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Pest categorisation of *Leptinotarsa decemlineata*

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Abstract

The EFSA Panel on Plant Health performed a pest categorisation of the Colorado potato beetle, *Leptinotarsa decemlineata* (Say) (Coleoptera: Chrysomelidae) for the EU. *L. decemlineata* is primarily known as a major defoliator of potatoes (*Solanum tuberosum*); feeding damage can result in significant yield loss. Field grown tomatoes and eggplants can be attacked and wild solanaceous species are also hosts. Having first established in Europe from North America in the early 20th century, *L. decemlineata* is now distributed in 21 EU Member States and is regulated in the EU by Commission Implementing Regulation 2019/2072, (Annex III) with protected zones in place for Cyprus, Ireland, Malta, Northern Ireland, parts of Spain (Ibiza and Menorca) and Portugal (Azores and Madeira), seven districts of Finland and five counties in Sweden. Adults occasionally enter some protected zones due to wind currents that carry flying adults; pathways are also provided by plant produce moved in trade. The availability of hosts and suitable climate make establishment of the pest possible in protected zones in the EU, especially in the southern EU. Spread within the protected zones could occur via adult flight and via leafy vegetables moved in trade. Impacts on potato yields would be expected within the protected zones; outdoor grown tomatoes and eggplants could be impacted in the protected zones of southern Member States too. Previous incursions into the current protected zones have been eradicated. *L. decemlineata* satisfies all of the criteria that are within the remit of EFSA to assess, to conclude that it is a potential protected zone quarantine pest. *L. decemlineata* does not satisfy all of the criteria that are within the remit of EFSA to assess with respect to regulated non-quarantine pest status, specifically plants for planting are not the main means of spread.

Keywords: Colorado potato beetle, pest risk, protected zone, plant health, plant pest, quarantine

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Table of contents

1. Introduction

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

1.1.1. Background

Council Directive 2000/29/EC[1] 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) 2016/2031[2] 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

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

(b) Bacteria

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

(c) Fungi

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

(d) Virus and virus-like organisms

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

Annex IIB

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

Anthonomus grandis (Boh.)
Cephalcia lariciphila (Klug)
Dendroctonus micans Kugelan
Gilphinia hercyniae (Hartig)
Gonipterus scutellatus Gyll.
Ips amitinus Eichhof
Ips cembrae Heer
Ips duplicatus Sahlberg
Ips sexdentatus Börner
Ips typographus Heer
Sternochetus mangiferae Fabricius

(b) Bacteria

Curtobacterium flaccumfaciens pv. flaccumfaciens (Hedges) Collins and Jones

(c) Fungi

Glomerella gossypii Edgerton
Gremmeniella abietina (Lag.) Morelet
Hypoxylon mammatum (Wahl.) J. Miller

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) *Carneocephala fulgida* Nottingham
2) *Draeculacephala minerva* Ball
3) *Graphocephala atropunctata* (Signoret)

Group of Tephritidae (non-EU) such as:

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

(c) Viruses and virus-like organisms

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

1) Andean potato latent virus
2) Andean potato mottle virus
3) Arracacha virus B, oca strain
4) Potato black ringspot virus
5) Potato virus T
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
2) Cherry rasp leaf virus (American)
3) Peach mosaic virus (American)
4) Peach phony rickettsia
5) Peach rosette mosaic virus
6) Peach rosette mycoplasm
7) Peach X-disease mycoplasm
8) Peach yellows mycoplasm
9) Plum line pattern virus (American)
10) Raspberry leaf curl virus (American)
11) Strawberry witches' broom mycoplasma
12) Non-EU viruses and virus-like organisms of *Cydonia Mill., Fragaria L., Malus Mill., Prunus L., Pyrus L., Ribes L., Rubus L.* and *Vitis L.*

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

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

(b) Fungi

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

(c) Viruses and virus-like organisms

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

(d) Parasitic plants

Arceuthobium spp. (non-EU)

Annex IAII

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

Meloidogyne fallax Karssen
Popillia japonica Newman
Rhizoecus hibisci Kawai and Takagi

(b) Bacteria

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

Leptinotarsa decemlineata 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.

In Appendix 1 of the ToR, the authority accompanying the bionomial name appears as Say and does not appear within brackets. However, Thomas Say who first formally described the organism (Say, 1824) gave it the name *Doryphora 10-lineata*. The taxonomy was later revised before the species was placed into the genus *Leptinotarsa*. Since the organism was reclassified the correct way to present the name of the authority is to give the authority name within brackets, indicating that the species was originally described in another genus, i.e. *Leptinotarsa decimlineata* (Say), just as the name and authority appears in EPPO global database (EPPO, online).

Following the adoption of Regulation (EU) 2016/2031[4] 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) 2019/2072[5].

Recognising that *L. decemlineata* is regulated as a quarantine pest in the EU protected zones only, the scope of this categorisation is the territory of the protected zones (Ireland, Spain (Ibiza and Menorca), Cyprus, Malta, Portugal (Azores and Madeira), Finland (districts of Åland, Häme, Kymi, Pirkanmaa, Satakunta, Turku, Uusimaa) and Sweden (counties of Blekinge, Gotland, Halland, Kalmar and Skåne)). The UK is also included in Commission Implementing Regulation (EU) 2019/2072 as one

[4] Regulation (EU) 2016/2031 of the European Parliament 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.

of the EU protected zones for *L. decemlineata.* However, following the withdrawal of the UK from the EU and in line with the Withdrawal Agreement[6] allowing free movement between the EU and Northern Ireland after 1/1/2021 (but not free movement for Great Britain) Great Britain is not considered in this opinion as part of the EU protected zones.

2. Data and methodologies

2.1. Data

2.1.1. Literature search

A literature search on *L. decemlineata* was conducted at the beginning of the categorisation in the ISI Web of Science bibliographic database, using the scientific and common name of the pest as search term (*Leptinotarsa decemlineata* OR Colorado potato beetle). Due to the very high number of hits, the search was limited to the last 5 years. Following the removal of duplicates, 254 hits were found. Relevant papers were reviewed, and further references and information were obtained from experts, as well as from citations within the references and grey literature.

2.1.2. Database search

Pest information, on host(s) and distribution, was retrieved from the European and Mediterranean Plant Protection Organization (EPPO) Global Database (EPPO, online) 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 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, and is 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 EU, 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 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).

Some literature regarding the pest from the early 19th century was retrieved from the Biodiversity Heritage Library database (https://www.biodiversitylibrary.org/).

The occurrence of wild/weedy hosts in the protected zones was checked using the Euro+Med plant database (Euro+Med, 2006). The database integrates and critically evaluates information from Flora Europaea, Med-Checklist, the Flora of Macaronesia, and from regional and national floras and checklists from the area as well as additional taxonomic and floristic literature (http://ww2.bgbm.org/EuroPlusMed/query.asp).

2.2. Methodologies

The Panel performed the pest categorisation for *L. decemlineata* 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

[6] Agreement on the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community 2019/C 384 I/01.

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 zones; thus, the criteria refer to the protected zones 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?
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?

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
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 the pest is established.

Colorado potato beetle (*Leptinotarsa decemlineata*) is an insect in the family Chrysomelidae, tribe Doryphorini. The species was first described by Thomas Say in 1824 (Say, 1824) as a member of the genus *Doryphora.* Based on morphological similarities to other members of the tribe, Suffrian (1858) noted that the organism should be reclassified but did not make any formal change himself. It was Stål (1862) who formally revised the taxonomy and placed the species in the genus *Chrysomela*, making *Doryphora 10-lineata* Say a junior synonym of *Chrysomela decemlineata* (Say). Kraatz (1874) then transferred *C. decemlineata* into the genus *Leptinotarsa* to create *Leptinotarsa decemlineata* (Say) where it has remained ever since.

