■ | |
| **DIOSCOREACEAE** | | | | | |
| *Dioscorea batatas* | Yam | | ■ | | |
| *Dioscorea* x *cayenensis* | Yellow yam | ■ | | ■ | |
| **EBENACEAE** | | | | | |
| *Diospyros digyna* | Black sapote | ■ | ■ | | |
| *Diospyros* sp. | Wild persimmon | ■ | | | |
| *Diospyros virginiana* | Wild or common persimmon | ■ | | ■ | |
| **EUPHORBIACEAE** | | | | | |
| *Bischofia javanica* | Bishop's bush | ■ | | | |
| *Codiaedum variegatum* (*) | Croton | ■ | ■ | | |
| *Jatropha curcas* | Physic nut | | ■ | | |
| *Manihot esculenta* | Cassava, yuca, manioc, tapioca | ■ | | ■ | |
| *Ricinus communis* | Castor bean | | ■ | | |
| **FABACEAE (LEGUMINOSAE)** | | | | | |
| *Acacia* sp. | Acacia | ■ | | | |
| *Albizia lebbek* | Woman's tongue | | ■ | | |
| *Andira inermis* | Coffee shade | | ■ | | |

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| *Arachis hypogaea* | Ground nut, peanut | ■ | ■ | ■ | ■ |
| *Bauhinia* sp. | Orchid tree | ■ | ■ | | |
| *Bauhinia purpurea* | Orchid tree | ■ | | | |
| *Bauhinia variegata* | Orchid tree | ■ | | | |
| *Caesalpinia mexicana* | Caesalpinia | ■ | | | |
| *Cajanus cajan* | Pigeon pea, gondul | ■ | ■ | | |
| *Canavalia gladiata* | Sword bean, jack bean | | ■ | | |
| *Cassia* sp. | | ■ | | | |
| *Centrosema pubescens* | Butterfly-pea | | ■ | | |
| *Crotalaria* sp. | rattlebox | | | ■ | |
| *Delonix regia* | Royal poinciana | | ■ | | |
| *Desmodium tortuosum* | Beggarweed | ■ | | | |
| *Erythrina berteroana* | Bucare | | ■ | | |
| *Erythrina folkersii* | Gallito | | ■ | | |
| *Erythrina poeppigiana* | Bucare | | ■ | | |
| *Gliricidia septum* | Pea tree | | ■ | | |
| *Haematoxylum campechianum* | Bloodwood tree | | ■ | | |
| *Indigofera hirsuta* | Hairy indigo | | ■ | | |
| *Inga laurina* | Guaná, palal, paternillo | | ■ | | |
| *Inga spuria* | Guiaba, cuajinicuil | | ■ | | |
| *Lablab purpureus* | Bonavist bean, hyacinth bean | ■ | ■ | | |
| *Lonchocarpus domingensis* | Genogeno, lancepod | | ■ | | |
| *Lonchocarpus latifolius* | Hediondo, lancepod | | ■ | | |
| *Mimosa ceratonia* | Zarza | | ■ | | |
| *Macuna deeriingiana* | Velvet bean, Bengal bean | | ■ | | |
| *Phaseolus lunarus* | Lima bean | | | ■ | |
| *Phaseolus vulgaris* | String bean, kidney bean | | ■ | ■ | |
| *Phaseolus* sp. | Bean | ■ | | | |
| *Pithcellobium unguis-cati* | Bread and cheese, catclaw | | | ■ | |
| *Pithcellobium* sp. | | | | ■ | |
| *Pongamia pinnata* | Pongam | ■ | ■ | | |
| *Pueraria montana* | Kudzu vine | ■ | | | |
| *Schrankia leptocarpa* | Zarzilla | | ■ | | |
| *Senna obtusifolia* | Sicklepod, coffeeweed | | ■ | | |
| *Senna surattensis* | Senna | ■ | | | |
| *Tamarindus indica* | Tamarind, Indian date | | ■ | | |
| *Tephrosia candida* | | | ■ | | |
| *Tipuana tipu* (*) | | ■ | ■ | ■ | ■ |
| *Vigna adenantha* | Wild bean | | ■ | | |
| **FAGACEAE** | | | | | |
| *Quercus laurifolia* | Swamp laurel oak | ■ | | | |
| *Quercus virginiana* | Live oak | ■ | ■ | | |
| **GUTTIFERAE** | | | | | |
| *Calophyllum* sp. | Calophyllum | | ■ | | |
| **ILLICACEAE** | | | | | |
| *Ilicium anisatum* | Anise | ■ | | | |
| **JUGLANDACEAE** | | | | | |
| *Carya glabra* | | | | | |

