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# Pest categorisation of *Spodoptera eridania*

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## Abstract

The EFSA Panel on Plant Health performed a pest categorisation of *Spodoptera eridania* (Lepidoptera: Noctuidae) for the European Union (EU). *S. eridania* (southern armyworm) is a highly polyphagous pest native to the Americas which has spread to Africa being first reported there in 2016. There are multiple generations per year. Although it can endure short freezing periods, prolonged frosts are lethal. Eggs are laid in batches on the leaves of host plants. Five to seven larval instars follow. Like other armyworms, early instars are gregarious and cause leaf skeletonisation. Older instars disperse and become more solitary and nocturnal. Larvae feed on field vegetables and can bore into tomato fruit. They can eat apical portions of branches and can bore into stems and tubers if preferred foods are scarce. Pupation takes place in the soil. *S. eridania* is regulated in the EU by Directive 2000/29/EC (Annex IAI). Within this Directive, a prohibition of soil imported from countries where *S. eridania* occurs, prevents the entry of *S. eridania* pupae. However, immature stages on plants (excluding seeds), fruit and flowers provide potential pathways for entry into the EU. *S. eridania* adults have been intercepted in the EU as hitchhikers. Climatic conditions and the wide availability of host plants provide conditions to support establishment in frost-free regions of the EU. It could spread more widely forming transient populations during summer months. Impacts on field vegetables and ornamentals would be possible. Phytosanitary measures are available to reduce the likelihood of entry. *S. eridania* satisfies the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest. *S. eridania* does not meet the criteria of (a) occurring in the EU, and (b) plants for planting being the principal means of spread for it to be regarded as a potential Union regulated non-quarantine pest.



**Keywords:** pest risk, plant health, plant pest, quarantine, southern armyworm

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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 categorisations of the harmful organisms included in the annexes of Directive 2000/29/EC, in the cases where recent pest risk assessment/ pest categorisation is not available.

### 1.1.2. Terms of Reference

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

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

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

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

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

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

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

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

#### 1.1.2.1 Terms of Reference: Appendix 1

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

***Annex IIAI***

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

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

**(b) Bacteria**

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

**(c) Fungi**

*Alternaria alternata* (Fr.) Keissler (non-EU pathogenic isolates)
*Anisogramma anomala* (Peck) E. Müller
*Apiosporina morbosa* (Schwein.) v. Arx
*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
Palm lethal yellowing mycoplasm
Satsuma dwarf virus
Citrus tristeza virus (non-EU isolates)
Leprosis
Little cherry pathogen (non- EU isolates)
Naturally spreading psorosis
Tatter leaf virus
Witches' broom (MLO)

***Annex IIB***

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

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

**(b) Bacteria**

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

**(c) Fungi**

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

### 1.1.2.2 Terms of Reference: Appendix 2

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

***Annex IAI***

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

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

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

Group of Tephritidae (non-EU) such as:

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

**(c) Viruses and virus-like organisms**

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

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

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

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

***Annex IIAI***

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

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

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

### 1.1.2.3 Terms of Reference: Appendix 3

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

***Annex IAI***

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

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

**(b) Fungi**

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

**(c) Viruses and virus-like organisms**

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

**(d) Parasitic plants**

*Arceuthobium* spp. (non-EU)

***Annex IAII***

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

*Meloidogyne fallax* Karssen
*Popillia japonica* Newman
*Rhizoecus hibisci* Kawai and Takagi

**(b) Bacteria**

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

**(c) Fungi**

*Melampsora medusae* Thümen
*Synchytrium endobioticum* (Schilbersky) Percival

***Annex I B***

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

*Leptinotarsa decemlineata* Say
*Liriomyza bryoniae* (Kaltenbach)

**(b) Viruses and virus-like organisms**

Beet necrotic yellow vein virus

### 1.2. Interpretation of the Terms of Reference

*Spodoptera eridania* (Cramer) is one of a number of pests listed in the Appendices to the Terms of Reference (ToR) to be subject to pest categorisation to determine whether it fulfils the criteria of a quarantine pest or those of a regulated non-quarantine pest (RNQP) for the area of the EU excluding Ceuta, Melilla and the outermost regions of Member States (MSs) referred to in Article 355(1) of the Treaty on the Functioning of the European Union (TFEU), other than Madeira and the Azores. Based on the latest scientific consensus available (ITIS, 2019), the valid authority for this species should appear as (Stoll). Hence we regard *Spodoptera eridania* (Cramer) to be a junior synonym of *Spodoptera eridania* (Stoll).

The new Plant Health Regulation (EU) 2016/2031[4], on the protective measures against pests of plants, will be applying from December 2019.

The regulatory status sections (3.3) of the present opinion are still based on Council Directive 2000/29/EC, as the document was adopted in November 2019.

## 2. Data and methodologies

### 2.1. Data

#### 2.1.1. Literature search

A literature search on *S. eridania* 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 experts, as well as from citations within the references and grey literature.

#### 2.1.2. Database search

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

[4] Regulation (EU) 2016/2031 of the European Parliament of the Council of 26 October 2016 on protective measures against pests of plants, amending Regulations (EU) 228/2013, (EU) 652/2014 and (EU) 1143/2014 of the European Parliament and of the Council and repealing Council Directives 69/464/EEC, 74/647/EEC, 93/85/EEC, 98/57/EC, 2000/29/EC, 2006/91/EC and 2007/33/EC. OJ L 317, 23.11.2016, pp. 4–104.

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

The Europhyt database was consulted for pest-specific notifications on interceptions and outbreaks. Europhyt is a web-based network run by the Directorate General for Health and Food Safety (DG SANTÉ) of the European Commission and is a subproject of PHYSAN (Phyto-Sanitary Controls) specifically concerned with plant health information. The Europhyt database manages notifications of interceptions of plants or plant products that do not comply with EU legislation, as well as notifications of plant pests detected in the territory of the MSs and the phytosanitary measures taken to eradicate or avoid their spread.

## 2.2. Methodologies

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

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

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

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

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

| Criterion of pest categorisation | Criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest | Criterion in Regulation (EU) 2016/2031 regarding protected zone quarantine pest (Articles 32–35) | Criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest |
|---|---|---|---|
| **Identity of the pest (Section 3.1)** | Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible? | Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible? | Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible? |
| **Absence/ presence of the pest in the EU territory (Section 3.2)** | Is the pest present in the EU territory?<br>If present, is the pest widely distributed within the EU?<br>Describe the pest distribution briefly! | Is the pest present in the EU territory? If not, it cannot be a protected zone quarantine organism. | Is the pest present in the EU territory? If not, it cannot be a RNQP. (A regulated non-quarantine pest must be present in the risk assessment area). |

| 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 |
|---|---|---|---|
| **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).<br>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?<br>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?<br>Clearly state if plants for planting is the main pathway! |
| **Potential for consequences in the EU territory (Section 3.5)** | Would the pests' introduction have an economic or environmental impact on the EU territory? | Would the pests' introduction have an economic or environmental impact on the protected zone areas? | Does the presence of the pest on plants for planting have an economic impact as regards the intended use of those plants for planting? |
| **Available measures (Section 3.6)** | Are there measures available to prevent the entry into, establishment within or spread of the pest within the EU such that the risk becomes mitigated? | Are there measures available to prevent the entry into, establishment within or spread of the pest within the protected zone areas such that the risk becomes mitigated?<br>Is it possible to eradicate the pest in a restricted area within 24 months (or a period longer than 24 months where the biology of the organism so justifies) after the presence of the pest was confirmed in the protected zone? | Are there measures available to prevent pest presence on plants for planting such that the risk becomes mitigated? |
| **Conclusion of pest categorisation (Section 4)** | A statement as to whether (1) all criteria assessed by EFSA above for consideration as a potential quarantine pest were met and (2) if not, which one(s) were not met. | A statement as to whether (1) all criteria assessed by EFSA above for consideration as potential protected zone quarantine pest were met, and (2) if not, which one(s) were not met. | A statement as to whether (1) all criteria assessed by EFSA above for consideration as a potential RNQP were met, and (2) if not, which one(s) were not met. |

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

# 3. Pest categorisation

## 3.1. Identity and biology of the pest

### 3.1.1. Identity and taxonomy

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

**Yes**, the identity of *S. eridania* is established and taxonomic keys are available for its identification to species level.

