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Pest categorisation of *Diabrotica undecimpunctata undecimpunctata*

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Abstract

The EFSA Panel on Plant Health performed a pest categorisation of the beetle *Diabrotica undecimpunctata undecimpunctata* (Coleoptera: Chrysomelidae) for the EU. This species occurs in western USA and Mexico. Adults oviposit on annual plants in the families Chenopodiaceae, Cucurbitaceae, Fabaceae, Poaceae, Polygonaceae and Solanaceae. Adults feed on tender plant parts in hosts in 30 additional botanical families. Preimaginal development takes place on the roots of the host plant, where larvae feed and pupate. The insect completes one to three generations per year depending on temperature. Overwintering adults (no diapause) may abandon crops to seek shelter in wild vegetation and reinvade crops in spring. *D. undecimpunctata undecimpunctata* is not known to occur in the EU and is regulated in Annex IIA of Commission Implementing Regulation 2019/2072. This species is a competent vector of squash mosaic virus, a pathogen already present and not regulated in the EU. Within Commission Implementing Regulation 2019/2072, potential entry pathways for *D. undecimpunctata undecimpunctata*, such as Poaceae and Solanaceae plants for planting with foliage and soil/growing medium, and soil/growing media by themselves can be considered as closed. However, plants for planting of the families Chenopodiaceae, Cucurbitaceae, Fabaceae and Polygonaceae are not specifically regulated. Should *D. undecimpunctata undecimpunctata* arrive in the EU, climatic conditions and availability of susceptible hosts provide conditions suitable for establishment and further spread. Economic impact is anticipated. *D. undecimpunctata undecimpunctata* satisfies the criteria that are within the remit of EFSA to assess for this species to be regarded as a potential Union quarantine pest. This species does not meet the criteria of being present in the EU nor plants for planting being the main pathway for spread for it to be regarded as a potential regulated non-quarantine pest.

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Keywords: European Union, pest risk, plant health, plant pest, quarantine, western spotted cucumber beetle, squash mosaic virus

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Table of contents

Abstract.....	1
1. Introduction.....	4
1.1. Background and Terms of Reference as provided by the requestor.....	4
1.1.1. Background.....	4
1.1.2. Terms of reference.....	4
1.1.2.1. Terms of Reference: Appendix 1.....	5
1.1.2.2. Terms of Reference: Appendix 2.....	6
1.1.2.3. Terms of Reference: Appendix 3.....	7
1.2. Interpretation of the Terms of Reference.....	8
2. Data and methodologies.....	8
2.1. Data.....	8
2.1.1. Literature search.....	8
2.1.2. Database search.....	9
2.2. Methodologies.....	9
3. Pest categorisation.....	11
3.1. Identity and biology of the pest.....	11
3.1.1. Identity and taxonomy.....	11
3.1.2. Biology of the pest.....	11
3.1.3. Intraspecific diversity.....	11
3.1.4. Detection and identification of the pest.....	12
3.2. Pest distribution.....	12
3.2.1. Pest distribution outside the EU.....	12
3.2.2. Pest distribution in the EU.....	13
3.3. Regulatory status.....	13
3.3.1. Commission Implementing Regulation 2019/2072.....	13
3.3.2. Legislation addressing the hosts of <i>Diabrotica undecimpunctata undecimpunctata</i>	17
3.3.3. Legislation addressing the organisms vectored by <i>Diabrotica undecimpunctata undecimpunctata</i> (Commission Implementing Regulation 2019/2072).....	17
3.4. Entry, establishment and spread in the EU.....	17
3.4.1. Host range.....	17
3.4.2. Entry.....	18
3.4.3. Establishment.....	19
3.4.3.1. EU distribution of main host plants.....	19
3.4.3.2. Climatic conditions affecting establishment.....	19
3.4.4. Spread.....	20
3.5. Impacts.....	20
3.6. Availability and limits of mitigation measures.....	21
3.6.1. Identification of additional measures.....	21
3.6.1.1. Additional control measures.....	21
3.6.1.2. Additional supporting measures.....	22
3.6.1.3. Biological or technical factors limiting the effectiveness of measures to prevent the entry, establishment and spread of the pest.....	22
3.6.1.4. Biological or technical factors limiting the ability to prevent the presence of the pest on plants for planting.....	22
3.7. Uncertainty.....	22
4. Conclusions.....	22
References.....	23
Abbreviations.....	25
Glossary.....	25

1. Introduction

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

1.1.1. Background

Council Directive 2000/29/EC¹ on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community established the previous European Union plant health regime. The Directive laid down the phytosanitary provisions and the control checks to be carried out at the place of origin on plants and plant products destined for the Union or to be moved within the Union. In the Directive's 2000/29/EC annexes, the list of harmful organisms (pests) whose introduction into or spread within the Union was prohibited, was detailed together with specific requirements for import or internal movement.

Following the evaluation of the plant health regime, the new basic plant health law, Regulation (EU) 2016/2031² on protective measures against pests of plants, was adopted on 26 October 2016 and applied from 14 December 2019 onwards, repealing Directive 2000/29/EC. In line with the principles of the above mentioned legislation and the follow-up work of the secondary legislation for the listing of EU regulated pests, EFSA is requested to provide pest categorisations of the harmful organisms included in the annexes of Directive 2000/29/EC, in the cases where recent pest risk assessment/pest categorisation is not available.

1.1.2. Terms of reference

EFSA is requested, pursuant to Article 22(5.b) and Article 29(1) of Regulation (EC) No 178/2002,³ to provide scientific opinion in the field of plant health.

EFSA is requested to prepare and deliver a pest categorisation (step 1 analysis) for each of the regulated pests included in the appendices of the annex to this mandate. The methodology and template of pest categorisation have already been developed in past mandates for the organisms listed in Annex II Part A Section II of Directive 2000/29/EC. The same methodology and outcome is expected for this work as well.

The list of the harmful organisms included in the annex to this mandate comprises 133 harmful organisms or groups. A pest categorisation is expected for these 133 pests or groups and the delivery of the work would be stepwise at regular intervals through the year as detailed below. First priority covers the harmful organisms included in Appendix 1, comprising pests from Annex II Part A Section I and Annex II Part B of Directive 2000/29/EC. The delivery of all pest categorisations for the pests included in Appendix 1 is June 2018. The second priority is the pests included in Appendix 2, comprising the group of *Cicadellidae* (non-EU) known to be vector of Pierce's disease (caused by *Xylella fastidiosa*), the group of *Tephritidae* (non-EU), the group of potato viruses and virus-like organisms, the group of viruses and virus-like organisms of *Cydonia* Mill., *Fragaria* L., *Malus* Mill., *Prunus* L., *Pyrus* L., *Ribes* L., *Rubus* L. and *Vitis* L., and the group of *Margarodes* (non-EU species). The delivery of all pest categorisations for the pests included in Appendix 2 is end 2019. The pests included in Appendix 3 cover pests of Annex I part A section I and all pest categorisations should be delivered by end 2020.

For the above mentioned groups, each covering a large number of pests, the pest categorisation will be performed for the group and not the individual harmful organisms listed under "such as" notation in the Annexes of the Directive 2000/29/EC. The criteria to be taken particularly under consideration for these cases, is the analysis of host pest combination, investigation of pathways, the damages occurring and the relevant impact.

Finally, as indicated in the text above, all references to 'non-European' should be avoided and replaced by 'non-EU' and refer to all territories with exception of the Union territories as defined in Article 1 point 3 of Regulation (EU) 2016/2031.

¹ Council Directive 2000/29/EC of 8 May 2000 on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community. OJ L 169/1, 10.7.2000, p. 1–112.

² Regulation (EU) 2016/2031 of the European Parliament of the Council of 26 October 2016 on protective measures against pests of plants. OJ L 317, 23.11.2016, p. 4–104.

³ Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. OJ L 31/1, 1.2.2002, p. 1–24.

1.1.2.1. Terms of Reference: Appendix 1

List of harmful organisms for which pest categorisation is requested. The list below follows the annexes of Directive 2000/29/EC.

