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Pest categorisation of *Amathynetoides nitidiventris*

EFSA Panel on Plant Health (PLH),
Claude Bragard, Paula Baptista, Elisavet Chatzivassiliou, Francesco Di Serio, Paolo Gonthier, Josep Anton Jaques Miret, Annemarie Fejer Justesen, Christer Sven Magnusson, Panagiotis Milonas, Juan A. Navas-Cortes, Stephen Parnell, Roel Potting, Philippe Lucien Reignault, Emilio Stefani, Hans-Hermann Thulke, Wopke Van der Werf, Antonio Vicent Civera, Jonathan Yuen, Lucia Zappalà, Jean-Claude Grégoire, Chris Malumphy, Virag Kertesz, Andrea Maiorano and Alan MacLeod

Abstract

The EFSA Panel on Plant Health performed the pest categorisation of the ulluco weevil, *Amathynetoides nitidiventris* (Hustache), for the EU territory. This species is not included in EU Commission Implementing Regulation 2019/2072. However, its only substantiated host, ulluco (*Ullucus tuberosus*), is included in Annex I of Regulation EU 2018/2019 as a high risk plant prohibited from entering the EU, pending risk assessment. In its native Andean region, *A. nitidiventris* is univoltine, with a lifecycle highly synchronised with the phenology of its host, reproduction and development take place during the development of tubers. Oviposition occurs in the soil. Larvae feed by tunnelling into the tubers, which most of them abandon to pupate in the soil. A minority pupates in the tubers. Because adult *A. nitidiventris* are often found in other crops due to crop rotations and crop associations, this species has been mistakenly identified as a pest of other crops. In principle soil and tubers of ulluco could provide a pathway for *A. nitidiventris* into the EU. However, the soil pathway is closed and ulluco tubers are regulated as high risk plants. There are no EU records of interception. Should this weevil enter the EU, the rarity of its host, which is not known to be cultivated in EU MSs, would hamper establishment, spread, and impact. As a consequence, *A. nitidiventris* does not satisfy all the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest. The criteria that are not met are the potential for establishment, spread, and economic or environmental consequences in the EU.

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Correspondence: plants@efsa.europa.eu

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Panel members: Claude Bragard, Paula Baptista, Elisavet Chatzivassiliou, Francesco Di Serio, Paolo Gonthier, Josep Anton Jaques Miret, Annemarie Fejer Justesen, Alan MacLeod, Christer Sven Magnusson, Panagiotis Milonas, Juan A Navas-Cortes, Stephen Parnell, Roel Potting, Philippe L Reignault, Emilio Stefani, Hans-Hermann Thulke, Wopke Van der Werf, Antonio Vicent Civera, Jonathan Yuen and Lucia Zappalà.

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Figure 1: Courtesy of McCaffrey and Walker (2012)

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1. Introduction

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

1.1.1. Background

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

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

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

1.1.2. Terms of reference

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

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

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

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

1.2. Interpretation of the Terms of Reference

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

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1.3. Additional information

A. nitidiventris was identified as a potential Union QP during the EFSA commodity risk assessment of *Ullucus tuberosus* tubers from Peru (EFSA PLH Panel, 2021), which triggered this categorisation.

2. Data and methodologies

2.1. Data

2.1.1. Information on the pest and hosts from the NPPO of Peru (Servicio Nacional de Sanidad Agraria, SENASA)

EFSA contacted SENASA in Peru, to obtain information on the biology of *A. nitidiventris* and its hosts, in order to decrease the uncertainties of this pest categorisation.

2.1.2. Literature search

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

2.1.3. Database search

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

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

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

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

2.1.4. Information on the pest status from Peru

To fill in gaps in information on the biology of the pest, EFSA contacted experts in Peru. Jesús Alcázar, researcher at the Nacional Agraria la Molina (UNAM), and Pedro Delgado, from the Instituto Nacional de Innovación Agraria (INIA) in Peru, provided key information on the host range and spread capacity of *A. nitidiventris*.

