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Pest categorisation of *Listronotus bonariensis*

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Abstract

The Panel on Plant Health performed a pest categorisation of *Listronotus bonariensis* (Coleoptera: Curculionidae), the Argentine stem weevil, for the EU. *L. bonariensis* is a well-defined species, recognised as a serious pest of pasture grasses, especially *Lolium* spp. and *Poa annua*, in New Zealand, and a rare pest of cereals in Argentina, Brazil and New Zealand. Larvae feed within the tillers and stems of grasses; adults can cut emerging cotyledons although they usually graze on leaves. Larval damage is most serious. Larval feeding causes a reduction in pasture quality that impacts on the production of grazing animals. *L. bonariensis* is not known to occur in the EU and is listed in Annex IIAI of Council Directive 2000/29/EC. *L. bonariensis* established in New Zealand via imported grass seeds and has been intercepted on grass seeds entering the EU. Considering the climatic similarities of the regions where the pest occurs and the very great extent to which hosts are grown across the EU, *L. bonariensis* has the potential to establish within the EU with two or three generations possible per year. Impacts could occur in grassland pastures and perhaps occasionally in cereals. In New Zealand, endophytic fungi occurring on potential hosts deter *L. bonariensis* from ovipositing on leaves and are toxic to larvae. Whether endophytic fungi on grasses in Europe could provide some resistance to *L. bonariensis* is uncertain. Phytosanitary measures are available to reduce the likelihood of introduction of this weevil. *L. bonariensis* fits all of the criteria assessed by EFSA to satisfy the definition of a Union quarantine pest. *L. bonariensis* does not meet the criterion of occurring in the EU territory for it to be regarded as a Union regulated non-quarantine pest.

Keywords: Argentine stem weevil, grass seed, pasture, pest risk, plant health, plant pest

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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 establishes the present European Union plant health regime. The Directive lays 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 is prohibited, is 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 will apply 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 categorizations 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 pests 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

Aleurocantus 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
Ceratocystis 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
Citrus tristeza virus (non-EU isolates)
Leprosis
Little cherry pathogen (non- EU isolates)
Naturally spreading psorosis
Palm lethal yellowing mycoplasm
Satsuma dwarf virus
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

Listronotus bonariensis 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 European Union (EU) excluding Ceuta, Melilla and the outermost regions of Member States (MSs) referred to in Article 355(1) of the Treaty on the Functioning of the European Union (TFEU), other than Madeira and the Azores.

2. Data and methodologies

2.1. Data

2.1.1. Literature search

A literature search on *L. bonariensis* was conducted at the beginning of the categorisation in the ISI Web of Science bibliographic database, using the scientific name of the pest as search term. Relevant papers were reviewed, and further references and information were obtained from citations within the references and grey literature.

2.1.2. Database search

Pest information, on host(s) and distribution, was retrieved from the EPPO Global Database (EPPO, 2017).

Data about the import of commodity types that could potentially provide a pathway for the pest to enter the EU were obtained from Eurostat.

The Europhyt database was consulted for pest-specific notifications on interceptions and outbreaks. Europhyt is a web-based network launched by the Directorate General for Health and Consumers (DG SANCO) 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 MSs and the phytosanitary measures taken to eradicate or avoid their spread.

2.2. Methodologies

The Panel performed the pest categorisation for *L. bonariensis* following guiding principles and steps presented in the EFSA guidance on the harmonised framework for pest risk assessment

(EFSA PLH Panel, 2010) and as defined in the International Standard for Phytosanitary Measures No. 11 (FAO, 2013) and No. 21 (FAO, 2004).

In accordance with the guidance on a harmonised framework for pest risk assessment in the EU (EFSA PLH Panel, 2010), this work was initiated following an evaluation of the EU's 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 as per the specific ToR 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 which 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, while addressing social impacts is outside the remit of the Panel, in agreement with EFSA guidance on a harmonised framework for pest risk assessment (EFSA PLH Panel, 2010).

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 regulated non-quarantine pest. (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!

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
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 regulated non-quarantine pest 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 or No)

Yes, the identity of the pest is established. *Listronotus bonariensis* (Kuschel) is an insect in the order Coleoptera (beetles) in the family Curculionidae (weevils). In English, it is commonly known as the Argentine stem weevil.

The Argentine stem weevil was first described by Kuschel (1955) who placed it in the genus *Hyperodes.* This genus was synonymised by O'Brien (1979) to instate the current binomial *L. bonariensis* (Kuschel). In Spanish, the common name is el gorgojo del macollo (CABI, 2017).

3.1.2. Biology of the pest

Although this species is native to South America (Williams et al., 1994), much of the accessible scientific literature about *L. bonariensis* is from New Zealand, where it was first reported in 1927

(Marshall, 1937); it is now widespread in New Zealand (McNeill et al., 2002) and regarded as a pest of pasture grasses (Goldson and Emberson, 1980; Prestidge et al., 1991).