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| *Carya illinoinensis* | Pecan | ■ | | | |
| **LAURACEAE** | | ■ | ■ | | |
| *Octoea portoricensis* | | | | | |
| *Persea americana* | Avocado | | ■ | | |
| **LILIACEAE** | | | | | |
| *Aloe vera* | Aloe | | | ■ | |
| *Hemerocallis* sp. | | | | | |
| *Liriope* sp. | Lilyturf | | | ■ | |
| **LYTHRACEAE** | | | | | |
| *Lagerstroemia indica* | Crape-myrtle | ■ | | | |
| *Lagerstroemia speciosa* | Queens's crape-myrtle | | ■ | | |
| **MAGNOLIACEAE** | | | | | |
| *Magnolia virginiana* | Sweet bay | ■ | | | |
| **MALPIGHIACEAE** | | | | | |
| *Byrsonima crassifolia* | Maricao | | ■ | | |
| *Byrsonima spicata* | Maricao | | ■ | | |
| **MALVACEAE** | | | | | |
| *Abelmoschus esculentus* | Okra | ■ | | | |
| *Brachychiton* sp. (*) | Bottletree | ■ | ■ | ■ | ■ |
| *Gossypium* spp. | Cotton | ■ | ■ | | |
| *Hibiscus rosa-sinensis* | Hibiscus | ■ | | | |
| *Lagunaria patersonia* (*) | Pyramid tree | ■ | ■ | ■ | |
| *Montezuma speciosissima* | Mag | | ■ | | |
| *Urena lobata* | Caesar weed, Congo jute | | | ■ | |
| **MARANTACEAE** | | | | | |
| *Maranta leuconeura* | Prayer plant | | | ■ | |
| **MELIACEAE** | | | | | |
| *Azadirachta indica* | Neem tree | ■ | | | |
| *Cedrela odorata* | Cigar-box cedar | | ■ | | |
| *Guarea trichilioides* | Guaraguao | | ■ | | |
| *Melia azedarach* | Chinaberry tree | ■ | | | |
| *Swietenia macrophylla* | Honduras mahogany | | ■ | | |
| *Swietenia mahagony* | Mahogany | ■ | ■ | ■ | |
| **MORACEAE** | | | | | |
| *Ficus benjamina* | Weeping fig | ■ | | | |
| *Ficus citrifolia* | Short-leaved fig | | | | ■ |
| *Ficus retusa* | Cuban laurel, Indian laurel fig | ■ | | | |
| *Ficus stahlii* | Jagüey | | ■ | | |
| *Ficus* sp. | Wild fig | | | | ■ |
| *Morus alba* (*) | White mulberry | ■ | ■ | ■ | ■ |
| **MUSACEAE** | | | | | |
| *Musa* sp. | Banana | | ■ | | |
| **MYRICACEAE** | | | | | |
| *Myrica cerifera* | Wax-myrtle | ■ | | | |
| **MYRSINACEAE** | | | | | |
| *Ardisia crenata* | Coralberry, coral ardisia | | | ■ | |
| *Ardisia crispa* | Christmas berry | ■ | | | |

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| **MYRTACEAE** | | | | | |
| *Callistemon citrinus* | Lemon bottlebush | ■ | | | |
| *Eugenia uniflora* | Surinam cherry | ■ | ■ | ■ | ■ |
| *Feijoa sellowiana* | Pineapple guava | ■ | ■ | | |
| *Myrcianthes simpsonii* | Simpson's stopper | ■ | ■ | | |
| *Pimenta racemosa* | Bay-rum tree | | ■ | | |
| *Psidium littorale* | Cattley guava | ■ | | | |
| *Psidium guajaba* | Common guava | | ■ | | |
| *Psidium* sp. | Guava | ■ | ■ | | |
| *Syzygium aqueum* (*) | Watery rose, water apple | ■ | ■ | ■ | |
| *Syzygium jambos* | Rose apple | | ■ | | |
| **NYCTAGINACEAE** | | | | | |
| *Guapira fragrans* | Corcho prieto | | ■ | | |
| **OLACACEAE** | | | | | |
| *Ximenia americana* | Hog plum | | ■ | | |
| **PASSIFLORACEAE** | | | | | |
| *Passiflora incarnata* | Maypop | ■ | | | |
| *Passiflora* sp. | Passiofruit | | ■ | | |
| **PIPERACEAE** | | | | | |
| *Piper* sp. | Pepper (black) | | | ■ | |
| **PITTOSPORACEAE** | | | | | |
| *Pittosporum tobira* | Chinese pittosporum | ■ | | | |
| **POACEAE (GRAMINAE)** | | | | | |
| *Bothriochloa pertusa* | Pitted. bluestem | | | ■ | |
| *Panicum maximum* | Guineagrass | | | | ■ |
| *Saccharum officinarum* | Sugarcane | ■ | ■ | ■ | ■ |
| *Sorghum bicolor* | Sorghum, Guinea corn | ■ | ■ | ■ | ■ |
| *Zea mays* | Maize, corn, Indian corn | ■ | ■ | ■ | ■ |
| **POLYGONACEAE** | | | | | |
| *Coccoloba uvifera* | Sea grape | ■ | ■ | | |
| *Triplaris* sp. | Triplaria | | ■ | | |
| **RHIZOPHORACEAE** | | | | | |
| *Rhizophora mangle* | Mangrove | ■ | ■ | | |
| **ROSACEAE** | | | | | |
| *Eriobotrya japonica* | Loquat | ■ | ■ | | |
| *Prunus caroliniana* | Carolina cherry-laurel | ■ | | | |
| *Prunus persivca* | Peach | ■ | | | |
| *Prunus* sp. | Wild cherry | ■ | | | |
| *Pyrus communis* | Pear | ■ | | | |
| *Rosa* sp. | Rose | ■ | | | |
| *Rubus argulus* | Blackberry | ■ | | | |
| **RUBIACEAE** | | | | | |
| *Coffea arabica* | Coffee | | ■ | | |
| **RUTACEAE** | | | | | |
| *X Citroncirus* 'Swingle' | Swingle citrumelo | | | ■ | |
| *X Citroncirus* 'webberi' | Carrizo citrange | | | ■ | |
| *Citrus aurantifolia* | Lime | ■ | ■ | ■ | ■ |