2.2. Methodologies

The Panel performed the pest categorisation for *A. nitidiventris*, following guiding principles and steps presented in the EFSA guidance on quantitative pest risk assessment (EFSA PLH Panel, 2018), the EFSA guidance on the use of the weight of evidence approach in scientific assessments (EFSA

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Scientific Committee, 2017) and the International Standards for Phytosanitary Measures No. 11 (FAO, 2013) and No. 21 (FAO, 2004).

The criteria to be considered when categorising a pest as a potential Union QP is given in Regulation (EU) 2016/2031 Article 3 and Annex I, Section 1 to this Regulation. Table 1 presents the Regulation (EU) 2016/2031 pest categorisation criteria on which the Panel bases its conclusions. In judging whether a criterion is met the Panel uses its best professional judgement (EFSA Scientific Committee, 2017) by integrating a range of evidence from a variety of sources (as presented above in Section 2.1) to reach an informed conclusion as to whether or not a criterion is satisfied.

The Panel's conclusions are formulated respecting its remit and particularly with regard to the principle of separation between risk assessment and risk management (EFSA founding regulation (EU) No 178/2002); therefore, instead of determining whether the pest is likely to have an unacceptable impact, deemed to be a risk management decision, the Panel will present a summary of the observed impacts in the areas where the pest occurs, and make a judgement about potential likely impacts in the EU. While the Panel may quote impacts reported from areas where the pest occurs in monetary terms, the Panel will seek to express potential EU impacts in terms of yield and quality losses and not in monetary terms, in agreement with the EFSA guidance on quantitative pest risk assessment (EFSA PLH Panel, 2018). Article 3 (d) of Regulation (EU) 2016/2031 refers to unacceptable social impact as a criterion for QP status. Assessing social impact is outside the remit of the Panel.

Table 1: Pest categorisation criteria under evaluation, as 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 (article 3)
Identity of the pest (Section 3.1)	Is the identity of the pest clearly defined, or has it been shown to produce consistent symptoms and to be transmissible?
Absence/presence of the pest in the EU territory (Section 3.2)	Is the pest present in the EU territory? If present, is the pest in a limited part of the EU or is it scarce, irregular, isolated or present infrequently? If so, the pest is considered to be not widely distributed.
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	Is the pest able to enter into, become established in, and spread within, the EU territory? If yes, briefly list the pathways for entry and spread.
Potential for consequences in the EU territory (Section 3.5)	Would the pests' introduction have an economic or environmental impact on the EU territory?
Available measures (Section 3.6)	Are there measures available to prevent pest entry, establishment, spread or impacts?
Conclusion of pest categorisation (Section 4)	A statement as to whether (1) all criteria assessed by EFSA above for consideration as a potential quarantine pest were met and (2) if not, which one(s) were not met.

3. Pest categorisation

3.1. Identity and biology of the pest

3.1.1. Identity and taxonomy

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

Yes, the identity of the species is established. *Amathynetoides nitidiventris* (Hustache) is its valid scientific name.

The ulluco weevil, *Amathynetoides nitidiventris* (Hustache), is an insect within the order Coleoptera and family Curculionidae. Junior synonyms include *Adioristus nitidiventris* Hustache, *Amathynetes nitidiventris* Kuschel, *Puranius nitidiventris* Kuschel and *Macrostyphlus nitidiventris* Kuschel (Morrone 1994, 2011).

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

3.1.2. Biology of the pest

As stated in the EFSA commodity risk assessment of ulluco from Peru (EFSA PLH Panel, 2021), and based on Alcázar et al. (2004), the life cycle of *A. nitidiventris* reared in the laboratory at 17°C and 78% relative humidity has an egg-adult life span of 243 days and the total cycle, from egg laying to adult death is 459 days (Aldana Yurivilca, 2003). In the field, this species is univoltine and its lifecycle is highly synchronised with that of the host plant; reproduction and development take place during the development of tubers. The main features when feeding on ulluco in Peru are summarised in Table 2.