Annex IIAI

(a) Insects, mites and nematodes, at all stages of their development

<i>Aleurocanthus</i> spp.	<i>Numonia pyrivorella</i> (Matsumura)
<i>Anthonomus bisignifer</i> (Schenkling)	<i>Oligonychus perditus</i> Pritchard and Baker
<i>Anthonomus signatus</i> (Say)	<i>Pissodes</i> spp. (non-EU)
<i>Aschistonyx eppoi</i> Inouye	<i>Scirtothrips aurantii</i> Faure
<i>Carposina niponensis</i> Walsingham	<i>Scirtothrips citri</i> (Moultex)
<i>Enarmonia packardi</i> (Zeller)	<i>Scolytidae</i> spp. (non-EU)
<i>Enarmonia prunivora</i> Walsh	<i>Scrobipalopsis solanivora</i> Povolny
<i>Grapholita inopinata</i> Heinrich	<i>Tachypterellus quadrigibbus</i> Say
<i>Hishomonus phycitidis</i>	<i>Toxoptera citricida</i> Kirk.
<i>Leucaspis japonica</i> Ckll.	<i>Unaspis citri</i> Comstock
<i>Listronotus bonariensis</i> (Kuschel)	

(b) Bacteria

Citrus variegated chlorosis	<i>Xanthomonas campestris</i> pv. <i>oryzae</i> (Ishiyama) Dye
<i>Erwinia stewartii</i> (Smith) Dye	and pv. <i>oryzicola</i> (Fang. et al.) Dye

(c) Fungi

<i>Alternaria alternata</i> (Fr.) Keissler (non-EU pathogenic isolates)	<i>Elsinoe</i> spp. Bitanc. and Jenk. Mendes
<i>Anisogramma anomala</i> (Peck) E. Müller	<i>Fusarium oxysporum</i> f. sp. <i>albedinis</i> (Kilian and Maire) Gordon
<i>Apiosporina morbosus</i> (Schwein.) v. Arx	<i>Guignardia piricola</i> (Nosa) Yamamoto
<i>Ceratocystis virescens</i> (Davidson) Moreau	<i>Puccinia pittieriana</i> Hennings
<i>Cercoseptoria pini-densiflorae</i> (Hori and Nambu) Deighton	<i>Stegophora ulmea</i> (Schweinitz: Fries) Sydow & Sydow
<i>Cercospora angolensis</i> Carv. and Mendes	<i>Venturia nashicola</i> Tanaka and Yamamoto

(d) Virus and virus-like organisms

Beet curly top virus (non-EU isolates)	Citrus tristeza virus (non-EU isolates)
Black raspberry latent virus	Leprosis
Blight and blight-like	Little cherry pathogen (non- EU isolates)
Cadang-Cadang viroid	Naturally spreading psorosis
Palm lethal yellowing mycoplasma	Tatter leaf virus
Satsuma dwarf virus	Witches' broom (MLO)

Annex IIB

(a) Insect mites and nematodes, at all stages of their development

<i>Anthonomus grandis</i> (Boh.)	<i>Ips cembrae</i> Heer
<i>Cephalcia lariciphila</i> (Klug)	<i>Ips duplicatus</i> Sahlberg
<i>Dendroctonus micans</i> Kugelán	<i>Ips sexdentatus</i> Börner
<i>Gilpinia hercyniae</i> (Hartig)	<i>Ips typographus</i> Heer
<i>Gonipterus scutellatus</i> Gyll.	<i>Sternochetus mangiferae</i> Fabricius
<i>Ips amitinus</i> Eichhof	

(b) Bacteria

Curtobacterium flaccumfaciens pv. *flaccumfaciens*
(Hedges) Collins and Jones

(c) Fungi

Glomerella gossypii Edgerton

Hypoxyton mammatum (Wahl.) J. Miller

Gremmeniella abietina (Lag.) Morelet

1.1.2.2. Terms of Reference: Appendix 2

List of harmful organisms for which pest categorisation is requested per group. The list below follows the categorisation included in the annexes of Directive 2000/29/EC.

Annex IAI**(a) Insects, mites and nematodes, at all stages of their development**

Group of Cicadellidae (non-EU) known to be vector of Pierce's disease (caused by *Xylella fastidiosa*), such as:

- | | |
|--|---|
| 1) <i>Carneocephala fulgida</i> Nottingham | 3) <i>Graphocephala atropunctata</i> (Signoret) |
| 2) <i>Draeculacephala minerva</i> Ball | |

Group of Tephritidae (non-EU) such as:

- | | |
|--|---|
| 1) <i>Anastrepha fraterculus</i> (Wiedemann) | 12) <i>Pardalaspis cyanescens</i> Bezzi |
| 2) <i>Anastrepha ludens</i> (Loew) | 13) <i>Pardalaspis quinaria</i> Bezzi |
| 3) <i>Anastrepha obliqua</i> Macquart | 14) <i>Pterandrus rosa</i> (Karsch) |
| 4) <i>Anastrepha suspensa</i> (Loew) | 15) <i>Rhacochlaena japonica</i> Ito |
| 5) <i>Dacus ciliatus</i> Loew | 16) <i>Rhagoletis completa</i> Cresson |
| 6) <i>Dacus curcurbitae</i> Coquillett | 17) <i>Rhagoletis fausta</i> (Osten-Sacken) |
| 7) <i>Dacus dorsalis</i> Hendel | 18) <i>Rhagoletis indifferens</i> Curran |
| 8) <i>Dacus tryoni</i> (Froggatt) | 19) <i>Rhagoletis mendax</i> Curran |
| 9) <i>Dacus tsuneonis</i> Miyake | 20) <i>Rhagoletis pomonella</i> Walsh |
| 10) <i>Dacus zonatus</i> Saund. | 21) <i>Rhagoletis suavis</i> (Loew) |
| 11) <i>Epochra canadensis</i> (Loew) | |

(c) Viruses and virus-like organisms

Group of potato viruses and virus-like organisms such as:

- | | |
|----------------------------------|--|
| 1) Andean potato latent virus | 4) Potato black ringspot virus |
| 2) Andean potato mottle virus | 5) Potato virus T |
| 3) Arracacha virus B, oca strain | 6) non-EU isolates of potato viruses A, M, S, V, X and Y (including Yo, Yn and Yc) and Potato leafroll virus |

Group of viruses and virus-like organisms of *Cydonia* Mill., *Fragaria* L., *Malus* Mill., *Prunus* L., *Pyrus* L., *Ribes* L., *Rubus* L. and *Vitis* L., such as:

- | | |
|--------------------------------------|--|
| 1) Blueberry leaf mottle virus | 8) Peach yellows mycoplasma |
| 2) Cherry rasp leaf virus (American) | 9) Plum line pattern virus (American) |
| 3) Peach mosaic virus (American) | 10) Raspberry leaf curl virus (American) |
| 4) Peach phony rickettsia | 11) Strawberry witches' broom mycoplasma |
| 5) Peach rosette mosaic virus | 12) Non-EU viruses and virus-like organisms of <i>Cydonia</i> Mill., <i>Fragaria</i> L., <i>Malus</i> Mill., <i>Prunus</i> L., <i>Pyrus</i> L., <i>Ribes</i> L., <i>Rubus</i> L. and <i>Vitis</i> L. |
| 6) Peach rosette mycoplasma | |
| 7) Peach X-disease mycoplasma | |

Annex IIAI

(a) Insects, mites and nematodes, at all stages of their development

Group of *Margarodes* (non-EU species) such as:

- 1) *Margarodes vitis* (Phillipi)
- 2) *Margarodes vredendalensis* de Klerk
- 3) *Margarodes prieskaensis* Jakubski

1.1.2.3. Terms of Reference: Appendix 3

List of harmful organisms for which pest categorisation is requested. The list below follows the annexes of Directive 2000/29/EC.

Annex IAI

(a) Insects, mites and nematodes, at all stages of their development

<i>Acleris</i> spp. (non-EU)	<i>Longidorus diadecturus</i> Eveleigh and Allen
<i>Amauromyza maculosa</i> (Malloch)	<i>Monochamus</i> spp. (non-EU)
<i>Anomala orientalis</i> Waterhouse	<i>Myndus crudus</i> Van Duzee
<i>Arrhenodes minutus</i> Drury	<i>Nacobbus aberrans</i> (Thorne) Thorne and Allen
<i>Choristoneura</i> spp. (non-EU)	<i>Naupactus leucoloma</i> Boheman
<i>Conotrachelus nenuphar</i> (Herbst)	<i>Premnotrypes</i> spp. (non-EU)
<i>Dendrolimus sibiricus</i> Tschetverikov	<i>Pseudopityophthorus minutissimus</i> (Zimmermann)
<i>Diabrotica barberi</i> Smith and Lawrence	<i>Pseudopityophthorus pruinosis</i> (Eichhoff)
<i>Diabrotica undecimpunctata howardi</i> Barber	<i>Scaphoideus luteolus</i> (Van Duzee)
<i>Diabrotica undecimpunctata undecimpunctata</i> Mannerheim	<i>Spodoptera eridania</i> (Cramer)
<i>Diabrotica virgifera zea</i> Krysan & Smith	<i>Spodoptera frugiperda</i> (Smith)
<i>Diaphorina citri</i> Kuway	<i>Spodoptera litura</i> (Fabricus)
<i>Heliothis zea</i> (Boddie)	<i>Thrips palmi</i> Karny
<i>Hirschmanniella</i> spp., other than <i>Hirschmanniella gracilis</i> (de Man) Luc and Goodey	<i>Xiphinema americanum</i> Cobb sensu lato (non-EU populations)
<i>Liriomyza sativae</i> Blanchard	<i>Xiphinema californicum</i> Lamberti and Bleve-Zacheo

