Pest categorisation of *Anthonomus grandis*

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Abstract

The European Commission requested EFSA to conduct a pest categorisation of *Anthonomus grandis* (Coleoptera: Curculionidae), an oligophagous pest weevil feeding on Malvaceae, including *Gossypium* spp., *Hampea* spp., *Cienfuegosia* spp. and *Hibiscus pernambucensis*. Marginal reproduction has also been observed on the ornamental *Hibiscus syriacus*. *A. grandis* is a taxonomic entity with reliable methods available for identification. It is regulated in the EU by Council Directive 2000/29/EC where it is listed in Annex IIB as a harmful organism whose introduction into EU Protected Zones (PZ) (Greece and the Spanish Communities of Andalusia, Catalonia, Extremadura, Murcia and Valencia) is regulated. *A. grandis* is native to tropical regions of Mesoamerica and has spread to other cotton-growing areas in the Americas, from the USA to Argentina, causing significant damage to this crop. An eradication programme is in progress in the USA and has been successful in 16 previously infested states. In the EU, phytosanitary measures are in place in order to limit entry via traded commodities. Cotton seeds and fruit, as well as unginned cotton are currently regulated for the PZ but remain a potential pathway. Furthermore, ornamental Malvaceae (e.g. *Hibiscus* spp.) originating in infested areas may provide additional pathways. The EFSA Plant Health Panel concludes that *A. grandis* could establish and spread in the cotton-growing areas of southern EU. Considering the criteria within the remit of EFSA to assess the status as a potential Union quarantine pest (QP), as a potential protected zone quarantine pest (PZQP), or as a potential regulated non-quarantine pest (RNQP), *A. grandis* satisfies with no uncertainties the criteria to be regarded as a Union QP. However, it does not meet the criterion of occurrence in the EU territory (for PZQP) plus that of plants for planting being the principal means of spread (for RNQP).

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1. Introduction

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

1.1.1. Background

Council Directive 2000/29/EC\(^1\) on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community establishes the present European Union plant health regime. The Directive lays down the phytosanitary provisions and the control checks to be carried out at the place of origin on plants and plant products destined for the Union or to be moved within the Union. In the Directive’s 2000/29/EC annexes, the list of harmful organisms (pests) whose introduction into or spread within the Union is prohibited, is detailed together with specific requirements for import or internal movement.

Following the evaluation of the plant health regime, the new basic plant health law, Regulation (EU) 2016/2031\(^2\) on protective measures against pests of plants, was adopted on 26 October 2016 and will apply from 14 December 2019 onwards, repealing Directive 2000/29/EC. In line with the principles of the above mentioned legislation and the follow-up work of the secondary legislation for the listing of EU regulated pests, EFSA is requested to provide pest categorizations of the harmful organisms included in the annexes of Directive 2000/29/EC, in the cases where recent pest risk assessment/pest categorisation is not available.

1.1.2. Terms of Reference

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

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

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

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

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

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

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

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

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

**Annex IIAI**

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

| Insects, mites and nematodes | Organism                                                                 |
|------------------------------|--------------------------------------------------------------------------|
| Aleurocanthus spp.           | Numonia pyrivorella (Matsumura)                                         |
| Anthonomus bisignifer (Schenkling) | Oligonychus perditus Pritchard and Baker                                 |
| Anthonomus signatus (Say)    | Pissodes spp. (non-EU)                                                  |
| Aschistonyx eppoi Inouye     | Scirtothrips aurantii Faure                                              |
| Carposina niponensis Walsingham | Scirtothrips citri (MoulteX)                                             |
| Enarmonia packardi (Zeller)  | Scytyidae spp. (non-EU)                                                 |
| Enarmonia prunivora Walsh    | Scrobipalopsis solanivora Povolny                                        |
| Grapholita inopinata Heinrich | Tachypterillus quadrigibbus Say                                          |
| Hishomonus phycitis          | Toxoptera citricida Kirk.                                                |
| Leucaspis japonica Clkl.     | Unasps citri Comstock                                                   |
| Listronotus bonariensis (Kuschel) |                                                                     |

(b) Bacteria

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

(c) Fungi

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

(d) Virus and virus-like organisms

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

**Annex IIB**

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

| Insect mites and nematodes | Organism                                                                 |
|---------------------------|--------------------------------------------------------------------------|
| Anthonomus grandis (Boh.) | Ips cembae Heer                                                          |
| Cephalcia lariciphila (Klug) | Ips duplicatus Sahlberg                                                 |
| Dendroctonus micans Kugelan | Ips sexdentatus Börner                                                  |
| Gilphinia hercyniae (Hartig) | Ips typographus Heer                                                    |
| Gonipterus scutellatus Gyll. | Sternochetus mangiferae Fabricius                                       |
| Ips amitinus Eichhof       |                                                                         |
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 I A I

(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

Group of Tephritidae (non-EU) such as:

1) Anastrepha fraterculus (Wiedemann) 12) Pardalaspis cyanescens Bezzi

2) Anastrepha ludens (Loew) 13) Pardalaspis quinaria Bezzi

3) Anastrepha obliqua Macquart 14) Pterandrus rosa (Karsch)

4) Anastrepha suspensa (Loew) 15) Rhacochaena japonica Ito

5) Dacus ciliatus Loew 16) Rhagoletis completa Cresson

6) Dacus curcurbitae Coquillet 17) Rhagoletis fausta (Osten-Sacken)

7) Dacus dorsalis Hendel 18) Rhagoletis indifferens Curran

8) Dacus tryoni (Froggatt) 19) Rhagoletis mendax Curran

9) Dacus tsuneonis Miyake 20) Rhagoletis pomonella Walsh

10) Dacus zonatus Saund.