Table 2: Important features of the life history strategy of *Amathynetoides nitidiventris* based on Alcázar et al. (2004)

Life stage	Phenology and relation to host	Other relevant information
Egg	Eggs are laid in the soil, close to the plant, in moist places in groups of approximately 14 eggs.	Development time: 30 days
Larva	Larvae feed tunnelling ulluco tubers. Most larvae (96%) abandon the tuber to pupate in the soil before harvest. The remaining 4% can complete development inside the tuber in the storehouse and can become a source of new infestations when used as seed tuber.	Larval type: grub (apodous) Larval instars: 4 + pre-pupa Development time: 100 days (+30 days of pre-pupa) Field occurrence: all year, either in the tubers or in the soil
Pupa	Mature larvae mostly abandon the tuber and build an earthen cocoon where they pupate (mostly between 16 cm and 30 cm deep). About 4% of larvae remain in the tuber to pupate.	Pupal type: exarate (pupal appendages are free) Development time: 30 days Field occurrence: late autumn to late spring (May to November in the southern hemisphere)
Adult	Adults first remain quiescent in the soil for about 50 days. Spring rains trigger adult emergence, which extends from September until November. They search for ulluco plants and shelter in the soil, close to the plant. They feed on small roots, tender leaves and uppermost tubers of ulluco. They do not usually feed on the stem. After mating, females oviposit in the soil. Oviposition extends for about 150 days with a total fecundity of about 370 eggs per female.	Quiescence: winter (July–August) Field occurrence: almost all year Peak densities: Summer (January) Pre-oviposition time: 18 days Adult longevity: 220 days

3.1.3. Host range/species affected

According to J. Alcázar and P. Delgado (Alcázar (UNAM) and Delgado (INIA), 3 May 2022), *A. nitidiventris* is a monophagous species restricted to ulluco, *Ullucus tuberosus* Caldas (Basellaceae). This was confirmed by J. Carrasco Valiente, Director of Plant Health at SENASA, Peru (Carrasco Valiente, 2022). Ulluco is a fully domesticated crop for which wild relatives have not been conclusively identified (Manrique et al., 2017). Because *A. nitidiventris* adults are often found in potato (*Solanum tuberosum*) fields due to crop rotations, this species had been mistakenly identified as a *S. tuberosum* pest (Alcázar et al., 2004; Kühne, 2007). The same could apply to other crops which are frequently grown in association with ulluco (e.g. oca, maize, mashua) or which are part of the same crop rotation (e.g. barley, broad beans, maize, mashua, oats, oca, quinoa) (Fries and Tapia, 2007; Ríos and Kroschel, 2011). Indeed, López and Herman (2004) reported that no oviposition could be found on stems of barley, oats, and stover, contrary to closely related potato and oca weevils (*Premnotrypes*

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

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spp. and *Adioristidius tuberculatus* Voss, respectively). Indeed, the monophagy of *A. nitidiventris* makes crop rotation an effective cultural practice to reduce *A. nitidiventris* populations (Fries and Tapia, 2007). However, FAO in their book 'Quality declared planting material. Protocols and standards for vegetatively propagated crops' included carrots, broad beans and maize as plants susceptible to *A. nitidiventris* damage (FAO, 2010) without specifying the type of damage caused (adult or larval feeding), its severity or even the true host status of these plants (i.e. whether they could sustain full development of *A. nitidiventris*). These plants were subsequently cited by McCaffrey and Walker (2012) in a datasheet on this weevil ('...*it also is found on other tubers including carrot, fava bean and corn*.'), and more recently by EFSA in the commodity risk assessment of ulluco from Peru (EFSA PLH Panel, 2021). J. Alcázar and P. Delgado (Alcázar (UNAM) and Delgado (INIA), 3 May 2022), confirmed that *A. nitidiventris* cannot complete development on carrots, broad beans and maize, which was further supported by the information received from J. Carrasco Valiente, Director of Plant Health at SENASA, Peru (Carrasco Valiente, 2022). As a consequence, in this categorisation, *A. nitidiventris* is considered a monophagous species which can complete development in *U. tuberosus* only.

3.1.4. Intraspecific diversity

No reports of intraspecific variation of the species under scrutiny have been found.