In the South Island of New Zealand, there are usually two generations per year. Populations of the first (spring/early summer) generation are usually larger than the second (late summer/autumn) (May, 1961; Goldson et al., 1998). Adults overwinter sheltered amongst host grasses but can become active and feed on calm, sunny winter days. They mate and females oviposit between mid-winter and late spring. Eggs are laid in small groups, usually numbering from one to three eggs, on the leaf sheath of grass hosts, typically within 5 cm of the soil surface, (May, 1961). Females oviposit over a period of approximately 6 weeks. In the spring, eggs develop in around 30 days. The first generation larvae burrow into the tillers of hosts and develop between mid-spring and early summer. May (1961) reported seven larval instars whilst later authors indicate that there are four instars (e.g. Barker et al., 1989a). Final instar larvae chew exit holes to escape from tillers then drop to the ground and burrow into the soil, where pupae are formed a few millimetres below the soil surface. Pupae can be found from late spring to mid-summer. The summer generation of adults emerge 7–15 days after pupae are first formed. These adults shelter during the day and emerge to feed on leaves of host grasses after dark (May, 1961). They mate and disperse by flight. Females oviposit for about 40 days during summer until mid-autumn. Eggs laid in the summer develop in 10–20 days; second generation larvae can be found during the summer and autumn with pupae forming in autumn from which adults emerge to overwinter. Adult females that emerge early in the autumn may mature, mate and oviposit although most females enter reproductive diapause and only mature to lay eggs in the early spring (Barker et al., 1988).

In the warmer areas of the North Island, developmental times for all stages are shorter, and there can be three generations per year. In Auckland (North Island), adult weevils can be present throughout the year with peaks in late spring and late summer (May, 1961).

Above a threshold temperature of 10°C, eggs require a mean of 83 degree days (DD) (95% confidence limit 75–91 DD) to hatch; larvae and prepupae require 189 (159–246) DD to develop; prepupa 40 (35–47) DD and pupa 172 (149–204) DD. Overall, the development from egg to adult requires a mean of 454 (422–486) DD above a threshold of 10°C (Barker, 1988).

3.1.3. Detection and identification of the pest

Are detection and identification methods available for the pest?

Yes, the organism can be detected in the field by visual searching, often after damage symptoms are seen. The species can be identified by examining morphological features, for which detailed descriptions exist (e.g. examples in CABI, 2017).

Detection

Symptoms of host damage reveal the presence of the pest. Rectangular holes in the tips of leaves are caused by adult feeding. Adults leave fibrous frass deposits on leaves. Yellowing of the leaves of tillers is caused by larval feeding in tillers and in the lower portion of host stems (Smith et al., 1997).

Sampling of infested grassland using sweep nets after dark, when adults are feeding, can provide good estimates of population size, as can direct soil sampling (May, 1961; Barker and Addison, 1989; Proffitt et al., 1993). Sticky traps can be used to capture flying adults (Goldson et al., 1999).

Identification

Descriptions of the morphology and colours of life stages are provided by various authors, e.g. eggs by Goldson and Emberson (1980) and Anon. (2016); larvae by May (1994) and Marvaldi (1998), pupae by CABI (2017) and adults by Ferro (1976).

3.2. Pest distribution

3.2.1. Pest distribution outside the EU

Listronotus bonariensis is native to South America (Williams et al., 1994) but spread to New Zealand in the early twentieth century (Kuschel, 1972; Goldson and Emberson, 1980). It has been present in mainland Australia since 1962 and was reported in Tasmania in 1979 (Hardy et al. (1979) in EPPO, 2017) (Table 2; Figure 1).

Table 2: Global distribution of *Listronotus bonariensis* based on information from the EPPO Global Database and CABI (2017)

Region	Country	Subnational distribution	Occurrence
North America			Absent, not known to occur
Central America & Caribbean			Absent, not known to occur
South America	**Argentina**		Present, no details
	Bolivia		Present, no details
	Brazil	Rio Grande do Sul	Present, no details
	Chile		Present, widespread
	Uruguay		Present, widespread
Europe			Absent, intercepted only
Africa			Absent, not known to occur
Asia			Absent, not known to occur
Oceania	**Australia**		Present, restricted distribution
		New South Wales	Present, no details
		Northern Territory	Absent, not known to occur
		Queensland	Absent, not known to occur
		South Australia	Present, restricted distribution
		Tasmania	Present, no details
		Victoria	Present, widespread
		Western Australia	Present, restricted distribution
	New Zealand		Present, widespread