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| *Citrus jambhiri* | Milam lemon | | | ■ | |
| *Citrus macrophylla* | Alemow | | | ■ | |
| *Citrus maxima* | Pummelo | ■ | | | |
| *Citrus x Poncirus trifoliata* | Pummelo x trifoliate orange | | | ■ | |
| *Citrus medica* | Acid citron | | | ■ | |
| *Citrus reticulata* | Mandarin | ■ | | | |
| *Citrus paradisi* | Grapefruit | | ■ | ■ | ■ |
| *Citrus reshni* | Cleopatra mandarin | | | ■ | |
| *Citrus reticulata* | Mandarin, tangerine | ■ | ■ | | |
| *Citrus sinensis* | Sweet orange | ■ | ■ | ■ | |
| *Citrus* sp. | Citrus | ■ | | ■ | ■ |
| *Citrus* x tangelo | Orlando tangelo | ■ | | | |
| *Fortunella* sp. | Kumquat | ■ | | | |
| *Murraya paniculata* | Orange jasmine | ■ | ■ | | |
| *Poncirus trifoliata* 'Flying dragon' *x Citrus maxima* 'Nakorn' | | | | ■ | |
| *Zanthoxyllum americanum* | Toothache tree | ■ | | | |
| *Zanthoxyllum caribaeum* | Prickly yellow scorpion tree | | ■ | | |
| *Zanthoxyllum clava-herculis* | Prickly ash, Hercules' club | ■ | | | |
| **SALICACEAE** | | | | | |
| *Salix humboldtiana* | Huboldt's willow | | ■ | | |
| **SAPINDACEAE** | | | | | |
| *Cupaniopsis anacardioides* | Carrotwood | ■ | ■ | | |
| *Dimocarpus longan* | Longan | ■ | ■ | | |
| *Koelreuteria elegans* | Golden rain tree | ■ | | | |
| *Melicoccus bijugatus* | Spanish lime, genip | | ■ | | |
| **SAPOTACEAE** | | | | | |
| *Chrysophyllum cainito* | Star apple | | ■ | | |
| *Chrysophyllum oliviforme* | Satin leaf | ■ | ■ | | |
| *Manilkara roxburghiana* | Mimusops | ■ | | | |
| *Manilkara zapota* | Sapodilla | ■ | ■ | | |
| **SOLANACEAE** | | | | | |
| *Acnistus arborescens* | Galán arbóreo | | ■ | | |
| *Capsicum annuum* | Pepper | ■ | | ■ | |
| *Cestrum diurnum* | Day jasmine, day cestrum | ■ | | | |
| *Nicotiana tabacum* | Tobacco | ■ | | | |
| *Solanum melongena* | Aubergine, eggplant | ■ | ■ | ■ | |
| *Solanum tuberosum* | Potato | ■ | | | |
| **STERCULIACEAE** | | | | | |
| *Guazuma ulmifolia* | Bastard cedar, white elm | ■ | | | |
| *Theobroma cacao* | Cocoa | | | ■ | |
| **ULMACEAE** | | | | | |
| *Celtis laevigata* | | ■ | | | |
| *Ulmus parviflora* | | ■ | | | |
| **VERBENACEAE** | | | | | |
| *Clerodendrum indicum* | | ■ | | | |

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| **VITACEAE** | | | | | |
| *Vitis* sp. (*) | Grapevine | | | | |
| **ZYGOPHYLLACEAE** | | | | | |
| *Guaiacum officinale* | | | | | |
| *Kallstroemia maxima* | | | | | |

AC: adult collection; AF: adult feeding; L: larvae found; E: egg masses found.
*: see also Appendix C.

Tables **A.2**–**A.5** further lists the plants associated with *D. abbreviatus* according to the different life stages observed on them.

**Table A.2:** **Host plants supporting the whole life cycle** (where all life stages, including feeding adults, have been observed)

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| *Dracaena drago* (L.) L. | Dragon tree | | | | |
| **BIGNONIACEAE** | | | | | |
| *Markhamia lutea* | Nile tulip, siala tree | | | | |
| **CONVOLVULACEAE** | | | | | |
| *Ipomoea batatas* (L.) Lam. | Sweet potato | | | | |
| **FABACEAE (LEGUMINOSAE)** | | | | | |
| *Arachis hypogaea* L. | Ground nut, peanut | | | | |
| *Tipuana tipu* Kuntze | | | | | |
| **MALVACEAE** | | | | | |
| *Brachychiton* sp. | Bottletree | | | | |
| **MORACEAE** | | | | | |
| *Morus alba* L. | White mulberry | | | | |
| **MYRTACEAE** | | | | | |
| *Eugenia uniflora* L. | Surinam cherry | | | | |
| **POACEAE (GRAMINAE)** | | | | | |
| *Saccharum officinarum* L. | Sugarcane | | | | |
| *Sorghum bicolor* L. | Sorghum, Guinea corn | | | | |
| *Zea mays* L. | Maize, corn, Indian corn | | | | |
| **RUTACEAE** | | | | | |
| *Citrus aurantifolia* (Christm.) Swingle | Lime | | | | |
| **VITACEAE** | | | | | |
| *Vitis* sp. | Grapevine | | | | |

AC: adult collection; AF: adult feeding; L: larvae found; E: egg masses found.