3.1.5. Detection and identification of the pest

Are detection and identification methods available for the pest?

Yes, detection methods and identification keys are available for *A. nitidiventris*.

Identification

A. nitidiventris was redescribed by Morrone (1994), who produced a key for its determination to species level. *A. nitidiventris* is recognised from other congeneric weevils by the combination of pro- and mesotibiae with two spurs, and metatibiae with one spur.

Detection

- Trapping: no references have been found.
- Symptoms: Larval feeding in the tubers produces holes, especially in the late stages of cultivation.

Morphology

- Adults: Males are 4.6 mm long and 2.0 mm wide, while females are a bit larger: 5.2 mm long and 2.3 mm wide. Quiescent adults are orange-brownish and become darker when emerging. Elytra are completely sclerotised at emergence (Figure 1).

Figure 1: Side view of adult *Amathynetoides nitidiventris* (Source: McCaffrey and Walker, 2012 Available online: PaDIL - http://www.padil.gov.au, under the Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0)

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- Eggs: 0.8 mm long and 0.4 mm wide. Hyaline when freshly laid turning blackish as hatching approaches.
- Larvae: typical curculioniform, apodous (legless). Mature 4th instar larvae are 6.4 mm long and 2.6 mm wide.
- Pupae: exarate, whitish. Adult characteristics can be easily observed in the pupa. 4.7 mm long and 2.3 mm wide.

3.2. Pest distribution

3.2.1. Pest distribution outside the EU

A. nitidiventris is distributed in Peru (EFSA PLH Panel, 2021), Bolivia and northern Chile (Morrone, 1994) (Figure 2). Since ulluco is the only host of *A. nitidiventris,* the pest could be present in other neighbouring countries where ulluco is cultivated (López and Hermann, 2004; Manrique et al., 2017).

Figure 2: Global distribution of *Amathynetoides nitidiventris* (Data source: Morrone, 1994)

3.2.2. Pest distribution in the EU

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

No. *A. nitidiventris* is not known to occur in the EU.

3.3. Regulatory status

3.3.1. Commission Implementing Regulation 2019/2072

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

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

Annex I of Regulation EU 2018/2019 lists high risk plants. Plants of *Ullucus tuberosus*, a host of *A. nitidiventris*, originating from all third countries are currently prohibited.

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3.4. Entry, establishment and spread in the EU

3.4.1. Entry

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

Yes, *A. nitidiventris* could enter the EU territory. The main pathways would be ulluco tubers and infested soil. These pathways can be considered as closed with current regulations (see Table 3).

Comment on plants for planting as a pathway.

Ulluco tubers used as seed (plants for planting) can be infested and, therefore, could provide the main pathway for entry. However, ulluco is not known to be cultivated in the EU (see Section 3.4.2). This pathway can be considered as closed with current regulations (see Table 3).

A. nitidiventris is restricted to *U. tuberosus*, where complete development takes place (Alcázar (UNAM) and Delgado (INIA), 3 May 2022)). Eggs are laid in the soil in the vicinity of the host. Larvae feed on the tubers and mostly abandon the host to pupate in the soil. Only a small percentage (4%) pupates inside the tuber. Peru exported 59,790 kg of ulluco tubers to the EU in 2018, while in 2019, the exported volume was 59,983 kg (EFSA PLH Panel, 2021). Notifications of interceptions of harmful organisms began to be compiled in Europhyt in May 1994 and in TRACES in May 2020. As of 17 November 2021, there was no records of interception of *A. nitidiventris* in the Europhyt and TRACES databases. However, it should be taken into account that because *U. tuberosus* was not regulated by previous PH Directive (2000/29 EC), there was no obligation to inspect incoming shipments. Moreover, because of the categorisation of *U. tuberosus* as a high-risk plant (Annex I of EU 2018/2019), imports of ulluco were discontinued at the end of 2019. In the UK, screening of plantings originating from unregulated internet purchases of ulluco tubers revealed the presence of QPs (Fox et al., 2019). Table 3 identifies potential pathways and life stages of *A. nitidiventris* associated with each pathway.