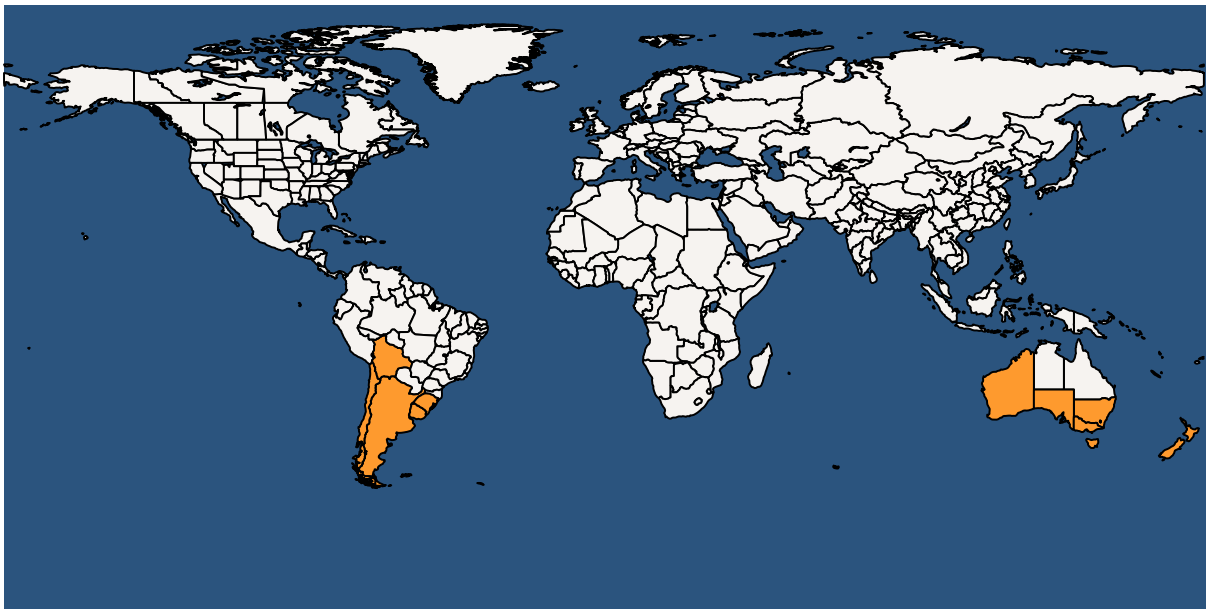


Figure 1: Global distribution of *Listronotus bonariensis* (extracted from the EPPO Global Database accessed on 20th March 2017)

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, *L. bonariensis* is absent (not known to occur) in the EU although it has been intercepted (see Section 3.4.2).

3.3. Regulatory status

3.3.1. Council Directive 2000/29/EC

Listronotus bonariensis is listed in Council Directive 2000/29/EC. Details are presented in Tables 3 and 4.

Table 3: *Listronotus bonariensis* in Council Directive 2000/29/EC

Annex II, Part A	**Harmful organisms whose introduction into, and spread within,all Member States shall be banned if they are present on certain plants or plant products**	
Section I	**Harmful organisms not known to occur in the Community and relevant for the entire Community**	
(a)	Insects, mites and nematodes, at all stages of their development	
	Species	Subject of contamination
18.	*Listronotus bonariensis* (Kuschel)	Seeds of *Cruciferae, Gramineae* and *Trifolium* spp., originating in Argentina, Australia, Bolivia, Chile, New Zealand and Uruguay

3.3.2. Legislation addressing the hosts of *Listronotus bonariensis*

No hosts or commodities relevant to *Listronotus bonariensis* are listed in Annex III or IV.

Table 4: Regulated hosts and commodities that may involve *Listronotus bonariensis* in Annex V of Council Directive 2000/29/EC

Annex V	**Plants, plant products and other objects which must be subject to a plant health inspection (at the place of production if originating in the Community, before being moved within the Community — in the country of origin or the consignor country, if originating outside the Community) before being permitted to enter the Community**
Part B	**Plants, plant products and other objects originating in territories, other than those territories referred to in Part A**
1.	**Plants, plant products and other objects which are potential carriers of harmful organisms of relevance for the entire Community**
1.	Plants, intended for planting, other than seeds but including seeds of *Cruciferae Gramineae*, *Trifolium* spp., originating in Argentina, Australia, Bolivia, Chile, New Zealand and Uruguay genera *Triticum, Secale* and *X Triticosecale* from Afghanistan, India, Iran, Iraq, Mexico, Nepal, Pakistan, South Africa and the USA. *Capsicum* spp. *Helianthus annuus* L., *Lycopersicon lycopersicum* (L.) Karsten ex Farw., *Medicago sativa* L., *Prunus* L., *Rubus* L., *Oryza* spp., *Zea mais* L., *Allium ascalonicum* L., *Allium cepa* L., *Allium porrum* L., *Allium schoenoprasum* L. and *Phaseolus* L.

3.4. Entry, establishment and spread in the EU

3.4.1. Host range

Listronotus bonariensis mainly attacks *Lolium* spp., and also many other pasture grasses, such as *Anthoxanthum puelii*, *Agrostis capillaris*, *Dactylis glomerata*, *Festuca rubra* and *Phleum pratense* (May, 1961; Goldson, 1982; Barker, 1989; Smith et al., 1997; Morrone, 2013).

