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Pest categorisation of 'Blight and blight-like' diseases of citrus

EFSA Panel on Plant Health (PLH),
Michael Jeger, Claude Bragard, David Caffier, Elisavet Chatzivassiliou, Katharina Dehnen-Schmutz, Gianni Gilioli, Jean-Claude Gregoire, Josep Anton Jaques Miret, Alan MacLeod, Maria Navajas Navarro, Björn Niere, Stephen Parnell, Roel Potting, Trond Rafoss, Vittorio Rossi, Gregor Urek, Ariena Van Bruggen, Wopke Van der Werf, Jonathan West, Stephan Winter, Antonino F Catara, Nuria Duran-Vila, Gabor Hollo, Tomasz Kaluski and Thierry Candresse

Abstract

The EFSA Panel on Plant Health performed a pest categorisation of 'Blight and blight-like' for the EU territory. Blight is a major disease of citrus. Similar 'blight-like' diseases are also known (e.g. declinio, declinamiento) and are addressed simultaneously with Blight in the present categorisation. The causal agent(s) remain(s) unknown and the potential role of a recently identified citrus endogenous pararetrovirus (Citrus Blight-associated pararetrovirus, CBaPRV) remains to be established. Transmissibility and ability to produce consistent (although poorly specific) symptoms have been demonstrated and a combination of indirect approaches is used, with limits, for diagnosis. There are large uncertainties on the biology of the causal agent(s) and on the epidemiology of the disease, including the transmission mechanism(s) responsible for the observed field spread. Blight has been reported from North, Central and South America, Africa and Oceania but is not known to occur in the EU. It is listed in Annex IIA of Directive 2000/29EC. It has the potential to enter, establish and spread in the EU territory. The main entry pathway (citrus plants for planting) is closed by existing legislation and entry is only possible on minor pathways (such as illegal import). Blight is a severe disease and a negative impact is expected should it be introduced in the EU, but the magnitude of this negative impact is very difficult to estimate. 'Blight and blight like' satisfies all criteria evaluated by EFSA to qualify as a Union quarantine pest. It does not meet the criterion of being present in the EU to qualify as a Union regulated non-quarantine pest (RNQP). Since the identity of the causal agent(s) of the Blight and blight-like disease(s) and the existence and efficiency of natural spread mechanism(s) remain unknown, large uncertainties affect all aspects of the present pest categorisation.

Keywords: Blight and blight-like, declinio, declinamiento, Citrus Blight-associated pararetrovirus, citrus, pest risk, plant pest

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Correspondence: alpha@efsa.europa.eu

Panel members: Claude Bragard, David Caffier, Thierry Candresse, Elisavet Chatzivassiliou, Katharina Dehnen-Schmutz, Gianni Gilioli, Jean-Claude Gregoire, Josep Anton Jaques Miret, Michael Jeger, Alan MacLeod, Maria Navajas Navarro, Björn Niere, Stephen Parnell, Roel Potting, Trond Rafoss, Vittorio Rossi, Gregor Urek, Ariena Van Bruggen, Wopke Van der Werf, Jonathan West and Stephan Winter.

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1. Introduction

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

1.1.1. Background

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

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

1.1.2. Terms of Reference

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

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

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

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

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

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

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

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

1.1.2.1. Terms of Reference: Appendix 1

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

Annex IIAI

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

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

(b) Bacteria

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

(c) Fungi

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

(d) Virus and virus-like organisms

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

Annex IIB

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

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

(b) Bacteria

Curtobacterium flaccumfaciens pv. flaccumfaciens (Hedges) Collins and Jones

(c) Fungi

Glomerella gossypii Edgerton

Gremmeniella abietina (Lag.) Morelet

Hypoxylon mammatum (Wahl.) J. Miller

1.1.2.2. Terms of Reference: Appendix 2

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

Annex IAI

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

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

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

Group of Tephritidae (non-EU) such as:

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

(c) Viruses and virus-like organisms

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

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

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

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

Annex IIAI

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

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

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

1.1.2.3. Terms of Reference: Appendix 3

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

Annex IAI

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

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

(b) Fungi

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

(c) Viruses and virus-like organisms

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

(d) Parasitic plants

Arceuthobium spp. (non-EU)

Annex IAII

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

Meloidogyne fallax Karssen

Popillia japonica Newman

Rhizoecus hibisci Kawai and Takagi

(b) Bacteria

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

Ralstonia solanacearum (Smith) Yabuuchi et al.

(c) Fungi

Melampsora medusae Thümen

Synchytrium endobioticum (Schilbersky) Percival

Annex I B

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

Leptinotarsa decemlineata Say

Liriomyza bryoniae (Kaltenbach)

(b) Viruses and virus-like organisms

Beet necrotic yellow vein virus

1.2. Interpretation of the Terms of Reference

'Blight and blight-like' 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 (QP) 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 EU (TFEU), other than Madeira and the Azores.

'Blight' or 'Citrus Blight' is an important disease of citrus, in particular in Florida, Brazil and Argentina. Although this disease has been known for more than a century, it has proven very recalcitrant to efforts to understand its aetiology and, to date, its causal agent(s) remain(s) to be identified. Given that the symptoms of Blight are not very specific and may be confused with those of other diseases and given that the causal agent(s) is(are) unknown, the diagnosis of Blight is complicated and relies on indirect assays. Diseases resembling Blight have been reported in some countries, sometimes as 'blight-like' and sometimes under other names (for example declinio, declinamiento...), but in view of the diagnostic difficulties, it is not known whether these diseases are identical with Blight and caused by the same agent(s) or represent distinct diseases. Given the extremely high uncertainties associated with these so-called 'blight-like' diseases, the Panel decided to address them together with Blight. In the present categorisation and unless specified to the contrary, the term Blight should therefore be seen as covering both Citrus Blight (as known for example in Florida and Brazil) but also blight-like diseases reported from other areas.