*Spodoptera eridania* (Stoll, 1781) is the current valid name (ITIS, 2019) of a highly polyphagous herbivorous moth (Lepidoptera: Noctuidae) native to the American tropics. This species has many synonyms (Todd and Poole, 1980) including the presently invalid authority name 'Cramer' (i.e. *Spodoptera eridania* (Cramer, 1784)), which is the one listed in Annex IAI of Council Directive 2000/29/EC.

### 3.1.2. Biology of the pest

According to Smith et al. (1997), the eggs of *S. eridania*, the southern armyworm, are laid in large batches on the leaves of the host plant, protected by a layer of grey bristles from the female abdomen. Egg development usually takes 4–8 days. Five to seven larval instars, depending on the suitability of the host (Dos Santos et al., 2005; Montezano et al., 2014), follow. Similar to other armyworms within the Noctuidae family, larvae are gregarious and remain together on the leaf for the first two instars, resulting in leaf skeletonisation. The third-instar larvae disperse and become more solitary and nocturnal. During the day they hide in the leaf litter or plant foliage and abandon their refugia to feed on the leaves at night. Mature larvae can bore into fruit (e.g. tomato in Florida; Capinera, 2018). When stressed by lack of food, larvae can eat apical portions of branches, bore into stem tissue and attack tubers close to the soil surface (Capinera, 2018). Larval development usually takes 14–18 days. As with other Noctuidae, the rate of larval development is affected by the quality of diet and prevailing temperatures; the latter also affects the adult condition. Larvae sometimes swarm and migrate to adjacent fields when food is scarce. Pupation takes place in the soil at a depth of 5–10 cm (Capinera, 2018) in a weak earthen cell and typically requires 9–13 days. Adults are nocturnal.

*Spodoptera eridania* is essentially a subtropical species and so a temperature of 20–25°C is optimum for development, and breeding may be continuous. The life cycle can be completed in 28–30 days, but up to 40 days is common (Capinera, 2018). There are several to many generations per year, the number depending on local conditions. Experiments in Brazil by Foerster and Dionizio (1989) showed that development at suboptimal temperatures of 17 and 30°C was 115 and 33 days, respectively. At 30°C, pupae weighed less, and survival rates were lower. In northern Florida, moths can be found throughout the year, withstanding several days of freezing weather. However, it cannot survive extended freezing and recolonises northward each year from subtropical areas (Mitchell and Tumlinson, 1994).

### 3.1.3. Intraspecific diversity

No reports on the intraspecific diversity of this species have been found.

### 3.1.4. Detection and identification of the pest

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

**Yes**, detection and identification methods for *S. eridania* are available. An EPPO standard (EPPO/OEPP, 2015) is available.

**Detection**

An EPPO standard provides guidance for the identification of *S. eridania*, *S. littoralis*, *S. litura*, and *S. frugiperda* (EPPO/OEPP, 2015). Todd and Poole (1980) produced a key for armyworm moths of the genus *Spodoptera* Guenée occurring in the Americas.

Symptoms:

According to EPPO (EPPO/OEPP, 2015), 'leaf-eating is the main damage to the host plant, and in extreme cases complete defoliation may occur. The larger caterpillars are not normally seen because they are nocturnal feeders, but the first two smaller instars are gregarious and can be seen in clusters on the foliage. Initial damage to the leaves may be skeletonisation. Tomato fruits may be holed. Large larvae sometimes act as cutworms'.

Pheromone trapping:

The sex pheromone produced by female moths has been described (Teal et al., 1985), comprising of (*Z*)-9-tetradecenyl acetate (59.7%), (*Z*,*E*)-9,12-tetradecadienyl acetate (23.8%), (*Z*)-9-tetradecenol (8.4%), (*Z*)-11-hexadecenyl acetate (5.1%), (*Z*,*Z*)-9,12-tetradecadienyl acetate (3%) and (*Z*,*E*)-9,11-tetradecadienyl acetate (trace). This volatile blend was evaluated in the field (Mitchell and Tumlinson, 1994) and could be useful for detection and/or monitoring purposes.

**Identification** (based on CABI datasheet):

Egg: Subspherical in shape (0.45 × 0.35 mm) and greenish (Capinera, 2018). Laid in large groups on the plant foliage and covered with a layer of grey bristles (scales) from the abdomen of the female.

Larva: There are usually six instars (Capinera, 2018). Fully grown larvae measure 35–40 mm. Young larvae are blackish green with yellow lateral lines, but older instars are grey-brown with a dorsal row of paired black triangular spots, and subdorsal reddish lines when older; the head capsule is yellow-brown. Larvae are characterised by a prominent yellow subspiracular line which is broken by a dark (sometimes diffuse) spot on the first abdominal segment (Levy and Habeck, 1976). A full description of the larvae is given in Crumb (1956). Larvae are usually found on the lower surface of leaves and most active at night (Capinera, 2018).

Pupa: A typical noctuid pupa, shiny brown, and 19–20 mm long with rounded head and abdomen. Shiny mahogany brown, with darker head, spiracles and anterior edges of abdominal segments. Anal segment terminates in a two-spined cremaster. Pupae are usually found in the soil 5–10 cm deep (Capinera, 2018).

Adult: A sturdy grey-brown moth, wing-span 28–40 mm, forewings grey sometimes with a central dark spot or bar, hindwings white. The posterior angle of the forewing is narrowly divided from the rest of the wing by an irregular, oblique, pale band. The principal definitive features are in the male genitalia (Todd and Poole, 1980).

## 3.2. Pest distribution

### 3.2.1. Pest distribution outside the EU

*Spodoptera eridania* is native to the Americas and has spread to Africa, where it was first recorded in south-eastern Nigeria in 2016. It has subsequently spread to Bénin, Cameroon and Gabon (Goergen, 2018; EPPO, online) (Figure 1). In the Americas, *S. eridania* occurs year-round in tropical and some sub-tropical regions and northwards into the USA where permanent populations occur only in the south (Florida, South Carolina, North Carolina, to southern Kansas and Texas). However, during the summer, populations fly north and can reach into New England. In the southern hemisphere, populations from Central and tropical South America fly southwards to reach Argentina and Chile during the southern hemisphere summer. Although *S. eridania* has been reported from California (Capinera, 2011; Capinera, 2014 cited in CDFA, 2016), the California Department of Food and Agriculture states that it has never been found in the environment of California but intercepted four times on bell peppers, cilantro, tree fern, and *Asparagus sperengeri* from Florida (CDFA, 2016).

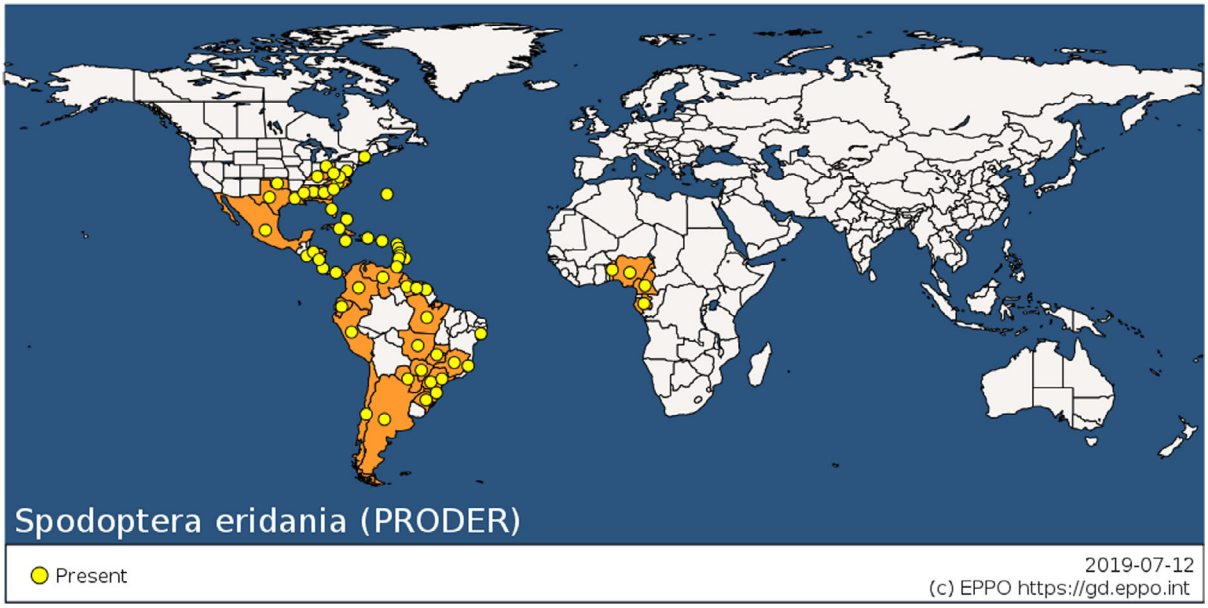


**Figure 1:** Global distribution map for *S. eridania* (extracted from the EPPO Global Database accessed on 12 July 2019)

### 3.2.2. Pest distribution in the EU

*Spodoptera eridania* is not known to be present in the EU. According to EPPO (online), Slovenia and The Netherlands NPPO report *S. eridania* as absent and Denmark reports it as intercepted only.