In laboratory feeding trials, *Lolium* sp., *Poa annua*, *Poa trivialis* and *D. glomerata* were preferred grasses for eating and ovipositing on. They also supported larval development (May, 1961) with *P. annua* supporting high numbers of larvae (Prestidge et al., 1989).

Zea mays (maize) has been reported as a host (Carpenter et al., 1978; Watson and Wrenn, 1978) as has *Avena sativa* (oats), *Hordeum vulgare* (barley) and *Triticum aestivum* (wheat) (Cromey et al., 1980; Gassen, 1984; Anon., 1996). However, compared to pasture grasses, there is much less literature on cereals as hosts to *L. bonariensis.*

The Plant Health Directive 2000/29 EC regulates seeds of Gramineae (= Poaceae) from countries where *L. bonariensis* occurs; protection is therefore provided against entry on all hosts.

3.4.2. Entry

Is the pest able to enter into the EU territory? (Yes or No) If yes, identify and list the pathways!

Yes, *L. bonariensis* has been intercepted in the EU with grass seed from New Zealand.

Potential pathways are:

- Plants for planting (seeds of host grasses)
- Plants for planting (rooted pot plants of grasses with soil)
- Soil

L. bonariensis was introduced into Australia as adults in ryegrass seed, and possibly with cereal seeds too (Smith et al., 1997). EU imports of ryegrass (*Lolium multiflorum* and *Lolium perenne*) seed, for sowing (CN 1209 2500) from countries where *L. bonariensis* occurs are shown in Table 5 for the years 2012–2016.

Table 5: EU imports of *Lolium multiflorum* and *L. perenne* seed, for sowing, (CN 1209 25 00) from countries where *L. bonariensis* occurs, 2012–2016 (Tonnes) (Source: Eurostat)

From	2012	2013	2014	2015	2016	5 year sum
New Zealand	15,000	15,227	11,585	5,617	3,725	51,153
Argentina	2,535	1,790	2,208	905	2,597	10,035
Uruguay	536	65	170	0	1,010	1,781
Australia	516	273	142	20	46	997
Brazil	0	0	100	0	0	100
Bolivia	0	0	0	0	0	0
Chile	0	0	0	0	0	0
	20,599	19,367	16,219	8,557	9,393	64,066

Appendix A details individual EU MS imports of *L. multiflorum* and *L. perenne* seed from countries where *L. bonariensis* occurs between January 2012 and December 2016. The Netherlands, Italy and Germany represent almost 60% of all such imports into the EU.

As at 26 October 2017, there were five records of interceptions of *L. bonariensis* in the Europhyt database (Table 6). All notifications were made by the UK.

Table 6: Summary information regarding *Listronotus bonariensis* EU notifications of non-compliance (interceptions) (Source: Europhyt)

Year	From	Plant name	Plant class	Product
2004	Chile	*Cortaderia* sp. (pampas grass, Poaceae)	020	Intended for planting
2011	New Zealand	Gramineae (= Poaceae)	023	Seed
2012	New Zealand	Gramineae (= Poaceae)	023	Seed
2013	New Zealand	Horticultural plants	023	Seed
2015	New Zealand	*Lolium* sp.	023	Seed

The seeds pathway is regulated and interceptions have been reported (see above). Pasture grasses and cereals are not traded as rooted pot plants; soil is a closed pathway because the introduction of soil from Third countries is prohibited by 2000/29 EC (Annex III, A, 14.).