Table 3: Potential pathways for *Amathynetoides nitidiventris* into the EU 27

Pathways (e.g. host/intended use/source)	Life stage	Relevant mitigations [e.g. prohibitions (Annex VI), Special requirements (Annex VII) or phytosanitary certificates (Annex XI) within Implementing Regulation 2019/2072]
Ulluco tubers	Larvae, pupae	Annex I of EU 2018/2019 prohibits the introduction of plants of *Ullucus tuberosus* from all third countries, pending risk assessment.
Soil	Eggs, larvae, pupae, adults	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	Eggs, larvae, pupae, adults	Annex VII (2.) Official statement that machinery or vehicles are cleaned and free from soil and plant debris

The ulluco tubers pathway is closed, as the import of *U. tuberosus* plants is prohibited by Annex I of EU 2018/2019, which lists high risk plants and includes this species. The soil pathway can be considered as closed as well because soil can only enter the EU from Switzerland (Annex VI).

3.4.2. Establishment

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

No, *A. nitidiventris* would most likely be unable to establish in the EU territory. Because its host is not known to be cultivated in the EU, it would most probably be unable to transfer to a new host and establish.

Even if the pest would enter the EU in seed tubers of ulluco, its transfer to a host would be highly unlikely. Only if moved with infested seed tubers of *U. tuberosus*, *A. nitidiventris* could complete development. However, as ulluco is not known to be cultivated in the EU, the pest would most probably be unable to transfer to a new suitable host. Additional bottlenecks would include its ability to find a mate (*A. nitidiventris* is not a parthenogenetic species) and other Allee effects (effects causing reduced survival of new colonies with a small number of individuals) (Tobin et al., 2011) as well as the impact of cultural practices and opportunistic natural enemies, such as birds, occurring in the EU.

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There is one single unsubstantiated report which includes carrots, broad beans and maize as plants *A. nitidiventris* can feed on (FAO, 2010). These crops are widely cultivated in the EU. However, as discussed above (see Section 2.1.3), in this categorisation *A. nitidiventris* is considered monophagous, feeding on *U. tuberosus* only (Alcázar (UNAM) and Delgado (INIA), 3 May 2022).

3.4.2.1. EU distribution of main host plants

The only confirmed host of *A. nitidiventris*, *U. tuberosus*, is not known to occur in the EU. In 1948, ulluco was introduced to Europe as a potential alternative crop (King, 1988). However, according to Rousi et al. (1989), interest in the crop was lost due to its low yields. Extensive cultivation in a high-latitude, temperate region without a long autumn is unlikely due to day length requirements for tuber induction (EFSA PLH Panel, 2021). The crop has a long, 7–8 month, cropping cycle, with tuberisation occurring under 11–13.5 h of day length. In long days it fails to form tubers (Scheffer et al., 2002). Therefore, further cultivation in the EU ecoclimatic conditions is not expected.

3.4.2.2. Climatic conditions affecting establishment

Although ulluco can be grown at the sea level, in its native Andean region, ulluco naturally occurs at altitudes between 2,800 and 4,000 m asl (Manrique et al., 2017), which roughly coincide with its optimum cultivation area, with temperatures ranging between 8°C and 14°C (Fries and Tapia, 2007; EFSA PLH Panel, 2021). Because these areas are close to the equator, the mean monthly temperatures recorded do not vary much over the year.

Figure 3 provides a map of South America showing all Köppen–Geiger climate types (Kottek et al., 2006) found between 2,100 and 4,700 m asl. Climate types BSh (hot semi-arid), BSk (cold semi-arid), Cfb (temperate oceanic), Cfc (subpolar oceanic) and ET (tundra), which occur in that area can be also found in the EU (Figure 4). BSh and BSk can be found in Cyprus, Greece, Italy, Portugal and Spain. Cfb and Cfc occur widely across the EU, while ET can be found in the Alps and in Scandinavia (Figure 4).