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

**No**, *S. eridania* is not known to be present in the EU

## 3.3. Regulatory status

### 3.3.1. Council Directive 2000/29/EC

*S. eridania* is listed in Council Directive 2000/29/EC. Details are presented in Table 2.

**Table 2:** *Spodoptera eridania* in Council Directive 2000/29/EC

| **Annex I Part A** | **Harmful organisms whose introduction into, and spread within, all member states shall be banned** |
|---|---|
| **Section I** | Harmful organisms not known to occur in any part of the community and relevant for the entire community |
| **(a)** | Insects, mites and nematodes, at all stages of their development |
| | Species |
| **21** | *Spodoptera eridania* (Cramer) |

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

### 3.4.1. Host range

According to Montezano et al. (2014), *S. eridania* has been found on at least 202 natural host plants in 58 botanical families, including both cultivated and non-crop plants that could be considered as weeds (Appendix A). Compared to its close relative *S. frugiperda* Walker, for which 186 host plants have been cited with a clear preference for Poaceae (66 species) (Casmuz et al., 2010; EFSA PLH Panel, 2017), such a preference for any plant family is not found in *S. eridiana* (Montezano et al., 2014). The same authors report the occurrence of this species in crops of regional importance, which highlights the versatility and ability of this species to rapidly adapt in various regions of the Americas,

feeding on cultivated plants including alfalfa, bean, beet, cabbage, cassava, cotton, maize, potato, soybean, sweet potato, and tomato, but also exploiting weeds as alternative hosts used by females for oviposition and by larger larvae when migrating.

The existing plant health directive does not explicitly list all *S. eridania* hosts. However, as it is listed in Annex IAI, its introduction and spread in the EU is banned irrespective of what it may be found on. Some host plants are listed in the import prohibitions of Annex III or in specific requirements in Annex IV of Council Directive 2000/29/EC.

### 3.4.2. Entry

*Is the pest able to enter into the EU territory?*

**Yes**, plants for planting, cut branches, cut flowers, fruit and soil/growing media could provide pathways for entry. The soil/growing medium pathway is closed and the remaining pathways are partly regulated.

*S. eridania* is a polyphagous species and its different life stages could use different pathways to enter the EU:

- Eggs and larvae:
    - Plants for planting (excluding seeds)
    - Cut branches
    - Cut flowers
    - Fruit
- Pupae:
    - Soil/growing medium from infested fields, and
- Adults:
    - Hitchhikers, as already observed (ref to Denmark, EPPO GD; Europhyt).

The soil/growing medium pathway can be considered as closed, as soil from *S. eridania* infested countries is banned from entering into the EU (Annex IIIA 14). The plants for planting (excluding seeds), cut branches, cut flowers, and fruit pathways are not specifically regulated although as an Annex IAI pest, the entry of *S. eridania* into the EU is prohibited regardless of the commodity where they are found. In the future, following the implementation of the Plant Health Regulation (EC 2016/2031), consignments of almost all fruit and vegetable will require a phytosanitary certificate indicating that they have been inspected and are free from harmful organisms before entry into the EU.

According to the Europhyt database, between 2005 and 2019, *S. eridania* has been intercepted 37 times by the Netherlands NPPO. Two of these interceptions refer to Mexico (where it was found on *Rubus ulmifoilus* and *Rubus* spp.), two to Costa Rica (where it was found on *Dracaena marginata* and *Schefflera arboricola*), and the remaining 33 to Suriname, where it was found on *Amaranthus dubius, Apium graveolens, Capsicum* sp., *Solanum macrocarpon*, *Solanum melongena*, *Phaseolus* sp., and *Vigna* sp.) (Figure 2). The lack of specific CN codes for most of the plants on which *S. eridania* has been intercepted means that it is not possible to determine the volume of these host plants imported into EU from countries where *S. eridania* occurs. Nevertheless, for the purposes of this categorisation, the fact that this pest has been repeatedly intercepted indicates that pathways for entry exist.

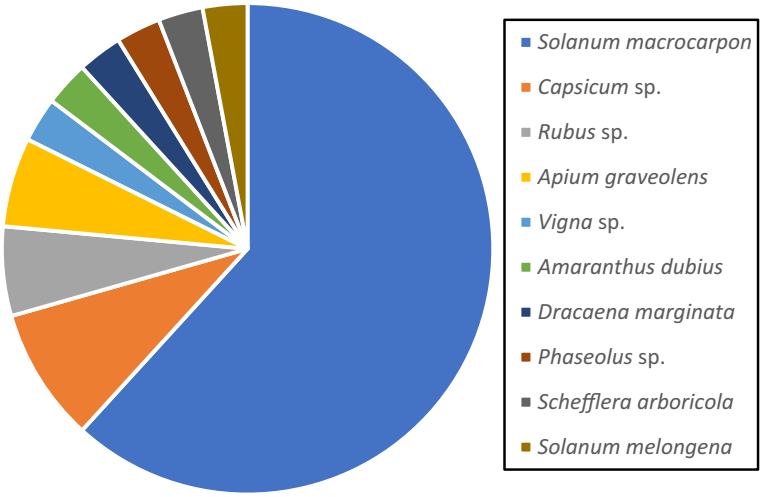


**Figure 2:** Relative frequency of *S. eridania* on different plant species where it has been intercepted when entering into the EU (n = 37) (Source: Europhyt, March 2005–February 2019)

### 3.4.3. Establishment

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

**Yes**, biotic and abiotic conditions are conducive for establishment of *S. eridania* in some parts of the EU where potential hosts are either cultivated or occur as weeds.

#### 3.4.3.1 EU distribution of main host plants

Smith et al. (1997) and CABI (2018) note that many potential crop hosts are available to *S. eridania* in the EU, especially those in the southern member states. These authors suggest field tomatoes and sugarbeet could be especially vulnerable, as well as a wide range of other vegetables and flowers, including those grown in glasshouses. EU crop areas for tomatoes and beetroots (sugarbeet data is not available at Eurostat) are presented in Tables 3 and 4.