11) Epochra canadensis (Loew)

(c) Viruses and virus-like organisms

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

1) Andean potato latent virus 4) Potato black ringspot virus

2) Andean potato mottle virus 5) Potato virus T

3) Arracacha virus B, oca strain 6) non-EU isolates of potato viruses A, M, S, V, X and Y (including Yo, Yn and Yc) and Potato leafroll virus

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

1) Blueberry leaf mottle virus 7) Peach X-disease mycoplasm

2) Cherry rasp leaf virus (American) 8) Peach yellows mycoplasm

3) Peach mosaic virus (American) 9) Plum line pattern virus (American)

4) Peach phony rickettsia 10) Raspberry leaf curl virus (American)

5) Peach rosette mosaic virus 11) Strawberry witches’ broom mycoplasm

6) Peach rosette mycoplasm 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 Tsчетвериков  
Diabrotica barberi Smith and Lawrence  
Diabrotica undecimpunctata howardi Barber  
Diabrotica undecimpunctata undecimpunctata Mannerheim  
Diabrotica virgifera zeae Krysan & Smith  
Diaphorina citri Kuway  
Heteropteryx diadema (Boddie)  
Hirschmanniella spp., other than Hirschmanniella gracilis (de Man) Luc and Goodey  
Liriomyza sativae Blanchard

(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

(c) Viruses and virus-like organisms

Tobacco ringspot virus  
Tomato ringspot virus  
Bean golden mosaic virus  
Cowpea mild mottle virus  
Lettuce infectious yellows virus

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(d) Parasitic plants

Arceuthobium spp. (non-EU)

Annex I AII

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

Meloidogyne fallax Karssen

Rhizoecus hibisci Kawai and Takagi

Popillia japonica Newman

(b) Bacteria

Clavibacter michiganensis (Smith) Davis et al. ssp. 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

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

Unusually for a pest that is not present in the EU, A. grandis is specifically regulated in some protected zones (PZ), (Greece and the Spanish Autonomous Communities of Andalusia, Catalonia, Extremadura, Murcia and Valencia). The categorisation will explore whether the pest fulfils the criteria set in Regulation (EU) 2016/2031 regarding union quarantine pests (QPs), RNQP and protected zone quarantine pests (PZQP).

2. Data and methodologies

2.1. Data

2.1.1. Literature search

A literature search on A. grandis 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, from citations within the references and grey literature.

2.1.2. Database search

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

Data about 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 (online).

The Europhyt database was consulted for pest-specific notifications on interceptions and outbreaks. Europhyt is a web-based network launched by the Directorate General for Health and Consumers (DG SANCO), and is a subproject of PHYSAN (Phyto-Sanitary Controls) specifically concerned with plant...
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 *A. grandis*, following guiding principles and steps presented in the EFSA guidance on the harmonised framework for pest risk assessment (EFSA PLH Panel, 2010) and as defined in the International Standard for Phytosanitary Measures No 11 (FAO, 2013) and No 21 (FAO, 2004).

In accordance with the guidance on a harmonised framework for pest risk assessment in the EU (EFSA PLH Panel, 2010), this work was initiated following an evaluation of the EU’s plant health regime. Therefore, to facilitate the decision-making process, in the conclusions of the pest categorisation, the Panel addresses explicitly each criterion for a Union QP and for a Union RNQP in accordance with Regulation (EU) 2016/2031 on protective measures against pests of plants, and includes additional information required as per the specific 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 regulated non-quarantine pest. If one of the criteria is not met, the pest will not qualify. Note that a pest that does not qualify as a QP may still qualify as an RNQP which needs to be addressed in the opinion. For the pests regulated in the protected zones only, the scope of the categorisation is the territory of the protected zone, thus the criteria refer to the protected zone instead of the EU territory.

It should be noted that the Panel’s conclusions are formulated respecting its remit and particularly with regards to the principle of separation between risk assessment and risk management (EFSA founding regulation (EU) No 178/2002); therefore, instead of determining whether the pest is likely to have an unacceptable impact, the Panel will present a summary of the observed pest impacts. Economic impacts are expressed in terms of yield and quality losses and not in monetary terms, while addressing social impacts is outside the remit of the Panel, in agreement with EFSA guidance on a harmonised framework for pest risk assessment (EFSA PLH Panel, 2010).

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

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

| 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). The pest satisfies the IPPC definition of a quarantine pest that is not present in the risk assessment area (i.e. protected zone). | Is the pest regulated as a quarantine pest? If currently regulated as a quarantine pest, are there grounds to consider its status could be revoked? |
| Pest potential for entry, establishment and spread in the EU territory (Section 3.4) | Is the pest able to enter into, become established in, and spread within, the EU territory? If yes, briefly list the pathways! | Is the pest able to enter into, become established in, and spread within, the protected zone areas? Is entry by natural spread from EU areas where the pest is present possible? | Is spread mainly via specific plants for planting, rather than via natural spread or via movement of plant products or other objects? Clearly state if plants for planting is the main pathway! |
| Potential for consequences in the EU territory (Section 3.5) | Would the pests’ introduction have an economic or environmental impact on the EU territory? | Would the pests’ introduction have an economic or environmental impact on the protected zone areas? | Does the presence of the pest on plants for planting have an economic impact, as regards the intended use of those plants for planting? |
| Available measures (Section 3.6) | Are there measures available to prevent the entry into, establishment within or spread of the pest within the EU such that the risk becomes mitigated? | Are there measures available to prevent the entry into, establishment within or spread of the pest within the protected zone areas such that the risk becomes mitigated? Is it possible to eradicate the pest in a restricted area within 24 months (or a period longer than 24 months where the biology of the organism so justifies) after the presence of the pest was confirmed in the protected zone? | Are there measures available to prevent pest presence on plants for planting such that the risk becomes mitigated? |
| Conclusion of pest categorisation (Section 4) | A statement as to whether (1) all criteria assessed by EFSA above for consideration as a potential quarantine pest were met and (2) if not, which one(s) were not met. | A statement as to whether (1) all criteria assessed by EFSA above for consideration as potential protected zone quarantine pest were met, and (2) if not, which one(s) were not met. | A statement as to whether (1) all criteria assessed by EFSA above for consideration as a potential regulated non-quarantine pest were met, and (2) if not, which one(s) were not met. |

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

3.1. **Identity and biology of the pest**

3.1.1. **Identity and taxonomy**

**Anthonomus grandis** (Coleoptera: Curculionidae) was described by Boheman in 1843 (Boheman, 1843) and is considered the valid name for this species (ITIS, 2017), which is also known as Mexican cotton boll weevil in English, picudo del algodón in Spanish, bicudo-do-algodoeiro in Portuguese and charancón americain du cotonnier in French. This species had been traditionally segregated into three subspecies based on adult morphological and behavioural characteristics (Burke et al., 1986) (see Section 3.1.3). Species-specific taxonomic keys for the different stages of this weevil are available (see Section 3.1.4).