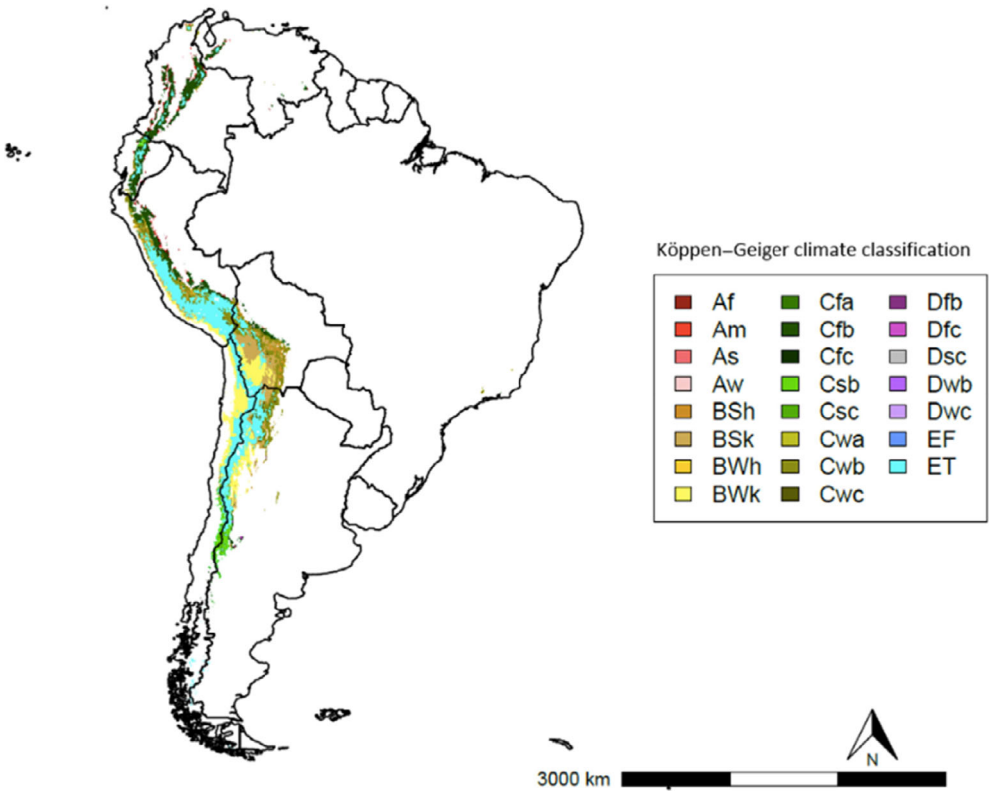

Figure 3: Occurrence of Köppen–Geiger climate classifications at altitudes between 2,100 and 4,700 m in South America (Source: EFSA PLH Panel, 2020)