(b) Fungi

<i>Ceratocystis fagacearum</i> (Bretz) Hunt	<i>Guignardia loricata</i> (Saw.) Yamamoto and Ito
<i>Chrysomyxa arctostaphyli</i> Dietel	<i>Gymnosporangium</i> spp. (non-EU)
<i>Cronartium</i> spp. (non-EU)	<i>Inonotus weirii</i> (Murril) Kotlaba and Pouzar
<i>Endocronartium</i> spp. (non-EU)	<i>Melampsora farlowii</i> (Arthur) Davis
<i>Mycosphaerella larici-leptolepis</i> Ito et al.	<i>Septoria lycopersici</i> Speg. var. <i>malagutii</i> Ciccarone and Boerema
<i>Mycosphaerella populorum</i> G. E. Thompson	<i>Thecaphora solani</i> Barrus
<i>Phoma andina</i> Turkensteen	<i>Trechispora brinkmannii</i> (Bresad.) Rogers
<i>Phyllosticta solitaria</i> Ell. and Ev.	

(c) Viruses and virus-like organisms

Tobacco ringspot virus	Pepper mild tigré virus
Tomato ringspot virus	Squash leaf curl virus
Bean golden mosaic virus	Euphorbia mosaic virus
Cowpea mild mottle virus	Florida tomato virus
Lettuce infectious yellows virus	

(d) Parasitic plants

Arceuthobium spp. (non-EU)

Annex I A I I

(a) Insects, mites and nematodes, at all stages of their development

Meloidogyne fallax Karssen

Rhizoecus hibisci Kawai and Takagi

Popillia japonica Newman

(b) Bacteria

Clavibacter michiganensis (Smith) Davis et al. ssp. *Ralstonia solanacearum* (Smith) Yabuuchi et al. *sepedonicus* (Spieckermann and Kotthoff) Davis et al.

(c) Fungi

Melampsora medusae Thümen

Synchytrium endobioticum (Schilbersky) Percival

Annex I B

(a) Insects, mites and nematodes, at all stages of their development

Leptinotarsa decemlineata Say

Liriomyza bryoniae (Kaltenbach)

(b) Viruses and virus-like organisms

Beet necrotic yellow vein virus

1.2. Interpretation of the Terms of Reference

Diabrotica undecimpunctata undecimpunctata Mannerheim is one of a number of pests listed in the Appendices to the Terms of Reference (ToR) to be subject to pest categorisation to determine whether it fulfils the criteria of a quarantine pest or those of a regulated non-quarantine pest (RNQP) for the area of the EU excluding Ceuta, Melilla and the outermost regions of Member States (MS) referred to in Article 355(1) of the Treaty on the Functioning of the European Union (TFEU), other than Madeira and the Azores.

Following the adoption of Regulation (EU) 2016/2031⁴ on 14 December 2019 and the Commission Implementing Regulation (EU) 2019/2072 for the listing of EU regulated pests, the Plant Health Panel interpreted the original request (ToR in Section 1.1.2) as a request to provide pest categorisations for the pests in the Annexes of Commission Implementing Regulation (EU) 2019/2072⁵.

2. Data and methodologies

2.1. Data

2.1.1. Literature search

A literature search on *Diabrotica undecimpunctata undecimpunctata* was conducted at the beginning of the categorisation in the ISI Web of Science bibliographic database, using the scientific name of the pest and its common name (western spotted cucumber beetle) as search terms. Relevant papers were reviewed, and further references and information were obtained from experts, as well as from citations within the references and grey literature.

⁴ Regulation (EU) 2016/2031 of the European Parliament and of the Council of 26 October 2016 on protective measures against pests of plants, amending Regulations (EU) No 228/2013, (EU) No 652/2014 and (EU) No 1143/2014 of the European Parliament and of the Council and repealing Council Directives 69/464/EEC, 74/647/EEC, 93/85/EEC, 98/57/EC, 2000/29/EC, 2006/91/EC and 2007/33/EC.

⁵ Commission Implementing Regulation (EU) 2019/2072 of 28 November 2019 establishing uniform conditions for the implementation of Regulation (EU) 2016/2031 of the European Parliament and the Council, as regards protective measures against pests of plants, and repealing Commission Regulation (EC) No 690/2008 and amending Commission Implementing Regulation (EU) 2018/2019.

2.1.2. Database search

Pest information, on host(s) and distribution, was retrieved from the European and Mediterranean Plant Protection Organization (EPPO) Global Database (EPPO, 2020) and relevant publications.

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

The Europhyt database was consulted for pest-specific notifications on interceptions and outbreaks. Europhyt is a web-based network run by the Directorate General for Health and Food Safety (DG SANTÉ) of the European Commission, and is a subproject of PHYSAN (Phyto-Sanitary Controls) specifically concerned with plant health information. The Europhyt database manages notifications of interceptions of plants or plant products that do not comply with EU legislation, as well as notifications of plant pests detected in the territory of the MS and the phytosanitary measures taken to eradicate or avoid their spread. The recording of interceptions switched from Europhyt to TRACES in May 2020. TRACES is a European Commission online platform used for the importation of plants into the European Union (It is also used for animals, animal products, food and feed of non-animal origin).

2.2. Methodologies

The Panel performed the pest categorisation for *D. undecimpunctata undecimpunctata* following guiding principles and steps presented in the EFSA guidance on quantitative pest risk assessment (EFSA PLH Panel, 2018) and in the International Standard for Phytosanitary Measures No 11 (FAO, 2013) and No 21 (FAO, 2004).

This work was initiated following an evaluation of the EU plant health regime. Therefore, to facilitate the decision-making process, in the conclusions of the pest categorisation, the Panel addresses explicitly each criterion for a Union quarantine pest and for a Union RNQP in accordance with Regulation (EU) 2016/2031 on protective measures against pests of plants, and includes additional information required in accordance with the specific terms of reference received by the European Commission. In addition, for each conclusion, the Panel provides a short description of its associated uncertainty.

Table 1 presents the Regulation (EU) 2016/2031 pest categorisation criteria on which the Panel bases its conclusions. All relevant criteria have to be met for the pest to potentially qualify either as a quarantine pest or as a RNQP. If one of the criteria is not met, the pest will not qualify. A pest that does not qualify as a quarantine pest may still qualify as a RNQP that needs to be addressed in the opinion. For the pests regulated in the protected zones only, the scope of the categorisation is the territory of the protected zone; thus, the criteria refer to the protected zone instead of the EU territory.

It should be noted that the Panel's conclusions are formulated respecting its remit and particularly with regard to the principle of separation between risk assessment and risk management (EFSA founding regulation (EU) No 178/2002); therefore, instead of determining whether the pest is likely to have an unacceptable impact, the Panel will present a summary of the observed pest impacts. Economic impacts are expressed in terms of yield and quality losses and not in monetary terms, whereas addressing social impacts is outside the remit of the Panel.

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

Criterion of pest categorisation	Criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Criterion in Regulation (EU) 2016/2031 regarding protected zone quarantine pest (Articles 32–35)	Criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest
Identity of the pest (Section 3.1)	Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible?	Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible?	Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible?