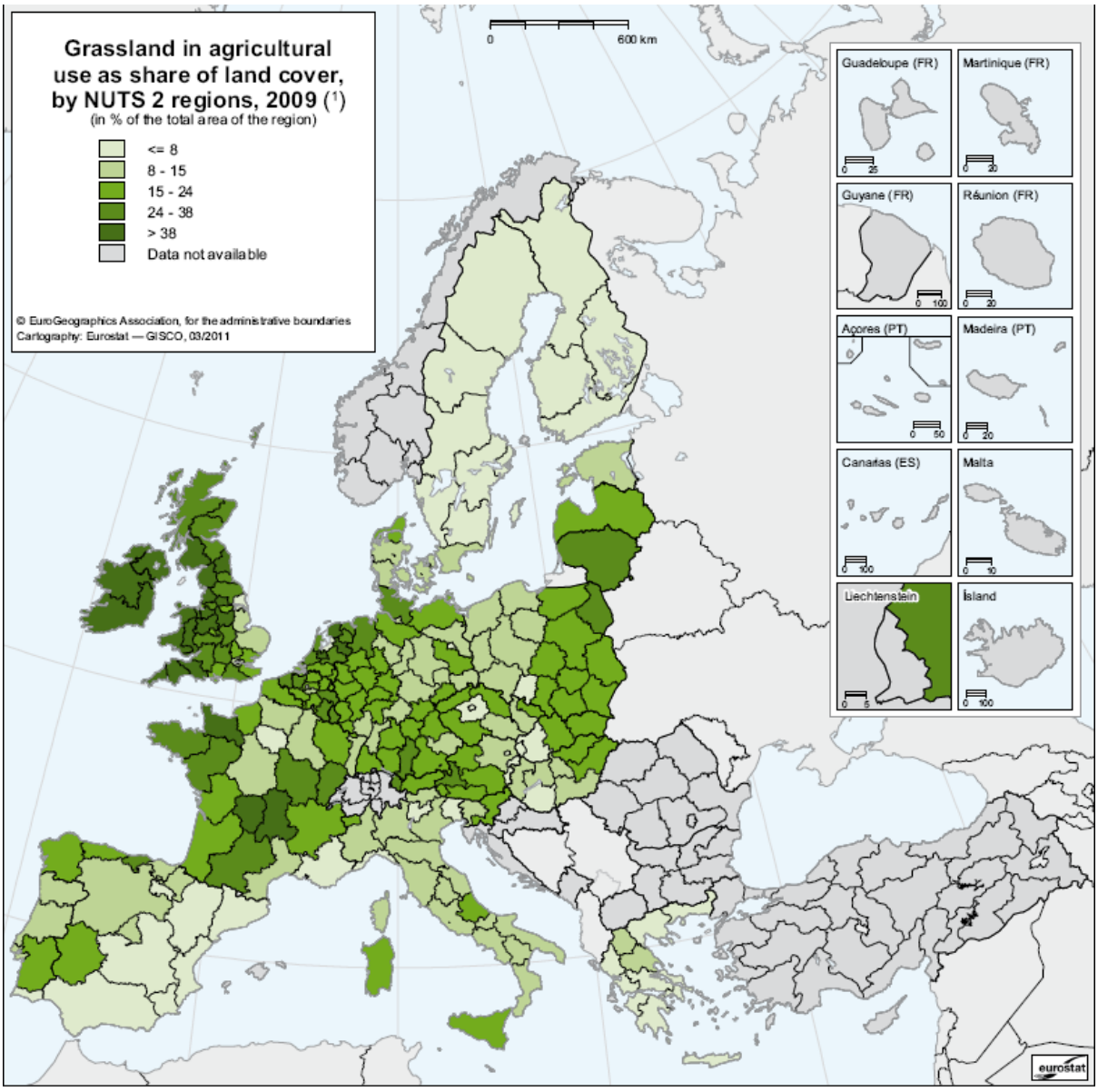
3.4.3. Establishment

Is the pest able to become established in the EU territory? (Yes or No)

Yes. Host grasses are widely available throughout the EU and many climate zones in the countries where the pest occurs are also found in the EU.

3.4.3.1. EU distribution of main host plants

Pasture grasses such as *L. perenne* and *L. muliflorum*, as well as other hosts such as wheat and maize, are widely grown across the entire EU (Figure 2 and Appendix B).



(1) Bulgaria, Cyprus, Malta and Romania were not included in the LUCAS 2009 survey.

Source: Eurostat http://ec.europa.eu/eurostat/statistics-explained/images/f/f6/Grassland_in_agricultural_use_as_share_of_land_cover%2C_by_NUTS_2_regions%2C_2009.PNG

Figure 2: Grassland in agricultural use as share of land over by NUTS 2 regions (2009)

3.4.3.2. Climatic conditions affecting establishment

The distribution and abundance of an organism that cannot control or regulate its body temperature is largely determined by host distribution and climate. Comparing climates from the known distribution of an organism with climates in the risk assessment area can inform judgements regarding the potential distribution and abundance of an organism in the risk assessment area (Sutherst and Maywald, 1985; Ehrlén and Morris, 2015). Regarding *L. bonariensis*, Koppen–Geiger climate zones that cover large parts of the countries where the pest occurs, such as the temperate zones without a dry season and with a hot summer (classification Cfa), and the temperate zone without a dry season and with a warm summer (Cfb) also occur across large parts of the EU (Kottek

et al., 2006). Hence if *L. bonariensis* were to enter the EU, suitable climatic conditions exist to support its establishment.

3.4.4. Spread

Is the pest able to spread within the EU territory following establishment? (Yes or No) How?

Yes, *L. bonariensis* is a free living organism with adults capable of flight.

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

International movement has been via seeds of pasture grasses and perhaps cereals. Local spread has been via natural dispersal of adults. If *L. bonariensis* were to establish in the EU, spread within the EU would mainly be through adult flight.

A number of studies have investigated the flight of adult *L. bonariensis* (e.g. Kelsey, 1958; Barker et al., 1989b; Goldson et al., 1999). Most flight occurs between spring and autumn, with capture in sticky traps peaking during the summer (Goldson et al., 1999). Goldson et al. (1999) determined that adults can fly above a threshold of 19°C, 81% relative humidity (RH) and a wind speed of 10.8 km h^{-1} with temperature being the most important requirement. Flight could be due to overcrowding (Barker et al., 1989b) or host desiccation (Goldson et al., 1999). The distances that adults can fly have not been investigated, but dispersal is over such a scale as to make crop rotation ineffective as a management practice against *L. bonariensis* (Morrison, 1959 cited by Goldson et al., 1999).