2. Data and methodologies

2.1. Data

2.1.1. Literature search

A literature search on Blight and blight-like was conducted at the beginning of the categorisation in the ISI Web of Science bibliographic database, using the scientific and synonymous names of the virus as well as the commonly used disease names 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.

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

2.2. Methodologies

The Panel performed the pest categorisation for Blight and blight-like, following guiding principles and steps presented in the European Food Safety Authority (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 ToR received by the European Commission. In addition, for each conclusion, the Panel provides a short description of its associated uncertainty.

Table 1 presents the Regulation (EU) 2016/2031 pest categorisation criteria on which the Panel bases its conclusions. All relevant criteria have to be met for the pest to potentially qualify either as a QP or as a RNQP. 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 a RNQP which needs to be addressed in the opinion. For the pests regulated in the protected zones only, the scope of the categorisation is the territory of the protected zone; thus, the criteria refer to the protected zone instead of the EU territory.

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

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

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

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

> *Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible?*
>
> The identity of the Blight causal agent(s) remains unknown. Its(their) transmissibility and ability to produce consistent (but poorly specific) symptoms has been demonstrated.

Blight disease was reported as a grave problem in citrus in Florida in 1896 (Swingle et al., cited in Derrick and Timmer, 2000) and is still considered today a major disease of citrus. At the same time, and despite extensive efforts over the years, its aetiology has remained largely elusive and its causative agent(s) is(are) still unknown. Citrus Blight is better described as a decline of affected trees, the most prominent symptom being a wilting and dieback of the canopy, suggesting that the disease is associated with a vascular disorder reducing the water flow in the xylem. Similar symptoms can, however, also be observed in other abiotic or biotic diseases and the general dieback associated with Blight is therefore not specific of this disease. Citrus Blight in Florida, 'declinamiento' in Argentina, 'declinio' and Citrus sudden death (CSD) in Brazil appear to be closely related disorders with largely similar symptoms and disease profiles. The latter have, therefore, sometimes been referred to as 'blight-like'. Despite this similarity in symptoms, in the absence of an identification of (a) causal agent (s) and given the poor specificity of the Blight symptoms, it is not possible to unambiguously consider that these various names describe a single disease in different countries. In particular, a specific aetiology has been proposed for CSD (Maccheroni et al., 2005), providing an indication that CSD and Blight may be different diseases (see below). Overall, it remains unclear whether Blight and 'blight-like' diseases have a common aetiology. It is also unclear whether a single agent or multiple ones acting in combination are involved.

Most of the early research on the aetiology of Blight was performed in Florida. The proof of the implication of a biotic agent was provided by the demonstration of its transmissibility by root grafting (Tucker et al., 1984; Derrick and Timmer, 2000). Remarkably, efforts at transmission by grafting aerial parts (twigs, buds...) failed and so did efforts to propagate the disease by use of vegetative propagation materials (Tucker et al., 1984). Further efforts to propagate the disease with cuttings or bud grafts from Blight-affected trees were also systematically negative, leading to the assumption that the causal agent (s) of citrus Blight is(are) located and/or restricted to the roots (Derrick and Timmer, 2000).

Experiments to test the association of various non-viral phytopathogenic agents (e.g. xylem-limited bacteria including *Xyllella fastidiosa* (Beretta et al., 1997), *Fusarium solani* or phytoplasmas...) all failed to associate a particular pathogen with the Blight disease, giving weight to the notion that (a) virus(es) is(are) implicated in the disease. Attempts to purify virus particles from roots of Blight-affected trees identified structures resembling virus-like particles, but these were shown to be also present in healthy trees (Brlansky and Hood, 2002). A fragment of the genome of an idaeovirus was reconstructed from a subtraction library prepared from leaves and root tissues of Blight-affected plants (Derrick et al., 2006) but proof that this putative virus might be implicated in the Blight disease was never provided. In Brazil, the genome of a novel species of the genus *Marafivirus* has been assembled from double-stranded RNA preparations purified from CSD-affected citrus. Although biological assays were not conducted to verify this virus as the causal agent of CSD, the virus was found to be tightly associated with the disease, being present in almost 100% of diseased plants as well as in aphids feeding on CSD trees (Maccheroni et al., 2005). The new virus was consequently named CSD-associated virus (CSDaV) and is today considered the likely cause of CSD. However, CSDaV was only found in citrus in Brazil and was not observed in Blight-affected trees in Florida, lending weight to the notion that CSDaV is not the causal agent of Blight and that CSD and Blight may be different diseases. This notion is further reinforced by information suggesting that the CSD agent could be transmissible by grafting of aerial parts, contrary to the Blight agent(s) (Yamamoto et al., 2003 meeting abstract cited by Bové and Ayres, 2007).

A virus theory for Blight aetiology was recently revived by virus discovery results from High-Throughput Sequencing (HTS) analyses. In 2014, a Florida group (Roy et al., 2014) assembled three complete genome sequences of endogenous pararetroviruses (EPRVs) from RNA extracts prepared from bark tissues of mature roots taken from apparently healthy Carrizo citrange rootstock, one of the many susceptible hosts of Blight. The three homologous sequences (85–89% nucleotide identity) have been assigned to a new virus, the Citrus endogenous pararetrovirus (CitPRV). The sequences of such EPRVs are known to be integrated in high copy numbers in the genome of many citrus species (Geering et al., 2014; Diop et al., 2018). In 2017, using an HTS approach to study putative viruses associated with CSD, Matsumura et al. (2017) identified multiple viruses in CSD-affected citrus plants and also confirmed the presence of CitPRV sequences.