Criterion of pest categorisation	Criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Criterion in Regulation (EU) 2016/2031 regarding protected zone quarantine pest (Articles 32–35)	Criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest
Absence/ presence of the pest in the EU territory (Section 3.2)	Is the pest present in the EU territory? If present, is the pest widely distributed within the EU? Describe the pest distribution briefly!	Is the pest present in the EU territory? If not, it cannot be a protected zone quarantine organism	Is the pest present in the EU territory? If not, it cannot be a RNQP. (A regulated non-quarantine pest must be present in the risk assessment area)
Regulatory status (Section 3.3)	If the pest is present in the EU but not widely distributed in the risk assessment area, it should be under official control or expected to be under official control in the near future	The protected zone system aligns with the pest free area system under the International Plant Protection Convention (IPPC) The pest satisfies the IPPC definition of a quarantine pest that is not present in the risk assessment area (i.e. protected zone)	Is the pest regulated as a quarantine pest? If currently regulated as a quarantine pest, are there grounds to consider its status could be revoked?
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	Is the pest able to enter into, become established in, and spread within, the EU territory? If yes, briefly list the pathways!	Is the pest able to enter into, become established in, and spread within, the protected zone areas? Is entry by natural spread from EU areas where the pest is present possible?	Is spread mainly via specific plants for planting, rather than via natural spread or via movement of plant products or other objects? Clearly state if plants for planting is the main pathway!
Potential for consequences in the EU territory (Section 3.5)	Would the pests' introduction have an economic or environmental impact on the EU territory?	Would the pests' introduction have an economic or environmental impact on the protected zone areas?	Does the presence of the pest on plants for planting have an economic impact as regards the intended use of those plants for planting?
Available measures (Section 3.6)	Are there measures available to prevent the entry into, establishment within or spread of the pest within the EU such that the risk becomes mitigated?	Are there measures available to prevent the entry into, establishment within or spread of the pest within the protected zone areas such that the risk becomes mitigated? Is it possible to eradicate the pest in a restricted area within 24 months (or a period longer than 24 months where the biology of the organism so justifies) after the presence of the pest was confirmed in the protected zone?	Are there measures available to prevent pest presence on plants for planting such that the risk becomes mitigated?
Conclusion of pest categorisation (Section 4)	A statement as to whether 1) all criteria assessed by EFSA above for consideration as a potential quarantine pest were met and 2) if not, which one(s) were not met	A statement as to whether 1) all criteria assessed by EFSA above for consideration as potential protected zone quarantine pest were met, and 2) if not, which one(s) were not met	A statement as to whether 1) all criteria assessed by EFSA above for consideration as a potential RNQP were met, and 2) if not, which one (s) were not met

The Panel will not indicate in its conclusions of the pest categorisation whether to continue the risk assessment process, but following the agreed two-step approach, will continue only if requested by the risk managers. However, during the categorisation process, experts may identify key elements and knowledge gaps that could contribute significant uncertainty to a future assessment of risk. It would be useful to identify and highlight such gaps so that potential future requests can specifically target the major elements of uncertainty, perhaps suggesting specific scenarios to examine.

3. Pest categorisation

3.1. Identity and biology of the pest

3.1.1. Identity and taxonomy

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

Yes, the identity of *Diabrotica undecimpunctata undecimpunctata* is well established.

The western spotted cucumber beetle, *Diabrotica undecimpunctata undecimpunctata* Mannerheim 1843, is an insect in the order Coleoptera, Family Chrysomelidae. *Diabrotica soror* LeConte 1865 is a junior synonym. The EPPO code⁶ (Griessinger and Roy, 2015; EPPO, 2019) for this species is DIABUN (EPPO, 2020). According to Derunkov et al. (2015), the New World genus *Diabrotica* Chevrolat, 1836 contains over 400 described species. An extensive review of North and Central American *Diabrotica* spp. (Derunkov & Konstantinov 2013) resulted in an online identification guide of 112 taxa including *D. undecimpunctata undecimpunctata* (Derunkov et al., 2013).

3.1.2. Biology of the pest

Adults of *D. undecimpunctata undecimpunctata*, (including gravid females, Miller, 2007) are present year-round in areas where they overwinter in western USA (Krysan, 1986) as this species does not undergo a true diapause (Rimando et al., 1966). During the winter, though, adults are difficult to observe as they hide in leaf litter accumulated next to trees, shrubbery, fences and other structures (Goodell and Phillips, 2019). According to Smith and Michelbacher (1949), adults have a pre- and a post-dormancy migration between lowlands and foothills. When the temperature rises above 15.6°C (60°F), adults become active. They fly readily and move between cultivated and non-cultivated land. These beetles like moisture and dislike heat. Consequently, host crop fields (e.g. melons) are especially attractive in hot weather during and after irrigation (ANRUC, 2019). Adults are polyphagous (more than 30 different botanical families, see Section 3.4.1), and may feed on leaves of seedlings in the spring (Alston and Worwood, 2012), but show a marked preference for maize tassels in the field. Males and females can mate several times, each copulation lasting from about 30 min to several hours. Copulation takes place at any time of day and can occur at 11.1°C (52°F). Fecundity is higher at 23.9–26.7°C (75–80°F). Field collected adults can produce eggs for about one month. However, they can live for up to 4 months. A cage of about 700 adults may result in 10,000 eggs/week (Krysan, 1986). In the field, adults lay eggs at the base of host plants, which according to Clark et al. (2004) and Krysan (1986), include several cultivated and wild Chenopodiaceae, Cucurbitaceae, Fabaceae, Poaceae, Solanaceae and Polygonaceae. Upon egg hatching, larvae begin to feed on corresponding plant roots. They complete development, which takes about 30 days at 27°C, in an earthen cocoon in the soil. There are about three generations a year in California (ANRUC, 2019) but just one in the Pacific Northwest of the USA (Rimando et al., 1965). As larvae of *D. undecimpunctata undecimpunctata* may develop outside of cultivated fields, on roots of wild hosts, they may escape any in-field control measure (ANRUC, 2019).

3.1.3. Intraspecific diversity

The species *D. undecimpunctata* is divided into four subspecies. In addition to *D. undecimpunctata undecimpunctata* Mannerheim, *D. undecimpunctata duodecimnotata* Harold, *D. undecimpunctata tenella* LeConte and *D. undecimpunctata howardi* Barber have been described (Derunkov et al., 2013). *D. undecimpunctata howardi* will be subject to a separate pest categorisation by the EFSA plant health panel.

⁶ 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 harmonized system to facilitate the management of plant and pest names in computerized databases, as well as data exchange between IT systems (Griessinger and Roy, 2015; EPPO, 2019).

3.1.4. Detection and identification of the pest

Are detection and identification methods available for the pest?

Yes, detection and identification methods for *D. undecimpunctata undecimpunctata* are available.

Detection

Infested cucurbits show adult feeding holes in the leaves and scars on runners and young fruits. Scarring in the crown of the plant is also typical of adult damage (EPPO, 2020). Young host plants may die either because of adult feeding on seedlings or because of larval root damage (ANRUC, 2019).

According to Alston and Worwood (2012), *D. undecimpunctata undecimpunctata* can be detected by field scouting and/or the use of traps that lure and capture beetles mostly using food attractants.

Identification

Adults: Based on Derunkov et al. (2013), body length 4.8–6.9 mm; body width 2.4–3.9 mm. Head basic colour black. Antennae filiform, bi- or tricoloured, antennomeres 1–3 yellow, upper sides darkened, antennomeres 4–11 black. Maxillary palpi and labrum black. Pronotum yellow or sulfur yellow, subquadrate, bifoveate, with small round foveae, shagreened with minute wrinkles. Scutellum black. Elytra green, yellow or rufous, maculate with 12 round black maculae. Elytral epipleura completely yellow, sutural angle of elytra round, punctation scattered, fine. Abdomen black. Legs black. Aedeagus symmetric, with four internal sac-sclerites.

Adults of *D. undecimpunctata undecimpunctata* can be separated from other *Diabrotica* species by the following features: legs and abdomen entirely black in *D. undecimpunctata undecimpunctata*, partly pale in other species (Figure 1).

Eggs: oval, orange-yellow and 0.6 mm diameter. Their surface is covered with hexagonal pits (Alston and Worwood, 2012; Arant, 1929).

Larvae: Third instar larvae are 8–13 mm long, white to yellowish, with a brownish head capsule and a brown dorsal shield on the ninth abdominal segment (Alston and Worwood, 2012; Arant, 1929).

Pupae: Pupae are exarate adecticous, whitish and 6 mm long. They are found in earthen cells in soil near plant roots (Alston and Worwood, 2012; Arant, 1929).



Figure 1: Adult *Diabrotica undecimpunctata undecimpunctata*. (David Cappaert, Bugwood.org)

3.2. Pest distribution

3.2.1. Pest distribution outside the EU

The distribution of the two subspecies of *D. undecimpunctata undecimpunctata* and *D. undecimpunctata howardi* was not distinguished in the older literature and is reported to range in

North America from Canada to Mexico. The distribution of the subspecies *D. undecimpunctata undecimpunctata* is limited to the southwest of this area (EPPO, 2020). The current distribution is provided in Figure 2 and Table 2.