3.1.2. **Biology of the pest**

In the USA, *A. grandis* adults usually migrate from cotton fields at the end of the season and hibernate in forest litter or on various malvaceous hosts, including volunteer and regrowth cotton in warmer areas. They may also survive in larval cells in cotton bolls where they enter diapause until the summer rains (100–175 mm) free them. About 95% of hibernating adults die because of biotic (natural enemies) and abiotic (temperature, moisture) factors (Rummel and Curry, 1986; EPPO, 1992; de Ribeiro et al., 2010). In the spring, as temperature rises, the adult resumes development and is able to disperse long distances to colonise cotton fields, predominantly during squaring-flowering stages (Neff and Vanderzant, 1963; Smith et al., 1965). In Texas, peak emergence of overwintered adults occurs in mid-May. The emerging adults cut their way out of the flowers or bolls. They feed on developing cotton foliage and female ovary development depends on a pollen diet (Rummel and Curry, 1986). Although adults can feed on pollen of a great variety of plant species (Jones and Coppedge, 1999; Pimenta et al., 2016), larvae can only complete their life cycle on a small number of plant species of the tribe Gossypieae (Malvaceae), to which cotton (*Gossypium* spp.) belongs (Lukefahr et al., 1986; Gabriel, 2002). When male boll weevils start feeding on cotton squares, their aggregation pheromone production increases, intensifying the attraction and aggregation of more males and females in the area (White and Rummel, 1978; Leggett, 1986). After feeding for 3–7 days, adults mate and within the subsequent 20 min females can start ovipositing at a rate of one egg per hour in daylight. Eggs are laid singly in cotton flower buds. In cases of high weevil populations and shortage of buds, more than one egg may be laid in one bud. However, this is of minor significance since only one weevil matures in a flower. Late in the season, eggs are laid both in flower buds and in young bolls. Under favourable conditions, the life cycle of *A. grandis* is completed in 17–21 days and as many as seven generations may develop in a year in the extreme southern part of the Cotton Belt in the USA (e.g. southern Texas). Eggs hatch in 3–5 days. The larvae feed for 7–12 days inside the flower or boll and then pupate. This stage lasts 3–5 days. In Arizona, high temperatures during June–August were reported to suppress boll weevil populations.

3.1.3. **Intraspecific diversity**

The species *A. grandis* had previously been segregated on the basis of several adult characteristics (including morphological and behavioural traits) into three subspecies (Warner, 1966; Cross, 1973; Burke et al., 1986; Barr et al., 2013):

- The south-eastern boll weevil (*Anthonomus grandis grandis*), feeding on commercial cotton,
- The Thurberia or Arizona wild cotton boll weevil (*Anthonomus grandis thurberiae*), feeding on *Gossypium thurberi* Todaro (wild cotton, also known as *Gossypium thurberiae*), which could be found in southern Arizona and northern regions of Sonora, Mexico, and was not regarded as a significant pest of commercial cotton, and
The Mexican boll weevil, an intermediate form found on *Gossypium hirsutum* and different wild hosts including *Gossypium davidsonii* Kell, *Gossypium barbadense* L., *Hampea rovirosae* Standley and also *G. thurberi*.

Recent analyses of nucleotide sequences from a segment of the mitochondrial cytochrome c oxidase subunit I (*COI*) gene of Mexican and USA *A. grandis* populations (Alvarado et al., 2017) showed that boll weevils partitioned into two clusters: ‘western’ and ‘eastern’. Importantly, no evidence was found for host-plant-associated genetic differentiation in either group. The level of genetic divergence and lack of shared *COI* haplotypes, combined with five apparent fixed nucleotide differences between the two groups and earlier evidence of reproductive isolation, together provide strong support for reinstating the subspecies names, *Anthonomus grandis thurberiae* Pierce and *A. grandis grandis* Boheman, for the western and the eastern lineages, respectively.

### 3.1.4. Detection and identification of the pest

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

Yes, *A. grandis* can be detected in the field by visual inspection and use of its aggregation pheromone (grandlure). Damage symptoms can be easily seen. The species can be identified by examining morphological features, for which keys exist.

**Morphology:**

Larva: Ahmad and Burke (1972) provide a detailed description and a key for this stage. Mature white legless larvae are 5.6–8.1 mm in length, robust, thickest through middle abdominal segments, distinctly curved, tapered towards posterior end (CABI, 2017).

Pupa: Burke (1968) provides a description and key to the pupa, which is white and 6.6–7.4 mm long. Anderson (1968) described the pupae of *A. g. grandis* and *A. g. thurberiae*, and identified diagnostic features to distinguish them (CABI, 2017).

Adult: Dietz (1891) provides a key to North American *Anthonomus* spp., including *A. grandis*. Jones and Burke (1997) keyed the *A. grandis* species group. Adults measure about 5 mm without the rostrum, which is 3 mm long and round. They are elongated oval, grey-brown to almost black reddish-brown in colour. Antennae are slightly paler (CABI, 2017).

**Symptoms:**

The early stage of *A. grandis* attack is recognisable by a small puncture (either egg or feeding scars) at the side of the cotton flower bud which induces its abscission 5–8 days later: the bracteoles spread out, and buds turn brown and fall off. In later attacks, flowers turn yellow and fall to the ground, as do small bolls. Punctured large bolls usually remain on the plant and will be of poor quality (White and Rummel, 1978; EPPO, 1992; Showler, 2008; Neves et al., 2013).