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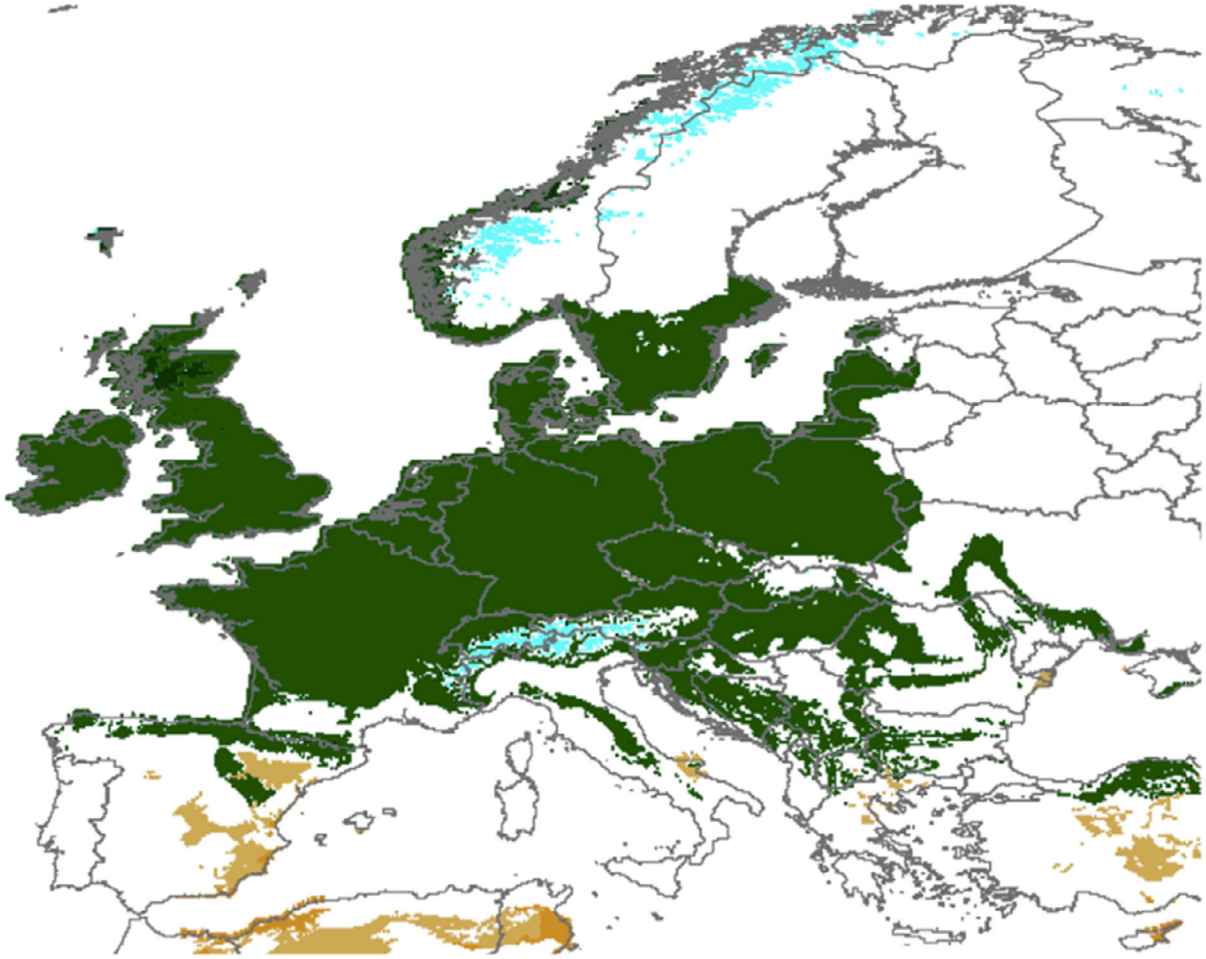

Figure 4: Occurrence of Köppen–Geiger climate types BSh, BSk, Cfb, Cfc and ET in Europe (Source: EFSA PLH Panel, 2020)

While climatic conditions would be suitable for the development of *A. nitidiventris* in some EU areas, the lack of its host, ulluco, would preclude its establishment in Europe.

3.4.3. Spread

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

A. nitidiventris is mostly passively moved in ulluco seed tubers. Because ulluco is not known to be cultivated in the EU, its spread via seed tubers trade does not occur. Without hosts to feed on, natural movement of adult weevils would not result in successful spread.

Comment on plants for planting as a mechanism of spread.

See comments above.

Similar to other closely related weevils (i.e. those in the Andean Potato Weevil complex; EFSA PLH Panel, 2020) adult *A. nitidiventris* are supposed not to actively spread more than a few hundred metres. Indeed, this species has never been observed flying (Alcázar (UNAM) and Delgado (INIA), 3 May 2022). As a consequence, spread would be mostly passive in ulluco seed tubers. Because ulluco is not known to be cultivated in the EU, spread would never result in further establishment.

3.5. Impacts

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

No. The host is not known to be cultivated in the EU.

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A study carried out in La Libertad, one of the main producing centres of ulluco in the central highlands of Peru, found that 96% of growers considered the ulluco weevil as the main pest of this crop (Alcázar et al., 2004). This weevil causes between 2.5 and 50.0% tuber yield losses. Late harvesting, absence of crop rotation, and presence of volunteer ulluco plants in the field are associated with higher losses (Alcázar et al., 2004). Since ulluco is not known to be cultivated in the EU, no impact would be expected.