**Table 3:** EU crop area (1000 ha) for tomatoes (2014–2019). Source: Eurostat (code: V3100; data extracted: 7/7/19)

| GEO/TIME | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|
| European Union – 28 countries | 248.09 | 254.43 | 247.00 | 241.07 | 239.70 | : |
| Austria | 0.19 | 0.19 | 0.18 | 0.18 | 0.2 | 0.19 |
| Belgium | 0.51 | 0.51 | 0.51 | 0.52 | 0.52 | : |
| Bulgaria | 3.59 | 3.28 | 4.2 | 5.01 | 4.52 | 4.00 |
| Croatia | 0.32 | 0.42 | 0.37 | 0.45 | 0.4 | 0.45 |
| Cyprus | 0.21 | 0.27 | 0.22 | 0.26 | 0.26 | 0.28 |
| Czech Republic | 0.28 | 0.2 | 0.34 | 0.24 | 0.30 | 0.30 |
| Denmark | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Estonia | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | : |
| Finland | 0.11 | 0.11 | 0.11 | 0.11 | 0.10 | 0.09 |
| France | 5.83 | 5.69 | 5.65 | 5.75 | 5.74 | 4.65 |
| Germany | 0.33 | 0.33 | 0.34 | 0.37 | 0.40 | : |
| Greece | 17.26 | 15.25 | 14.01 | 13.32 | 13.33 | 14.48 |
| Hungary | 1.88 | 2.26 | 2.08 | 2.19 | 2.50 | 2.50 |
| Ireland | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Italy | 103.11 | 107.18 | 96.78 | 92.67 | 100.90 | : |
| Latvia | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Lithuania | 0.54 | 0.49 | 0.57 | 0.55 | 0.57 | 0.60 |

| GEO/TIME | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|
| Luxembourg | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | : |
| Malta | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Netherlands | 1.78 | 1.76 | 1.78 | 1.79 | 1.79 | : |
| Poland | 13.50 | 13.80 | 12.42 | 12.64 | 13.11 | : |
| Portugal | 18.46 | 18.66 | 20.85 | 20.87 | 15.83 | 15.84 |
| Romania | 24.43 | 24.84 | 22.71 | 22.21 | 22.06 | 22.95 |
| Slovakia | 0.51 | 0.57 | 0.68 | 0.60 | 0.59 | : |
| Slovenia | 0.23 | 0.19 | 0.21 | 0.20 | 0.19 | : |
| Spain | 54.75 | 58.13 | 62.72 | 60.85 | 56.12 | 56.06 |
| Sweden | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| United Kingdom | 0.20 | 0.23 | 0.20 | 0.20 | 0.18 | 0.19 |

**Table 4:** EU crop area (1000 ha) for beetroots (2014–2019). Source: Eurostat (V4300; data extracted: 7/7/2019)

| GEO/TIME | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|
| European Union - 28 countries | : | : | 23.38 | 23.51 | : | : |
| Austria | 0.15 | 0.11 | 0.15 | 0.15 | 0.14 | : |
| Belgium | 0.00 | 0.00 | 0.00 | 0.05 | 0.04 | : |
| Bulgaria | 0.00 | 0.15 | 0.11 | 0.10 | 0.04 | 0.00 |
| Croatia | 0.11 | 0.14 | 0.14 | 0.14 | 0.16 | : |
| Cyprus | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | : |
| Czech Republic | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | : |
| Denmark | : | 0.31 | 0.28 | 0.27 | 0.27 | : |
| Estonia | 0.20 | 0.20 | 0.24 | 0.25 | 0.21 | : |
| Finland | 0.43 | 0.42 | 0.43 | 0.42 | 0.46 | : |
| France | 2.88 | 2.87 | 3.03 | 3.12 | 3.1 | : |
| Germany | 1.69 | 1.49 | 1.67 | 1.74 | 1.83 | : |
| Greece | 0.64 | 0.59 | 0.55 | 0.58 | 0.60 | : |
| Hungary | 0.21 | 0.32 | 0.38 | 0.33 | 0.33 | : |
| Ireland | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Italy | : | : | 0.85 | 0.88 | : | : |
| Latvia | 0.40 | 0.40 | 0.40 | 0.20 | 0.30 | : |
| Lithuania | 1.73 | 1.62 | 1.84 | 1.76 | 2.09 | : |
| Luxembourg | : | : | 0.01 | 0.01 | 0.01 | : |
| Malta | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Netherlands | 0.00 | 0.66 | 0.74 | 0.95 | 0.88 | : |
| Poland | 11.30 | 11.30 | 10.24 | 10.37 | 10.55 | : |
| Portugal | 0.15 | 0.20 | 0.17 | 0.14 | 0.22 | : |
| Romania | 0.20 | 0.16 | 0.16 | 0.15 | 0.14 | 0.00 |
| Slovakia | 0.00 | 0.06 | 0.07 | 0.09 | 0.04 | 0.00 |
| Slovenia | : | 0.12 | 0.17 | 0.16 | 0.16 | : |
| Spain | : | 1.00 | 1.31 | 1.13 | 1.16 | : |
| Sweden | 0.46 | 0.42 | 0.44 | 0.5 | 0.49 | : |
| United Kingdom | 2.00 | 1.70 | 0.00 | 0.00 | 0.00 | : |

#### 3.4.3.2 Climatic conditions affecting establishment

Although *S. eridania* can be widely distributed in the Americas (Figure 1), USA populations at latitudes higher than North Carolina are considered vagrant, which reduces the number of Köppen–Geiger temperate climate zones where this herbivore is permanently established (Figure 3). Hence, *S. eridania* is mostly established in areas of the Americas and the Gulf of Guinea where tropical or

some sub-tropical Köppen–Geiger climate types occur (Figures 3 and 4). As a consequence, the establishment of *S. eridania* in areas with a climate type matching EU is quite limited and may be restricted to Cfa (warm temperate climate, fully humid, hot summer), which represents 6.31% of EU area in Bulgaria, France, Italy, Romania, and Spain (MacLeod and Korycinska, 2019). Whether *S. eridania* could establish under protected cultivation at higher latitudes in the EU remains unknown but is considered likely by EPPO (Smith et al., 1997).

Mitchell and Tumlinson (1994) note that *S. eridania* cannot survive extended periods of freezing temperatures. The EFSA PLH Panel (2019) provides a map of the mean number of annual frost days in Europe, 1988-2017. It shows that southern coastal areas of Portugal, Spain, France, Italy, Greece and Cyprus normally remain frost free year round.

We assume that climatic conditions in the EU will not limit the ability of *S. eridania* to establish.

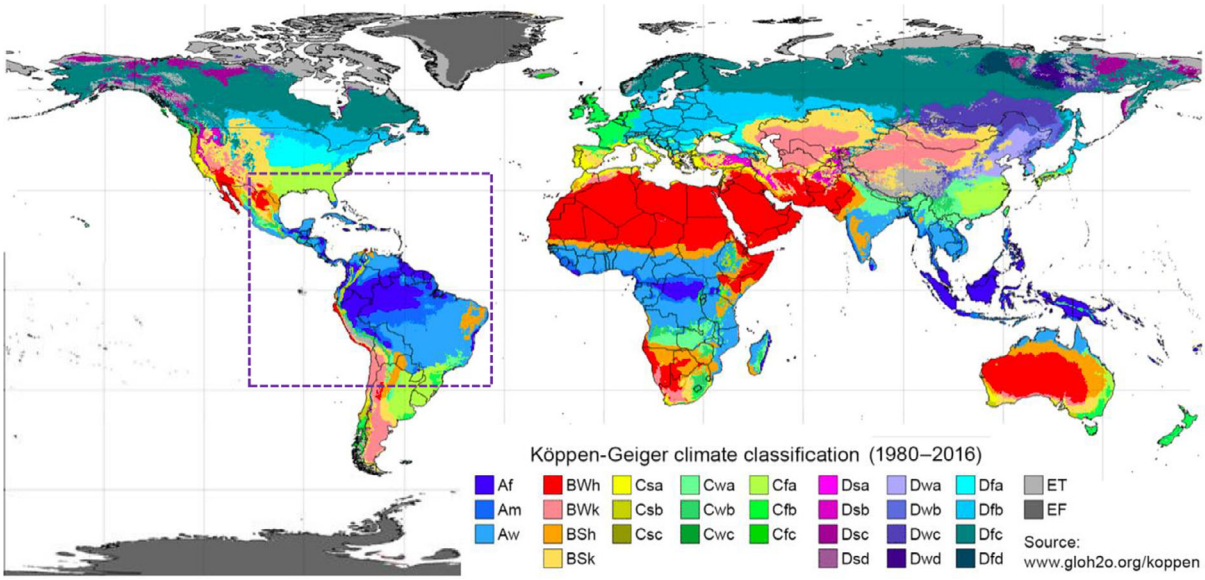


**Figure 3:** Köppen–Gieger climate type zones (Beck et al., 2019). In the Americas, *S. eridania* is established year round in tropical areas (within dotted rectangle, climates Af, Am, Aw), which do not occur in the EU (MacLeod and Korycinska, 2019)