Further efforts apparently led to the identification, among the populations of Citrus EPRVs, of a specific variant tightly associated with Blight-affected trees (Schneider et al., 2015; Roy et al., 2016). However, significant uncertainties are attached to these results which have only been presented so far in meetings or in the grey literature (industry trade journals...) and have not been published and submitted to peer review (see below). The tentative name Citrus Blight-associated pararetrovirus (CBaPRV) has nevertheless been proposed for this particular EPRV variant (Roy et al., 2016).

Pararetroviruses are double-stranded DNA viruses belonging to the family Caulimoviridae. For some genera of this family (Badna-, Caulimo-, Petu-, Solendovirus...), complete or partial viral genomes are sometimes integrated in host plant genomes (Geering et al., 2014). These sequences are named endogenous viral elements (EVEs). EVEs can contribute significantly to plant genomes (for example, EVEs represent 0.68% of the *Citrus x clementina* genome). In the majority of cases, these integrated sequences are ancestral and, even if they are transcribed, they cannot generate a fully functional virus able to replicate in episomal (i.e. non-integrated) form because they are incomplete, fragmented, rearranged or mutated.

There are a few cases of viruses in *Musa balbisiana*, in *Petunia x hybrida* and in *Nicotiana x edwardsonii* where EVEs can, under specific circumstances, be activated into a replicating episomal virus, then named an endogenous pararetrovirus (EPR). The episomal virus then expresses all the viral biological functions and symptoms develop in the infected plants, similar to a normal viral infection. The most prominent and well investigated such case concerns *Banana streak virus* (BSV), on which a Scientific Opinion of the PLH Panel on a PRA prepared by France was published in 2008 (EFSA Journal 2008, 667, 1-24).

Caulimoviridae members episomaly replicate their DNA genomes through an RNA intermediate and a reverse transcription step. Thus, the presence of viral RNA transcripts in a plant can either result from viral episomal replication or from host transcription of integrated EVEs. The consequence is that the analysis by HTS of a plant transcriptome may allow the identification of EVEs and EPRVs but will not readily allow to conclude whether the identified sequences mark an episomal viral replication.

From the few elements currently available, CBaPRV was found as RNA in the transcriptome of the tested Blight-affected trees (42 trees) but not in the eight control healthy trees or in trees affected by other diseases such as Huanglongbing (Roy et al., 2016). Moreover, CBaPRV sequences could be amplified by reverse transcription polymerase chain reaction (RT-PCR) from various organs of Blight-affected trees (roots, leaves, bark and flowers) but not from control trees.

Although intriguing, these results do not establish a causal link between CBaPRV and Blight, as rightly pointed out by the authors (Roy et al., 2016). Given the peculiarities of the biology of EPRVs and the currently missing information, several scenarios can indeed be envisioned:

- CBaPRV is a distinct Caulimoviridae, not present in integrated form in citrus genomes, and the causal agent of Blight.
- CBaPRV is present in citrus genomes and, upon activation, its episomal replication causes the Blight disease.
- CBaPRV is present in citrus genomes and Blight causes its transcription or induces its episomal replication, but the presence of CBaPRV RNA sequences in Blight-affected trees is then a consequence and not the cause of Blight.

There is no further evidence for a causative link between CBaPRV and the disease. It is, for example, unclear why the suspected presence of episomal replication in leaves and branches from affected trees does not allow graft transmission of the virus and replication of the disease while transmission by root grafting does. Similarly, assuming CBaPRV to be present in integrated form in Citrus genomes, it is unclear why it would be activated in Blight-affected countries and not generally over the world. Also, the rather unspecific wilting and dieback symptoms associated with Blight are not known to be associated with infections by Caulimoviridae members, further adding to uncertainties.

Taken together, these novel results suggest that a particular citrus EPRV, CBaPRV, is found associated in RNA form with the Blight disease in Florida. Whether CBaPRV infection causes Blight or whether Blight infection induces CBaPRV transcription or replication remains to be determined. A potential role of CBaPRV in the 'blight-like' diseases similarly remains to be evaluated.

3.1.2. Biology of the pest

Given that it(they) is(are) not currently identified, the biology of the Blight agent(s) remains highly uncertain. There is evidence for field spread of Blight but the mechanism(s) involved remain(s) unknown (see Sections 3.2.3 and 3.4.4). Some epidemiological elements have suggested the possible existence of (an) aerial vector(s), in particular the initial random distribution of diseased trees in affected groves (Bar-Joseph, 1999; Derrick and Timmer, 2000) and the observation that the incidence of Blight was reduced by insecticide applications (Adlerz et al., 1989). However, these informations remain highly circumstantial and the hypothesis of the existence of vector(s) should be considered highly uncertain.

Considering the hypothesis of a causative role for CBaPRV, it can be pointed out that a variety of situations exist in the Caulimoviridae family, from insect-vectored genera (aphids for Caulimoviruses, scale insects for Badnaviruses) to genera for which no insect-mediated transmission is known. The latter is in particular the case for Petuviruses, which appears to be closest to CBaPRV (Roy et al., 2014; Schneider et al., 2015).