The EPPO code (Griessinger and Roy, 2015; EPPO, 2019) for this species is LPTNDE (EPPO, online).

3.1.2. Biology of the pest

Adults emerge from overwintering diapause during the spring or early summer when soil temperature rises to 11°C or above; this generally coincides with the availability of leaves of host plants (Lefevere and de Kort, 1989; de Kort, 1990; Pulatov et al., 2016). Adults emerging from diapause require food and water to develop flight muscles and once sufficiently fed can survive starvation periods of over 30 days (Boiteau et al., 2003; MacQuarrie and Boiteau, 2003). *L. decemlineata* is an oligophagous species feeding on wild and cultivated plants within the family Solanaceae (Alyokhin et al., 2013b). The preferred host is potato (*Solanum tuberosum*); tomato (*Solanum lycopersicum*) and eggplant (*Solanum melongena*) are also important hosts (Weber, 2003; Vargas-Ortiz et al., 2018). There are also a number of wild solanaceous host species. Table 5 lists the plants on which *L. decemlineata* can complete development. While primarily a plant feeder, adults and larvae are known to be cannibalistic and will consume conspecific eggs, larvae, pupae and adults when overcrowded or where host plants are absent (Gui and Boiteau, 2010; Booth et al., 2017). After feeding, females will mate multiple times with multiple males. Mated females will lay up to 60 eggs in a mass on the underside of a leaf. Females avoid ovipositing on leaves containing conspecific eggs and will fly to lay egg masses across a number of sites within and between habitats, e.g. in fields and on wild Solanaceae in field edges. Over several weeks a female can lay several hundred to a few thousand eggs in total (Weber, 2003; Alyokhin et al., 2013a).

Eggs hatch after 4–14 days, depending on temperature, and larvae begin to feed on host leaves. There are four larval instars. At 29°C larvae can complete development in 8 days; at 14°C it takes 28 days (Hare, 1990). Fourth instar larvae drop to the ground and burrow in the soil to pupate. Pupation takes 8–18 days. Upon emergence adults will feed and may mate or will seek an overwintering site to enter diapause. During the summer in arid areas, adults can aestivate (summer dormancy, like winter diapause) to avoid desiccation.

Adults enter diapause to overwinter with day length, temperature and food availability being factors contributing to when diapause begins (Alyokhin et al., 2013a). Thus, towards the end of summer adults make migratory flights seeking overwintering sites (Boiteau et al., 2003). Adults burrow into the soil to overwinter; some adults will overwinter in the soil in open fields, others will overwinter in the soil in hedgerows (Weber and Ferro, 1993). Adults burrow to between 10 and 25 cm and overwintering survival increases with depth. At higher latitudes, adults may go deeper to reach soil depths of 20–60 cm where soil temperatures remain above 0°C (Lefevere & De Kort 1989). Piiroinen et al. (2011) studied *L. decemlineata* overwintering behaviour and found that larger (heavier) adults that burried into soil earlier than smaller (lighter) adults had a higher overwintering survival rate. Behavioural changes, such as entering diapause sooner could facilitate northern range expansion in Europe (Cingel et al., 2016), for example into parts of the EU protected zone.

Diapause ceases at temperatures above 10°C (de Kort, 1990), and adults can emerge over a period of up to three months. A small proportion of adults may remain in diapause for more than one winter. In a 10-year study in New York State, almost 98% of adult *L. decemlineata* emerged after one winter but some did not emerge for between 2 and 7 years; one adult emerged from diapause after 9 years (Tauber and Tauber, 2002).

Based on earlier literature, Pulatov et al. (2016) reported two threshold temperatures for development (10°C and 12°C) with a minimum of 411 degree days above either threshold for egg to egg development. Differences in threshold could be due to experimental and analytical methods used and/or differences in local adaptations of the populations examined (Boman et al., 2008). Sixty to 90 degree days above the thresholds are required for adults to emerge from diapause; 51–70 degree days for feeding, mating and egg laying, and 300 degree days for development from egg to adult. Where sufficient summer temperatures allow, *L. decemlineata* can develop four generations per year (Radcliffe 1982). Around the Mediterranean, three generations per year are possible and in northern Europe there can be one or two generations per year (Pulatov et al., 2016). In Canada, adult numbers peak in August and are the result of the overwintering generation, a second smaller peak later in the year can be the result of reproduction by the summer generation or the result of delayed oviposition from overwintering adults (Senanayake and Holliday, 1989).

One of the most noteworthy aspects of the biology of *L. decemlineata* is its plasticity, which has resulted in the species developing resistance to 56 different active substances in nearly all insecticide classes (Mota-Sanchez and Wise, 2020). Many studies have investigated the mechanisms for enzymatic detoxification of insecticides by *L. decemlineata* (e.g. studies listed in Clements et al., 2020) although

behavioural changes, such as delayed emergence, may also contribute to the ability to develop insecticide resistance (Cingel et al., 2016; Clements et al., 2020).

3.1.3. Intraspecific diversity

Tower (1906) proposed four sub-species of *L. decemlineata*, based on differences in spot patterns and coloration of the head, pronotum and elytra. The sub-species are not now recognised and most scientists consider *L. decemlineata* to be a single species (Alyokhin et al., 2013a). However, phenotypic variations between populations in the Americas, Europe and Asia, and variations in mitochondrial and nuclear DNA suggest the existence of three distinct races within the single species (Alyokhin et al., 2013a). It is unknown whether there is any significant difference in the phytosanitary threat posed by the different races to the protected zone.

3.1.4. Detection and identification of the pest

Are detection and identification methods available for the pest?

Yes. Both adults and larvae eat the foliage, and can be seen and recognised by eye. Sweep nets can be used to collect samples from hedgerow vegetation. Symptoms include stripping of foliage. Adults and larvae produce a characteristic, black and sticky excrement which is deposited on the stem and leaves of hosts.

Because of their size, distinctive markings and colour, adults and larvae are not difficult to observe during visual inspection. Leaves and stems should be examined for larvae and adults. Mechanical disturbance, such as shaking plants can cause adults to drop off a host as they feign death (Bach, 1982; Misener and Boiteau, 1993). The underside of leaves should be examined for egg masses.

In potato fields, visual sampling is as efficient for estimating population density as whole-plant bag-sampling and more efficient than sweep netting (Senanayake and Holliday, 1989). Soil sampling can be used to detect adults in diapause.

Adult beetles are attracted to yellow and can be captured with yellow sticky traps or water traps (Kroschel et al., 2020).

At least two keys are available to identify *L. decemlineata*. There is a key to genera for adults in the tribe Doryphorini in North America and to 31 of the 41 species in the genus *Leptinotarsa*, including *L. decemlineata* (Jacques, 1988). There is also a key to the Palaearctic Chrysomelidae (Warchalowski, 2010).

A diagnostic protocol designed for use in Australia is available (Australian Government, 2018).

Figure 1: *Leptinotarsa decemlineata,* from left to right: egg batch (MJ Hatfield, Bugguide.net), newly hatched larvae (MJ Hatfield, Bugguide.net), 4th instar larva (Steven Mlodinov, Bugguide.net), adult female (Lynn Bergen, Bugguide.net)

The description of life stages below is based on Defra (2017) and EPPO (online). See also Figure 1.