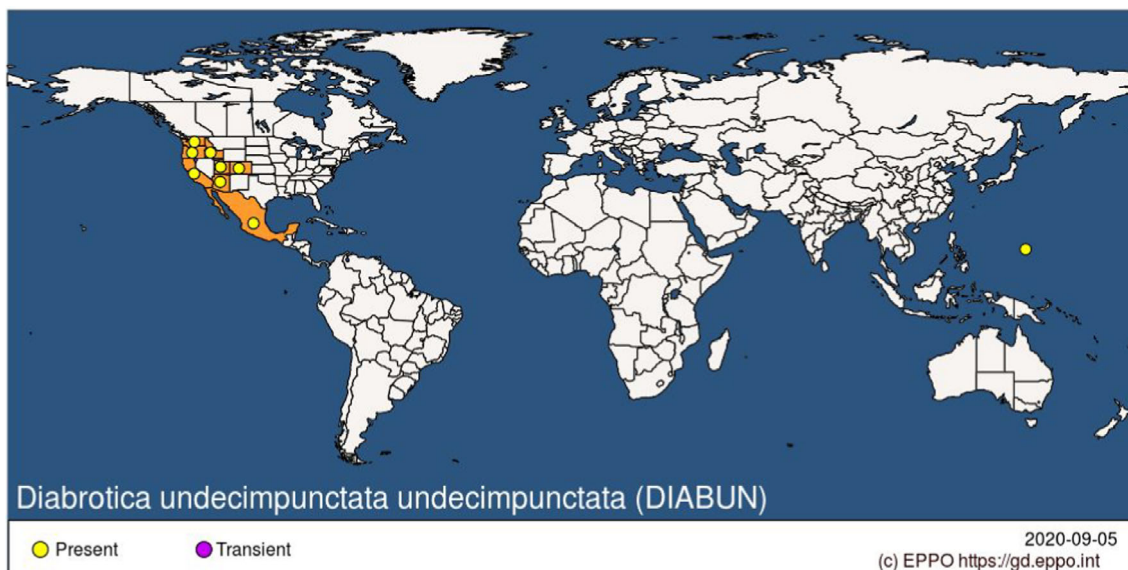


Figure 2: Global distribution map for *Diabrotica undecimpunctata undecimpunctata* (extracted from the EPPO Global Database accessed on 25 September 2020)

Table 2: Distribution of *Diabrotica undecimpunctata undecimpunctata* (Source: EPPO Global Database, 2020)

Continent	Country	Subnational area, e.g. State	Status
America	Mexico		Present restricted distribution
	United States of America		Present restricted distribution
		Arizona	Present
		California	Present
		Colorado	Present
		Idaho	Present
		Oregon	Present
		Utah	Present
Washington	Present		
Oceania	Guam		Present, few occurrences

3.2.2. Pest distribution in the EU

Is the pest present in the EU territory? If present, is the pest widely distributed within the EU?

No, *D. undecimpunctata undecimpunctata* is not known to occur in the EU.

D. undecimpunctata undecimpunctata is not known to occur in the EU. The NPPO of Slovenia declared to EPPO in July 2017 that *D. undecimpunctata undecimpunctata* was absent from its territory on the basis that there are no records of it in the country (EPPO, global database).

3.3. Regulatory status

3.3.1. Commission Implementing Regulation 2019/2072

D. undecimpunctata undecimpunctata is listed in Annex II of Commission Implementing Regulation (EU) 2019/2072, the implementing act of Regulation (EU) 2016/2031. Details are presented in Tables 3 and 4.

Table 3: *D. undecimpunctata undecimpunctata* in Commission Implementing Regulation 2019/2072

Annex II	List of Union quarantine pests and their respective codes
Part A	Pests not known to occur in the Union territory
	Quarantine Pests and their codes assigned by EPPO
C	Insects and mites
26	<i>Diabrotica undecimpunctata undecimpunctata</i> Mannerheim

3.3.2. Legislation addressing the hosts of *Diabrotica undecimpunctata undecimpunctata*

Regulated hosts and commodities that may involve *D. undecimpunctata undecimpunctata* in Annexes of Commission Implementing Regulation 2019/2072 are shown in Table 4.

Table 4: Regulated hosts and commodities that may involve *Diabrotica undecimpunctata undecimpunctata* in Annexes of Commission Implementing Regulation 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
14.	Plants for planting of the family <i>Poaceae</i> , other than plants of ornamental perennial grasses of the subfamilies <i>Bambusoideae</i> and <i>Panicoideae</i> and of the genera <i>Buchloe</i> , <i>Bouteloua</i> Lag., <i>Calamagrostis</i> , <i>Cortaderia</i> Stapf., <i>Glyceria</i> R. Br., <i>Hakonechloa</i> Mak. ex Honda, <i>Hystrix</i> , <i>Molinia</i> , <i>Phalaris</i> L., <i>Shibataea</i> , <i>Spartina</i> Schreb., <i>Stipa</i> L. and <i>Uniola</i> L., other than seeds	ex 0602 90 50 ex 0602 90 91 ex 0602 90 99	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 the following parts: Central Federal District (Tsentralny federalny okrug), Northwestern Federal District (Severo-Zapadny federalny okrug), Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug)), San Marino, Serbia, Switzerland, Syria, Tunisia, Turkey and Ukraine
15.	Tubers of <i>Solanum tuberosum</i> L., seed potatoes	0701 10 00	Third countries other than Switzerland
16.	Plants for planting of stolon- or tuber-forming species of <i>Solanum</i> L. or their hybrids, other than those tubers of <i>Solanum tuberosum</i> L. as specified in entry 15	ex 0601 10 90 ex 0601 20 90 ex 0602 90 50 ex 0602 90 70 ex 0602 90 91 ex 0602 90 99	Third countries other than Switzerland

17.	Tubers of species of <i>Solanum</i> L., and their hybrids, other than those specified in entries 15 and 16	ex 0601 10 90 ex 0601 20 90 0701 90 10 0701 90 50 0701 90 90	Third countries other than: (a) Algeria, Egypt, Israel, Libya, Morocco, Syria, Switzerland, Tunisia and Turkey, or (b) those which fulfil the following provisions: (i) they are one of following: Albania, Andorra, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Canary Islands, Faeroe Islands, Georgia, Iceland, Liechtenstein, Moldova, Monaco, Montenegro, North Macedonia, Norway, Russia (only the following parts: Central Federal District (Tsentralny federalny okrug), Northwestern Federal District (Severo-Zapadny federalny okrug), Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug)), San Marino, Serbia, and Ukraine and (ii) – they are either recognised as being free from <i>Clavibacter sepedonicus</i> (Spieckermann and Kottho) Nouioui et al., in accordance with the procedure referred to in Article 107 of Regulation (EU) No 2016/2031, or – their legislation, is recognised as equivalent to the Union rules concerning protection against <i>Clavibacter sepedonicus</i> (Spieckermann and Kottho) Nouioui et al. in accordance with the procedure referred to in Article 107 of Regulation (EU) No 2016/2031 have been complied with
18.	Plants for planting of <i>Solanaceae</i> other than seeds and the plants covered by entries 15, 16 or 17	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	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 the following parts: Central Federal District (Tsentralny federalny okrug), Northwestern Federal District (Severo-Zapadny federalny okrug), Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug)), San Marino, Serbia, Switzerland, Syria, Tunisia, Turkey and Ukraine

Annex VII	List of plants, plant products and other objects, originating from third countries and the corresponding special requirements for their introduction into the Union territory			
	Plants, plant products and other objects	CN code	Origin	Special requirements
6.	Plants for planting, of the family <i>Poaceae</i> of ornamental perennial grasses of the subfamilies <i>Bambusoideae</i> , <i>Panicoideae</i> and of the genera <i>Buchloe</i> Lag., <i>Bouteloua</i> Lag., <i>Calamagrostis</i> Adan., <i>Cortaderia</i> Stapf, <i>Glyceria</i> R. Br., <i>Hakonechloa</i> Mak. ex Honda, <i>Hystrix</i> L., <i>Molinia</i> Schnrak, <i>Phalaris</i> L., <i>Shibataea</i> Mak. Ex Nakai, <i>Spartina</i> Schreb., <i>Stipa</i> L. and <i>Uniola</i> L., other than seeds	ex 0602 90 50 ex 0602 90 91 ex 0602 90 99	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 the following parts: Central Federal District (Tsentralny federalny okrug), Northwestern Federal District	Official statement that the plants: (a) have been grown in nurseries; (b) are free from plants debris, flowers and fruits; (c) have been inspected and prior to export; (d) are found to be free from symptoms of harmful bacteria, viruses and virus- like organisms; and (e) are found to be free from signs or symptoms of harmful nematodes, insects, mites and fungi, or have been subjected to appropriate treatment to eliminate such organisms EN L 319/98 Official Journal of the European Union 10.12.2019