**Pheromone:**

*A. grandis* adults can be trapped with the synthetic aggregation pheromone ‘grandlure’ (Benedict et al., 1985). This is used either to ensure compliance with eradication programmes (Suh et al., 2011) or early in the season to time the first insecticide applications (Henneberry et al., 1988). However, captures decline considerably during the squaring-flowering stage of cotton (Lloyd, 1986; Rummel and Curry, 1986; Neves et al., 2013) suggesting that host plant volatiles produced at the reproductive stage may modulate boll weevil attraction to its pheromone (Silva et al., 2015).

### 3.2. Pest distribution

#### 3.2.1. Pest distribution outside the EU

*Anthonomus grandis* is indigenous to Mesoamerica (probably from southern Mexico and Guatemala) (EPPO, 1992). Around 1892, this weevil invaded southern Texas (Burke et al., 1986) and subsequently spread throughout southeastern USA to the Atlantic coast causing enormous economic losses in cotton (*G. hirsutum* L.). The enormous economic impact of the invasion prompted pioneering research efforts in pest management, which lead to the successful eradication of the boll weevil in all cotton-producing areas of the USA in 2015, with the exception of relatively small populations in southern Texas (TBWEF, 2017; NCC, 2016). *A. grandis* also invaded South America during last century (Figure 1). The pest was
first reported from Venezuela in 1949 and has since dispersed southward to the primary cotton-producing regions of Argentina, Brazil, Colombia, Bolivia, Paraguay and Venezuela, (Ramalho and Wanderley, 1996; Durán Parada, 2000; Scataglini et al., 2006; Stadler and Buteler, 2007).

Figure 1: Global distribution of *Anthonomus grandis* based on data presented in Table 2

Table 2: *Anthonomus grandis* world distribution

| Country              | Sub-country records          | Source                      |
|----------------------|------------------------------|-----------------------------|
| Argentina            | Restricted distribution      | EPPO (2017)                 |
| Belize               | Present                      | EPPO (2017)                 |
| Bolivia              | Restricted distribution      | Durán Parada (2000);       |
|                      | (piedmont areas)             | Scataglini et al. (2006)    |
| Brazil               | Alagoas (present)            | EPPO (2017)                 |
|                      | Bahia (present)              | EPPO (2017)                 |
|                      | Ceara (present)              | EPPO (2017)                 |
|                      | Maranhão (present)           | EPPO (2017)                 |
|                      | Mato Grosso do Sul (present) | EPPO (2017)                 |
|                      | Minas Gerais (present)       | EPPO (2017)                 |
|                      | Paraiba (present)            | EPPO (2017)                 |
|                      | Parana (present)             | EPPO (2017)                 |
|                      | Pernambuco (present)         | EPPO (2017)                 |
|                      | Pirai (present)              | EPPO (2017)                 |
|                      | Rio Grande do Norte (present)| EPPO (2017)                 |
|                      | Sao Paulo (present)          | EPPO (2017)                 |
| Colombia             | Restricted distribution      | EPPO (2017)                 |
| Costa Rica           | Present                      | EPPO (2017)                 |
| Cuba                 | Widespread                   | EPPO (2017)                 |
| Dominican Republic   | Widespread                   | EPPO (2017)                 |
| Ecuador              | Absent, invalid record       | EPPO (2017)                 |
| El Salvador          | Present                      | EPPO (2017)                 |
| Guatemala            | Present                      | EPPO (2017)                 |
3.2.2. Pest distribution in the EU

EPPO Global database (2017) reports that *A. grandis* is absent from EU. The absence from Greece, Italy and Spain has been confirmed by surveys conducted by the respective NPPOs to comply with PZ requirements.

3.3. Regulatory status

3.3.1. Council Directive 2000/29/EC

*Anthonomus grandis* is listed in Council Directive 2000/29/EC. Details are presented in Tables 3 and 4.

### Table 3: Pest in Council Directive 2000/29/EC

| Country             | Sub-country records                                      | Source               |
|---------------------|----------------------------------------------------------|----------------------|
| Haiti               | Widespread                                               | EPPO (2017)          |
| Honduras            | Present                                                  | EPPO (2017)          |
| Martinique (French DOM) | Present                                             | EPPO (2017)          |
| Mexico              | Widespread (native), under eradication in some northern states close to the US border | EPPO (2017); NCC (2016) |
| Nicaragua           | Present                                                  | EPPO (2017)          |
| Paraguay            | Restricted distribution                                   | EPPO (2017)          |
| Peru                | Unreliable record not supported by evidence              | Alvarado et al. (2017) |
| Saint Kitts and Nevis | Present                                              | EPPO (2017)          |
| **US**              |                                                          |                      |
| Alabama (eradicated)| EPPO (2017)                                              |                      |
| Arizona (eradicated)| EPPO (2017)                                              |                      |
| Arkansas (eradicated)| NCC (2016)                                           |                      |
| California (eradicated)| EPPO (2017)                  |                      |
| Florida (eradicated)| EPPO (2017)                                              |                      |
| Georgia (eradicated)| EPPO (2017)                                              |                      |
| Kansas (eradicated) | NCC (2016)                                               |                      |
| Louisiana (eradicated)| NCC (2016)                                          |                      |
| Mississippi (eradicated)| NCC (2016)           |                      |
| Missouri (eradicated)| NCC (2016)                                              |                      |
| New Mexico (eradicated)| NCC (2016)                                      |                      |
| North Carolina (eradicated)| EPPO (2017)                 |                      |
| Oklahoma (eradicated)| NCC (2016)                                              |                      |
| South Carolina (eradicated)| EPPO (2017)       |                      |
| Tennessee (eradicated)| NCC (2016)                                             |                      |
| Texas (present; under eradication) | NCC (2016); TBWEF (2017) |                      |
| Virginia (eradicated) | EPPO (2017)                                            |                      |
| Venezuela           | Widespread                                               | EPPO (2017)          |