- Eggs

Eggs are yellow or light-orange, ovoid and approximately 1.2 mm long

- Larvae

Larvae have large arched abdomens; the 1st instar is 1.5 mm long, cherry-red with a shiny black heads and feet; later instars become progressively paler from cherry-red to orange-red, then

pale-orange, with a line of several small black dots on each side of the body marking the spiracles. Fourth instar larvae are approximately 8 mm long.

- Pupae

Pupae are yellowish, up to 1 cm. No pupal case is formed.

- Adult

A stout, oval, strongly convex beetle, approximately 8.5–11.5 mm in length; yellowish-brown except for five narrow black stripes on each of the two creamy-yellow elytra (wing covers); about 12 small black spots on the top of the head and thorax; the tips of the orange legs are dark-brown or black.

3.2. Pest distribution

3.2.1. Pest distribution outside the EU

L. decemlineata is widely distributed across the Northern Hemisphere (Figure 2). Several texts suggest that *L. decemlineata* originated in Mexico (e.g. Casagrande, 1985; Weber, 2003; Alyokhin et al., 2013a,b; Kroschel et al., 2020), where the diversity of *Leptinotarsa* species is highest (Tower, 1906). However, molecular studies on *L. decemlineata* populations from Mexico, the central plains of USA and eastern USA support the hypothesis that *L. decemlineata* is actually a native of the plains regions of the USA (Izzo et al., 2018). Regardless of its origins, the species is established across much of the USA, Canada and Mexico, Costa Rica, Cuba, Guatemala, and parts of Europe and Asia. It continues to spread in China (Wang et al., 2020). For details of distribution outside, the EU see Appendix A.

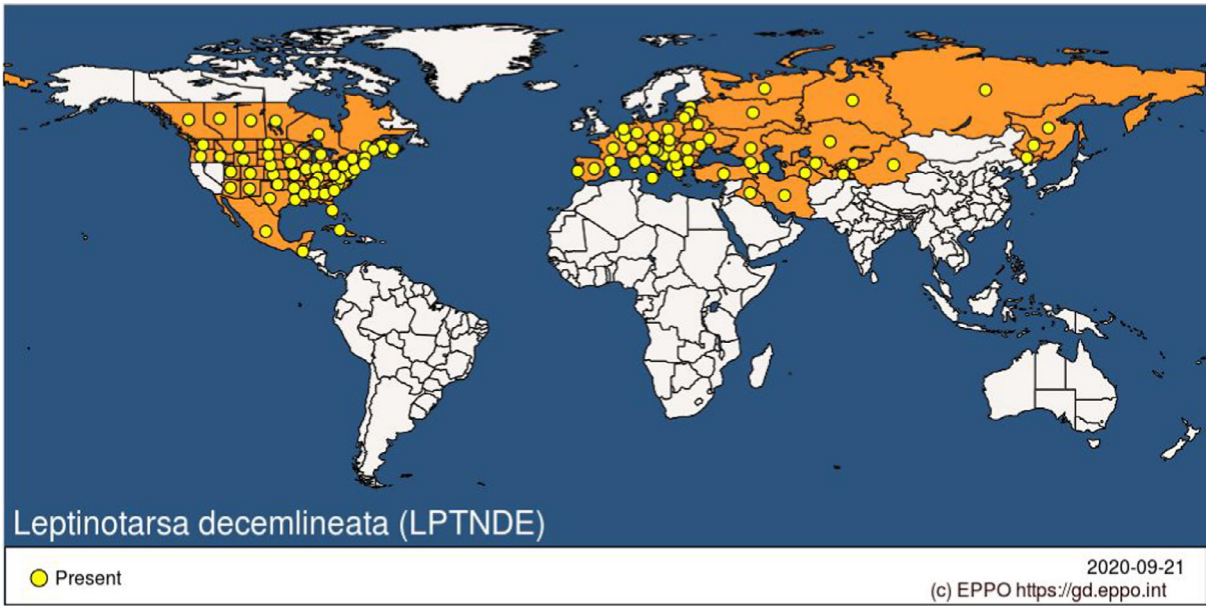


Figure 2: World distribution of the Colorado potato beetle (*Leptinotarsa decemlineata*) (EPPO Global database, accessed 21/9/2020)

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?

Yes. The pest is established and widely distributed within the EU, although absent from the protected zone.

Table 2: Current distribution of *Leptinotarsa decemlineata* in EU Member States and Northern Ireland based on information from the EPPO Global Database accessed 22/9/2020

Country	EPPO Global Database (accessed: 22/9/2020)
Austria	Present, widespread
Belgium	Present, widespread
Bulgaria	Present, widespread
Croatia	Present, widespread
Cyprus	Absent, confirmed by survey
Czech Republic	Present, widespread
Denmark	Absent, pest eradicated
Estonia	Present, widespread
Finland	Absent, pest eradicated
France	Present, widespread Corsica-present-no details
Germany	Present, widespread
Greece	Present, restricted distribution
Hungary	Present, widespread
Ireland	Absent, intercepted only
Italy	Present, widespread Sicily, Present-no details Sardinia - Absent, invalid record
Latvia	Present, no details
Lithuania	Present, widespread
Luxembourg	Present, restricted distribution
Malta	Absent, no pest record
Netherlands	Present, no details
Poland	Present, widespread
Portugal	Present, widespread Azores - Absent, confirmed by survey Madeira - Absent, confirmed by survey
Romania	Present, widespread
Slovak Republic	Present, no details
Slovenia	Present, widespread
Spain	Present, widespread Balearic Islands – Present, restricted distribution
Sweden	Absent, pest eradicated
Northern Ireland[(a)]	Absent

(a): As noted in Section 1.2 (interpretation of ToR), the UK has withdrawn from the EU and in line with the Withdrawal Agreement (European Commission, 2019) Northern Ireland is considered part of the EU protected zones in this opinion.

3.3. Regulatory status

3.3.1. Commission Implementing Regulation 2019/2072

Leptinotarsa decemlineata is listed in Commission Implementing Regulation 2019/2072. Details are presented in Tables 3 and 4.

Table 3: *Leptinotarsa decemlineata* in Commission Implementing Regulation 2019/2072

Annex III	List of protected zones and the respective protected zone quarantine pests and their respective codes	
(c)	Insects and mites	
Protected zone quarantine pests	EPPO code	Protected zones

12	*Leptinotarsa decemlineata* Say	LPTNDE	a) Ireland; (b) Spain (Ibiza and Menorca); (c) Cyprus; (d) Malta; (e) Portugal (Azores and Madeira); (f) Finland (districts of Åland, Häme, Kymi, Pirkanmaa, Satakunta, Turku, Uusimaa); (g) Sweden (counties of Blekinge, Gotland, Halland, Kalmar and Skåne); (h) United Kingdom[(a)]

(a): Refer to Section 1.2 (Interpretation of Terms of Reference) to see how the UK is treated in this opinion with respect to being part of the EU protected zones.

3.3.2. Legislation addressing the hosts of *Leptinotarsa decemlineata*

Table 4 identifies regulated hosts and commodities in relation to entry from third countries.