Likewise, considering the hypothesis that the Blight disease could be caused by the activation of an EPRV integrated in the citrus genome raises the question of the triggering factor(s) involved. The study of CBaPRV closest known relative, the Petuvirus *Petunia vein clearing virus* (PVCV) indicates that its integrated form is activated to episomal infection in *Petunia* x *hybrida* upon plant stress, including heat stress, wounding and by grafting (Richert-Pöggeler et al., 2003).

3.1.3. Intraspecific diversity

In the absence of information on the identity of the Blight causal agent(s), no information is available on its(their) intraspecific diversity. Although some differences have been observed from site to site in the severity or speed of spread of the disease, it is not possible to unambiguously correlate these with intraspecific diversity of the causal agent(s) since these differences might also result from differences in local agro-environmental parameters (soil, climate, agricultural practices...) (Burnett et al., 1982; Berger, 1998; Derrick and Timmer, 2000).

3.1.4. Detection and identification of the pest

Are detection and identification methods available for the pest?
No but some indirect tests are available for Blight disease diagnosis in old (> 4 years old), symptomatic trees. A specific RT-PCR detection assay is available for CBaPRV.

As long as the identity of the causal agent(s) of Blight remains unknown, the identification of affected plants relies on the development of symptoms. As a consequence, diagnosis involves only indirect approaches aiming at distinguishing Blight from other forms of decline.

Blight-affected trees are only identified after the expression of a general decline (leaf loss, twig dieback, and poor growth flushes) and of wilting symptoms (Brlansky et al., 1984). Symptoms appear only on fruit-bearing trees entering at least their 4–6 year (Derrick and Timmer, 2000) and are similar to drought stress or to the symptoms of various other biotic diseases (Albrigo and Young, 1979). The drought-like symptoms of Blight are accompanied by the formation of light-yellow amorphous plugs in the xylem vessels of the trunk, large branches and roots, suspected to impede water transfer to the canopy (Cohen, 1974; Brlansky et al., 1985; Beretta et al., 1988). The observation of such plugs is one of the methods used to differentiate Blight and so is the 'syringe injection test' which measures the quantity of water that can be injected under pressure in the trunk of a tree in a given period of time (Lee et al., 1984). Plugged xylem vessels also appear to be smaller in Blight-affected trees compared to healthy ones (Vasconcellos and Castle, 1994), but this has not been used for Blight diagnosis. The reduced water intake seen in Blight-affected trees is also correlated with the accumulation of zinc in the bark and outer xylem tissue (Young et al., 1980). This zinc accumulation has been reported to be detectable before plugs formation and Blight symptoms development (Smith, 1974 & Wutscher et al., 1977 in Derrick and Timmer, 2000) and measurement of abnormal zinc concentrations is one of the methods that has been used for the identification of diseased trees (Albrigo and Young, 1979).

On the other hand, root grafting, which allows the experimental transmission of the disease, is not used as a diagnostic method due to the long incubation period (18–24 months) needed for symptoms development (EPPO datasheet).

The detection by serological assays in extracts of roots or leaves of specific pathogenesis-related proteins (Derrick et al., 1990), referred to as Blight-associated proteins (BAPs), has also been reported to distinguish between Blight from other forms of decline (Bausher and Sweeney, 1991; Derrick et al., 1992).

Recently, an RT-PCR technique has been developed for the detection of CBaPRV RNA sequences (Roy et al., 2016), However, this method is not yet published so that uncertainties remain about the validity and effectiveness of this approach for Blight detection.

Overall, Blight and blight-like diseases diagnosis is difficult and associated with uncertainties, as no method is available to identify diseased trees in the absence of symptoms. Only a combination of several indirect diagnostic approaches such as the observation of a general decline and wilting, the detection of elevated zinc levels in trunk wood and bark, a reduced water flow as evaluated by the 'syringe injection test', the presence of amorphous plugs in the xylem and the presence of BAPs can be used to achieve a level of confidence in Blight identification (Derrick and Timmer, 2000). This combination of indirect approaches does not allow, however, the identification of Blight-affected trees in a presymptomatic phase. In particular, the absence of symptoms in young (< 4 years old) trees precludes Blight detection in their case, limiting the ability to apply quarantine measures for this disease.

3.2. Pest distribution

3.2.1. Pest distribution outside the EU

Blight and blight-like diseases have been reported from North, Central and South America, Africa and Oceania (Table 2, Figure 1). Given the difficulties associated with the unambiguous diagnostics of Blight and of the various blight-like diseases, this distribution should, however, be considered as carrying significant uncertainty.

Table 2: Global distribution of the 'Citrus Blight agent' (extracted from EPPO Global Database, accessed 1st of December 2017)

Africa	Mozambique	Present, no details
Africa	South Africa	Present, no details
America	Argentina	Present, no details
America	Belize	Present, no details
America	Brazil	Present, restricted distribution
America	Colombia	Present, no details
America	Costa Rica	Present, no details
America	Cuba	Present, no details
America	Dominican Republic	Present, no details
America	Guatemala	Present, no details
America	Mexico	Present, restricted distribution
America	Suriname	Present, no details
America	United States of America	Present, restricted distribution
America	Uruguay	Present, no details
America	Venezuela	Present, no details
Oceania	Australia	Present, restricted distribution