3.5. Impacts

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

Yes, *L. bonariensis* is regarded as a major pest of pasture crops in New Zealand. Similar impacts could be expected in the EU.

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?[4]

L. bonariensis does not occur in the EU so it does not meet one of the criteria to be a regulated non-quarantine pest.

Most of the literature reporting damage caused by *L. bonariensis* is from New Zealand where it is a major pest of pasture grasses due to the damage caused by larvae which mine in the tillers of hosts, lowering pasture quality. Larvae are able to destroy many tillers during their development and high levels of larval infestation can kill plants (Barker et al., 1989a). Adults are also harmful, feeding on host leaves. Adults can cause severe damage by severing emerging cotyledons in newly sown pastures (Goldson, 1981). Adult densities in New Zealand pastures can reach 700 specimens per m^2 (Barker and Addison, 1993).

Losses in pasture quality reduce the carrying capacity for grazing animals such as sheep and cattle on the land and hence impact animal production and require land owners to intervene or suffer further losses; a reduction in pasture quality also has impacts on animal health (Prestidge et al., 1991).

Newly established pasture and pasture up to 5 years old, consisting of *L. multiflorum* (Italian ryegrass), and its hybrid cultivars are more susceptible to damage by *L. bonariensis* than older, more established pasture or pastures made up of perennial ryegrass, *L. perenne* (Barker et al., 1989a). This is because *L. perenne* host endophytic *Acremonium* fungi, e.g. *A. lolii*, which deter *L. bonariensis* from ovipositing and are toxic to larvae (Pottinger et al., 1985; Barker et al., 1989a).

In estimating the economic impact of *L. bonariensis*, Prestidge et al. (1991) concluded that it was the most important insect pest in New Zealand, causing tens of millions of NZ dollars worth of damage annually. However, the impact of *L. bonariensis* in New Zealand was reduced significantly following the successful introduction of the parasitoid, *Microctonus hyperodae* (Hymenoptera: Braconidae) in 1992 (Goldson et al., 1993) together with greater use of ryegrass cultivars supporting endophytic fungi which provided resistance to *L. bonariensis* (Popay and Wyatt, 1995). However, the success of *M. hyperodae* as a biological control agent has declined over time. By 2011, up to 68% of tillers in a

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

trial near Hamilton (North Island) showed signs of larval damage. Ninety six per cent of damaged tillers were rated as suffering moderate or severe damage (Popay et al., 2011). It is interesting to note that the parasitoid undergoes asexual parthenogenetic reproduction whilst *L. bonariensis* reproduces sexually. It is possible that *L. bonariensis* has evolved and developed resistance against the parasitoid *M. hyperodae* (Goldson and Tomasetto, 2016).

While not usually regarded as a pest in South America (Chadwick, 1963), there have been a few reports of *L. bonariensis* causing damage to cereal crops, e.g. in wheat in southern Brazil and Argentina, where yields were lowered (Gassen, 1984; Anon, 1996).

Barratt et al. (2016) reported *L. bonariensis* as a potential risk to endangered native grass species in New Zealand.

Although carried internationally via seed, *L. bonariensis* is not a pest of seed as such; adults are foliage feeders and larvae feed within host tillers. Findings in seed are incidental occurrences.

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, entry could be inhibited if seed is sourced from pest free areas; consignments that could potentially carry the pest could be treated (fumigated) and inspected.

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

L. bonariensis does not occur in the EU so RNQP status is not being considered.

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

- Adults are small (< 3 mm long) and can be difficult to detect. Nevertheless, there have been interceptions (see Section 3.4.2).
- Adults can disperse by flight
- Hosts are very widely available

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

- Not relevant as not a candidate for RNQP status.

3.6.3. Control methods

- Careful timing of sowing (to avoid seedlings emerging when adults are abundant)
- Use of resistant host varieties (e.g. having endophytic entomopathogenic fungi)
- Systemic insecticides applied against adults
- Classical biological control, e.g. *M. hyperodae*.

3.7. Uncertainty

There is uncertainty as to the number of generations that could develop each year in the EU; this leads to uncertainty regarding the magnitude of potential impacts. There is also some uncertainty over which hosts would be most impacted in the EU. Based on the impacts reported in New Zealand, losses in *Lolium*-based pastures could be expected. However, impacts in cereals such as maize and wheat have also been reported in both New Zealand and South America. The extent to which endophytic fungi on grasses in Europe could provide some resistance to *L. bonariensis* is uncertain. The extent to which natural enemies in the EU could limit *L. bonariensis* population development is also unknown. However, none of these uncertainties affect the conclusions of this pest categorisation.

4. Conclusions

Listronotus bonariensis meets the criteria assessed by EFSA for consideration as a Union quarantine pest (Table 7).