**Table A.3:** **Host plants most probably supporting the whole life cycle** (where larvae but not all life stages have been observed)

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| **ARALIACEAE** | | | | | |
| *Schefflera actinophylla* (End.) Harms | Schefflera | | | | |
| *S. elegantissima* (Veitch.) Lowry & Frodin | False aralia | | | | |

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| **ARECACEAE (PALMAE)** | | | | | |
| *Veitchia merrillii* Becc. | Christmas palm | | | | |
| **ASCLEPIACEAE** | | | | | |
| *Hoya carnosa* (L.f.) R. Br | Wax plant | | | | |
| **ASPARAGACEAE** | | | | | |
| *Dracaena cincta* | Dracaena rainbow | | | | |
| *Dracaena sanderiana* Hort. | Ribbon plant | | | | |
| **CORYNOCARPACEAE** | | | | | |
| *Corynocarpus variegata* | Karaka, New Zealand laurel | | | | |
| **CUPRESACEAE** | | | | | |
| *Juniperus conferta* L. | Shore juniper | | | | |
| *Juniperus virginiana* L. | Red cedar | | | | |
| **CYPERACEAE** | | | | | |
| *Cyperus* sp. | Nut grass | | | | |
| **DIOSCOREACEAE** | | | | | |
| *Dioscorea* x *cayenensis* | Yellow yam | | | | |
| **EBENACEAE** | | | | | |
| *Diospyros virginiana* | Wild or common persimmon | | | | |
| **EUPHORBIACEAE** | | | | | |
| *Manihot esculenta* | Cassava, yuca, manioc, tapioca | | | | |
| **FABACEAE (LEGUMINOSAE)** | | | | | |
| *Crotalaria* sp. | rattlebox | | | | |
| *Phaseolus lunarus* | Lima bean | | | | |
| *Phaseolus vulgaris* | String bean, kidney bean | | | | |
| *Pithcellobium unguis-cati* | Bread and cheese, catclaw | | | | |
| *Pithcellobium* sp. | | | | | |
| **LILIACEAE** | | | | | |
| *Aloe vera* | Aloe | | | | |
| *Liriope* sp. | Lilyturf | | | | |
| **MALVACEAE** | | | | | |
| *Lagunaria patersonia* | Pyramid tree | | | | |
| *Urena lobata* | Caesar weed, Congo jute | | | | |
| **MARANTACEAE** | | | | | |
| *Maranta leuconeura* | Prayer plant | | | | |
| **MELIACEAE** | | | | | |
| *Swietenia mahagony* | Mahogany | | | | |
| **MYRSINACEAE** | | | | | |
| *Ardisia crenata* | Coralberry, coral ardisia | | | | |
| **MYRTACEAE** | | | | | |
| *Syzygium aqueum* | Watery rose, water apple | | | | |
| **PIPERACEAE** | | | | | |
| *Piper* sp. | Pepper (black) | | | | |
| **POACEAE (GRAMINAE)** | | | | | |
| *Bothriochloa pertusa* | Pitted. bluestem | | | | |
| **RUTACEAE** | | | | | |
| *X Citroncirus* 'Swingle' | Swingle citrumelo | | | | |

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| *X Citroncirus* 'webberi' | Carrizo citrange | | | | |
| *Citrus jambhiri* | Milam lemon | | | | |
| *Citrus macrophylla* | Alemow | | | | |
| *Citrus x Poncirus trifoliata* | Pummelo x trifoliate orange | | | | |
| *Citrus medica* | Acid citron | | | | |
| *Citrus paradisi* | Grapefruit | | | | |
| *Citrus reshni* | Cleopatra mandarin | | | | |
| *Citrus sinensis* | Sweet orange | | | | |
| *Citrus* sp. | Citrus | | | | |
| *Poncirus trifoliata* 'Flying dragon' *x Citrus maxima* 'Nakorn' | | | | | |
| **SOLANACEAE** | | | | | |
| *Capsicum annuum* | Pepper | | | | |
| *Solanum melongena* | Aubergine, eggplant | | | | |
| **STERCULIACEAE** | | | | | |
| *Theobroma cacao* | Cocoa | | | | |

AC: Adult collection; AF: Adult feeding; L: larvae; E: egg masses.

**Table A.4: Plants that could act as a trap crop** (where egg masses, but no larvae, have been observed)

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| **ANACARDIACEAE** | | | | | |
| *Mangifera indica* | Mango | | | | |
| *Spondias mombin* | Yellow mombin | | | | |
| **ASPARAGACEAE** | | | | | |
| *Dracaena fragrans* | Corn plant | | | | |
| **CONVOLVULACEAE** | | | | | |
| *Argyreia nervosa* | Cephalic vine | | | | |
| **MORACEAE** | | | | | |
| *Ficus benjamina* | Weeping fig | | | | |
| *Ficus citrifolia* | Short-leaved fig | | | | |
| *Ficus retusa* | Cuban laurel, Indian laurel fig | | | | |
| *Ficus stahlii* | Jagüey | | | | |
| *Ficus* sp. | Wild fig | | | | |
| **POACEAE (GRAMINAE)** | | | | | |
| *Panicum maximum* | Guinea grass | | | | |

AC: Adult collection; AF: Adult feeding; L: larvae; E: egg masses.