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

**No**, *A. grandis* is not known to occur in the EU territory (EPPO, 2017).

EPPO Global database (2017) reports that *A. grandis* is absent from EU. The absence from Greece, Italy and Spain has been confirmed by surveys conducted by the respective NPPOs to comply with PZ requirements.
3.3.2. Legislation addressing plants and plant parts on which *Anthonomus grandis* is regulated

Table 4: Regulated hosts and commodities that may involve *A. grandis* in Annexes III, IV and V of Council Directive 2000/29/EC

| Annex V | PLANTS, PLANT PRODUCTS AND OTHER OBJECTS WHICH ARE POTENTIAL CARRIERS OF HARMFUL ORGANISMS OF RELEVANCE FOR CERTAIN PROTECTED ZONES, AND WHICH MUST BE ACCOMPANIED BY A PLANT PASSPORT VALID FOR THE APPROPRIATE ZONE WHEN INTRODUCED INTO OR MOVED WITHIN THAT ZONE |
|---|---|
| **Part A** | Plants, plant products and other objects originating in the Community |
| **Section II** | Plants, plant products and other objects which are potential carriers of harmful organisms of relevance for certain protected zones, and which must be accompanied by a plant passport valid for the appropriate zone when introduced into or moved within that zone |
| 1.9. | Fruits (bolls) of *Gossypium* spp. and unginned cotton |
| **Part B** | Plants, plant products and other objects originating in territories, other than those territories referred to in part A |
| **Section II** | Plants, plant products and other objects which are potential carriers of harmful organisms of relevance for certain protected zones |
| 6. | Seeds and fruits (bolls) of *Gossypium* spp. and unginned cotton |

3.4. Entry, establishment and spread in the EU

3.4.1. Host range

*Anthonomus grandis* is an oligophagous species feeding on a few genera within the tribes Gossypieae and Hibisceae (family Malvaceae). Its main host is cultivated cotton, mostly *G. hirsutum*. Both *A. grandis* subspecies (*A. grandis grandis* and *A. grandis thurberiae*) have been found on a few additional species of tribe Gossypieae including *G. barbadense*, wild *Gossypium* spp., *Hampea* and *Cienfuegosia*. *A. grandis grandis* only has been found on the Hibisceae *Hibiscus pernambucensis* (Alvarado et al., 2017). Marginal reproduction has also been observed on the ornamental *Hibiscus syriacus* (EPPO, 2017). Both wild EU Malvaceae and non-indigenous ornamental *Hibiscus* spp. might be attacked and act as reservoirs (EPPO, 1992) sustaining overwintering adults feeding on their pollen (Pimenta et al., 2016).

Current EU legislation regulates *A. grandis* in seeds and fruit of *Gossypium* spp. and unginned cotton. However, there are other hosts (e.g. ornamental Malvaceae like *Hibiscus* spp.), which remain unregulated and could potentially provide additional pathways for entry into the EU.

3.4.2. Entry

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

**Yes**, *A. grandis* could enter the EU in cotton seeds or bolls, unginned cotton, and probably on ornamental Malvaceae

In international trade, boll weevils may be carried with:
- cotton seeds or bolls (fruit),
- unginned (raw) cotton, and
- ornamental Malvaceae plants for planting (e.g. *Hibiscus* spp.)

originating from the infested areas in the Americas.

The first two pathways are regulated only for the EU PZ by existing EU legislation. Moreover, ornamental Malvaceae plants for planting may provide a plausible pathway for *A. grandis* into the EU. The Netherlands NPPO kindly provided detailed trade inspection data regarding plants for planting from 2012 to 2014. These data show that *Hibiscus* spp. were imported several times from Costa Rica in 2012 and 2013, indicating that this possible pathway into the EU exists.

No records of interception of *A. grandis* in the Europhyt database exist.
3.4.3. Establishment

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

**YES**, the pest would be able to establish in the EU

3.4.3.1. EU distribution of main host plants

According to EUROSTAT, cotton is grown in three EU countries. The average cultivated area in these countries in 2011–2016 was: $1.55 \times 10^3$, $340.84 \times 10^3$, and $79.72 \times 10^3$ ha in Bulgaria, Greece and Spain, respectively. According to FAOSTAT (online), cotton is also grown in two additional EU Ms: Italy and Romania.

3.4.3.2. Climatic conditions affecting establishment

Although *A. grandis* is considered as a subtropical pest (EPPO, 2014), it has been found in many climatic zones in the Americas, from northern Argentina to southern USA, including California. Therefore, this species is not restricted to humid regions and can survive in hot, arid regions (e.g. southwestern USA). As a consequence, EU Mediterranean countries where cotton is grown may provide conditions for establishment (EPPO, 1992, 2014).

3.4.4. Spread

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

**Yes**, as a free living organism, flying adults may spread over long distances within the EU following introduction.

*A. grandis* is able to disperse long distances to colonise cotton fields, predominantly during squaring-flowering stages (Neff and Vanderzant, 1963; Smith et al., 1965). Plants for planting are not the main means of spread of this species.

3.5. Impacts

Sources: impact reports and other literature

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

**Yes**, *A. grandis* is considered a key pest of cotton. Unless control measures are adopted, damage can lead to total crop loss.

The cotton boll weevil, *A. grandis*, has been the most important cotton insect pest in the US. Due to the Boll Weevil Eradication Program, boll weevil populations have been almost completely eradicated from this country (Table 2). In South America, nevertheless, the insect populations are still causing great damage to the cotton crops, destroying cotton plant floral buds and bolls. Due to their high reproductive rate in tropical areas and to the endophytic behaviour of earlier developmental stages, infestation levels increase fast and unless control measures are adopted, damage can lead up to total loss of production (Martins et al., 2007; Firmino et al., 2013).

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 combination of different measures can even allow eradication, as achieved in most of the cotton producing states of USA.
3.6.1. Biological or technical factors limiting the feasibility and effectiveness of measures to prevent the entry, establishment and spread of the pest

- High reproductive rate, especially in tropical climates (extremely uncommon in continental EU),
- Early stages remain hidden within flower and fruit (bolls),
- Adults can fly long distances from overwintering sites to cotton fields,
- The aggregation pheromone, which can be used for monitoring and mass trapping, becomes less attractive during cotton squaring,
- Ploughing the cotton stalk residue places the boll weevil larvae and pupae in a dark and generally moist environment which may be conducive for over-wintering in warm areas, and
- Ineffectiveness of chemical control and its harmful side-effects.