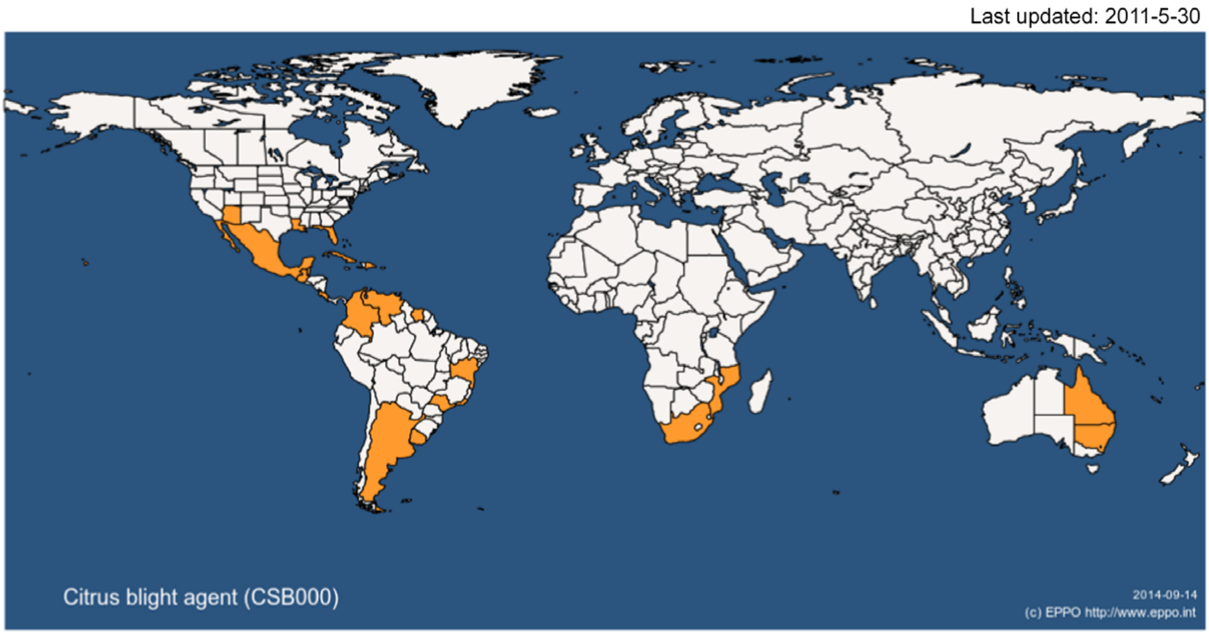

Figure 1: Global distribution of the "Citrus Blight agent" (extracted from EPPO Global Database, accessed, 1st December 2017)

3.2.2. Pest distribution in the EU

Is the pest present in the EU territory? If present, is the pest widely distributed within the EU?
NO

Blight is not known to occur in the EU. As a consequence, 'Blight and blight-like' does not fulfil the presence in the EU territory criterion to qualify as a Union RNQP.

3.2.3. Vectors and their distribution

The mechanism(s) of spread of Blight is(are) not currently known. Some epidemiological elements have suggested the possible existence of (an) aerial vector(s), in particular the initial random distribution of diseased trees in affected groves (Bar-Joseph, 1999; Derrick and Timmer, 2000) and the observation that the incidence of Blight was reduced by insecticide applications (Adlerz et al., 1989). However, this information remains highly circumstantial and the hypothesis of the existence of vector (s) should be considered highly uncertain.

3.3. Regulatory status

3.3.1. Council Directive 2000/29/EC

'Blight and blight-like' is currently regulated in Directive 2000/29 EC (Table 3).

Table 3: "Blight and blight-like" in Council Directive 2000/29/EC

Annex II, Part A	**Harmful organisms whose introduction into, and spread within, all member states shall be banned if they are present on certain plants or plant products**	
Section I	**Harmful organisms not known to occur in the community and relevant for the entire community**	
(d)	Virus and virus-like organisms	
	Species	Subject of contamination
3.	Blight and blight-like	Plants of *Citrus* L., *Fortunella* Swingle, *Poncirus* Raf., and their hybrids, other than fruit and seeds

3.3.2. Legislation addressing plants and plant parts on which Blight and blight-like is regulated (Table 4)

Table 4: Regulated hosts and commodities that may involve Blight and blight-like in Annexes III, IV and V of Council Directive 2000/29/EC

Annex III, Part A	Plants, plant products and other objects the introduction of which shall be prohibited in all member states
Description	Country of origin
16. Plants of *Citrus* L., *Fortunella* Swinlge, *Poncirus* Raf., and their hybrids, other than fruit and seeds	Third countries
Annex IV, Part A	**Special requirements which must be laid down by all member states for the introduction and movement of plants, plant products and other objects into and within all member states**
Section I	Plants, plant products and other objects originating outside the community
Plants, plant products and other objects	Special requirements
16.1 Fruits of *Citrus* L., *Fortunella* Swingle, *Poncirus* Raf., and their hybrids, originating in third countries	The fruits shall be free from peduncles and leaves and the packaging shall bear an appropriate origin mark.
Section II	Plants, plant products and other objects originating in the community
Plants, plant products and other objects	Special requirements
30.1 Fruits of *Citrus* L., *Fortunella* Swingle, *Poncirus* Raf., and their hybrids	The packaging shall bear an appropriate origin mark
Annex V **Part B**	Plants, plant products and other objects which must be subject to a plant health inspection (at the place of production if originating in the community, before being moved within the community — in the country of origin or the consignor country, if originating outside the community) before being permitted to enter the community Plants, plant products and other objects originating in territories, other than those territories referred to in part A. I. Plants, plant products and other objects which are potential carriers of harmful organisms of relevance for the entire Community
	1. Plants, intended for planting, other than seeds but including seeds of .... *Citrus* L., *Fortunella* Swingle and *Poncirus* Raf., and their hybrids .... 3. Fruits of: – *Citrus* L., *Fortunella* Swingle, *Poncirus* Raf., and their hybrids.....