3.6. Available measures and their limitations

Are there measures available to prevent pest entry, establishment, spread or impacts such that the risk becomes mitigated?

Yes, the inclusion of ulluco, the only known host of *A. nitidiventris*, in the High Risk Plant regulation EU 2018/2019 prevents the introduction of this plant into the EU, pending risk assessment, and effectively mitigates the likelihood of *A. nitridiventris* entry.

3.6.1. Identification of potential additional measures

Phytosanitary measures (prohibitions) are currently applied to host plants for planting (see Section 3.3.2). Because imports of ulluco seed tubers and soil are already prohibited and natural spread of *A. nitidiventris* from its native range (the Andean region) is unlikely, passenger baggage checks for travellers entering the EU from *A. nitidiventris* native countries could be an additional potential risk reduction option. Because of the same reasons, no potential additional risk reduction options or supporting measures are suggested.

3.7. Uncertainty

The main source of uncertainty, the possibility that the host range of *A. nitidiventris* might include crops other than ulluco (see Section 3.1.3), was discarded. The FAO unsubstantiated citation for carrots, broad beans and maize as plants susceptible to *A. nitidiventris* damage (FAO, 2010), which was subsequently reproduced in McCaffrey and Walker (2012) and EFSA (EFSA PLH Panel, 2021), could be rejected based on expert consultation (Alcázar (UNAM) and Delgado (INIA), 3 May 2022; J. Carrasco Valiente, SENASA, 2022).

4. Conclusions

A. nitidiventris does not satisfy all the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union QP (Table 4). The criteria that are not met are the potential for establishment, spread, and economic or environmental consequences in the EU.

Table 4: The Panel's conclusions on the pest categorisation criteria defined in Regulation (EU) 2016/2031 on protective measures against pests of plants (the number of the relevant sections of the pest categorisation is shown in brackets in the first column)

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Key uncertainties
Identity of the pest (Section 3.1)	The identity of *A. nitidiventris* is well established	None
Absence/presence of the pest in the EU (Section 3.2)	*A. nitidiventris* is not known to occur in the EU	None
Pest potential for entry, establishment and spread in the EU (Section 3.4)	Although *A. nitidiventris* could enter the EU in ulluco (*Ullucus tuberosus*) tubers imported from infested countries (Bolivia, Chile, Peru), ulluco is a high risk plant whose introduction is prohibited into the EU. The strict association of *A. nitidiventris* with ulluco, which is not known to be cultivated in the EU, would hamper its establishment and spread in the EU.	None

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Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Key uncertainties
Potential for consequences in the EU (Section 3.5)	Because *A. nitidiventris* is restricted to ulluco, which is not known to be cultivated in the EU, no impact would occur.	None
Available measures (Section 3.6)	Import of ulluco is prohibited; because of the monophagy of *A. nitidiventris*, this measure alone could effectively prevent entry, establishment and spread.	None
Conclusion (Section 4)	*A. nitidiventris* does not satisfy all the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest. The criteria that are not met are the potential for establishment, spread, and economic or environmental consequences in the EU.	
Aspects of assessment to focus on/scenarios to address in future if appropriate:		

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Abbreviations

EPPO	European and Mediterranean Plant Protection Organization
FAO	Food and Agriculture Organization
IPPC	International Plant Protection Convention
ISPM	International Standards for Phytosanitary Measures
MS	Member State
PLH	EFSA Panel on Plant Health
PZ	Protected Zone
TFEU	Treaty on the Functioning of the European Union
ToR	Terms of Reference

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Glossary

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

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Appendix A – Distribution of *Amathynetoides nitidiventris*

Distribution records based on Morrone (1994) and EFSA PLH Panel (2021).

Region	Country	Sub-national (e.g. State)	Status
South America	Bolivia		Present
	Chile	Northern Chile	Present
	Peru		Present

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