3.6.2. Control methods

Different control methods can be used in combination (Integrated Pest Management (IPM)) with the final goal of achieving the eradication of the weevil. These techniques are:

- Biotechnological control: use of transgenic Bt-cotton (cotton encoding one of the Bacillus thuringiensis Berliner (Bt) subsp. kurstaki cry genes); use of the sterile insect technique (SIT); use of pheromones (e.g. the aggregation pheromone grandlure) either for monitoring or for mass-trapping;
- Biological control: conservation biological control; inundative biological control with the entomopathogenic bacterium B. thuringiensis and the entomopathogenic fungus Beauveria bassiana;
- Chemical control: use of different pesticides, often timed according to pheromone captures;
- Cultural control: suppression of overwintering sites (e.g. cotton regrowth), destruction of fallen lower buds; delayed planting;
- Use of resistant cultivars.

3.7. Uncertainty

1) The actual status of ornamental Malvaceae (e.g. Hibiscus spp.) imported from infested areas in the Americas, which could constitute an open pathway. The genus Hibiscus has been reported as a marginal host and there is high uncertainty on the exact meaning of ‘marginal’ and whether plants belonging to this genus could support full development of A. grandis.

2) The actual status of wild Malvaceae in the EU, which could act as reservoir for the pest. There is high uncertainty as the main hosts of A. grandis belong to the tribe Gossypiae (fam. Malvaceae) and this tribe is distributed pantropically, mostly in arid habitats (Hinsley, 2014), not in Europe.

4. Conclusions

Considering the criteria within the remit of EFSA to assess the status as a potential Union QP, as a potential PZQP, or as a potential RNQP, A. grandis satisfies with no uncertainties the criteria to be regarded as a Union QP (Table 5). However, it does not meet the criterion of occurrence in the EU territory (for PZQP) plus that of plants for planting being the principal means of spread (for RNQP).
Table 5: 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 protected zone quarantine pest (articles 32–35) | Panel’s conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest | Key uncertainties |
|---------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------------------|
| Identity of the pest (Section 3.1) | The identity of the pest is established. Both conventional taxonomic keys based on morphology and molecular methods can be used to identify A. grandis. | The identity of the pest is established. Both conventional taxonomic keys based on morphology and molecular methods can be used to identify A. grandis. | The identity of the pest is established. Both conventional taxonomic keys based on morphology and molecular methods can be used to identify A. grandis. | None |
| Absence/presence of the pest in the EU territory (Section 3.2) | The pest is not known to occur in the EU territory. | The pest is not known to occur in the EU territory. Therefore, it does not meet a criterion required for a protected zone quarantine pest (PZQP). | The pest is not known to occur in the EU territory. Therefore, it does not meet a criterion required for a regulated non-quarantine pest (RNQP). | None |
| Regulatory status (Section 3.3) | The pest is not known to occur in the EU. However, it is under official surveillance in EU protected zone areas (Greece and the Spanish Autonomous Communities of Andalucia, Catalonia, Extremadura, Murcia, and Valencia). | Because the pest is currently not known to occur in the EU, it does not meet a criterion required PZQP. | Because the pest is not currently regulated as a quarantine pest, there are no grounds to consider its status could be revoked. | None |
| Pest potential for entry, establishment and spread in the EU territory (Section 3.4) | The pest is able to enter into, become established in, and spread within, the EU territory. Seeds and fruit of cotton and unginned cotton are the main pathways, which are presently regulated but not closed. Ornamental Malvaceae plants for planting originating in infested countries may represent an additional plausible pathway. Spread is mainly via natural spread of flying adult weevils. | The pest is able to enter into, become established in, and spread within, the EU territory, including the protected zone areas. | Spread is mainly via natural spread of flying adult weevils. Plants for planting is not the main pathway. | The actual status of ornamental Malvaceae and that of wild Malvaceae in the EU |
| 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 protected zone quarantine pest (articles 32–35) | Panel’s conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest | Key uncertainties |
|----------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------|
| Potential for consequences in the EU territory (Section 3.5) | The pests’ introduction would most probably have economic and environmental impacts on the EU territory. Cotton cultivation and wild Malvaceae could be impacted. | The pests’ introduction would most probably have economic and environmental impacts on the EU territory, including the protected zone areas. | The presence of the pest on plants for planting would most probably have an economic impact. However, as plants for planting is not the main means of spread of this pest, this impact could be irrelevant. | The actual status of ornamental Malvaceae and that of wild Malvaceae in the EU |
| Available measures (Section 3.6) | There are measures available to prevent the entry into, establishment within and spread of the pest within the EU. These measures (biotechnical, cultural, chemical and biological control methods) have even allowed the pest to be successfully eradicated in many USA states. | There are measures available to prevent the entry into, establishment within and spread of the pest within the EU. These measures have even allowed the pest to be successfully eradicated in many US states. In case that either EU wild Malvaceae or ornamental Malvaceae in the EU become a suitable host, more than 24 months may be needed for eradication. | There measures available to prevent pest presence on plants for planting. These measures have even allowed the pest to be successfully eradicated in many US states. | The actual status of ornamental Malvaceae and that of wild Malvaceae in the EU |
| Conclusion on pest categorisation (Section 4) | All criteria assessed by EFSA above for consideration as a potential quarantine pest are met. | Not all criteria assessed by EFSA above for consideration as potential PZQP were met. The pest is not known to occur in the EU territory. | Not all criteria assessed by EFSA above for consideration as a potential RNQP pest were met. The pest is not known to occur in the EU territory and plants for planting is not the main pathway to spread. | None |
| Aspects of assessment to focus on/scenarios to address in future if appropriate | • Host status of ornamental Malvaceae imported into the EU |  |  |  |
|  | • Host status of wild Malvaceae occurring in the EU |  |  |  |
References

Ahmad M and Burke HR, 1972. Larvae of the weevil tribe Anthonomini (Coleoptera, Curculionidae). Miscellaneous Publications of the Entomological Society of America, 8, 3181.