Table 4: Regulated hosts and commodities that could potentially provide a pathway into the EU protected zones for *Leptinotarsa decemlineata* in Annexes of Commission Implementing Regulation 2019/2072 Annex VI

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**
15.	Tubers of *Solanum tuberosum* L., seed potatoes	0701 10 00	Third countries other than Switzerland
16.	Plants for planting of stolon- or tuber-forming species of *Solanum* L. or their hybrids, other than those tubers of *Solanum tuberosum* 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 *Solanum* 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) […] Switzerland […] Turkey; or (b) those which fulfil the following provisions: (i) they are one of the following […] and (ii) – they are either recognised as being free from *Clavibacter sepedonicus* […], or – their legislation, is recognised as equivalent to the Union rules concerning protection against *Clavibacter sepedonicus*
18.	Plants for planting of Solanaceae 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
19.	Soil as such consisting in part of solid organic substances	ex 2530 90 00 ex 3824 99 93	Third countries other than Switzerland

L. decemlineata occurs in many of the countries exempt from the prohibitions listed in Table 5.

Annexes IX (List of plants, plant products and other objects, whose introduction into certain protected zones is prohibited), X (List of plants, plant products and other objects, to be introduced into, or moved within protected zones and corresponding special requirements for protected zones),

XII (List of plants, plant products and other objects for which a phytosanitary certificate is required for their introduction into a protected zone from certain third countries of origin or dispatch) and XIV (List of plants, plant products and other objects for which a plant passport with the designation 'PZ' is required for introduction into, and movement within certain protected zones) of Regulation 2019–2072 concern controls regarding certain protected zones. While such annexes may contain special requirements for specific named PZ pests, *L. decemlineata* is not specifically named in these annexes.

3.4. Entry, establishment and spread in the EU (protected zone)

3.4.1. Host range

L. decemlineta is an oligophagous species feeding on wild and cultivated plants within the family Solanaceae (Alyokhin et al., 2013b). The preferred host is potato (*Solanum tuberosum*) although tomato (*S. lycopersicum*) and eggplant (*S. melongena*) are also hosts (Weber, 2003). Table 5 lists the plants on which *L. decemlineata* can complete development.

Table 5: *Leptinotarsa decemlineata* hosts and their status as recorded in EPPO global database, CABI (2020) both accessed 22/9/2020) and Hsiao (1978).

Plant name	Present in PZ	Host status EPPO	Host status CABI	Hsiao (1978)
Solanum tuberosum (potato)	Yes	Major	Main	Main
Solanum lycopersicum (tomato)	Yes	Minor	Other	Minor
Solanum melongena (eggplant)	Yes	Minor	–	Minor
Nicotiana tabacum (tobacco)	Yes	–	Other	–
Solanum carolinense	–	–	–	Important host
Solanum elaeagnifoilum	Yes	–	–	Important host
Solanum rostratum	Yes	–	–	Predominant host
Solanum diversifolium	–	–	–	Minor
Solanum dulcamara	Yes	–	–	Minor
Solanum saccharoides	–	–	–	Minor
Solanum villosum	Yes	–	–	Minor
Hyoscyamus niger (black henbane)	Yes	–	Other	Minor

–: no information.

Occurrence of hosts in the protected zones is based on Euro+Med (2006). Plants listed in the CABI and EPPO databases that are not solanaceous should be regarded as minor alternative food sources rather than true hosts on which complete development can take place.

3.4.2. Entry

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

Yes, *L. decemlineata* has entered the protected zones in the past. It can enter by natural spread, such as adult migratory flight and pathways are provided by plant produce moved in trade.

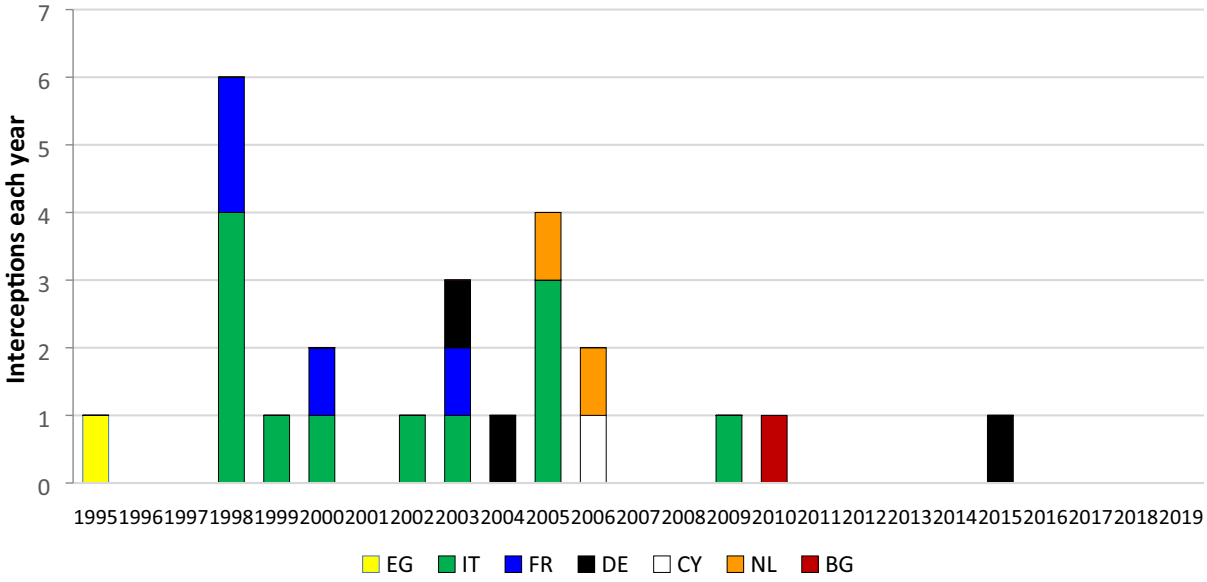
- *L. decemlineata* adults can enter the protected zones by flying. When airborne adults can be lifted by air currents and then be spread passively in prevailing winds, being carried hundreds of kilometres, including into the protected zones, e.g. into Sweden from Poland and Germany (Wiktelius, 1981); and into Finland, for example in 1948, 1983, 1998 and 2002 (Grapputo et al., 2005). EPPO (online) provides links to EPPO Reporting Service articles from 2001, 2002, 2003 and 2011 where outbreaks of *L. decemlineata* in Finland are reported; each outbreak is assumed to result from adult *L. decemlineata* having been carried to Finland with air currents from areas where the pest is known to occur, or as a contaminating pest of goods moved in trade. Molecular analysis of mitochondrial DNA of *L. decemlineata* found in Finland show associations to populations of *L. decemlineata* from Russia and/or Poland (Grapputo et al., 2005).

- *L. decemlineata* adults can enter the protected zones on leafy plant material moving within the internal market of the EU. For example, the UK, previously part of the EU protected zones, intercepted *L. decemlineata* relatively frequently with interceptions reported during any of the 12 months of the year, although peak findings occurred in the spring, during March, April and May (Bartlett, 1990). Interceptions occurred on a number of commodities, including lettuce (*Lactuca*), parsley (*Petroselinum*) and spinach (*Spinacia*). Accidentally introduced adult *L. decemlineata* have been found in Finland in supermarket and restaurant lettuce imported from other European countries (Grapputo et al., 2005).
- *L. decemlinetata* has been found twice in Ibiza. The most recent findings took place in the early 2000s and it was eradicated.
- The Europhyt database, searched on 22/9/2020, reports 158 records of *L. decemlineata* interceptions on a range of plant genera (*Allium*, *Brassica*, *Cichorium*, *Daucus*, *Eruca*, *Fragaria*, *Lactuca*, *Petroselinum*, *Pisum*, *Raphanus*, *Solanum*, *Spinacia*, *Triticale*, *Valerianella*). However, 137 of the records are records from the UK (117 from England, 7 from Scotland, 3 from Northern Ireland, 2 from Wales, 8 unspecified). Twenty-four Europhyt records relate to interceptions in the EU protected zones (inc. 3 for Northern Ireland). Table 6 shows PZ countries reporting interceptions by host (Details in Appendix B).