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

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest	Key uncertainties
Identity of the pest (Section 3.1)	The identity of the pest is established. *Listronotus bonariensis* (Kuschel) is an insect in the order Coleoptera (beetles) in the family Curculionidae (weevils	The identity of the pest is established. *Listronotus bonariensis* (Kuschel) is an insect in the Order Coleoptera (beetles) in the family Curculionidae (weevils). In English, it is commonly known as the Argentine stem weevil.	None
Absence/presence of the pest in the EU territory (Section 3.2)	*L. bonariensis* is absent (not known to occur) in the EU although it has been intercepted.	*L. bonariensis* is absent (not known to occur) although it has been intercepted. (A criterion to satisfy the definition of a regulated non-quarantine pest is that the pest must be present in the risk assessment area).	None
Regulatory status (Section 3.3)	*Listronotus bonariensis* is listed in Annex II/ AI of Council Directive 2000/29/EC. It is regulated on seeds of Cruciferae, Gramineae and *Trifolium* spp., originating in Argentina, Australia, Bolivia, Chile, New Zealand and Uruguay.	*Listronotus bonariensis* is listed in Annex II/ AI of Council Directive 2000/29/EC. It is regulated on seeds of Cruciferae, Gramineae and *Trifolium* spp., originating in Argentina, Australia, Bolivia, Chile, New Zealand and Uruguay.	None
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	*Listronotus bonariensis* could enter the EU, e.g. via *Lolium* seeds (there have been interceptions) and soil. Biotic factors (host availability) and abiotic factors (climate suitability) suggest that it would find large parts of the EU suitable for establishment. As a free living organism, adults can disperse naturally, e.g. by walking and flying.	If *L. bonariensis* established within the EU, plants for planting would not be the principle mechanism for further spread. As a mobile insect, capable of flight, spread would occur naturally. (A criterion to satisfy the definition of a RNQP is that spread should primarily be via plants for planting– *L. bonariensis* does not meet this criterion).	There is uncertainty as to the number of generations that could develop each year in the EU (perhaps two in the north, three in the south).
Potential for consequences in the EU territory (Section 3.5)	There is potential for economic impact if *L. bonariensis* were to establish in the EU; pasture grasses could be affected– potentially impacting on animal health and welfare. Cereals could also suffer yield losses.	The main hosts are generally traded as seed (plants for planting). Although *L. bonariensis* has been intercepted with grass seeds, it is not a pest of seed as such; adults are foliage feeders and larvae feed within host tillers. Findings in seed are incidental occurrences.	Whether or not cereals in the EU would be impacted is uncertain; the magnitude of impacts on pasture grasses is also uncertain.

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
Available measures (Section 3.6)	Phytosanitary measures are available to inhibit the likelihood of entry into the EU, e.g. inspection of seed prior to export (issue a phytosanitary certificate to indicate consignment is pest free); fumigation of seeds.	Hosts are generally traded as seed. Grow seed-producing plants in pest-free areas, conduct surveillance, apply chemical treatments.	None
Conclusion on pest categorisation (Section 4)	*Listronotus bonariensis* satisfies all of the criteria assessed by EFSA to satisfy the definition of a Union quarantine pest.	*Listronotus bonariensis* does not meet the criteria of (a) occurring in the EU territory, and (b) plants for planting being the principal means of spread. Hence, it does not satisfy all of the criteria that are within the remit of EFSA to assess to be regarded as a Union RNQP.	None
Aspects of assessment to focus on/scenarios to address in future if appropriate	Any future assessment should focus on likelihood and magnitude of impacts.		

