

ADOPTED: 27 September 2017

doi: 10.2903/j.efsa.2017.5036

Pest categorisation of *Puccinia pittieriana*

EFSA Panel on Plant Health (PLH),

Michael Jeger, Claude Bragard, David Caffier, Thierry Candresse, 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, Gregor Urek, Ariena Van Bruggen, Wopke Van der Werf, Jonathan West, Stephan Winter, Irene Vloutoglou, Bernard Bottex and Vittorio Rossi

Abstract

The Panel on Plant Health performed a pest categorisation of *Puccinia pittieriana*, the causal agent of common rust of potato, for the EU. The pathogen is a single taxonomic entity and reliable methods exist for its detection and identification. Cultivated potato (*Solanum tuberosum*) and tomato (*Solanum lycopersicum*) are the main hosts of *P. pittieriana*. Some wild solanaceous plants can also be affected by the pathogen. *P. pittieriana* is present in countries of South and Central America (most commonly at elevations of 3,000–4,000 m), but uncertainty exists about its presence in Bolivia and Paraguay. The pathogen is not known to occur in the EU and is listed in Annex IIAI of Directive 2000/29/EC. *P. pittieriana* could potentially enter the EU mainly on living host plants and infested soil attached to potato tubers originated in infested areas. Potato and tomato crops are widely distributed in the EU and the prevailing climatic conditions, at least in part of the risk assessment area, are suitable for the establishment and spread of the pathogen. There is uncertainty on the yield/quality losses currently caused by the pathogen in the infested areas. Nevertheless, it is expected that the introduction and spread of *P. pittieriana* in the EU could impact potato and tomato production, although the magnitude is unknown. Cultural practices and chemical measures may reduce the inoculum sources but they cannot eliminate the pathogen. Phytosanitary measures are available to mitigate the risk of introduction and spread of the pathogen in the EU. *P. pittieriana* meets all the criteria assessed by EFSA for consideration as a potential Union quarantine pest. As *P. pittieriana* is not known to occur in the EU, this criterion assessed by EFSA to consider it as a Union regulated non-quarantine pest is not met.

© 2017 European Food Safety Authority. *EFSA Journal* published by John Wiley and Sons Ltd on behalf of European Food Safety Authority.

Keywords: common rust of potato, European Union, pest risk, plant health, plant pest, quarantine

Requestor: European Commission

Question number: EFSA-Q-2017-00332

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.

Suggested citation: EFSA PLH Panel (EFSA Panel on Plant Health), Jeger M, Bragard C, Caffier D, Candresse T, Chatzivassiliou E, Dehnen-Schmutz K, Gilioli G, Gregoire J-C, Jaques Miret JA, MacLeod A, Navajas Navarro M, Niere B, Parnell S, Potting R, Rafoss T, Urek G, Van Bruggen A, Van der Werf W, West J, Winter S, Vloutoglou I, Bottex B and Rossi V, 2017. Pest categorisation of *Puccinia pittieriana*. EFSA Journal 2017;15(11):5036, 22 pp. <https://doi.org/10.2903/j.efsa.2017.5036>

ISSN: 1831-4732

© 2017 European Food Safety Authority. *EFSA Journal* published by John Wiley and Sons Ltd on behalf of European Food Safety Authority.

This is an open access article under the terms of the [Creative Commons Attribution-NoDerivs License](#), which permits use and distribution in any medium, provided the original work is properly cited and no modifications or adaptations are made.

Figure 1: © EPPO; Figure 2: © CABI



The EFSA Journal is a publication of the European Food Safety Authority, an agency of the European Union.



Table of contents

Abstract.....	1
1. Introduction.....	4
1.1. Background and Terms of Reference as provided by the requestor.....	4
1.1.1. Background.....	4
1.1.2. Terms of Reference.....	4
1.1.2.1. Terms of Reference: Appendix 1.....	5
1.1.2.2. Terms of Reference: Appendix 2.....	6
1.1.2.3. Terms of Reference: Appendix 3.....	7
1.2. Interpretation of the Terms of Reference.....	8
2. Data and methodologies.....	8
2.1. Data.....	8
2.1.1. Literature search.....	8
2.1.2. Database search.....	9
2.2. Methodologies.....	9
3. Pest categorisation.....	11
3.1. Identity and biology of the pest.....	11
3.1.1. Identity and taxonomy.....	11
3.1.2. Biology of the pest.....	11
3.1.3. Intraspecific diversity.....	12
3.1.4. Detection and identification of the pest.....	12
3.2. Pest distribution.....	12
3.2.1. Pest distribution outside the EU.....	12
3.2.2. Pest distribution in the EU.....	14
3.3. Regulatory status.....	14
3.3.1. Council Directive 2000/29/EC.....	14
3.3.2. Legislation addressing the hosts of <i>Puccinia pittieriana</i>	14
3.4. Entry, establishment and spread in the EU.....	15
3.4.1. Host range.....	15
3.4.2. Entry.....	15
3.4.3. Establishment.....	16
3.4.3.1. EU distribution of main host plants.....	16
3.4.3.2. Climatic conditions affecting establishment.....	17
3.4.4. Spread.....	18
3.4.4.1. Vectors and their distribution in the EU (if applicable).....	18
3.5. Impacts.....	18
3.6. Availability and limits of mitigation measures.....	19
3.6.1. Biological or technical factors limiting the feasibility and effectiveness of measures to prevent the entry, establishment and spread of the pest.....	19
3.6.2. Control methods.....	19
3.7. Uncertainty.....	20
4. Conclusions.....	20
References.....	21
Abbreviations.....	22