		(Severo- Zapadny federalny okrug), Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug)), San Marino, Serbia, Switzerland, Syria, Tunisia, Turkey and Ukraine	
Annex XI List of plants, plant products and other objects subject to phytosanitary certificates and those for which such certificates are not required for their introduction into the Union territory			
B	List of the respective CN codes of plants, as well as the respective third countries of their origin or dispatch, for which, pursuant to Article 73 of Regulation (EU) 2016/2031, phytosanitary certificates are required for their introduction into the Union territory		
Plants, plant products and other objects	CN code and its respective description under Council Regulation (EEC) No 2658/87	Country of origin or dispatch	
<i>All plants, within the meaning of point 1 of Article 2 of Regulation (EU) 2016/2031, other than those specified in parts A and C of this Annex</i>	<p>...</p> <p>Cucumbers and gherkins, fresh or chilled: 0707 00 05 0707 00 90</p> <p>Leguminous vegetables, shelled or unshelled, fresh or chilled: 0708 10 00 0708 20 00 0708 90 00</p> <p>Asparagus, celery other than celeriac, spinach, New Zealand spinach and orache spinach (garden spinach), globe artichokes, olives, pumpkins, squash and gourds (<i>Cucurbita</i> spp.), salad vegetables, (other than lettuce (<i>Lactuca sativa</i>) and chicory (<i>Cichorium</i> spp.)), chard (or white beet) and cardoons, capers, fennel and other vegetables, fresh or chilled, other than planted in a growing substrate: 0709 20 00 ex 0709 40 00 ex 0709 70 00 0709 91 00 0709 92 10 0709 92 90 0709 93 10 0709 93 90 ex 0709 99 10 ex 0709 99 20 0709 99 40 ex 0709 99 50 ex 0709 99 90</p>	Third countries other than Switzerland	
	<p>Melons, fresh or chilled: 0807 11 00 0807 19 00</p> <p>...</p>		

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

D. undecimpunctata undecimpunctata, as other beetles within the genus *Diabrotica*, can spread the squash mosaic virus, EPPO code SQMV00 (ANRUC, 2019), a pest present in Greece, Italy and the Netherlands (EPPO GD) and not regulated in the EU.

3.4. Entry, establishment and spread in the EU

3.4.1. Host range

Both adults and larvae of *D. undecimpunctata undecimpunctata* are highly polyphagous. True hosts, i.e. those on which this beetle can reproduce, include a wide range of wild and cultivated annual plants in the families Chenopodiaceae, Cucurbitaceae, Fabaceae, Poaceae, Polygonaceae and Solanaceae (Krysan, 1989; Clark et al., 2004; Alston and Worwood, 2012; ANRUC, 2019). Adults may feed on plants in 30 additional families. Table 5 shows plant parts of plant species where either larvae may complete development or adults may feed. Fruit like peaches have been reported as an adult feeding host by Alston and Worwood (2012). As adults actively look for moisture, this report may just reflect an attraction for mature fruit (i.e. not only peaches), which would precisely offer what adults look for in hot and dry days.

Table 5: Plant parts of the plant hosts where larvae and adults of *D. undecimpunctata undecimpunctata* can feed (based on Krysan, 1989; Clark et al., 2004; Alston and Worwood, 2012; ANRUC, 2019; Day, 2020)

Life stage	Hosts
Larva	Roots of Chenopodiaceae (<i>Beta vulgaris</i>), Cucurbitaceae (<i>Cucumis melo</i> , <i>C. sativus</i> , <i>Cucurbita</i> spp.), Fabaceae (<i>Arachis hypogaea</i> , <i>Vicia</i> sp., <i>Lathyrus hirsutus</i> , <i>L. odoratus</i> , <i>Medicago sativa</i> , <i>Phaseolus vulgaris</i> , <i>Pisum sativum</i>), Poaceae (<i>Hordeum</i> sp., <i>Oryza sativa</i> , <i>Phalaris</i> sp., <i>Triticum</i> sp., <i>Zea mays</i>), Polygonaceae (<i>Polygonum</i> sp.) and Solanaceae (<i>Solanum lycopersicon</i> , <i>Solanum tuberosum</i>)
Adult	Leaves, flowers, and soft fruits of Aceraceae, Agavaceae, Apiaceae, Asteraceae, Brassicaceae, Cannaceae, Caryophyllaceae, Chenopodiaceae, Convolvulaceae, Cucurbitaceae (cantaloupe, cucumber, squash, gourd), Cyperaceae, Fabaceae (beans, peanuts), Fumariaceae, Grossulariaceae (currant), Iridaceae, Juglandaceae, Lauraceae (avocado), Liliaceae, Malvaceae, Moraceae, Orobanchaceae, Paeoniaceae, Papaveraceae, Plantaginaceae, Poaceae (maize), Polygonaceae, Ranunculaceae, Rosaceae (almonds, apples, peaches, cherries), Rutaceae (citrus), Scrophulariaceae, Solanaceae (peppers, potatoes, tomatoes), Typhaceae, Verbenaceae and Violaceae

Although the high polyphagy of *D. undecimpunctata undecimpunctata* would make the regulation of the hosts/commodities included in their host range an endless task, as a quarantine pest listed in Annex II, Part A of Regulation 2016/2031, the pest freedom status of any commodity introduced into the EU from the areas where the pest is known to occur should be granted by the compulsory phytosanitary certificate (Commission Implementing Regulation 2019/2072). Current regulations (see Tables 2 and 3) are not comprehensive of the true host range of *D. undecimpunctata undecimpunctata* (i.e. those where oviposition takes place and immature stages complete development), as plants for planting of the families Chenopodiaceae (*Beta vulgaris*), Cucurbitaceae (*Cucumis* spp.) and Fabaceae (*Arachis hypogaea*, *Vicia* spp., *Lathyrus* spp., *Medicago sativa*, *Phaseolus vulgaris* and *Pisum sativum*) other than seeds from third countries (where *D. undecimpunctata undecimpunctata* occur) are not specifically regulated.

3.4.2. Entry

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

Yes, the pest could enter into the EU in plants for planting (any life stage), flowers and fruit (adults) and soil/growing medium (immature stages, either by themselves, accompanying plants for planting, or attached to machinery).

Adult *D. undecimpunctata undecimpunctata* are unlikely to be carried by either plants for planting, flowers, or fruit, which are the adult feeding hosts (Table 5), because 1) they would be expected to fly off such plant parts when disturbed during harvesting and processing for shipment and 2) they only feed on soft skinned young fruit (i.e. melons) not ready for harvest. *D. undecimpunctata undecimpunctata* is more likely to move in international trade as immature stages (eggs, larvae and pupae) on roots of true hosts or in soil, either as a commodity on its own, or when accompanying plants for planting. However, whether there is any import into the EU of susceptible plants for planting with soil (keep in mind that all plant hosts where larvae feed are annual) is uncertain but is quite unlikely.

A search of Europhyt interceptions database did not reveal any interception of *D. undecimpunctata undecimpunctata* for the period 1995–2020 (accessed on 15 July 2020). There were no interceptions recorded in the TRACES database from May to September 2020 (accessed on 25 September 2020). Potential entry pathways are shown in Table 6.

Table 6: Potential pathways for *D. undecimpunctata undecimpunctata* and existing mitigations (if any)

Pathway	Life stage	Relevant mitigations [e.g. prohibitions (Annex VI) or special requirements (Annex VII) within Implementing Regulation 2019/2072]
Plants for planting with foliage and soil/growing medium	Eggs larvae and pupae on roots/in soil Adults on foliage	Annex VII of Regulation 2019/2072 requires a general freedom from symptoms of quarantine pests Annex VI (14.) bans the introduction of Poaceae from the USA Annex VI (15.-18.) bans the introduction of Solanaceae from the USA Annex VII (5.) excludes the USA from the introduction into the EU of annual (..) plants for planting other than Poaceae and seed
Fruits	Adults on fruit	Annex VII of Regulation 2019/2072 requires a general freedom from symptoms of quarantine pests Article 72(1) of Regulation (EU) 2016/2031 requires a phytosanitary certificate
Soil and growing media	Immature stages	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	Immature stages	Annex VII (2.) Official statement that machinery or vehicles are cleaned and free from soil and plant debris

The plants for planting with foliage and growing medium pathway is regulated because plants for planting require a phytosanitary certificate and, therefore, should be free from quarantine pests even if they are not specifically regulated in relation to *D. undecimpunctata undecimpunctata*.