3.4. Entry, establishment and spread in the EU

3.4.1. Host range

Blight affects all citrus species, cultivars, rootstock–scion combinations and seedlings but to varying extents since susceptibility is variable. Sweet oranges and grapefruits are more susceptible than lemons and mandarins (EPPO datasheet). All affected trees show severe symptoms; however, the rootstock used affects the timing of first symptoms onset and disease development, from a few years in the more susceptible cases to tens of years in the more tolerant ones (Derrick and Timmer, 2000). Trees grafted on rough lemon (*Citrus jambhiri*), rangpur lime (*Citrus limonia*), tangor (*Citrus nobilis*), trifoliate orange (*Poncirus trifoliata*) and Carrizo citrange (*Citrus sinensis x P. trifoliata*) rootstocks are very susceptible, those on alemow (*Citrus macrophylla*), Volkamer lemon (*C. volkameriana*) and *Citroncitrus x webberi* are susceptible, while those grown on sweet orange (*C. sinensis*), sour orange (*C. aurantium*) and Cleopatra mandarin (*Citrus reshni*) are more tolerant (Agostini and Haberle, 2000;

Derrick and Timmer, 2000; Roberts and Brlansky, 2016; EPPO Datasheet). Swingle citrumelo (*Citrus paradisii x P. trifoliata*) is also listed as tolerant; however, there appears to be an increase in Blight incidence on that rootstock.

It should be stressed that, in the absence of efficient diagnostics (see Section 3.1.4) and experimental transmission procedures (see Sections 3.1.1 and 3.1.2), all efforts to evaluate citrus susceptibility to Blight are associated with significant uncertainty. All citrus hosts of Blight are covered by the existing legislation and there are no known non-citrus hosts of Blight.

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 but only through minor pathways such as illegal import since the citrus plants for planting pathway is closed by existing legislation

Given that Blight has been transmitted by root grafting (Tucker et al., 1984; Rossetti et al., 1991 and Marais and Lee, 1991 cited in Derrick and Timmer, 2000) the movement of rootstocks or of grafted trees could conceivably allow the entry of Blight in the EU territory. However, the citrus plants for planting pathway are closed by existing legislation.

The few experiments performed seem to rule out the possibility of spread of Blight by seed transmission in citrus (reviewed in Derrick and Timmer, 2000). There is currently no evidence for the existence of alternative, non-citrus hosts of Blight and, as outlined in Section 3.4.1, no precise information on the possible existence of vector(s).

Overall, Blight is only considered to be able to enter through minor pathways such as the illegal import of citrus plants.

Between 1995 and 20 October 2017, there were no records of interception of 'Blight and blight-like' in the Europhyt database.

3.4.3. Establishment

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

YES *but with high uncertainty*

3.4.3.1. EU distribution of main host plants

Citrus sp. hosts of Blight are commercially grown for citrus fruit production (oranges, mandarins, lemons...) in eight MSs of the EU. In order of decreasing production, they are Spain, Italy, Greece, Portugal, Cyprus, Croatia, Malta and France. In addition, plants of *Citrus, Fortunella* and *Poncirus* are grown as ornamentals, either in the open or under protected cultivation in a number of MS (Table 5).

Table 5: Area of citrus production (in 1,000 ha) in Europe according to the Eurostat database (Crop statistics apro_acs_a, extracted on 20 June 2017)

GEO/TIME	2012	2013	2014	2015	2016
Spain	310.50	306.31	302.46	298.72	295.33
Italy	146.79	163.59	140.16	149.10	141.22
Greece	50.61	49.88	49.54	46.92	44.72
Portugal	19.85	19.82	19.80	20.21	20.21
France	3.89	4.34	4.16	4.21	4.70
Cyprus	3.21	2.63	2.69	2.84	3.29
Croatia	1.88	2.17	2.17	2.21	2.18

3.4.3.2. Climatic conditions affecting establishment

There are indications that Blight preferentially affects citrus grown in more humid areas and that it is more common and more severe in warmer areas (discussed in Derrick and Timmer, 2000). However, in the absence of precise experimental data and of information on the identity of the Blight causal agent(s) or on the existence of potential vector(s), it is not possible to evaluate whether conditions prevailing in EU citrus-growing areas could potentially have a limiting effect on the development of Blight. The wide distribution of Blight suggests nevertheless that Blight establishment should be possible in a least some parts of the EU citrus growing areas.

Is the pest able to spread within the EU territory following establishment? (Yes or No) How?
YES *but with high uncertainty*
RNQPs: Is spread mainly via specific plants for planting, rather than via natural spread or via movement of plant products or other objects?
Since the precise mechanism(s) of Blight spread is(are) not known, it is not possible to conclude whether citrus plants for planting would represent the main means of Blight spread if it was to be introduced in the EU

3.4.4. Spread

The mechanism(s) of spread of Blight, whether locally within a grove or more distantly between groves, regions or countries is (are) not currently known. Some epidemiological observations have suggested the possible existence of (an) aerial vector(s) (see Section 3.2.3). However, this information remains highly circumstantial and the hypothesis of the existence of vector(s) should be considered highly uncertain. In addition, if accepting the hypothesis of Blight being caused by activation of BCaPRV integrated sequences, it should be considered that the apparent spread of Blight in a grove might in fact reflect an erratic activation process.