1. Introduction

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

1.1.1. Background

Council Directive 2000/29/EC¹ 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) 2016/2031² 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

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

(b) Bacteria

Citrus variegated chlorosis	<i>Xanthomonas campestris</i> pv. <i>oryzae</i> (Ishiyama)
<i>Erwinia stewartii</i> (Smith) Dye	Dye and pv. <i>oryzicola</i> (Fang, et al.) Dye

(c) Fungi

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

(d) Virus and virus-like organisms

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 mycoplasma
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

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

(b) Bacteria

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

(c) Fungi

Glomerella gossypii Edgerton

Hypoxyton mammatum (Wahl.) J. Miller

Gremmeniella abietina (Lag.) Morelet

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) <i>Carneocephala fulgida</i> Nottingham | 3) <i>Graphocephala atropunctata</i> (Signoret) |
| 2) <i>Draeculacephala minerva</i> Ball | |

Group of Tephritidae (non-EU) such as:

- | | |
|--|---|
| 1) <i>Anastrepha fraterculus</i> (Wiedemann) | 12) <i>Pardalaspis cyanescens</i> Bezzi |
| 2) <i>Anastrepha ludens</i> (Loew) | 13) <i>Pardalaspis quinaria</i> Bezzi |
| 3) <i>Anastrepha obliqua</i> Macquart | 14) <i>Pterandrus rosa</i> (Karsch) |
| 4) <i>Anastrepha suspensa</i> (Loew) | 15) <i>Rhacochlaena japonica</i> Ito |
| 5) <i>Dacus ciliatus</i> Loew | 16) <i>Rhagoletis completa</i> Cresson |
| 6) <i>Dacus curcurbitae</i> Coquillet | 17) <i>Rhagoletis fausta</i> (Osten-Sacken) |
| 7) <i>Dacus dorsalis</i> Hendel | 18) <i>Rhagoletis indifferens</i> Curran |
| 8) <i>Dacus tryoni</i> (Froggatt) | 19) <i>Rhagoletis mendax</i> Curran |
| 9) <i>Dacus tsuneonis</i> Miyake | 20) <i>Rhagoletis pomonella</i> Walsh |
| 10) <i>Dacus zonatus</i> Saund. | 21) <i>Rhagoletis suavis</i> (Loew) |
| 11) <i>Epochra canadensis</i> (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 | 8) Peach yellows mycoplasma |
| 2) Cherry rasp leaf virus (American) | 9) Plum line pattern virus (American) |
| 3) Peach mosaic virus (American) | 10) Raspberry leaf curl virus (American) |
| 4) Peach phony rickettsia | 11) Strawberry witches' broom mycoplasma |
| 5) Peach rosette mosaic virus | 12) Non-EU viruses and virus-like organisms of <i>Cydonia</i> Mill., <i>Fragaria</i> L., <i>Malus</i> Mill., <i>Prunus</i> L., <i>Pyrus</i> L., <i>Ribes</i> L., <i>Rubus</i> L. and <i>Vitis</i> L. |
| 6) Peach rosette mycoplasma | |
| 7) Peach X-disease mycoplasma | |

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

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

(b) Fungi

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

(c) Viruses and virus-like organisms

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

(d) Parasitic plants

Arceuthobium spp. (non-EU)

Annex I A II

(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

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

2. Data and methodologies

2.1. Data

2.1.1. Literature search

A search of literature (1997–2017) in Web of Science and Scopus was conducted at the beginning of the categorisation. The search focussed on *Puccinia pittieriana* and its geographic distribution, life cycle, host plants and the damage it causes. The following search terms (TS) and combinations were used: TS = (("Puccinia pittieriana" OR "common potato rust" OR "potato common rust" OR "potato rust" OR "rust of potato" OR "tomato rust") AND (Solanaceae OR Solanum OR Potato OR Tomato) AND (geograph* OR distribution OR "life cycle" OR lifecycle OR damag*)).

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 Member States and the phytosanitary measures taken to eradicate or avoid their spread.