Table 6: Europhyt interception records of *Leptinotasa decemlineata* by host, as reported by countries in the EU protected zones (excluding GB)

Host\Reporting country:	Ireland	Sweden	Northern Ireland	Cyprus	Sum
Solanum tuberosum (potatoes)	10	1		1	12
Allium fistulosum (spring onion)		1			1
Petroselinum (parsley)	1		3		4
Allium porrum (leek)	2				2
Eruca sp. (salad rocket)		1			1
Lactuca sp. (lettuce)	1				1
Spinacia oleracea (spinach)	1				1
Triticale		1			1
Various objects		1			1
Sum	15	5	3	1	24

Figure 3 shows that most interceptions in the protected zones originate from other EU MS rather than third countries.



[a]: Of note is that Sweden reported an interception of *L. decemlineata* from Cyprus where *L. decemlineata* is not known to occur.

Figure 3: Origins of interceptions in the EU protected zones 1995–2019. EG = Egypt, IT = Italy, FR = France, DE = Germany, CY = Cyprus[a], NL = Netherlands, BG = Bulgaria (Source: Europhyt)

From May 2020, interception records have been recorded on TRACES rather than Europhyt. When searched on 22/9/2020 there were no records of *L. decemlineata* interceptions in TRACES.

Searching the Europhyt database for outbreaks revealed two outbreak notifications from Sweden, one from 2017 and one from 2019. In both cases a single individual of *L. decemlineata* was found by a member of the public in Skåne County, the southern-most tip of Sweden and within the protected zone. Whether either finding was a genuine outbreak, i.e. a recently detected pest population, including an incursion, or a sudden significant increase of an established pest population in an area (FAO, 2018) is questionable given only a single adult was found in each case. Table 7 lists potential pathways from third countries (Table 7, part A) and from within the EU into the protected zones (Table 7, part B).

Table 7: Potential pathways for *Leptinotarsa decemlineata* into the protected zones

Part A: Pathways from third countries		
Pathways	**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 growing medium	Eggs, larvae, adults on foliage	**Annex VI (18.)**. Introduction into the EU of plants for planting of Solanaceae other than seeds (. . .) from 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 (. . .), San Marino, Serbia, Switzerland, Syria, Tunisia, Turkey and Ukraine is prohibited **Annex VII (1.)**. The growing medium attached to or associated with plants, intended to sustain the vitality of the host plants (*Solanum* spp.) are mostly covered by the CN codes listed in Annex VII of Regulation 2019/2072 and require a general freedom from symptoms of quarantine pests
Seed potatoes (*Solanum tuberosum*)	Larvae, adults Pupae (in soil with tubers)	**Annex VI (15.)** Introduction into the EU of seed potatoes from third countries other than Switzerland is prohibited

Ware potatoes (*Solanum tuberosum*)	Larvae, adults Pupae (in soil with tubers)	**Annex VI (17.)** Introduction of tubers of species of *Solanum* L. and their hybrids other than *S. tuberosum* seed potatoes is prohibited from 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 (. . .), San Marino, Serbia, and Ukraine, and (ii) — they are either recognised as being free from *Clavibacter sepedonicus* (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 *Clavibacter sepedonicus* (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 **Annex VII (14.)** Official statement that the consignment or lot does not contain more than 1% by net weight of soil and growing medium
Soil & growing media	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	Pupae	**Annex VII (2.)** Official statement that machinery or vehicles are cleaned and free from soil and plant debris
Part B: Pathways within the EU		
Flight	Adults	None
Fresh produce	Adults	None

3.4.3. Establishment

Is the pest able to become established in the EU (protected zone) territory?

Yes. Some of the climate types that occur in North America and in EU MS where *L. decemlineata* is already established are also found in the EU protected zones where host plants are present in the wild and as cultivated crops both in open fields and in greenhouses or under other protected conditions.

Conditions within the protected zones are suitable for establishment of the pest. Pest outbreaks have occurred and have been eradicated from the protected zones.

3.4.3.1. EU distribution of main host plants

L. decemlineata is an oligophagous species feeding and developing on wild and cultivated plants within the family Solanaceae (Alyokhin et al., 2013a). Wild hosts occur in the protected zones (Table 5).

The preferred host is potato (*Solanum tuberosum*) which is grown over approximately 52,000 ha within the protected zones area (Table 8). The area of potato production within parts of the EU protected zones is shown in more detail in Table 8 for whole countries (Ireland, Cyprus and Malta) and for NUTS 2 regions within Sweden, Spain, Portugal and Finland forming part of the protected zones. For context, the potato production area of the EU 27 is also provided. Approximately 3.4% of the EU 27 potato production area is within the protected zones.

Tomato (*S. lycopersicum*) and eggplant (*S. melongena*) are hosts grown in the protected zones and are grown outdoors in southern EU, including in parts of the protected zones, but more likely to be grown in greenhouses in protected zones in the northern EU.

Table 8: Potato production area (cultivation/harvested/production) within the protected zones (Eurostat code R1000 Potatoes (including seed potatoes) (1,000 ha)