Alvarado A, Jones RW, Pedraza-Lara C, Alvarado Villanueva O and Pfeiler E, 2017. Reassessment of the phylogeography and intraspecific relationships of western and eastern populations of the boll weevil, Anthonomus grandis Boheman (Coleoptera: Curculionidae), in North America. Biological Journal of the Linnean Society, 122, 29–45. https://doi.org/10.1093/biolinnean/blx049

Anderson DM, 1968. Observations on the pupae of Anthonomus grandis Boheman and A. grandis thurberiae Pierce. Annals of the Entomological Society of America, 61, 125–129.

Barr N, Ruiz-Arce R, Obregon O, De Leon R, Foster N, Reuter C, Boratynski T and Vacek D, 2013. Molecular diagnosis of populational variants of Anthonomus grandis (Coleoptera: Curculionidae) in North America. Journal of Economic Entomology, 106, 437–449.

Benedict JH, Urban TC, Segers JC, Anderson DJ, McWhorter GM and Zummo GR, 1985. Pheromone trap thresholds for management of overwintered boll weevils. Journal of Economic Entomology, 78, 169–171. https://doi.org/10.1093/jee/78.1.169

Boheman CH, 1843. Original description of Anthonomus grandis. In: Schoenher C (ed.). Genera et species curculionidum, Vol. 7, part 2. La Librairie Encyclopedique de Roret, Paris. pp. 232–233.

Burke HR, 1968. Pupae of the weevil tribe Anthonomini (Coleoptera: Curculionidae). Technical Monographs, Texas Agricultural Experiment Station, 5, 1–92.

Burke HR, Clark WE, Cate JR and Fryxell PA, 1986. Origin and dispersal of the boll weevil. Bulletin of the Entomological Society of America, 32, 228–238.

CABI, 2017. CABI Datasheet report for Anthonomus grandis (Mexican cotton boll weevil). Available online: http://www.cabi.org/isc/datasheet/5735

Cross WH, 1973. Biology, control and eradication of the boll weevil. Annual Review of Entomology, 18, 17–46.

Dietz WG, 1891. Revision of the genera and species of Anthonomini inhabiting North America. Transactions of the American Entomological Society, 18, 177–276.

Durán Parada D, 2000. Situación y programa de prevención y erradicación del picudo mexicano en Bolivia. In: Workshop Proceedings III International Workshop on "Integrated Pest Management of the Cotton Boll Weevil in Argentina and Paraguay", 5–7 September 1999, Riberao Preto, Brazil, pp. 135–137.

EFSA PLH Panel (EFSA Panel on Plant Health), 2010. PLH Guidance on a harmonised framework for pest risk assessment and the identification and evaluation of pest risk management options by EFSA. EFSA Journal 2010;8(2):1495, 66 pp. https://doi.org/10.2903/j.efsa.2010.1495

EPPO (European and Mediterranean Plant Protection Organization), 1992. Data sheets on quarantine pests Anthonomus grandis. Available online: https://www.eppo.int/QUARANTINE/data_sheets/insects/ANTHGR_ds.pdf

EPPO (European and Mediterranean Plant Protection Organization), 2014. PQR database. European and Mediterranean Plant Protection Organization, Paris, France. Available online: http://www.eppo.int/DATABASES/pqr/pqr.htm

EPPO (European and Mediterranean Plant Protection Organization), 2017. EPPO Global Database. Available online: https://gd.eppo.int

EUROSTAT, online. European Commission, Statistical Office of the European Communities Database consulted for international trade in goods for EU trade since 1988 by CN8. Available online: http://ec.europa.eu/eurostat/data/database

FAO (Food and Agriculture Organization of the United Nations), 2004. ISPM (International Standards for Phytosanitary Measures) 21—Pest risk analysis of regulated non-quarantine pests. FAO, Rome, 30 pp. Available online: https://www.ippc.int/sites/default/files/documents/1323945746_ISPM_21_2004_En_2011-11-29_Refor.pdf

FAO (Food and Agriculture Organization of the United Nations), 2013. ISPM (International Standards for Phytosanitary Measures) 11—Pest risk analysis for quarantine pests. FAO, Rome, 36 pp. Available online: https://www.ippc.int/sites/default/files/documents/20140512/ispm_11_2013_en_2014-04-30_201405121523-494.65%20KB.pdf

FAOSTAT, online. Food and agriculture data. Available online: http://www.fao.org/faostat/en/#search/Cottonseed

Firmino AAP, Fonseca FCD, de Macedo LLP, Coelho RR, Antonino de Souza JD Jr, Togawa RC, Silva-Junior OB, Pappas-Jr GJ, da Silva MC, Engler G and Grossi-de-Sa MF2013. Transcriptome analysis in cotton boll weevil (Anthonomus grandis) and RNA interference in insect pests. PLoS ONE, 8, e85079. https://doi.org/10.1371/journal.pone.0085079

Gabriel D, 2002. Avaliação de malvaceae cultivadas como hospedeiras alternativas para a reprodução do bicudo do algodoeiro Anthonomus grandis Boh. 1843 no laboratório. Arquivos do Instituto Biológico, 69, 69–76.

Henneberry TJ, Meng T and Bariola LA, 1988. Boll weevil: grandlure trapping and early-season insecticide applications in relation to cotton infestations in Arizona. Southwestern Entomologist, 13, 251–259.

Hinsley SR, 2014. Malvaceae info. Available online: http://www.malvaceae.info/index.html

ITIS (Integrated Taxonomic Information System), 2017. Anthonomus grandis. Available online: http://www.itis.gov

www.efsa.europa.eu/efsajournal 2017;15(12):5074
Jones RW and Burke HR, 1997. New species and host plants of the Anthonomus grandis species group (Coleoptera: Curculionidae). Proceedings of the Entomological Society of Washington, 99, 705–719.