**Table A.5: Adult feeding plants** (plant species where adults but no immature stages have been observed)

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| **ANACARDIACEAE** | | | | | |
| *Rhus copallina* | Winged sumac | | | | |
| *Spondias purpurea* | Hog plum | | | | |

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| **APIACEAE (UMBELLIFERAE)** | | | | | |
| *Apium graveolens* | Celery | | ■ | | |
| **AQUIFOLIACEAE** | | | | | |
| *Ilex cassine* | Dahoon holly | ■ | ■ | | |
| *Ilex cornuta* | Chinese holly | ■ | | | |
| *Ilex glabra* | Gallberry | ■ | | | |
| *Ilex* x *attenuata* | Hybrid holly | ■ | ■ | | |
| *Ilex* sp. | Holly | ■ | | | |
| *Ilex*? *syderoxyloides* | Gongoli | | ■ | | |
| *Ilex vomitoria* | Yaupon holly | ■ | | | |
| **ARALIACEAE** | | | | | |
| *Schefflera arboricola* | Dwarf schefflera | ■ | | | |
| **ARECACEAE (PALMAE)** | | | | | |
| *Chrysalidocarpus lutescens* | Areca palm, butterfly palm | ■ | | | |
| *Phoenix dactylifera* | Date palm | | ■ | | |
| *Phoenix roebelinii* | Pigmy date palm | ■ | | | |
| *Roystonea regia* | Royal palm | ■ | | | |
| **ASPARAGACEAE** | | | | | |
| *Dracaena deremensis* | Janet Crig dracaena | ■ | | | |
| **ASTERACEAE (COMPOSITAE)** | | | | | |
| *Ambrosia artemisifolia* | Ragweed | ■ | | | |
| *Baccharis halimifolia* | Groundsel bush, salt bush | ■ | | | |
| **BIGNONIACEAE** | | | | | |
| *Tabebuia aurea* | Silver trumpet tree | ■ | | | |
| **BOMBACACEAE** | | | | | |
| *Ceiba pentandra* | Ceiba, kapok | | ■ | | |
| **BORAGINACEAE** | | | | | |
| *Cordia alliodora* | Capá prieto, laurel negro | ■ | | | |
| *Cordia lineata* | None | ■ | | | |
| *Cordia sebestena* | Ceiger tree | | ■ | | |
| **BRASSICACEAE (CRUCIFERAE)** | | | | | |
| *Brassica* sp. | Mustard | | ■ | | |
| **BURSERACEAE** | | | | | |
| *Bursera simaruba* | Gumbo limbo | ■ | ■ | | |
| **CHRYSOBALANACEAE** | | | | | |
| *Chrysobalanus icaco* | Cocoplum, icaco | ■ | ■ | | |
| **COMBRETACEAE** | | | | | |
| *Bucida buceras* | Black olive, oxhorn bucida | ■ | ■ | | |
| *Conocarpus erectus* | Buttonwood, green buttonwood | ■ | ■ | | |
| *Terminalia catappa* | Tropical almond | ■ | ■ | | |
| **CUPRESACEAE** | | | | | |
| *Cupressus sempervirens* | Italian cypress | ■ | | | |
| Juniperus x media | Hetz juniper | ■ | | | |
| *Platycladus orientalis* | Oriental arbovitae | ■ | | | |
| **DIOSCOREACEAE** | | | | | |
| *Dioscorea batatas* | Yam | | ■ | | |

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| **EBENACEAE** | | | | | |
| *Diospyros digyna* | Black sapote | ■ | ■ | | |
| *Diospyros* sp. | Wild persimmon | ■ | | | |
| **EUPHORBIACEAE** | | | | | |
| *Bischofia javanica* | Bishop's bush | ■ | | | |
| *Codiaedum variegatum* | Croton | ■ | ■ | | |
| *Jatropha curcas* | Physic nut | | ■ | | |
| *Ricinus communis* | Castor bean | | ■ | | |
| **FABACEAE (LEGUMINOSAE)** | | | | | |
| *Acacia* sp. | Acacia | ■ | | | |
| *Albizia lebbek* | Woman's tongue | | ■ | | |
| *Andira inermis* | Coffee shade | | ■ | | |
| *Bauhinia* sp. | Orchid tree | ■ | ■ | | |
| *Bauhinia purpurea* | Orchid tree | ■ | | | |
| *Bauhinia variegata* | Orchid tree | ■ | | | |
| *Caesalpinia mexicana* | Caesalpinia | ■ | | | |
| *Cajanus cajan* | Pigeon pea, gondul | ■ | ■ | | |
| *Canavalia gladiata* | Sword bean, jack bean | | ■ | | |
| *Cassia* sp. | | ■ | | | |
| *Centrosema pubescens* | Butterfly-pea | | ■ | | |
| *Delonix regia* | Royal poinciana | | ■ | | |
| *Desmodium tortuosum* | Beggarweed | ■ | | | |
| *Erythrina berteroana* | Bucare | | ■ | | |
| *Erythrina folkersii* | Gallito | | ■ | | |
| *Erythrina poeppigiana* | Bucare | | ■ | | |
| *Gliricidia septum* | Pea tree | | ■ | | |
| *Haematoxylum campechianum* | Bloodwood tree | | ■ | | |
| *Indigofera hirsuta* | Hairy indigo | | ■ | | |
| *Inga laurina* | Guaná, palal, paternillo | | ■ | | |
| *Inga spuria* | Guiaba, cuajinicuil | | ■ | | |
| *Lablab purpureus* | Bonavist bean, hyacinth bean | ■ | ■ | | |
| *Lonchocarpus domingensis* | Genogeno, lancepod | | ■ | | |
| *Lonchocarpus latifolius* | Hediondo, lancepod | | ■ | | |
| *Mimosa ceratonia* | Zarza | | ■ | | |
| *Macuna deeriingiana* | Velvet bean, Bengal bean | | ■ | | |
| *Phaseolus* sp. | Bean | ■ | | | |
| *Pongamia pinnata* | Pongam | ■ | ■ | | |
| *Pueraria montana* | Kudzu vine | ■ | | | |
| *Schrankia leptocarpa* | Zarzilla | | ■ | | |
| *Senna obtusifolia* | Sicklepod, coffeeweed | | ■ | | |
| *Senna surattensis* | Senna | ■ | | | |
| *Tamarindus indica* | Tamarind, Indian date | | ■ | | |
| *Tephrosia candida* | | | ■ | | |
| *Vigna adenantha* | Wild bean | | ■ | | |
| **FAGACEAE** | | | | | |
| *Quercus laurifolia* | Swamp laurel oak | ■ | | | |
| *Quercus virginiana* | Live oak | ■ | ■ | | |