In view of the fact that efforts at above-ground graft transmission of Blight have repeatedly failed (reviewed in Derrick and Timmer, 2000), it is unlikely that budwood and grafting could represent a means of spread. Despite some uncertainties, the few experiments performed seem to rule out the possibility of spread by seed transmission in citrus (reviewed in Derrick and Timmer, 2000). However, given that Blight has been transmitted by root grafting (Tucker et al., 1984; Rossetti et al., 1991 and Marais and Lee, 1991 cited in Derrick and Timmer, 2000), the movement of rootstocks or of grafted trees could conceivably allow the spread of Blight. In addition, root grafts, which occur naturally between neighbouring trees in groves, have been suspected to represent a local natural spread mechanism (Derrick and Timmer, 2000).

Taken together, this limited information suggests that if introduced in the EU, Blight may be able to spread locally by root grafting to neighbouring citrus plants. It may also conceivably spread to more distant areas through the movement of contaminated plants for planting. However, given the very limited information on the biology and epidemiology of the Blight causal agent(s), these conclusions obviously carry a large uncertainty.

3.5. Impacts

Would the pests' introduction have an economic or environmental impact on the EU territory?
YES, the introduction of Blight would have a negative impact in the EU territory but there are large uncertainties on the magnitude of this impact
RNQPs: Does the presence of the pest on plants for planting have an economic impact, as regards the intended use of those plants for planting?[4]
YES

Citrus Blight is a very serious disease affecting citrus species in the Americas and a few other parts of the world and millions of trees have been lost to Blight (Derrick and Timmer, 2000). Blight causes a general decline of the tree canopy with wilt, leaf loss, twig dieback and poor growth flushes. In the most susceptible citrus species, the Blight decline only becomes evident after 4–6 years while younger trees never show symptoms. Initial symptoms are stagnating growth, a mild wilting and leaf loss with a greyish cast to the canopy. Early symptoms are followed by a more severe and permanent wilt, leaf drop, twig dieback and only small fruits are produced (Albrigo and Young, 1979). Climate or edaphic factors as well as horticultural practices are also known to influence the development and severity of symptoms (Donadio and Banzato, 1988; Marais and Lee, 1991; Agostini and Haberle, 2000).

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

Blight is a severe disease and Blight-affected trees do not recover. All citrus species are susceptible to the disease, but the susceptibility of rootstocks varies, determining the pace and severity of symptom development and consequently yield loss (Bar-Joseph, 1999; Derrick and Timmer, 2000; EPPO datasheet). Indeed differences in susceptibility of citrus rootstocks (Castle and Baldwin, 1995; Castle and Stover, 2000) may render difficult the identification of Blight symptoms. In a trial with 26 rootstock varieties in Argentina, Agostini and Haberle (2000) identified rootstocks with various responses to the 'declinamiento' disease and identified tolerant and vigorously growing rootstocks that despite being infected resulted in sustained yields.

Blight is a very severe disease and a negative impact is expected should it be introduced in the EU. However, given the high uncertainties about its mechanism(s) of spread, it is extremely difficult to predict the magnitude of this negative impact. In this respect, it is important to consider that after the spread of *Citrus tristeza virus* in the Mediterranean, all EU citrus states have started to replant citrus orchards on citranges, *C. macrophylla* and *C. volkameriana* all of which are susceptible or highly susceptible to Blight (see Section 3.4.1).

The presence of Blight in Citrus plants for planting inevitably has severe impact for the crop and production of fruits. The current limitations to adequate and early disease diagnosis, the long latency period with symptom expression only in more than 4-year-old plants that eventually succumb to the disease emphasise the losses due to Blight and its economic impact.

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?

No. The citrus plants for planting pathway is already closed by existing legislation

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

No. As long as the identity of the citrus Blight causal agent(s) remains unknown, there is no diagnostic procedure for young trees.

3.6.1. Phytosanitary measures

There are no additional phytosanitary measures available. The citrus plants for planting, the most important pathway, are already closed by existing legislation.

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

- The identification of diseased trees requires the development of symptoms. Young infected trees (< 4 years old) do not exhibit any disease symptom and therefore cannot be identified.
- Water stress or other biotic diseases (nematodes, root weevils or beetles, viruses, bacterial and fungal rots) may cause symptoms similar to those of Blight.
- The long incubation period needed for the development of symptoms (18–24 month; Derrick and Timmer, 2000) limits visual inspection efficiency and the interest of root grafting as a detection method.
- There is no single detection method for the reliable identification of Blight-affected trees, and a combination of several indirect approaches is needed to increase diagnosis confidence.

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

- The identification of diseased trees requires the development of symptoms. Young infected trees (< 4 years old) do not exhibit any disease symptom and therefore cannot be identified.

3.6.2. Pest control methods

- Use of certified trees grafted on less susceptible rootstocks [Swingle citrumelo (*P. trifoliata* x *C. paradisi*), Cleopatra mandarin (*C. reshni*), Empress mandarin (*Citrus reticulata*)].[5] Avoiding the use of rough lemon (*C. jambhiri*) and of other highly susceptible rootstocks.
- Eradication of diseased trees.
- Antibiotics and fungicide injections are inefficient (Lee et al., 1982; Timmer et al., 1985).

3.7. Uncertainty

Since the identity of the causal agent(s) of the Blight and blight-like disease(s) and the existence and the efficiency of natural spread mechanism(s) remain unknown, there are large uncertainties affecting all aspects of this pest categorisation.

4. Conclusions

Of the criteria evaluated by EFSA to qualify as a Union QP, and while 'Blight and blight-like' causal agent(s) remain(s) unknown, its(their) transmissibility and ability to produce consistent (even though poorly specific) symptoms have been demonstrated and therefore 'Blight and blight-like' qualify as a Union QP. It does not meet the RNQP criterion of being present in the EU or, possibly, of plants for planting being the main spread mechanism (Table 6).