Likewise, the fruit pathway is regulated because fruits require a phytosanitary certificate and, therefore, should be free from quarantine pests even if they are not specifically regulated in relation to *D. undecimpunctata undecimpunctata*.

The soil/growing media pathway can be considered as closed because soil can only enter the EU from Switzerland (Annex VI). *D. undecimpunctata undecimpunctata* is not known to occur in Switzerland.

Import records do not provide sufficient detail to identify whether host plants of the pest are imported into the EU.

3.4.3. Establishment

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

Yes. Taking into account its distribution in western North America within climate zones that also occur in the EU, and the availability of hosts outdoors in Europe, *D. undecimpunctata undecimpunctata* has the potential to establish in the EU.

3.4.3.1. EU distribution of main host plants

Sources: EUROSTAT and/or other sources (previous opinions, forestry JRC maps, etc.)

As noted above (Section 3.4.1) both adults and larvae of *D. undecimpunctata undecimpunctata* are polyphagous. However, they show a preference for cucurbits. Many of the various cultivated varieties of *Cucurbita pepo* (marrows, courgettes and zucchini) are grown within the EU. Marrows are grown more in northern Europe, while courgettes and zucchini are grown more in central and southern Europe. *Cucurbita maxima* (pumpkin) is grown outdoors across the EU. *Cucumis sativus* (cucumbers and gherkins) are grown both outdoors and in greenhouses in Europe. *Cucumis melo* (melons: cantaloupe, musk, winter) can be grown on a field scale in all Mediterranean countries and in greenhouses in northern Europe (de Rougemont, 1989). The area of cucurbit production in the EU, is shown in Table 7.

Table 7: Crop production area 2015–2019 in EU28 (cultivation/harvested/production) of maize and cucurbit hosts of *Diabrotica undecimpunctata undecimpunctata* (1,000 ha) Source Eurostat Crop production in EU standard humidity [apro_cpsh1] (accessed on 20/6/2020)

Crop	Code	2015	2016	2017	2018	2019
Watermelons	V3520	76.39	75.29	76.47	73.54	76.13
Muskmelons	V3510	73.73	73.27	72.60	70.30	70.28
Courgettes and marrows	V3420	39.99	41.52	42.41	42.52	42.32
Cucumbers	V3200	33.51	32.43	31.91	32.76	35.04
Cucumbers - under glass	V3200S	14.76	:	:	:	:
Gherkins	V3300	12.24	11.81	12.24	12.53	11.96
Gourds and pumpkins	V3430	:	:	:	:	:

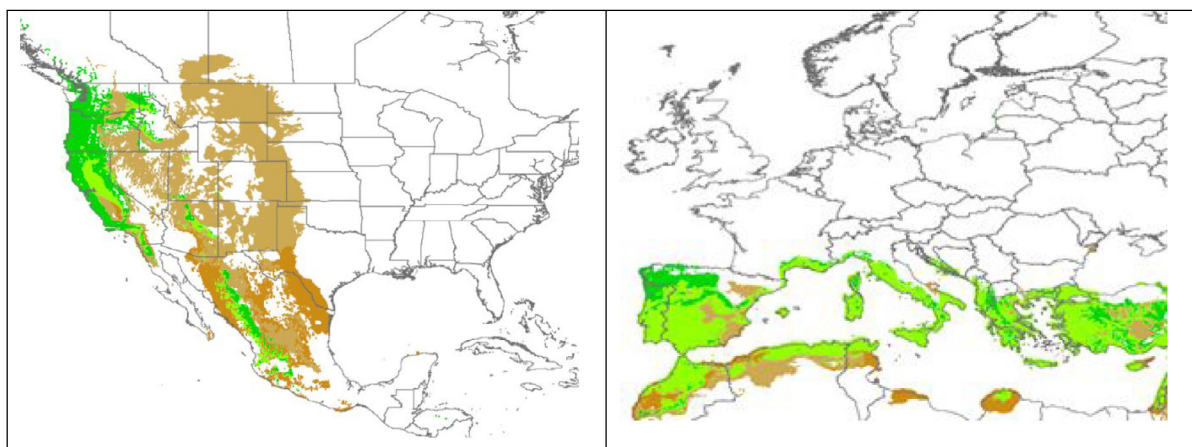
.; Data not available.

3.4.3.2. Climatic conditions affecting establishment

Krysan (1986) reports that the distribution of *Diabrotica* species in North America is limited by climate with *D. undecimpunctata undecimpunctata* being found primarily along the western coastal states of USA and Mexico as indicated in Figure 1. A range of Köppen–Geiger climate zones can be found over this area. The global Köppen–Geiger climate zones (Kottek et al., 2006) describe terrestrial climate in terms of average minimum winter temperatures and summer maxima, amount of precipitation and seasonality (rainfall pattern). Several climate types that occur in Europe also occur over much of the area of US states in which *D. undecimpunctata undecimpunctata* is known to occur (Figure 3). In particular climate types Bsh (Hot semi-arid), Bsk (Cold semi-arid), Csa (Hot-summer Mediterranean), Csb (Warm-summer Mediterranean) also occur in the EU where maize and cucurbit crops are grown.

Considering its distribution in North America, availability of hosts outdoors in Europe and the temperatures required for development, *D. undecimpunctata undecimpunctata* has the potential to establish in the EU. In the warmer southern EU, there could be two or three generations per year.

D. undecimpunctata undecimpunctata feeds on field crops and moves between crops and wild vegetation; it regularly migrates between lowlands and foothills. We have no evidence that it feeds on plants in greenhouses. As such it is not expected to establish in greenhouses if it were to enter the EU.



Key	Climate category	Descriptions
	Bsh	Dry, Hot semi-arid steppe, sub-tropical steppe, low-altitude dry
	Bsk	Dry, Cold semi-arid steppe, Mid-altitude steppe, dry
	Csa	Temperate, Dry hot summer; Mediterranean; Mild with dry hot summer
	Csb	Temperate, Dry, warm summer; Mediterranean; Mild with dry warm summer

Figure 3: Distribution of four Köppen–Gieger climate zones in North America including in States where *Diabrotica undecimpunctata undecimpunctata* occurs and which also occur in the EU (Map from MacLeod and Korycinska, 2019)

3.4.4. Spread

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

Yes, adults are strong flyers, which can also be passively dispersed long distances by air currents

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

No, plants for planting is not the main spread mechanism used by *D. undecimpunctata undecimpunctata*

According to EPPO (2020), the adults are strong fliers and can disperse rapidly, travelling readily from field to field during the summer. Moreover, adults can be carried long distances by high-altitude air currents.

3.5. Impacts

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

Yes, the introduction of *D. undecimpunctata undecimpunctata* into the EU would most likely have an economic impact on cucurbit production.

RNQPs: Does the presence of the pest on plants for planting have an economic impact, as regards the intended use of those plants for planting?

Yes, the presence of *D. undecimpunctata undecimpunctata* on plants for planting would most likely have an economic impact on its intended use.

In California, the cucumber beetle complex, which, in addition to *D. undecimpunctata undecimpunctata*, includes *Acalymma trivittatum* and *D. balteata* is a serious pest of smooth-skinned cucurbits, especially melons (ANRUC, 2019). While the adults prefer tender, succulent portions of plants, including the flowers and leaves, which they may destroy during feeding, it is the damage to the surface of the melon that reduces marketable yield. When temperatures are high, adults especially feed on the undersides of young melons, scarring them. After the skin hardens, melons are much less subject to attack. Scarring in the crown of the plant is also typical of adult damage. Feeding on stems of young plants, followed by sustained winds, may result in severe stand reductions making replanting necessary. In some situations, larvae may cause serious injury by feeding on roots, and young plants

can be killed. Moreover, as pointed out in Section 3.3.3, *D. undecimpunctata undecimpunctata* can spread the squash mosaic virus (SqMV). Early infections of SqMV often result in no or very low fruit production. Later infection can result in fruit that is small, deformed and discoloured. Melons infected with SqMV often lack netting at maturity (University of Minnesota Extension, 2018).

3.6. Availability and limits of mitigation measures

Are there measures available to prevent the entry into, establishment within or spread of the pest within the EU such that the risk becomes mitigated?

Yes, the existing measures (see Sections 3.3 and 3.4.2) can mitigate the risks of entry, establishment and spread within the EU. The plant for planting excluding seeds with soil/growing medium pathway is partly closed (i.e. Poaceae and Solanaceae). However, plants for planting excluding seeds of the families Chenopodiaceae, Cucurbitaceae, Fabaceae and Polygonaceae are not specifically regulated.