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| **GUTTIFERAE** | | | | | |
| *Calophyllum* sp. | Calophyllum | | | | |
| **ILLICACEAE** | | | | | |
| *Ilicium anisatum* | Anise | | | | |
| **JUGLANDACEAE** | | | | | |
| *Carya glabra* | | | | | |
| *Carya illinoinensis* | Pecan | | | | |
| **LAURACEAE** | | | | | |
| *Octoea portoricensis* | | | | | |
| *Persea americana* | Avocado | | | | |
| **LYTHRACEAE** | | | | | |
| *Lagerstroemia indica* | Crape-myrtle | | | | |
| *Lagerstroemia speciosa* | Queens's crape-myrtle | | | | |
| **MAGNOLIACEAE** | | | | | |
| *Magnolia virginiana* | Sweet bay | | | | |
| **MALPIGHIACEAE** | | | | | |
| *Byrsonima crassifolia* | Maricao | | | | |
| *Byrsonima spicata* | Maricao | | | | |
| **MALVACEAE** | | | | | |
| *Abelmoschus esculentus* | Okra | | | | |
| *Gossypium* spp. | Cotton | | | | |
| *Hibiscus rosa-sinensis* | Hibiscus | | | | |
| *Montezuma speciosissima* | Mag | | | | |
| **MELIACEAE** | | | | | |
| *Azadirachta indica* | Neem tree | | | | |
| *Cedrela odorata* | Cigar-box cedar | | | | |
| *Guarea trichilioides* | Guaraguao | | | | |
| *Melia azedarach* | Chinaberry tree | | | | |
| *Swietenia macrophylla* | Honduras mahogany | | | | |
| **MORACEAE** | | | | | |
| *Ficus benjamina* | Weeping fig | | | | |
| *Ficus retusa* | Cuban laurel, Indian laurel fig | | | | |
| *Ficus stahlii* | Jagüey | | | | |
| **MUSACEAE** | | | | | |
| *Musa* sp. | Banana | | | | |
| **MYRICACEAE** | | | | | |
| *Myrica cerifera* | Wax-myrtle | | | | |
| **MYRSINACEAE** | | | | | |
| *Ardisia crispa* | Christmas berry | | | | |
| **MYRTACEAE** | | | | | |
| *Callistemon citrinus* | Lemon bottlebush | | | | |
| *Feijoa sellowiana* | Pineapple guava | | | | |
| *Myrcianthes simpsonii* | Simpson's stopper | | | | |
| *Pimenta racemosa* | Bay-rum tree | | | | |
| *Psidium littorale* | Cattley guava | | | | |
| *Psidium guajaba* | Common guava | | | | |

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| *Psidium* sp. | Guava | | | | |
| *Syzygium jambos* | Rose apple | | | | |
| **NYCTAGINACEAE** | | | | | |
| *Guapira fragrans* | Corcho prieto | | | | |
| **OLACACEAE** | | | | | |
| *Ximenia americana* | Hog plum | | | | |
| **PASSIFLORACEAE** | | | | | |
| *Passiflora incarnata* | Maypop | | | | |
| *Passiflora* sp. | Passion fruit | | | | |
| **PITTOSPORACEAE** | | | | | |
| *Pittosporum tobira* | Chinese pittosporum | | | | |
| **POLYGONACEAE** | | | | | |
| *Coccoloba uvifera* | Sea grape | | | | |
| *Triplaris* sp. | Triplaria | | | | |
| **RHIZOPHORACEAE** | | | | | |
| *Rhizophora mangle* | Mangrove | | | | |
| **ROSACEAE** | | | | | |
| *Eriobotrya japonica* | Loquat | | | | |
| *Prunus caroliniana* | Carolina cherry-laurel | | | | |
| *Prunus persivca* | Peach | | | | |
| *Prunus* sp. | Wild cherry | | | | |
| *Pyrus communis* | Pear | | | | |
| *Rosa* sp. | Rose | | | | |
| *Rubus argulus* | Blackberry | | | | |
| **RUBIACEAE** | | | | | |
| *Coffea arabica* | Coffee | | | | |
| **RUTACEAE** | | | | | |
| *Citrus maxima* | Pummelo | | | | |
| *Citrus reticulata* | Mandarin | | | | |
| *Citrus reticulata* | Mandarin, tangerine | | | | |
| *Citrus* x tangelo | Orlando tangelo | | | | |
| *Fortunella* sp. | Kumquat | | | | |
| *Murraya paniculata* | Orange jasmine | | | | |
| *Zanthoxyllum americanum* | Toothache tree | | | | |
| *Zanthoxyllum caribaeum* | Prickly yellow scorpion tree | | | | |
| *Zanthoxyllum clava-herculis* | Prickly ash, Hercules' club | | | | |
| **SALICACEAE** | | | | | |
| *Salix humboldtiana* | Huboldt's willow | | | | |
| **SAPINDACEAE** | | | | | |
| *Cupaniopsis anacardioides* | Carrotwood | | | | |
| *Dimocarpus longan* | Longan | | | | |
| *Koelreuteria elegans* | Golden rain tree | | | | |
| *Melicoccus bijugatus* | Spanish lime, genip | | | | |
| **SAPOTACEAE** | | | | | |
| *Chrysophyllum cainito* | Star apple | | | | |
| *Chrysophyllum oliviforme* | Satin leaf | | | | |
| *Manilkara roxburghiana* | Mimusops | | | | |