Jones GD and Coppedge JR, 1999. Foraging resources of boll weevils (Coleoptera: Curculionidae). Journal of Economic Entomology, 92, 860–869.

Leggett JE, 1986. The use of pheromone traps for detection and control of anthonomus. Documentos-Empresa Brasileira de Pesquisa Agropecuaria. Depto. de Difusao de Tecnologia, Brazil.

Leggett JE, Dickerson WA and Lloyd EP, 1988. Suppressing low level boll weevil populations with traps: influence of trap placement, grandlure concentration and population level. Southwestern Entomologist, 13, 205–216.

Lloyd EP, 1986. The boll weevil: recent research developments and progress towards eradication in the USA. In: Russell GE (ed.). Agricultural Zoology Reviews, Vol. 1. Intercept, Newcastle upon Tyne, UK. pp. 109–135.

Lukefahr MJ, Barbosa S and Sobrinho RB, 1986. Plantas hospedeiras do bicudo-do-algodoeiro com referência especial à flora brasileira, pp. 275-285. In Barbosa S, Lukefahr M J, Sobrinho RB (eds.). O bicudo-do-algodoeiro. Brasilia, EMBRAPA-DDT, 314 pp. (EMBRAPA-DDT, Documentos, 4).

Martins ES, Praça LB, Dumas VF, Silva-Werneck JO, Sone EH, Waga IC, Berry C and Monnerat RG, 2007. Characterization of Bacillus thuringiensis isolates toxic to cotton boll weevil (Anthonomus grandis). Biological Control, 40, 65–68.

NCC (National Cotton Council), 2016. Boll Weevil Eradication Program: History. Available online: http://www.cotton.org/tech/pest/bollweevil/bollweevil-erad-video.cfm

Neff DL and Vanderzant ES, 1963. Methods of evaluating the chemotropic response of boll weevils to extracts of the cotton plant and various other substances. Journal of Economic Entomology, 56, 761–766.

Neves RCS, Showler AT, Pinto ES, Bastos CS and Torres JB, 2013. Reducing boll weevil populations by clipping terminal buds and removing abscised fruiting bodies. Entomologia Experimentalis et Applicata, 146, 276–285. https://doi.org/10.1111/eea.12016

Pimenta M, Mata RA, Venzon M, Cunha DNC, Fontes EMG, Pires CSS and Suji ER, 2016. Survival and preference of cotton boll weevil adults for alternative food sources. Brazilian Journal of Biology, 76, 387–395. https://doi.org/10.1590/1519-6984.16214

Ramalho FS and Wandelley PA, 1996. Ecology and management of the boll weevil in South American cotton. American Entomologist, 42, 41–47.

de Ribeiro P, Suji ER, Diniz IR, de Medeiros MA, Salgado-Labouirau ML, Branco MC, Pires CSS and Fontes MG, 2010. Alternative food sources and overwintering feeding behaviour of the boll weevil, Anthonomus grandis Boheman (Coleoptera: Curculionidae) under the tropical conditions of central Brazil. Neotropical Entomology, 39, 28–34.

Rummel DR and Curry GL, 1986. Dinâmica populacional e níveis de dano econômico. In: Barbosa S, Lukefahr MJ and Sobrinho RB (eds.). O Bicudo do Algodoeiro, Vol 4. Departamento de Difusao Tecnológica Documentos, Embrapa. pp. 201–220.

Scataglini MA, Lanteri AA and Confalonieri VA, 2006. Diversity of boll weevil populations in South America: a phylogeographic approach. Genetica, 126, 353–368.

Showler AT, 2008. Relationships of abscised cotton fruit to boll weevil (Coleoptera: Curculionidae) feeding, oviposition, and development. Journal of Economic Entomology, 101, 68–73.

Silva JB, Silva-Torres CSA, Moraes MCB, Torres JB, Laumann RA and Borges M, 2015. Interaction of Anthonomus grandis and cotton genotypes: biological and behavioral responses. Entomologia Experimentalis et Applicata, 156, 238–253. https://doi.org/10.1111/eea.12326

Smith GL, Cleveland TC and Clark JC, 1965. Boll weevil movement hibernation sites to fruiting cotton. Journal of Economic Entomology, 58, 357–358.

Stadler T and Buteler M, 2007. Migration and dispersal of Anthonomus grandis (Coleoptera: Curculionidae) in South America. Revista de la Sociedad Entomológica Argentina, 66, 205–217.

Suh CPC, Ding N and Lan Y, 2011. Using an Electronic Nose to Rapidly Assess Grandlure Content in Boll Weevil Pheromone Luers. Journal of Bionic Engineering, 8, 449–454. https://doi.org/10.1016/S1672-6529(11)60050-4

TBWEF (Texas Boll Weevil Eradication Foundation), 2017. 2016 Program Year End Summary. Available online: https://www.txbollweevil.org/program.html

Warner RE, 1966. Taxonomy of the subspecies of Anthonomus grandis (Coleoptera: Curculionidae). Annals of the Entomological Society of America, 59, 1073–1088.

White JR and Rummel D, 1978. Re-emergence profile of overwintered boll weevils an entry into cotton. Environmental Entomology, 7, 7–14.

Abbreviations

Bt Bacillus thuringiensis
COI cytochrome c oxidase subunit I
EPPO European and Mediterranean Plant Protection Organization
FAO Food and Agriculture Organization of the United Nations
IPM Integrated Pest Management
**Anthonomus grandis:** pest categorisation

| Acronym | Definition |
|---------|------------|
| IPPC    | International Plant Protection Convention |
| MS      | Member State |
| PLH     | EFSA Panel on Plant Health |
| PZ      | Protected Zones |
| PZQP    | protected zone quarantine pest |
| QP      | quarantine pest |
| RNQP    | regulated non-quarantine pest |
| SIT     | sterile insect technique |
| TFEU    | Treaty on the Functioning of the European Union |
| ToR     | Terms of Reference |