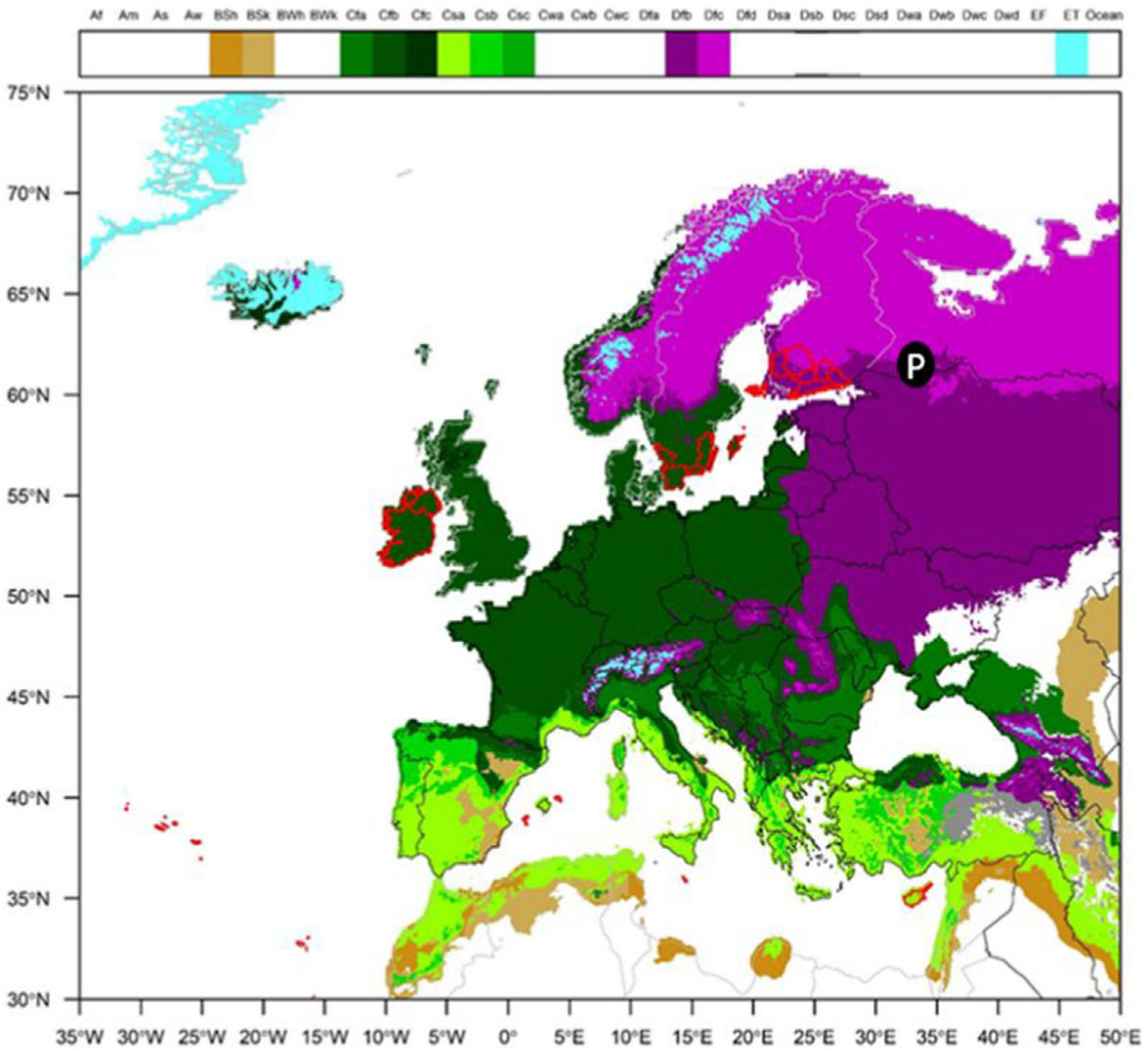
Area within protected zone	2014	2015	2016	2017	2018	5 year mean
Ireland	9.46	8.52	9.04	9.18	8.23	8.89
Cyprus	4.91	4.74	5.04	4.22	4.54	4.69
Malta	0.69	0.69	0.77	0.69	0.69	0.71
Sweden						
Sydsverige	12.32	12.11	12.79	13.10	12.98	12.66
Västsverige	4.23	3.98	4.34	4.23	4.06	4.17
Småland med öarna	2.13	2.14	2.25	2.33	2.27	2.22
Spain						
Illes Balears[(a)]	1.57	1.72	1.74	1.86	1.67	1.71
Portugal						
Azores	0.60	0.59	0.60	0.45	0.44	0.54
Madeira	1.21	1.24	1.00	1.00	0.92	1.07
Finland[(b)]						
Western Finland	13.40	11.50	11.30	12.30	12.60	12.22
Southern Finland	2.90	3.00	3.10	2.80	3.00	2.96
Åland[(b)]	0.70	0.80	0.70	0.70	0.80	0.74
Uusimaa	0.30	0.30	0.20	0.20	0.20	0.24
Sum	54.42	51.33	52.87	53.06	52.40	52.82
EU 27	1,521.80	1,527.13	1,550.38	1,601.18	1,562.85	1,552.67
PZ production as % of EU 27	3.58	3.36	3.41	3.31	3.35	3.40

(a): The actual area of the Balearic Islands potato production within the protected zones is much less than shown in Table 8 here. Table 8 shows potato production for all the Balearic Islands although only Ibiza and Menorca are specifically identified in Implementing Regulation (EU) 2019/2072 as part of the EU protected zones. The area of potato production on Eivissa (=Ibiza) was 90 ha, yielding 1,791 tonnes, while 20 ha (yielding 396 tonnes) was grown on Menorca in 2017. Outside of the protected zones Mallorca grew 1,742 ha of potatoes and Formentera 5ha. Thus 110 ha of 1,857 ha (approximately 6%) of potatoes were grown within the protected zones within the Balearic Islands http://www.caib.es/sites/semilla/ca/taules_i_grafics_2017 Taula 2.9.pdf).

(b): Seven districts of Finland are included in the protected zone (Åland, Häme, Kymi, Pirkanmaa, Satakunta, Turku and Uusimaa). Five of these districts are smaller than the NUTS 2 areas described in potato production statistics provided in EUROSTAT. PZ districts of Pirkanmaa, Satakunta and Turku sit within the larger area of Western Finland; Häme and Kymi sit within Southern Finland.

3.4.3.2. Climatic conditions affecting establishment

The climates in the EU protected zones are similar to those in some of the EU MS where *L. decemlineata* is already established (Figure 4). In Russia, *L. decemlineata* is established as far north as Petroskoi (61.78° N, 34.36° E), (Boman, 2008), marked P. in Figure 4.



Countries in which *L. decemlineata* is already established are marked with black borders. Red lines indicate the area of the EU protected zones.

Figure 4: Köppen–Geiger climate type zones occurring in the Western Palaearctic region

Heikkilä and Peltola (2006) provide a map showing the areas of southern and eastern Finland occupied by a large outbreak of *L. decemlineata* in 2002. Ooperi and Jolma (2009) provide a map showing *L. decemlineata* established in Russia around Lake Ladoga in Russian Karelia, close to the border of Finland. Heikkilä and Peltola (2006) note that the establishment of *L. decemlineata* in Finland has been difficult to predict. In laboratory studies measuring *L. decemlineata* cold tolerance, Lyytinen et al. (2009) exposed larvae to sub-zero temperatures and simulated night frosts that could be experienced during the summer at Finnish latitudes. Rearing conditions simulated daytime temperatures of 10–15°C, representing cool summer days in Finland. Night frosts did not cause immediate larval mortality but the low rearing temperature caused approximately 90% larval mortality. Of the adults that did develop, 80% died during the overwintering period. Such results suggest that conditions in Finland appear to be at the margins of the range of *L. decemlineata*, although establishment in Finland is possible.

When describing the distribution of *L. decemlineata* in China, Li et al. (2014) reported that the winter mean monthly minimum isotherm of –8°C approximates the cold tolerance affecting establishment.

Wang et al. (2017) used correlative species distribution modelling (Maximum Entropy; MaxEnt) to identify where climatic conditions were potentially suitable for *L. decemlineata* to establish on a global

scale. The most suitable areas were classified by Wang et al. as 'high risk' and included parts of the EU protected zones such as southern Sweden. Establishment in Ireland was rated as 'medium risk'.

Pulatov et al. (2016) used threshold temperatures of 10°C and 12°C to show the number of generations *L. decemlineata* could complete across Europe in a year based on annual temperatures and climate averages 1981 to 2010. From examining the output maps, three generations per year were possible in all parts of the protected zones in southern Europe. Based on a threshold of 10°C, one generation per year is possible in the northern parts of the protected zones in parts of Ireland, Sweden and Finland.

Behaviour change by northern populations of *L. decemlineata* close to the border of the protected zones may facilitate establishment within the protected zones. For example, Izzo et al. (2014) noted that when populations of *L. decemlineata* from Mexico were taken to Vermont (northern USA) the local population from Vermont exhibited overwintering behaviour (burrowing into the soil) earlier in the year than *L. decemlineata* from Mexico. Overwintering survival by northern populations was subsequently higher. Izzo et al. (2014) suggested that northern populations had adapted their behaviour from ancestral Mexican populations and began diapause earlier to avoid harsh winter conditions and such a change in behaviour has facilitated the northern range expansion of *L. decemlineata*.

Predicted climate warming, together with the adaptability of *L. decemlineata*, will make northern Europe, including areas within the protected zones more suitable for *L. decemlineata* establishment, with faster and earlier population development in future (Baker et al., 1998, 2000; Cingel et al., 2016; Pulatov et al., 2016).

The protected zones span a large area and include a variety of climate types. The extent of potential establishment is not the same in all parts of the protected zones.