| Family/host name | Common name | Observations | | | |
|---|---|---|---|---|---|
| | | AC | AF | L | E |
| *Manilkara zapota* | Sapodilla | ■ | ■ | | |
| **SOLANACEAE** | | | | | |
| *Acnistus arborescens* | Galán arbóreo | | ■ | | |
| *Cestrum diurnum* | Day jasmine, day cestrum | ■ | | | |
| *Nicotiana tabacum* | Tobacco | ■ | | | |
| *Solanum tuberosum* | Potato | ■ | | | |
| **STERCULIACEAE** | | | | | |
| *Guazuma ulmifolia* | Bastard cedar, white elm | ■ | | | |
| *Theobroma cacao* | Cocoa | | | ■ | |
| **ULMACEAE** | | | | | |
| *Celtis laevigata* | | ■ | | | |
| *Ulmus parviflora* | | ■ | | | |
| **VERBENACEAE** | | | | | |
| *Clerodendrum indicum* | | ■ | | | |
| **ZYGOPHYLLACEAE** | | | | | |
| *Guaiacum officinale* | | | ■ | | |
| *Kallstroemia maxima* | | ■ | ■ | | |

AC: Adult collection; AF: Adult feeding; L: larvae; E: egg masses.

## Appendix B – Distribution of *Diaprepes abbreviatus*

Distribution records based on the EPPO Global Database (EPPO, online), CABI CPC (CABI, online) and literature.

| Region | Country | Sub-national (e.g. State) | Status | |
|---|---|---|---|---|
| North America | USA | | Present, restricted distribution | EPPO (online); Seebens et al. (2017) |
| | | California | Present, restricted distribution | EPPO (online); Bates et al. (2015) |
| | | Florida | Present, no details | EPPO (online); Cherry et al. (2017) |
| | | Louisiana | Present, few occurrences | EPPO (online); State of Louisiana. Department of Agriculture and Forestry. 2009 (online) |
| | | Mississippi | Present | CABI (1980) |
| | | Texas | Present, restricted distribution | EPPO (online); Ascunce et al. (2008) |
| | | Virgin Islands (British) | Present, no details | EPPO (online); Peck et al. (2014) |
| | | Virgin Islands (US) | Present, no details | EPPO (online); Peck et al. (2014) |
| Central America | Costa Rica | | Present, no details | CABI (1980) |
| South America | French Guiana | | Present | CABI (1980) |
| Caribbean | Antigua and Barbuda | | Present, no details | EPPO (online) |
| | Barbados | | Present, no details | EPPO (online); Metcalfe (1959) |
| | Dominica | | Present, no details | EPPO (online); Blackwelder (1947) |
| | Dominican Republic | | Present, no details | EPPO (online); Peck et al. (2014) |
| | Grenada | | Present, no details | EPPO (online) |
| | Guadeloupe | | Present, no details | EPPO (online); Etienne and Delvare (1991) |
| | Haiti | | Present, no details | EPPO (online); Mumford (1964) |
| | Jamaica | | Present, no details | EPPO (online); CABI (1980) |
| | Martinique | | Present, no details | EPPO (online); Dupin (2017) |
| | Montserrat | | Present, no details | EPPO (online); CABI (1980) |
| | Puerto Rico | | Present, no details | EPPO (online); Virkki et al. (1991) |
| | Saint Lucia | | Present, no details | EPPO (online); Ulmer et al. (2006) |
| | St Kitts-Nevis | | Present, no details | EPPO (online); CABI (1980) |
| | St Vincent and the Grenadines | | Present, no details | EPPO (online); Blackwelder (1947) |
| | Trinidad and Tobago | | Present, no details | EPPO (online); Sirjusingh et al. (1992) |
| EU (27) | Portugal | | Present, no details | Portuguese NPPO (Appendix E) |

| Region | Country | Sub-national (e.g. State) | Status | |
|---|---|---|---|---|
| Other Europe | Canary Islands (Spain) | | Present, restricted distribution | Spanish NPPO (Appendix C) |
| | UK | | Present, transient | UK NPPO in EFSA PLH Panel (2022) |

## Appendix C – Response of the Spanish NPPO about the status of *Diaprepes abbreviatus*

(JULY 2023)

'*Diaprepes abbreviatus* is present on the Canary Islands (Spain).

A total of 11 outbreaks have been detected in the Island of Gran Canaria since the first detection in 2014 and 9 of them have been eradicated and only 2 of them remaining active Outbreaks N° 2 and N° 11:

Host plants affected:

Outbreak 2: *Tipuana tipu*, *Morus alba*, *Brachychiton* sp., *Coccoloba uvifera*, *Hybiscus* sp, *Citrus* sp; *Lagunaria patersonii*, *Corynocarpus variegata*, *Markhamia lutea lutea*, *Schefflera*, *Codiaedum croton*, *Schinus terebinthifolius* and *Syzygium aqueum*.