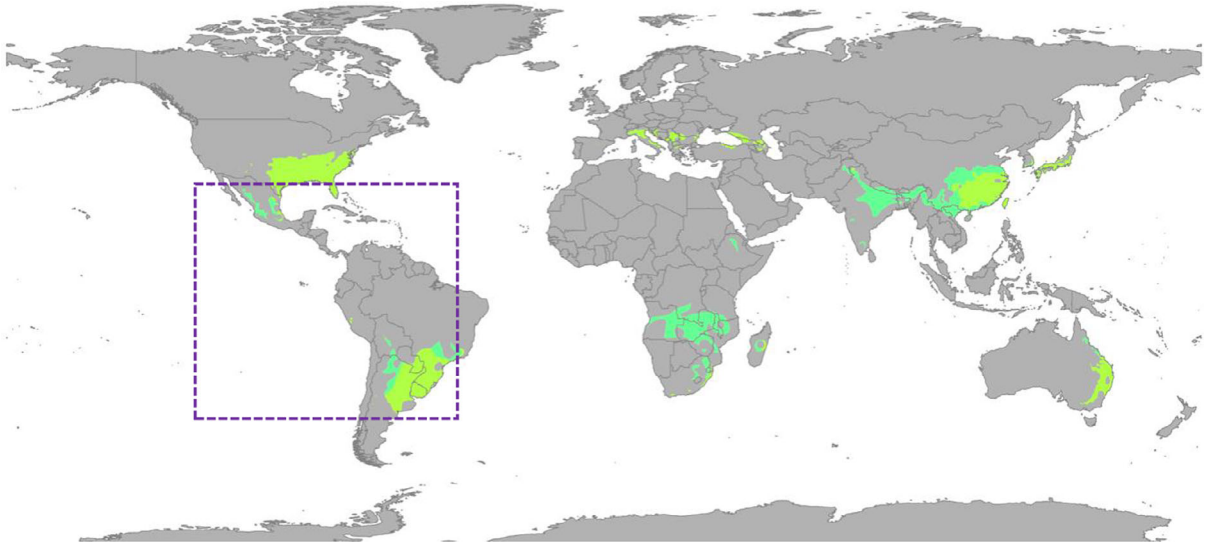

**Figure 4:** World occurrence of Köppen–Geiger climate types Cfa (humid subtropical, lighter green) and Cwa (dry winter, humid sub-tropical, blueish green) (Beck et al., 2019). In the Americas, *S. eridania* occurs (dotted rectangle) in areas with temperate Cfa climate type, which can be found in southern EU (6.31% of EU area, MacLeod and Korycinska, 2019)

### 3.4.4. Spread

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

**Yes**, adults can fly. However, *S. eridania* seems not to engage in long-distance migrations.

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

**No**, spread is not mainly via plants for planting. Adults are strong fliers. Human-assisted dispersal could play a major role in spread.

According to CABI (2018), in the Americas, *S. eridania* does not engage in long-distance migrations. Human-assisted dispersal is suspected for long distance movement as in the case of the colonisation of the Galápagos Islands (Ecuador) and is the likely cause of spread into Africa.

## 3.5. Impacts

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

**Yes**, the introduction of *S. eridania* would most probably have an economic impact in the EU through qualitative and quantitative effects on agricultural production.

*RNQPs: Does the presence of the pest on plants for planting have an economic impact, as regards the intended use of those plants for planting?*[5]

**Yes**, should *S. eridania* be present on plants for planting, an economic impact on their intended use would be expected.

*Spodoptera eridania* is usually only a minor pest on most crops in the New World (CABI, 2018). Since most damage is caused by leaf-eating, light infestations on field crops can be tolerated. However, locally, e.g. tomatoes and sweet potatoes in Florida, it can cause considerable economic damage (Mitchell and Tumlinson, 1994). In addition, other commercial vegetable and flower crops can be seriously affected. *S. eridania* has demonstrated a propensity to broaden its host range and include sunflower, often defoliating plants to a degree that yields are greatly reduced (Mitchell, 1984). Moreover, according to CDFA (2016), larvae of *S. eridania* may disfigure nursery stock with feeding damage and pupate in the associated soil, reducing the value of nursery stock and also of urban and backyard ornamental plants.

## 3.6. Availability and limits of mitigation measures

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

**Yes**, the existing measures (see Sections 3.3 and 3.4.2) can mitigate the risks of entry, establishment, and spread within the EU. As a pest listed in Annex IAI, its introduction and spread in the EU is banned irrespective of what it may be found on.

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

**Yes**, sourcing plants and plant parts from Pest Free Areas (PFA) would mitigate the risk.

### 3.6.1. Identification of additional measures

Phytosanitary measures are currently applied to soil. Some host plants are listed in the import prohibitions of Annex III or in specific requirements in Annex IV of Council Directive 2000/29/EC. Although, as a pest included in Annex IAI, its introduction and spread in the EU is banned, many potential hosts are not explicitly listed in this directive and therefore, not explicitly regulated (see Sections 3.3 and 3.4.2).

#### 3.6.1.1. Additional control measures

Potential additional control measures are listed in Table 5.

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

**Table 5:** Selected control measures (a full list is available in EFSA PLH Panel, 2018) for pest entry/establishment/spread/impact in relation to currently unregulated hosts and pathways. Control measures are measures that have a direct effect on pest abundance

| Information sheet title (with hyperlink to information sheet if available) | Control measure summary | Risk component (entry/ establishment/ spread/impact) |
|---|---|---|
| **Growing plants in isolation** | Description of possible exclusion conditions that could be implemented to isolate the crop from pests and if applicable relevant vectors. E.g. a dedicated structure such as glass or plastic greenhouses.<br>According to CABI (2018), plants used for production should come from locations found free from the pest during the previous 3 months | Entry, spread, impact |
| **Chemical treatments on consignments or during processing** | Use of chemical compounds that may be applied to plants or to plant products after harvest, during process or packaging operations and storage.<br>The treatments addressed in this information sheet are:<br>a) fumigation; b) spraying/dipping pesticides; c) surface disinfectants; d) process additives; e) protective compounds.<br>Plant cuttings of certain host plants may be treated by being held at low temperatures (< 1.7°C) for 2–4 days, followed by fumigation (CABI, 2018) | Entry, spread, impact |
| **Cleaning and disinfection of facilities, tools and machinery** | The physical and chemical cleaning and disinfection of facilities, tools, machinery, transport means, facilities and other accessories (e.g. boxes, pots, pallets, palox, supports, hand tools). The measures addressed in this information sheet are: washing, sweeping and fumigation | Entry, spread, impact |
| **Soil treatment** | The control of soil organisms by chemical and physical methods listed below:<br>a) fumigation; b) heating; c) solarisation; d) flooding; e) soil suppression; f) augmentative biological control; g) biofumigation<br>As a pest which passes part of its life cycle in the soil, these measures could impact its populations | Impact |
| **Physical treatments on consignments or during processing** | This information sheet deals with the following categories of physical treatments: irradiation/ionisation; mechanical cleaning (brushing, washing); sorting and grading, and; removal of plant parts (e.g. debarking wood). This information sheet does not address: heat and cold treatment (information sheet 1.14); roguing and pruning (information sheet 1.12) | Entry, spread, impact |
| **Controlled atmosphere** | Treatment of plants by storage in a modified atmosphere (including modified humidity, $O_2$, $CO_2$, temperature, pressure) | Entry, spread, impact |
| **Waste management** | Treatment of the waste (deep burial, composting, incineration, chipping, production of bioenergy, etc.) in authorised facilities and official restriction on the movement of waste | Entry, spread, impact |
| **Conditions of transport** | Specific requirements for mode and timing of transport of commodities to prevent escape of the pest and/or contamination. a) physical protection of consignment; b) timing of transport/trade | Entry, spread, impact |
| **Chemical treatments on crops including reproductive material** | – | Entry, spread, impact |
| **Use of resistant and tolerant plant species/varieties** | Resistant plants are used to restrict the growth and development of a specified pest and/or the damage they cause when compared to susceptible plant varieties under similar environmental conditions and pest pressure. It is important to distinguish resistant from tolerant species/varieties. Some soybean genotypes exhibit resistance to *S. eridania* (Souza et al., 2014) | Spread, impact |

| Information sheet title (with hyperlink to information sheet if available) | Control measure summary | Risk component (entry/ establishment/ spread/impact) |
|---|---|---|
| **Biological control and behavioural manipulation** | Other pest control techniques not covered by 1.03 and 1.13. Biological control (macro- and micro-BC (e.g. *B. thuringiensis*, endosymbionts) widely covered in different references, e.g. CABI, 2018) | Spread, impact |
| **Post-entry quarantine and other restrictions of movement in the importing country** | This information sheet covers post-entry quarantine of relevant commodities; temporal, spatial and end-use restrictions in the importing country for import of relevant commodities; Prohibition of import of relevant commodities into the domestic country. Relevant commodities are plants, plant parts and other materials that may carry pests, either as infection, infestation or contamination | Entry |

### 3.6.1.2. Additional supporting measures

Potential additional supporting measures are listed in Table 6.