Taking the above literature into account, climatic conditions suitable for the establishment of *L. decemlineata* do occur in the protected zones. Southern parts of the protected zones (e.g. Malta, Cyprus, Ibiza and Menorca in the Balearic Islands) are more favourable for establishment than northern regions (e.g. in Finland) although establishment there is still possible.

3.4.4. Spread

Is the pest able to spread within the EU (protected zone) territory following establishment?

Yes, adults could spread naturally by flying and also as contaminating pests on plants, especially leafy vegetables moved in trade.

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

No, spread would not be mainly via plants for planting; spread would be natural by walking or flying or as a contaminating pests, e.g. on produce.

L. decemlineata adults can disperse by walking or flying. Sunny weather with a mean daily air temperature of 17–20°C results in mass spread (EPPO, online). In a review of *L. decemlineata* movement, Boiteau et al. (2003) reported adults can walk at up to 2.1 cm s^{-1}. Flight can be initiated when temperatures rise above 15°C. Flight speed is estimated to be 2.2–3.0 m s^{-1} (Boiteau et al., 2003). Local, trivial flight occurs at low altitude, a few metres above ground level and mostly involves flights of less than 10 m (MacQuarrie and Boiteau, 2003). However, within large cultivated fields, short-distance walking is more common than short flights (Bach, 1982). Migratory flight over several hundreds of meters occurs at slightly higher altitudes of 15 m or more (Boiteau et al., 2003). However, airborne adults can be lifted by air currents and spread passively in prevailing winds, being carried hundreds of kilometres, including over water and into the protected zones, e.g. into Sweden from Poland and Germany (Wiktelius, 1981).

The spread of *L. decemlineata* in North America during the 19th century is documented in entomological text books (e.g. Giodenengo et al., 2013) and many academic papers (e.g. see Boiteau and Heikkila (2013) for references to several reviews) although precise details of the earliest spread can be disputed (Casagrande, 1985). Nevertheless, in only 15 years, between 1859 and 1874, *L. decemlineata* spread from the foothills of the Rocky Mountains east to the Atlantic coast of USA and Canada (Alyokhin, 2009; Jacques, 2015), over an area of approximately 4 million square kilometres.

L. decemlineata was first found in Europe in the 1870s (e.g. findings in Germany, Poland and the UK) but it did not establish (MacLeod et al., 2010). *L. decemlineata* first established in mainland

Europe in Bordeaux in the vicinity of US military camps and was reported in 1922 (Alyokhin et al., 2013a). From there *L. decemlineata* expanded across Europe relatively rapidly. Following analysis of mitochondrial DNA from *L. decemlineata* collected in six EU countries and from Russia, Grapputo et al. (2005) suggested that establishment in Europe resulted from a single event, or from multiple introductions of the same haplotype.

3.5. Impacts

Would the pests' introduction have an economic or environmental impact on the EU (protected zone) territory?

Yes, If *L. decemlineata* established in the protected zones it would be expected to impact potato production. Outdoor grown tomatoes and eggplants could also be impacted.

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?[7]

Yes, the presence of *L. decemlineata* on plants for planting, such as young tomato seedlings, in the protected zones would have an impact on their intended use.

Adults and larvae of *L. decemlineata* feed on the foliage of host plants. Hare (1990) regarded *L. decemlineata* as 'the most devastating defoliator of potatoes' in the world. During development an individual larva can consume 40 cm^2 leaf material; adults can consume around 10 cm^2 per day (Ferro et al., 1985). Yield losses in potatoes in Poland range from 5% when the pest is managed to 40% when unmanaged, although there can be considerable annual variation (Oerke et al., 1994). Alyokhin et al. (2013b) reported 40–80% yield losses in potato crops; losses in potato are most severe when peak numbers of fourth instar larvae coincide with tuber formation. If leaves are stripped prior to tuber formation there can be 100% yield loss (Hare, 1980, 1990; Kroschel et al., 2020). However, there are no reliable relationships between the defoliation caused by *L. decemlineata* and yield losses, due to wide variations between potato variety crop yields and the differences in timing of defoliation in relation to tuber formation (Nault and Kennedy, 1996, 1998).

If leaf material is not available stems and exposed tubers will be eaten. Although most often regarded as a serious pest of potatoes *L. decemlineata* is also known to affect tomatoes and eggplants (EPPO, 2004; Weber, 2003, Vargas-Ortiz et al., 2018) and feeds on *Solanum* species growing wild (Table 5).

If *L. decemlineata* established in the protected zones, it would be expected to impact potato production. In southern EU parts of the protected zones outdoor grown tomatoes and eggplants could also be impacted.

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 (protected zone) such that the risk becomes mitigated?

Yes, Entry into the protected zones from third countries via imports of solanaceous plants for planting and soil is prevented given existing prohibitions (see Section 3.4.2). Existing measures and vigilance of NPPOs in the protected zones prevent establishment of *L. decemlineata* from other EU MS.

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

Yes, sourcing of plants from pest free areas would reduce the risk of the pest being present on plants for planting.

Since existing mitigation measures have resulted in eradications where previous incursions of *L. decemlineata* occurred within the protected zones (Table 2), the measures currently used are effective. However, as climate warms future eradication efforts may be more challenging (Baker et al., 2000; Piiroinen et al., 2011; Cingel et al., 2016).

[7] See Section 2.1 on what falls outside EFSA's remit.

3.6.1. Identification of additional measures

3.6.1.1. Additional control measures

Potential additional control measures are listed in Table 9.

Table 9: 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	Growing potatoes in fields isolated from known populations will lessen potential impacts; growing tomato and eggplant hosts in greenhouses will prevent impacts	Impact
Chemical treatments on consignments or during processing	Commodities liable to carry *L. decemlineata* could be fumigated 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
Crop rotation, associations and density, weed/ volunteer control	Crop rotation is advised to reduce population build up and lower potential impacts (Alyokhin, 2009)	Impact
Timing of planting and harvesting	If possible potato crops should be planted and harvested so as to avoid the serious potential impacts caused by fourth instar larvae and summer adult populations feeding on foliage during important tuber formation and development (Alyokhin, 2009): cultivars, climatic conditions, timing of the sowing or planting, and level of maturity/age of the plant seasonal timing of planting and harvesting are factors to take into account	Impact
Chemical treatments on crops including reproductive material	Despite a long history of developing resistance to insecticides, the management of *L. decemlineata* is still strongly dependent on the use of chemical pesticides (Alyokhin, 2009; Alyokhin et al., 2013b; Kadoić Balaško et al., 2020) Fumigation of potatoes, timber and grain can be effective against *L. decemlineata* (EPPO, 2018)	Establishment, impact

3.6.1.2. Additional supporting measures

All appropriate supporting measures are already in place and the panel could not identify additional supporting measures.

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

- Adult mobility reduces effectiveness of growing hosts in isolation and rotation
- Relatively fast development time at optimal temperatures
- Behavioural adaptability to change in the environment e.g. allows the pest to survive periods of starvation (i.e. lack of hosts), variable duration of diapause,
- Kroschel et al. (2020) reported that the Arthropod Pesticide Resistance Database (https://www.pesticideresistance.org) lists 300 cases of *L. decemlineata* resistance to 56 active ingredients.

3.7. Uncertainty

The protected zones span a diverse area and include a variety of climate types. The extent of potential establishment is not the same in all parts of the protected zones; population dynamics and subsequent impacts are also likely to vary within the protected zones.