Outbreak 11: *Vitis sp*.

Infected area: the total area affected does not exceed 2 ha.
Buffer zone: The security area is around 10 ha. For each location, a demarcated area radius of 300 m has been established.

Current situation: Measures in outbreaks

Outbreak 2: eradication measures are being applied: application of phytosanitary products and in the case of finding any plant specimen with symptoms, it is destroyed.

Outbreak 11: outbreak detected on 23 December 2019, the neighbouring plots were surveyed considering the natural dispersal capacity of the pest and no new finding was detected. A phytosanitary treatment has been carried out to control adults (Karate Zeon) and continuous visits have been made to check the state of the pest. Furthermore, an agreement has been reached with the landowner and the vine crop is being removed, then weed control netting will be placed along the crop lines, after a phytosanitary treatment of the soil. After 2 years, if no new findings are detected the outbreak could be considered as eradicated.

The level of vigilance is being maintained at both points with monthly surveys.

The following eradication measures are carrying out for their eradication in the 2 outbreaks in force on the Island of Gran Canaria.

Eradication measures

- Treatment with phytosanitary products to both the aerial part and the root zone.
- Destruction of the affected plants, both root system and the aerial part, by means of a bio-shredder and a Second: Destruction of the affected plants, both of the root system and the aerial part, by means of a bio-shredder and subsequent burying of the remains with phytosanitary treatment.
- Placement of anti-weed netting on the ground where the destroyed plant species were growing, with the aim of the biological cycle of the insect, preventing the emergence of the adults from the soil and making it impossible for them to emerge from the emergence of adults from the soil and making it impossible for newly hatched larvae to bury themselves.
- Prohibition of the movement of material, host plant material and/or plant material close to the affected plant material which has been removed and susceptible to being a host.
- Monitoring of each registered nursery in Gran Canaria and Tenerife, then in the rest of the islands.
- Monthly surveys to detect the presence of the pest, prioritising the areas close to the outbreaks detected.

The Canary Islands are an EU third country according to Regulation 2016/2031, so they have their own status:

The status of Spain is **Absent, no pest record.** (Canary Islands is not included).
The status of Canary Islands is **Present, restricted distribution'.**

(SEPTEMBER 2023)

Host plant table filled with data from the plant health authorities of the Government of the Canary Islands.

| | ***D. abbreviatus* stage/s observed** | | | |
|---|---|---|---|---|
| | **Adult collection** | **Adult feeding** | **Larvae in roots** | **Egg masses** |
| *Tipuana tipu* | Observed | Observed | Observed | Observed |
| *Morus alba* | Observed | Observed | Observed | THERE IS NO RECORD OF* |
| *Brachychiton* sp. | Observed | Observed | Observed | Observed |
| *Lagunaria patersonii* | Observed | Observed | Observed | THERE IS NO RECORD OF* |
| *Corynocarpus variegata* | Observed | THERE IS NO RECORD OF* | Observed | THERE IS NO RECORD OF* |
| *Markhamia lutea lutea* | Observed | Observed | Observed | Detected |
| *Codiaedum croton* | Observed | THERE IS NO RECORD OF* | Observed | THERE IS NO RECORD OF* |
| *Syzygium aqueum* | Observed | Observed | Observed | THERE IS NO RECORD OF* |
| *Vitis* sp. | Observed | Observed | Observed | Observed |

*: Not observed, but an affirmative or negative answer cannot be given because it has not been specifically reviewed.

## Appendix D – Response of the Swedish NPPO about the status of *Diaprepes abbreviatus*

(SEPTEMBER 2023)

'In reply to your question below, the official pest of *D. abbreviatus* in Sweden is "Absent, invalid record". To reach this conclusion, the Swedish NPPO consulted the Swedish plant health risk assessors at SLU University, Uppsala, and you can find their assessment in the PDF-document attached to this email'.

CABI will update the pest status for Sweden in their database.

The detailed report on the presence of *D. abbreviatus* in Sweden prepared by SLU was archived with the literature references supporting this document.

## Appendix E – Response of the Portuguese NPPO about the status of *Diaprepes abbreviatus*

(SEPTEMBER 2023)

'The only information we have is that the insect feeds on various ornamental plants, notably Hibiscus and Schefflera. Up to now the colleagues from Madeira have no records on other crops affected. Just a few insects have been found in Funchal (Madeira island), and no data about the damages caused by the pest is available'.

# Appendix F – Methodological note for the climatic modelling of Europe and Florida in relation to *D. abbreviatus* thermal thresholds

Based on Lapointe et al. (2007), the mean number of days with mean soil temperature $\leq 12^{\circ}C$ (Figure 4) was based on the temperatures obtained as follows:

- Mean soil temperature was calculated as the mean between daily soil minimum and maximum temperatures ($T_{min}$ and $T_{max}$, respectively).
- The original published work was based on interpolated soil temperature measured with a sensor at 10 cm depth. The maps are based on data from the Copernicus ERA5Land dataset which includes soil temperature for different layers. The first two layers are 0–7 cm and 7–28 cm. The soil temperature is considered representative for the middle of each layer.
- To have a comparable depth, the soil temperature used was the mean temperature between the two layers.