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Abbreviations

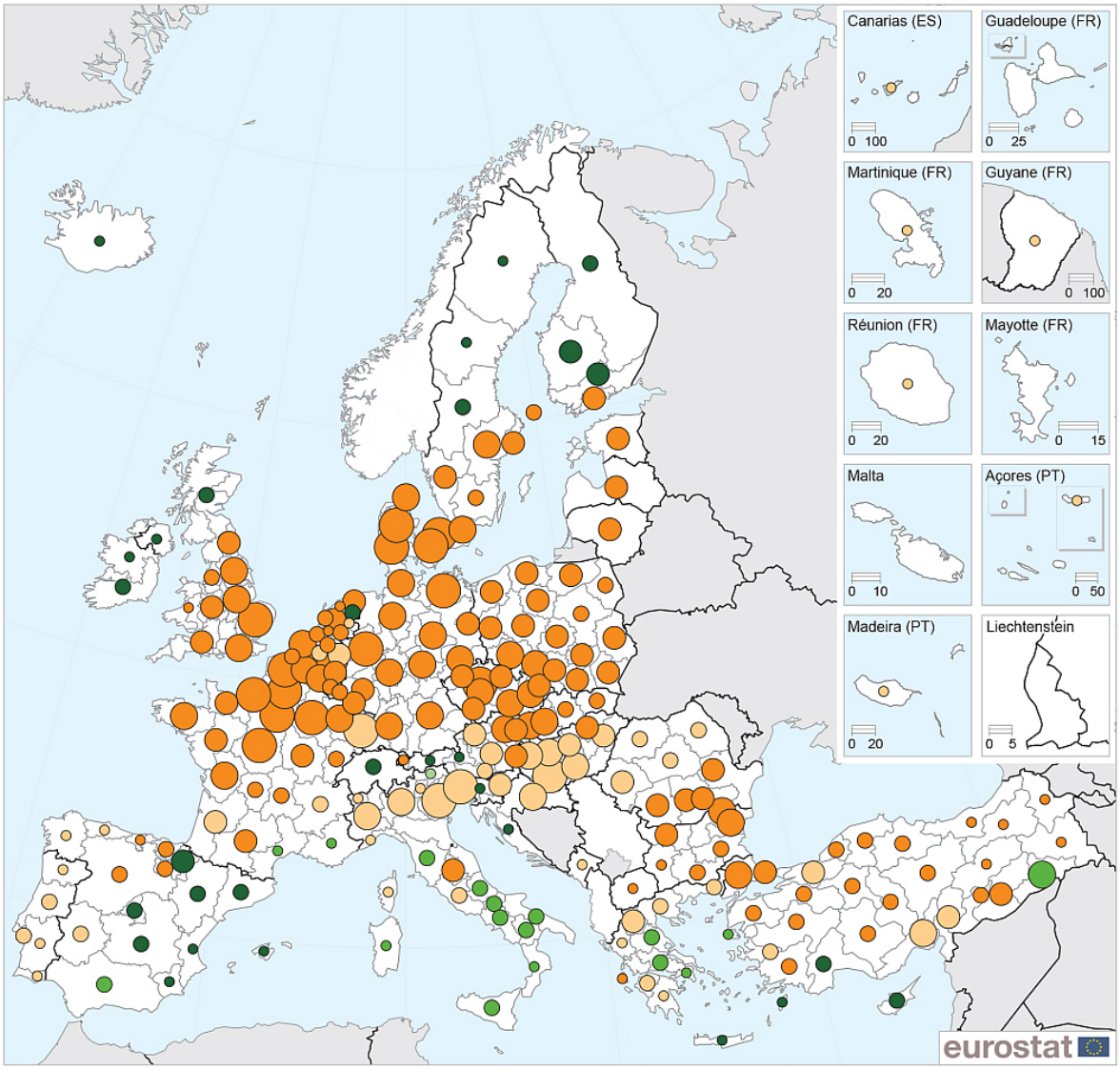
DD	degree days
DG SANCO	Directorate General for Health and Consumers
EPPO	European and Mediterranean Plant Protection Organization
FAO	Food and Agriculture Organization
IPPC	International Plant Protection Convention
MS	Member State
PLH	EFSA Panel on Plant Health
RH	Relative humidity
RNQP	regulated non-quarantine pest
TFEU	Treaty on the Functioning of the European Union
ToR	Terms of Reference

Appendix A – Individual EU member state imports of *Lolium multiflorum* and *L. perenne* seed, 2012–2016

EU MS	Imports in tonnes				
	New Zealand	Argentina	Uruguay	Australia	Brazil
Netherlands	17,789	2,594	160	62	0
Italy	1,600	5,411	936	528	100
Germany	8,232	71	30	92	0
France	6,540	400	169	73	0
United Kingdom	5,210	187	27	0	0
Belgium	3,920	52	0	0	0
Poland	2,690	262	75	133	0
Ireland	1,977	0	0	22	0
Spain	1,022	235	245	40	0
Austria	1,095	25	0	0	0
Portugal	102	528	139	47	0
Sweden	356	0	0	0	0
Czech Republic	236	0	0	0	0
Denmark	234	0	0	0	0
Greece	0	172	0	0	0
Hungary	74	75	0	0	0
Luxembourg	71	0	0	0	0
Cyprus	0	23	0	0	0
Finland	5	0	0	0	0
Croatia	2	0	0	0	0
Bulgaria	0	0	0	0	0
Estonia	0	0	0	0	0
Latvia	0	0	0	0	0
Lithuania	0	0	0	0	0
Malta	0	0	0	0	0
Romania	0	0	0	0	0
Slovakia	0	0	0	0	0
Slovenia	0	0	0	0	0
Sum	51,153	10,035	1,781	997	100

Appendix B – Harvested production of most common cereals

Harvested production of cereals (including seed) and most commonly grown cereals, by NUTS 2 regions, 2015
(tonnes per hectare of total utilised agricultural area)



Note: the map shows the harvested production of cereals (including seed) per hectare of total utilised agricultural area as proportional circles for each region, while the colour of each circle denotes the most commonly grown cereal in each region. Germany and the United Kingdom: NUTS level 1. Switzerland and Albania: national data. Italy, the Netherlands and Switzerland: 2014.

Source: Eurostat (online data code: agr_r_acs)

http://ec.europa.eu/eurostat/statistics-explained/images/thumb/9/9a/Harvested_production_of_cereals_%28including_seed%29_and_most_commonly_grown_cereals%2C_by_NUTS_2_regions%2C_2015_%28tonnes_per_hectare_of_total_utilised_agricultural_area%29_RYB17.png/