Table 6: The Panel's conclusions on the pest categorisation criteria defined in Regulation (EU) 2016/2031 on protective measures against pests of plants (the number of the relevant sections of the pest categorisation is shown in brackets in the first column)

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest	Key uncertainties
Identity of the pest (Section 3.1)	The identity of the 'Blight and blight-like' causal agent(s) remains unknown, but its (their) transmissibility and ability to produce consistent (but poorly specific) symptoms have been demonstrated. A combination of indirect approaches is used to distinguish Blight from other forms of decline. A specific detection assay is available for CBaPRV	The identity of the 'Blight and blight-like' causal agent(s) remains unknown, but its (their) transmissibility and ability to produce consistent (but poorly specific) symptoms have been demonstrated. A combination of indirect approaches is used to distinguish Blight from other forms of decline. A specific detection assay is available for CBaPRV	Exact nature of the diseases covered by the 'blight-like' term and their precise geographic distribution. 'Blight and blight-like' causal agent(s) are not identified so far. The absence of a detection method for young (<4 years) and presymptomatic trees Causal role of CBaPRV in the 'blight and blight like' diseases
Absence/ presence of the pest in the EU territory (Section 3.2)	'Blight and blight-like' is not known to be present in the EU	'Blight and blight-like' is not known to be present in the EU. It, therefore does not fulfil the presence in the EU territory criterion to qualify as a Union RNQP	'Blight and blight-like' presence in the EU given poor specificity of symptoms and difficulties of diagnostics. No information available on the presence of CBaPRV

[5] Sweet orange and sour orange have not been recently recommended because of susceptibility to Phytophthora root rot and tristeza, respectively. Similarly, the use of Swingle citrumelo has not been recommended recently because of an increase of disease impact on this rootstock which was previously regarded as tolerant (Roberts and Brlansky, 2016).

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
Regulatory status (Section 3.3)	'Blight and blight-like' is currently regulated in directive 2000/29 EC. CBaPRV is not specifically mentioned in the existing legislation	'Blight and blight-like' is currently regulated in directive 2000/29 EC. CBaPRV is not specifically mentioned in the existing legislation	The exact nature, distribution and biology of diseases covered by the 'blight-like' term. The causal role of CBaPRV in the 'blight and blight like' diseases. The existence of alternative hosts of 'blight and blight-like' disease(s) that are not covered by the legislation
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	'Blight and blight-like' has the potential to enter, establish and spread in the EU territory but with high uncertainties. However, the main pathway for entry is closed by the existing legislation so that entry is only possible on minor pathways (e.g. illegal trade)	Since the precise mechanism (s) of 'Blight and blight-like' spread is(are) not known, it is not possible to conclude on whether Citrus plants for planting could represent the main means of Blight spread if it was to be introduced in the EU	Biology and mechanism(s) of spread.
Potential for consequences in the EU territory (Section 3.5)	'Blight and blight-like' introduction and spread in the EU would have negative consequences on the EU citrus industry. The magnitude of this impact is, however, very difficult to estimate	Because of its severity, the presence of 'Blight and blight-like' on plants for planting would have a negative impact on their intended use	Existence and efficiency under the EU conditions of the potential mechanism(s) of spread
Available measures (Section 3.6)	The citrus plants for planting pathway are already closed by existing legislation	As long as the identity of the 'Blight and blight-like' causal agent(s) remains unknown, there is no diagnostic procedure for young trees	Uncertainties on the identity of the pest(s), on its(their) biology and on its(their) potential spread mechanism(s)
Conclusion on pest categorisation (Section 4)	Of the criteria evaluated by EFSA to qualify as a Union quarantine pest, and while 'Blight and blight-like' causal agent(s) remain(s) unknown, its(their) transmissibility and ability to produce consistent (even though poorly specific) symptoms have been demonstrated and therefore 'Blight and blight-like' qualify as a Union QP	Of the criteria evaluated by EFSA to qualify as a Union RNQP, 'Blight and blight-like' does not meet the criteria of being present in the EU or, possibly, of plants for planting being the main spread mechanism	
Aspects of assessment to focus on/ scenarios to address in future if appropriate	The key uncertainties of this categorisation concern: • The exact nature and the precise geographic distribution of the 'blight and blight-like' disease(s) • The identity and biology of the causal agent(s) and the role of CBaPRV • The potential existence and efficiency of natural spread mechanism(s) • The existence of alternative hosts of the disease(s) not covered by the legislation. **These uncertainties are unlikely to be resolved until further research results become available**		

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Abbreviations

BAPs	Blight-associated proteins
BSV	*Banana streak virus*
CBaPRV	Citrus Blight-associated pararetrovirus
CitPRV	Citrus endogenous pararetrovirus
CSD	Citrus sudden death
EPPO	European and Mediterranean Plant Protection Organization
EPR	endogenous pararetrovirus
EPRVs	endogenous pararetroviruses
EVEs	endogenous viral elements
FAO	Food and Agriculture Organization
HTS	High-Throughput Sequencing
IPPC	International Plant Protection Convention
MS	Member State
PLH	EFSA Panel on Plant Health
PVCV	*Petunia vein clearing virus*
QP	quarantine pest
RNQP	regulated non-quarantine pest
RT-PCR	Reverse transcription polymerase chain reaction
TFEU	Treaty on the Functioning of the European Union
ToR	Terms of Reference