**Table 6:** Selected supporting measures (a full list is available in EFSA PLH Panel, 2018) in relation to currently unregulated hosts and pathways. Supporting measures are organisational measures or procedures supporting the choice of appropriate risk reduction options that do not directly affect pest abundance.

| Information sheet title (with hyperlink to information sheet if available) | Supporting measure summary | Risk component (entry/ establishment/ spread/impact) |
|---|---|---|
| **Inspection and trapping** | Inspection is defined as the official visual examination of plants, plant products or other regulated articles to determine if pests are present or to determine compliance with phytosanitary regulations (ISPM 5). The effectiveness of sampling and subsequent inspection to detect pests may be enhanced by including trapping and luring techniques | Entry, spread, impact |
| **Laboratory testing** | Examination, other than visual, to determine if pests are present using official diagnostic protocols. Diagnostic protocols describe the minimum requirements for reliable diagnosis of regulated pests | Entry, impact |
| **Certified and approved premises** | Mandatory/voluntary certification/approval of premises is a process including a set of procedures and of actions implemented by producers, conditioners and traders contributing to ensure the phytosanitary compliance of consignments. It can be a part of a larger system maintained by a National Plant Protection Organization in order to guarantee the fulfilment of plant health requirements of plants and plant products intended for trade. Key property of certified or approved premises is the traceability of activities and tasks (and their components) inherent the pursued phytosanitary objective. Traceability aims to provide access to all trustful pieces of information that may help to prove the compliance of consignments with phytosanitary requirements of importing countries | Entry, spread, impact |
| **Delimitation of Buffer zones** | ISPM 5 defines a buffer zone as 'an area surrounding or adjacent to an area officially delimited for phytosanitary purposes in order to minimize the probability of spread of the target pest into or out of the delimited area, and subject to phytosanitary or other control measures, if appropriate' (ISPM 5). The objectives for delimiting a buffer zone can be to prevent spread from the outbreak area and to maintain a pest free production place, site or area | Entry, establishment, spread, impact |

| Information sheet title (with hyperlink to information sheet if available) | Supporting measure summary | Risk component (entry/ establishment/ spread/impact) |
|---|---|---|
| **Sampling** | According to ISPM 31, it is usually not feasible to inspect entire consignments, so phytosanitary inspection is performed mainly on samples obtained from a consignment. It is noted that the sampling concepts presented in this standard may also apply to other phytosanitary procedures, notably selection of units for testing.<br>For inspection, testing and/or surveillance purposes the sample may be taken according to a statistically based or a non-statistical sampling methodology | Entry, establishment, spread, impact |
| **Phytosanitary certificate and plant passport** | An official paper document or its official electronic equivalent, consistent with the model certificates of the IPPC, attesting that a consignment meets phytosanitary import requirements (ISPM 5)<br>a) export certificate (import)<br>b) plant passport (EU internal trade) | Entry, spread, impact |
| **Certification of reproductive material (voluntary/ official)** | – | Entry, spread, impact |
| **Surveillance** | – | Entry, spread, impact |

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

- Eggs and young larvae, especially if prevalence is low, may remain undetected.
- The extreme polyphagy of this species means that existing lists of host plants may not be comprehensive.

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

- High mobility of the insect that may disperse on many host plants for planting.

### 3.7. Uncertainty

By its very nature of a categorisation being a rapid process, uncertainty is rated high. However, the uncertainties in this case are insufficient to affect the conclusions of the categorisation.

## 4. Conclusions

*S. eridania* satisfies the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest. *S. eridania* does not meet the criteria of occurring in the EU nor plants for planting being the principal means of spread for it to be regarded as a potential Union RNQP (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 pests (Section 3.1)** | The identity of *S. eridania* is established and taxonomic keys are available for its identification to species level. | The identity of *S. eridania* is established and taxonomic keys are available for its identification to species level. | |

| 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 |
|---|---|---|---|
| **Absence/presence of the pest in the EU territory (Section 3.2)** | *S. eridania* is not known to be present in the EU. | *S. eridania* is not known to be present in the EU. Therefore, it does not fulfil this criterion to be regulated as a regulated non-quarantine pest (RNQP). | |
| **Regulatory status (Section 3.3)** | The pest is currently listed in Annex IAI of 2000/29 EC. | There are no grounds to consider its status as a quarantine pest is to be revoked. | |
| **Pest potential for entry, establishment and spread in the EU territory (Section 3.4)** | The pest could enter into, become established in, and spread within, the EU territory. The main pathways are:<br>• Plants for planting (excluding seeds)<br>• Cut branches<br>• Cut flowers<br>• Fruit<br>Imported from infested areas | Although adults can fly, natural spread is not considered its main dispersal mode but human-assisted transport. | Pathway volumes unknown |
| **Potential for consequences in the EU territory (Section 3.5)** | The pests' introduction would most probably have an economic impact in the EU. | Should *S. eridania* be present on plants for planting, an economic impact on its intended use would be expected. | |
| **Available measures (Section 3.6)** | There are measures available to prevent the entry into, establishment within or spread of the pest within the EU (i.e. sourcing plants from PFA). | There are measures available to prevent pest presence on plants for planting (i.e. sourcing plants from PFA, Pest Free Place of Production (PFPP)). | |
| **Conclusion on pest categorisation (Section 4)** | All criteria assessed by EFSA above for consideration as a potential quarantine pest are met with no uncertainties. | The criterion of the pest being present in the EU territory, which is a pre-requisite for consideration as a potential regulated non-quarantine, is not met. The criterion of plants for planting being the main means of spread is not met either. | |
| **Aspects of assessment to focus on/scenarios to address in future if appropriate** | | | |

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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, 1995, 2017) |
| Control (of a pest) | Suppression, containment or eradication of a pest population (FAO, 1995, 2017) |
| Entry (of a pest) | Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled (FAO, 2017) |
| Eradication (of a pest) | Application of phytosanitary measures to eliminate a pest from an area (FAO, 2017) |
| Establishment (of a pest) | Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO, 2017) |
| Impact (of a pest) | The impact of the pest on the crop output and quality and on the environment in the occupied spatial units |
| Introduction (of a pest) | The entry of a pest resulting in its establishment (FAO, 2017) |
| Measures | Control (of a pest) is defined in ISPM 5 (FAO 2017) as 'Suppression, containment or eradication of a pest population' (FAO, 1995).<br>Control measures are measures that have a direct effect on pest abundance.<br>Supporting measures are organisational measures or procedures supporting the choice of appropriate Risk Reduction Options that do not directly affect pest abundance. |
| Pathway | Any means that allows the entry or spread of a pest (FAO, 2017) |
| 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, 2017) |
| Protected zones (PZ) | A Protected zone is an area recognised at EU level to be free from a harmful organism, which is established in one or more other parts of the Union. |
| Quarantine pest | A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (FAO, 2017) |
| Regulated non-quarantine pest | A non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party (FAO, 2017) |
| Risk reduction option (RRO) | A measure acting on pest introduction and/or pest spread and/or the magnitude of the biological impact of the pest should the pest be 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, 2017) |

## 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 |
| PFA | Pest Free Areas |
| PFPP | Pest Free Place of Production |
| PLH | EFSA Panel on Plant Health |
| PZ | Protected Zone |
| TFEU | Treaty on the Functioning of the European Union |
| ToR | Terms of Reference |