RNQPs: Are there measures available to prevent pest presence on plants for planting such that the risk becomes mitigated?

Yes, sourcing plants from PFAs (pest-free areas) would reduce the risk of the pest being present on plants

3.6.1. Identification of additional measures

Phytosanitary measures are currently applied to plants for planting and soil (see Section 3.3). Therefore, the entry pathways can be considered as partially closed (i.e. soil and Poaceae and Solanaceae plants for planting only). Extending these measures to plants for planting of the families Chenopodiaceae, Cucurbitaceae, Fabaceae and Polygonaceae) would further reduce the risk of entry of *D. undecimpunctata undecimpunctata* into the EU.

3.6.1.1. Additional control measures

A number of hosts are currently prohibited for import (see Table 4). The prohibition could be extended to all hosts (i.e., plants for planting with foliage and soil/growing medium of the families Chenopodiaceae, Cucurbitaceae, Fabaceae and Polygonaceae) from countries where *D. undecimpunctata undecimpunctata* occur (i.e., extension of regulations in Annex VI). If prohibition is not going to be extended, then potential additional measures are listed in Table 8.

Table 8: Selected control measures (a full list is available in EFSA PLH Panel, 2018) for pest entry/ establishment/spread/impact in relation to currently unregulated hosts and pathways. Control measures are measures that have a direct effect on pest abundance

Information sheet title (with hyperlink to information sheet if available)	Control measure summary	Risk component (entry/ establishment/ spread/impact)
Growing plants in isolation	Description of possible exclusion conditions that could be implemented to isolate the crop from pests and if applicable relevant vectors. E.g. a dedicated structure such as glass or plastic greenhouses	Spread, impact
Chemical treatments on consignments or during processing	Use of chemical compounds that may be applied to plants or to plant products after harvest, during process or packaging operations and storage The treatments addressed in this information sheet are: a) fumigation; b) spraying/dipping pesticides; c) surface disinfectants; d) process additives; e) protective compounds	Entry

Information sheet title (with hyperlink to information sheet if available)	Control measure summary	Risk component (entry/ establishment/ spread/impact)
Physical treatments on consignments or during processing	This information sheet deals with the following categories of physical treatments: irradiation/ionisation; mechanical cleaning (brushing, washing); sorting and grading, and; removal of plant parts (e.g. debarking wood). This information sheet does not address: heat and cold treatment (information sheet 1.14); roguing and pruning (information sheet 1.12)	Entry, spread
Controlled atmosphere	Treatment of plants by storage in a modified atmosphere (including modified humidity, O ₂ , CO ₂ , temperature, pressure)	Entry, spread

3.6.1.2. Additional supporting measures

No additional supporting measures are suggested.

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

- Immature stages (i.e. eggs) could be hidden on the roots of/in the soil attached to host plants hampering their detection by external visual inspection
- Adults could be present as hitchhikers on non-host plants
- Adults can actively fly

3.6.1.4. Biological or technical factors limiting the ability to prevent the presence of the pest on plants for planting

- Immature stages (i.e. eggs) could be hidden on the roots of/in the soil attached to host plants hampering their detection by external visual inspection

3.7. Uncertainty

There are no uncertainties affecting the conclusions of this categorisation.

4. Conclusions

D. undecimpunctata undecimpunctata satisfies the criteria that are within the remit of EFSA to assess for this species to be regarded as a potential Union quarantine pest. This species does not meet the criteria of being present in the EU nor plants for planting being the main pathway for spread for it to be regarded as a potential RNQP. Pest categorisation conclusions are presented in Table 9.

Table 9: The Panel’s conclusions on the pest categorisation criteria defined in Regulation (EU) 2016/2031 on protective measures against pests of plants (the number of the relevant sections of the pest categorisation is shown in brackets in the first column)

Criterion of pest categorisation	Panel’s conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Panel’s conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest	Key uncertainties
Identity of the pests (Section 3.1)	The identity of <i>Diabrotica undecimpunctata undecimpunctata</i> is well established	The identity of <i>Diabrotica undecimpunctata undecimpunctata</i> is well established	
Absence/presence of the pest in the EU territory (Section 3.2)	<i>D. undecimpunctata undecimpunctata</i> not known to occur in the EU territory	<i>D. undecimpunctata undecimpunctata</i> is not known to occur in the EU territory. Therefore, it doesn’t meet the criterion of being present in the EU to qualify for RNQP	

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest	Key uncertainties
Regulatory status (Section 3.3)	<i>D. undecimpunctata undecimpunctata</i> is currently regulated as a quarantine pest	<i>D. undecimpunctata undecimpunctata</i> is currently regulated as a quarantine pest. There are no grounds to consider the revoking of this status	
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	<p><i>D. undecimpunctata undecimpunctata</i> could enter into, establish in, and spread within the EU territory. Main pathways are:</p> <ul style="list-style-type: none"> Plants for planting of the families Chenopodiaceae, Cucurbitaceae, Fabaceae, Poaceae, Polygonaceae, and Solanaceae Soil and growing medium as such or attached to machinery. <p>The regulation covers 2 out of 6 families with hosts. The families Chenopodiaceae, Cucurbitaceae, Fabaceae, and Polygonaceae are not specifically regulated for import into the EU</p>	<i>D. undecimpunctata undecimpunctata</i> could spread within the EU territory. Adults are good flyers. Immature stages could spread with plants for planting. Although the latter is considered as the main entry pathway in international trade, natural spread would be the main pathway should the pest be introduced into the EU	
Potential for consequences in the EU territory (Section 3.5)	Should <i>D. undecimpunctata undecimpunctata</i> be introduced into the EU, an economic impact would most likely follow	Should <i>D. undecimpunctata undecimpunctata</i> be introduced into the EU, its presence on plants for planting would most likely have an economic impact on its intended use	
Available measures (Section 3.6)	There are measures to prevent the entry, establishment and spread of <i>D. undecimpunctata undecimpunctata</i> within the EU territory, like sourcing plants for planting from PFA	There are measures to prevent the presence of <i>D. undecimpunctata undecimpunctata</i> on plants for planting, like sourcing plants for planting from PFA	
Conclusion on pest categorisation (Section 4)	<i>D. undecimpunctata undecimpunctata</i> fulfills all criteria assessed by EFSA above for consideration as a quarantine pest	<i>D. undecimpunctata undecimpunctata</i> does not meet the criteria of being present in the EU nor plants for planting being the main pathway for spread for it to be regarded as a potential regulated non-quarantine pest	
Aspects of assessment to focus on/ scenarios to address in future if appropriate			

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Abbreviations

DG SANTÉ	Directorate General for Health and Food Safety
EPPO	European and Mediterranean Plant Protection Organization
FAO	Food and Agriculture Organization
IPPC	International Plant Protection Convention
ISPM	International Standards for Phytosanitary Measures
MS	Member State
PFA	pest-free area
PLH	EFSA Panel on Plant Health
PZ	Protected Zone
SqMV	squash mosaic virus
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, 1995, 2017)
Control (of a pest)	Suppression, containment or eradication of a pest population (FAO, 1995, 2017)
Entry (of a pest)	Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled (FAO, 2017)
Eradication (of a pest)	Application of phytosanitary measures to eliminate a pest from an area (FAO, 2017)
Establishment (of a pest)	Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO, 2017)
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.
Impact (of a pest)	The impact of the pest on the crop output and quality and on the environment in the occupied spatial units
Introduction (of a pest)	The entry of a pest resulting in its establishment (FAO, 2017)
Measures	Control (of a pest) is defined in ISPM 5 (FAO 2017) as "Suppression, containment or eradication of a pest population" (FAO, 1995). Control measures are measures that have a direct effect on pest abundance. Supporting measures are organisational measures or procedures supporting the choice of appropriate Risk Reduction Options that do not directly affect pest abundance.
Phytosanitary measures	PathwayAny means that allows the entry or spread of a pest (FAO, 2017) Any legislation, regulation or official procedure having the purpose to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests (FAO, 2017)
Protected zones (PZ)	A Protected zone is an area recognised at EU level to be free from a harmful organism, which is established in one or more other parts of the Union.
Quarantine pest	A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (FAO, 2017)
Regulated non-quarantine pest	A non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party (FAO, 2017)
Risk reduction option (RRO)	A measure acting on pest introduction and/or pest spread and/or the magnitude of the biological impact of the pest should the pest be

Spread (of a pest)

present. A RRO may become a phytosanitary measure, action or procedure according to the decision of the risk manager
Expansion of the geographical distribution of a pest within an area (FAO, 2017)