4. Conclusions

L. decemlineata satisfies all of the criteria that are within the remit of EFSA to assess, to conclude that it is a potential protected zone quarantine pest. *L. decemlineata* does not satisfy all of the criteria that are within the remit of EFSA to assess with respect to regulated non-quarantine pest status, specifically plants for planting are not the main means of spread (Table 10).

Table 10: 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 protected zone quarantine pest (articles 32–35)	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 the pest is established	The identity of the pest is established	
Absence/ presence of the pest in the EU/ territory (Section 3.2)	The pest is established and widely distributed within the EU, although absent from the protected zones	The pest is established and widely distributed within the EU, although absent from the protected zones	None; annual surveys within the protected zones are used to demonstrate absence
Regulatory status (Section 3.3)	*L. decemlineata* is listed in Annex III of Commission Implementing Regulation 2019/2072 as a protected zone quarantine pest	*L. decemlineata* is listed in Annex III of Commission Implementing Regulation 2019/ 2072 as a protected zone quarantine pest. There are no grounds to indicate that its status could be revoked in the near future	
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	Adults can, and do, enter the protected zones e.g. in wind currents that carry adults undertaking migratory flights; pathways are also provided by plant produce moved in trade. The availability of hosts and suitable climate, especially in the southern part of the protected zones, and the northern temperate part of the protected zones make establishment possible. Spread within the protected zones could occur naturally and also as individuals move as contaminants, especially on leafy vegetables moved in trade	Spread would not be mainly via plants for planting; spread would be as a contaminating pest on produce or naturally by adult flight	The protected zones span a large area and includes a variety of climate types. The extent of Potential establishment is not the same in all parts of the PZ
Potential for consequences in the EU territory (Section 3.5)	Impacts on potato yields would be expected within the protected zones; in southern parts of the protected zones outdoor grown tomatoes and eggplants could also be impacted	The presence of *L. decemlineata* on plants for planting, such as young tomato seedlings, in the protected zones would have an impact on their intended use	
Available measures (Section 3.6)	Recognising that incursions into the protected zones have been eradicated in the past, measures are available to prevent establishment and spread of the pest within the protected zone	Sourcing plants from pest free areas would reduce the risk of the pest being present on plants for planting	

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding protected zone quarantine pest (articles 32–35)	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest	Key uncertainties
Conclusion on pest categorisation (Section 4)	*L. decemlineata* satisfies all of the criteria that are within the remit of EFSA to assess, to conclude that it is a potential protected zone quarantine pest	*L. decemlineata* does not satisfy all of the criteria that are within the remit of EFSA to assess with respect to regulated non-quarantine pest status. Specifically plants for planting are not the main means of spread, therefore *L. decemlineata* cannot 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
PLH	EFSA Panel on Plant Health
PZ	Protected Zone
TFEU	Treaty on the Functioning of the European Union
ToR	Terms of Reference

Glossary

Containment (of a pest)	Suppression, containment or eradication of a pest population (FAO, 1995, 2018)
Control (of a pest)	Suppression, containment or eradication of a pest population (FAO, 1995, 2018)
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, 2018)
Eradication (of a pest)	Application of phytosanitary measures to eliminate a pest from an area (FAO, 2018)
Establishment (of a pest)	Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO, 2018)
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, 2018)
Measures	Control (of a pest) is defined in ISPM 5 (FAO 2018) 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.
Pathway	Any means that allows the entry or spread of a pest (FAO, 2018)

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, 2018)
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, 2018)
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, 2018)
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, 2018)

Appendix A – Distribution of *Leptinotarsa decemlineata* outside the EU

Source: EPPO Online

Continent	Country	Sub-national distribution	Status
North America	Canada		Present, restricted distribution
		British Columbia	Present, restricted distribution
		Alberta, Manitoba, New Brunswick, Nova Scotia, Ontario, Prince Edward Island Québec, Saskatchewan	Present, no details
	Mexico		Present, widespread
	USA		Present, widespread
		Alabama, Arizona, Arkansas, Colorado, Connecticut, Delaware, Florida, Georgia Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin, Wyoming	Present, no details
Central America	Costa Rica		Absent, pest no longer present
	Cuba		Present, no details
	Guatemala		Present, no details
Asia	China		Present, restricted distribution
		Heilongjiang, Jilin,	Present, restricted distribution
		Xinjiang,	Present, no details
		Zhejiang	Absent, invalid record
	Iran		Present, no details
	Iraq		Present, restricted distribution
	Japan		Absent, intercepted only
	Kazakhstan		Present, restricted distribution
	Kyrgyzstan		Present, no details
	Tajikistan		Present, restricted distribution
	Turkmenistan		Present, no details
	Uzbekistan		Present, restricted distribution
Europe	Albania		Present, no details
	Andorra		Present, no details
	Armenia		Present, no details
	Azerbaijan		Present, no details
	Belarus		Present, widespread
	Bosnia and Herzegovina		Present, no details
	Georgia		Present, no details
	Guernsey		Absent, confirmed by survey
	Moldova		Present, restricted distribution
	North Macedonia		Present, no details
	Norway		Absent, intercepted only
	Russia		Present, restricted distribution

Continent	Country	Sub-national distribution	Status
		Central Russia, Eastern Siberia, Far East, Northern Russia, Southern Russia, Western Siberia	Present, no details
	Serbia		Present, widespread
	Switzerland		Present, no details
	Turkey		Present, restricted distribution
	Ukraine		Present, widespread
	United Kingdom		Absent, pest eradicated
		Channel Islands, England	Absent, pest eradicated
		Northern Ireland, Scotland	Absent, intercepted only

Appendix B – Notifications of non-compliance involving *Leptinotarsa decemlineata* in the EU Protected Zone

Notifications from England, Wales and Scotland excluded. (Source Europhyt)

Year	PZ country	Intercepted on	From
1995	Sweden	*Solanum tuberosum* (potatoes)	EG
1998	Ireland	*Allium porrum (*leek*)*	FR
1998	Ireland	*Allium porrum (*leek*)*	FR
1998	Ireland	*Solanum tuberosum* (potatoes)	IT
1998	Ireland	*Solanum tuberosum* (potatoes)	IT
1998	Ireland	*Solanum tuberosum* (potatoes)	IT
1998	Ireland	*Solanum tuberosum* (potatoes)	IT
1999	Ireland	*Solanum tuberosum* (potatoes)	IT
2000	Ireland	*Lactuca* sp. (lettuce)	FR
2000	Ireland	*Solanum tuberosum* (potatoes)	IT
2002	Ireland	*Solanum tuberosum* (potatoes)	IT
2003	Ireland	*Solanum tuberosum* (potatoes)	FR
2003	Ireland	*Solanum tuberosum* (potatoes)	IT
2003	Sweden	*Allium fistulosum* (spring onion)	DE
2004	Sweden	*Eruca* sp. (salad rocket)	DE
2005	Ireland	*Solanum tuberosum* (potatoes)	IT
2005	Northern Ireland	*Petroselinum crispum* (parsley)	IT
2005	Northern Ireland	*Petroselinum crispum* (parsley)	IT
2005	Northern Ireland	*Petroselinum crispum* (parsley)	NL
2006	Ireland	*Petroselinum* sp. (parsley)	NL
2006	Sweden	Various objects	CY[(a)]
2009	Ireland	*Spinacia oleracea* (spinach)	BE
2010	Cyprus	*Solanum tuberosum* (potatoes)	BG
2015	Sweden	*Triticale*	DE

(a): Of note is that Sweden intercepted *L. decemlineata* on various (unspecified goods) from Cyprus where *L. decemlineata* is not known to occur.