# Appendix A – List of natural host plants of *Spodoptera eridania* larvae recorded in several bibliographic sources and gathered in Montezano et al., 2014

| No | Plant family | Plant name | Common name |
|---|---|---|---|
| 1 | Acanthaceae | *Odontonema strictum* | |
| 2 | Acanthaceae | *Sanchezia speciosa* | |
| 3 | Acanthaceae | *Teliostachya alopecuroidea* | |
| 4 | Amaranthaceae | *Achyranthes aspera* | Devil's horsewhip |
| 5 | Amaranthaceae | *Amaranthus deflexus* | Red-root amaranth |
| 6 | Amaranthaceae | *Amaranthus hibridus* | Slim amaranth |
| 7 | Amaranthaceae | *Amaranthus quitensis* | |
| 8 | Amaranthaceae | *Amaranthus retroflexus* | Rough pigweed |
| 9 | Amaranthaceae | *Amaranthus spinosus* | Spiny amaranth |
| 10 | Amaranthaceae | *Amaranthus viridis* | |
| 11 | Amaranthaceae | *Celosia cristata* | Cockscomb |
| 12 | Amaranthaceae | *Spinacia oleracea* | Spinach |
| 13 | Anacardiaceae | *Schinus terebentifolium Raddi* | Brazilian peppertree |
| 14 | Apiaceae | *Apium graveolens* | Celery |
| 15 | Apiaceae | *Daucus carota* | Carrot |
| 16 | Apiaceae | *Hydrocotyle ranunculoides* | Water pennywort |
| 17 | Apocynaceae | *Nerium oleander* | Oleander |
| 18 | Araceae | *Xanthosoma* | |
| 19 | Araliaceae | *Didymopanax morototoni* | |
| 20 | Asteraceae | *Artemisia absinthium* | Absinthium |
| 21 | Asteraceae | *Baccharis trimera* | Carqueja |
| 22 | Asteraceae | *Bidens pilosa* | Hairy beggarticks |
| 23 | Asteraceae | *Chrysanthemum morifolium* | Ramat Chrysanthemum |
| 24 | Asteraceae | *Clibadium erosum* | |
| 25 | Asteraceae | *Conyza bonariensis* | Weed |
| 26 | Asteraceae | *Conyza canadensis* | Hogweed |
| 27 | Asteraceae | *Eclipta prostrata* | Eclipta |
| 28 | Asteraceae | *Erechtites valerianaefolia* | Brazilian fireweed |
| 29 | Asteraceae | *Gerbera jamesonii* | Gerbera daisy |
| 30 | Asteraceae | *Helianthus* sp. | |
| 31 | Asteraceae | *Helianthus annuus* | Sunflower |
| 32 | Asteraceae | *Lactuca sativa* | Lattuce |
| 33 | Asteraceae | *Mikania cordifolia* | Willdenow Guaco |
| 34 | Asteraceae | *Neurolaena lobata* | Cassini |
| 35 | Asteraceae | *Pseudoelephantopus spicatus* | Weed |
| 36 | Asteraceae | *Sonchus* sp. | |
| 37 | Asteraceae | *Sonchus oleraceus* | Common sowthistle |
| 38 | Asteraceae | *Taraxacum officinale* | Blowball |
| 39 | Asteraceae | *Vernonia tweedieana* | Ironweed |
| 40 | Balsaminaceae | *Impatiens sultani* | Balsamine |
| 41 | Balsaminaceae | *Impatiens wallerana* | |
| 42 | Begoniaceae | *Begonia rex* | Begonia |
| 43 | Brassicaceae | *Coronopus didymus* | Lesser swinecress |
| 44 | Brassicaceae | *Brassica napus* var. *oleifera* | Colza |
| 45 | Brassicaceae | *Brassica nigra* | Black mustard |
| 46 | Brassicaceae | *Brassica oleracea* var. *capitata* | Cabbage |

| No | Plant family | Plant name | Common name |
|---|---|---|---|
| 47 | Brassicaceae | *Brassica oleracea* var. *viridis* | Collard |
| 48 | Brassicaceae | *Eruca sativa* | Garden rocket |
| 49 | Brassicaceae | *Nasturium officinale* | Brown Watercress |
| 50 | Campanulaceae | *Lobelia portoricensis* | |
| 51 | Caprifoliaceae | *Lonicera japonica* | Japanese honeysuckle |
| 52 | Caricaceae | *Carica papaya* | Papaya |
| 53 | Caryophyllaceae | *Dianthus caryophillus* | Carnation |
| 54 | Cecropiaceae | *Cecropia peltata* | Trumpet tree |
| 55 | Chenopodiaceae | *Beta vulgaris* | Beet |
| 56 | Chenopodiaceae | *Beta vulgaris* var. *vulgaris* | Sugar beet |
| 57 | Chenopodiaceae | *Beta vulgaris* var. *cicla* | Swiss chard |
| 58 | Chenopodiaceae | *Chenopodium quinoa* | Quinoa |
| 59 | Commelinaceae | *Commelina diffusa* | |
| 60 | Commelinaceae | *Tripogandra serrula* | |
| 61 | Convolvulaceae | *Calonyctium speciosum* | Good night |
| 62 | Convolvulaceae | *Ipomoea batatas* | Sweet potato |
| 63 | Convolvulaceae | *Ipomoea grandiflora* | Moonflowe |
| 64 | Convolvulaceae | *Ipomea purpurea* | Handbell |
| 65 | Convolvulaceae | *Ipomea tiliacea* | |
| 66 | Cucurbitaceae | *Cayaponia americana* | |
| 67 | Cucurbitaceae | *Cayaponia racemosa* | |
| 68 | Cucurbitaceae | *Cucumis melo* | Melon |
| 69 | Cucurbitaceae | *Cucumis sativus* | Cucumber |
| 70 | Cucurbitaceae | *Cucurbita maxima* | Squash |
| 71 | Cucurbitaceae | *Citrullus lanatus* var. *lanatus* | Watermelon |
| 72 | Cucurbitaceae | *Sechium edule* | Chayote |
| 73 | Dioscoreaceae | *Dioscorea polygonoides* | Dioscorea |
| 74 | Dioscoreaceae | *Rajania cordata* | |
| 75 | Ericaceae | *Vaccinium macrocarpum* | Cranberry |
| 76 | Escrofulariaceae | *Antirrhinum majus* | Snapdragons |
| 77 | Euphorbiaceae | *Aleurites fordii* | Tung tree |
| 78 | Euphorbiaceae | *Manihot esculenta* | Cassava |
| 79 | Euphorbiaceae | *Ricinus communis* | Castor bean |
| 80 | Euphorbiaceae | *Sapium jamaicense* | |
| 81 | Fabaceae | *Arachis hypogaea* | Peanuts |
| 82 | Fabaceae | *Centrosema pubescens* | Spurred butterfly pea |
| 83 | Fabaceae | *Cicer arietinum* | Chick pea |
| 84 | Fabaceae | *Crotalaria breviflora* | Shortflower rattlebox |
| 85 | Fabaceae | *Crotalaria spectabilis* | Showy rattlebox |
| 86 | Fabaceae | *Desmodium adscendens* | Tick clover |
| 87 | Fabaceae | *Glycine max* | Soybean |
| 88 | Fabaceae | *Leucaena leucocephala* | |
| 89 | Fabaceae | *Medicago sativa* | Alfalfa |
| 90 | Fabaceae | *Mimosa pudica* | Sensitive plant |
| 91 | Fabaceae | *Mimosa scabrella* | Bracatinga |
| 92 | Fabaceae | *Mucuna pruriens* var. *utillis* | Velvet bean |
| 93 | Fabaceae | *Phaseolus lunatus* | Lima bean |
| 94 | Fabaceae | *Phaseolus polystachios* | Thicket bean |
| 95 | Fabaceae | *Phaseolus vulgaris* | beans |
| 96 | Fabaceae | *Pisum sativum* | peas |

| No | Plant family | Plant name | Common name |
|---|---|---|---|
| 97 | Fabaceae | *Trifolium* sp. | Clovers |
| 98 | Fabaceae | *Vicia faba* | Faba bean |
| 99 | Fabaceae | *Vignum unguiculata* | Cowpea |
| 100 | Geraniaceae | *Geranium* sp. | Geranium |
| 101 | Geraniaceae | *Pelargonium hortorum* | Geranium |
| 102 | Lamiaceae | *Lavandula angustifolia* | True lavender |
| 103 | Lamiaceae | *Melissa officinalis* | Common balm |
| 104 | Lamiaceae | *Mentha arvensis* var. *piperacens* | |
| 105 | Lamiaceae | *Mentha piperita* | |
| 106 | Lamiaceae | *Mentha spicata* | Garden mint |
| 107 | Lamiaceae | *Mentha* sp. | Peppermint |
| 108 | Lauraceae | *Ocotea* sp. | |
| 109 | Lauraceae | *Persea americana* | Avocado |
| 110 | Liliaceae | *Allium cepa* | Onion |
| 111 | Liliaceae | *Allium fistulosum* | Green Onion |
| 112 | Liliaceae | *Allium sativum* | Garlic |
| 113 | Liliaceae | *Asparagus officinalis* | Asparagus |
| 114 | Linaceae | *Linum usitatissimum* | Flax |
| 115 | Litraceae | *Lagerstroemia indica* | Crape myrtle |
| 116 | Lomariopsidaceae | *Elaphoglossum* sp. | |
| 117 | Malvaceae | *Abelmoschus esculentus* | Okra |
| 118 | Malvaceae | *Althaea rosea* | Hollyhock |
| 119 | Malvaceae | *Gossypium herbacium* | Cotton |
| 120 | Malvaceae | *Hibiscus cannabinus* | Brown Indianhemp |
| 121 | Malvaceae | *Hibiscus rosa–sinensis* | |
| 122 | Malvaceae | *Malva parviflora* | Mallow |
| 123 | Malvaceae | *Pavonia fruticosa* | |
| 124 | Malvaceae | *Sida rhombifolia* | Arrow–leaf sida |
| 125 | Melastomataceae | *Heterotrichum cymosum* | |
| 126 | Moraceae | *Morus alba* | Mulberry |
| 127 | Myrtaceae | *Eucalyptus* sp. | Eucalyptus |
| 128 | Myrtaceae | *Psidium guajava* | Apple guava |
| 129 | Ochnaceae | *Sauvagesia erecta* | |
| 130 | Onagraceae | *Ludwigia* sp. | |
| 131 | Papaveraceae | *Sanguinaria canadensis* | Bloodroot |
| 132 | Passifloraceae | *Passiflora edulis* | Passion–flower |
| 133 | Passifloraceae | *Passiflora sexflora* | |
| 134 | Phyllanthaceae | *Phyllanthus urinaria* | Chamber bitter |
| 135 | Phytolaccaceae | *Phytolacca americana* | |
| 136 | Phytolaccaceae | *Phytolacca decandra* | |
| 137 | Phytolaccaceae | *Phytolacca dioica* | |
| 138 | Phytolaccaceae | *Phytolacca rigida* | Pokeweed |
| 139 | Phytolaccaceae | *Phytolacca rivinoides* | |
| 140 | Phytolaccaceae | *Phytolacca thyrsiflora* | Pokeweed |
| 141 | Piperaceae | *Lepianthes umbellatum* | Rafinesque |
| 142 | Plantaginaceae | *Plantago major* | Common plantain |
| 143 | Poaceae | *Cynodon nlemfuensis* | African Bermudagrass |
| 144 | Poaceae | *Digitaria ischaemum* | Small crabgrass |
| 145 | Poaceae | *Digitaria sanguinalis* | Large crabgrass |
| 146 | Poaceae | *Ichnanthus pallens* | |

| No | Plant family | Plant name | Common name |
|---|---|---|---|
| 147 | Poaceae | *Lolium perene* | Ryegrass |
| 148 | Poaceae | *Melinis minutiflora* | Molassesgrass |
| 149 | Poaceae | *Oryza sativa* | Rice |
| 150 | Poaceae | *Pennisetum purpureum* | Elephant grass |
| 151 | Poaceae | *Stenopaphrum secundatum* | Buffalo grass |
| 152 | Poaceae | *Zea mays* | Corn |
| 153 | Polygonaceae | *Persicaria hydropiperoides* | Small False water–pepper |
| 154 | Polygonaceae | *Polygonium* sp. | Polygonium |
| 155 | Polygonaceae | *Polygonium segetum* | Field Smartweed |
| 156 | Polygonaceae | *Rheum rhabarbarum* | Rhubarb |
| 157 | Polygonaceae | *Rumex* sp. | Rumex |
| 158 | Polygonaceae | *Rumex crispus* | Curly dock |
| 159 | Polygonaceae | *Rumex obtusifolius* | Broad Leaved Dock |
| 160 | Portulacaceae | *Portulaca oleracea* | Purslane |
| 161 | Portulacaceae | *Portulaca grandiflora* | Portulaca |
| 162 | Rosaceae | *Fragaria vesca* | Strawberry |
| 163 | Rosaceae | *Malus domestica* | Apple |
| 164 | Rosaceae | *Pyrus communis* | Common pear |
| 165 | Rosaceae | *Rosa* spp. | Rose |
| 166 | Rosaceae | *Rubus idaeus* | Rasberry |
| 167 | Rosaceae | *Rubus rosifolius* | Mauritius rasberry |
| 168 | Rubiaceae | *Coffea arabica* | Coffee |
| 169 | Rubiaceae | *Diodia ocimifolia* | Weed |
| 170 | Rubiaceae | *Gonzalagunia spictata* | |
| 171 | Rubiaceae | *Hamelia ptlens* | |
| 172 | Rubiaceae | *Pentas* sp. | Pentas |
| 173 | Rubiaceae | *Psycotria berteriana* | |
| 174 | Rubiaceae | *Spermacoce ocymifolia* | Slender Buttonweed |
| 175 | Rutaceae | *Citrus* sp. | Citrus trees |
| 176 | Rutaceae | *Citrus limon* | Lemon tree |
| 177 | Rutaceae | *Citrus grandis* | Grapefruit |
| 178 | Rutaceae | *Citrus sinensis* | Orange |
| 179 | Salicaceae | *Salix* sp. | Willow |
| 180 | Scrophulariaceae | *Bacopa stricta* | |
| 181 | Solanaceae | *Capsicum annuum* | Pepper |
| 182 | Solanaceae | *Cestrum macrophyllum* | Gala'n del monte |
| 183 | Solanaceae | *Lycopersicum esculentum* | Tomato |
| 184 | Solanaceae | *Nicotiana alata* | Jasmine tobacco |
| 185 | Solanaceae | *Nicotiana tabacum* | Tobacco |
| 186 | Solanaceae | *Solanum acerosum* | Arrebenta–cavalo |
| 187 | Solanaceae | *Solanum americanum* | American nightshade |
| 188 | Solanaceae | *Solanum andigenum* | Andigena |
| 189 | Solanaceae | *Solanum jamaicense* | Jamaica nightshade |
| 190 | Solanaceae | *Solanum melongena* | Eggplant |
| 191 | Solanaceae | *Solanum peruvianum* | Peruvian nightshade |
| 192 | Solanaceae | *Solanum rugosum* | Tabacon aspero |
| 193 | Solanaceae | *Solanum torvum* | Turkey Berry |
| 194 | Solanaceae | *Solanum tuberosum* | Potato |
| 195 | Teaceae | *Camelia japonica* | Camellia |
| 196 | Urticaceae | *Laportea aestuans* | West Indian woodnettle |

| No | Plant family | Plant name | Common name |
|---|---|---|---|
| 197 | Urticaceae | *Urera bacifera* | Scratchbush |
| 198 | Verbenaceae | *Citharexylum fruticosum* | Fiddlewood |
| 199 | Violaceae | *Viola tricolor* | Pansy |
| 200 | Vitaceae | *Vitis labrusca* | Fox grape |
| 201 | Vitaceae | *Vitis vinifera* | Wine grape |
| 202 | Zingiberaceae | *Alpinia purpurata* | Red ginger |