2.2. Methodologies

The Panel performed the pest categorisation for *P. pittieriana*, following guiding principles and steps presented in the EFSA guidance on the harmonised framework for pest risk assessment (EFSA PLH Panel, 2010) and as defined in the International Standard for Phytosanitary Measures No 11 (FAO, 2013) and No 21 (FAO, 2004).

In accordance with the guidance on a harmonised framework for pest risk assessment in the EU (EFSA PLH Panel, 2010), this work was initiated following an evaluation of the EU's plant health regime. Therefore, to facilitate the decision-making process, in the conclusions of the pest categorisation, the Panel addresses explicitly each criterion for a Union quarantine pest and for a Union regulated non-quarantine pest 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 quarantine pest may still qualify as a regulated non-quarantine pest 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)
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?

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
Conclusion of pest categorisation (Section 4)	A statement as to whether (1) all criteria assessed by EFSA above for consideration as a potential quarantine pest were met and (2) if not, which one(s) were not met	A statement as to whether (1) all criteria assessed by EFSA above for consideration as potential protected zone quarantine pest were met, and (2) if not, which one(s) were not met	A statement as to whether (1) all criteria assessed by EFSA above for consideration as a potential regulated non-quarantine pest were met, and (2) if not, which one(s) were not met

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

3. Pest categorisation

3.1. Identity and biology of the pest

3.1.1. Identity and taxonomy

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

YES, *P. pittieriana* is a well-established fungal pathogen.

Puccinia pittieriana is a well-established fungus of the family Pucciniaceae. According to Index Fungorum database (www.indexfungorum.org) and Chalkley (2017), the pathogen has the following taxonomical identification:

Preferred scientific name: *Puccinia pittieriana* Henn. 1904

Family – Pucciniaceae

Genus – *Puccinia*

Species – *pittieriana*

Preferred common name: common rust of potato

Other common names: common potato rust; potato common rust; potato rust; rust of potato; tomato rust.

3.1.2. Biology of the pest

Puccinia pittieriana is a microcyclic (short-cycle) rust fungus that survives as teliospores on overlapping potato crops, on solanaceous weeds and/or on volunteer host plants. Teliospores may persist in plant debris and in soil adherent to potato tubers, but the longevity of their survival has not been determined (EPPO, 1988). *In vitro* and at temperatures below 15°C, teliospores germinate in 1 h to produce a basidium (promycelium), which gives rise to four basidiospores (sporidia) in 3–24 h. At temperatures above 15°C, the basidium usually continues to grow vegetatively without forming basidiospores (CABI, 2015). When detached, basidiospores germinate immediately to infect susceptible host plants. At temperatures ≤ 16°C, the first symptoms (lesions) appear in 14–16 days on potato plants. Lesions fully develop in 20–25 days. Teliospores mature in 30–40 days after inoculation (French, 1981, 2001a). Average temperatures around 10°C with 10–12 h of free moisture on plant surfaces are necessary for the development of the disease and the spread of the pathogen (French, 1981, 2001a; CABI, 2015). The inoculum (basidiospores) produced on earlier sown host crops or wild host plants, is disseminated by the wind (Laundon and Rainbow, 1971).

3.1.3. Intraspecific diversity

Rust fungi of the order Pucciniales usually form *Formae speciales* and races (Bettgenhaeuser et al., 2014). However, no information exists referring to *P. pittieriana*.

3.1.4. Detection and identification of the pest

Are detection and identification methods available for the pest?

YES, the pathogen can be detected and identified based on symptomatology and morphological characteristics of its fructifications

Detection and identification of the pathogen is based on symptomatology and morphological characteristic of signs (fructifications or sori) produced on the affected host plants (French, 2001a; CABI, 2015). At least one sequence for the LSU region of rDNA is publicly available (NCBI, 2009).

Symptoms

Except for seeds, all the aerial parts of the potato plants (i.e. stems, leaves, petioles, flowers and fruit) can be affected by the pathogen (French, 2001a). The pathogen is not known to occur on tubers, true seeds, seedlings or micropropagated host plants (CABI, 2015). Symptoms first appear on the underside of leaves as minute, round (occasionally elongate), greenish-white spots, 3–4 mm in diameter, although their size varies depending on the *Solanum* host species and possibly the pathogen race (Castaño, 1952). Some lesions become elongated with their longer axes reaching 8 mm (French, 1981, 2001a). They later turn to cream colour, with reddish centres, then tomato-red, and finally, rusty-red to coffee-brown. Subsequently, the lesions protrude by 1–3 mm, with corresponding depressions on the upper leaf surface, and may be surrounded by chlorotic or necrotic halos. Defoliation results when hundreds of lesions form on a leaf. Elongated or irregular lesions occur on petioles and stems (French, 2001a). For more details, see Kern (1933); Laundon and Rainbow (1971) and French (2001a).

The pathogen can easily be identified on tomato plants showing rust symptoms and signs as common rust of potato is the only rust affecting tomato (CABI, 2015). There is no information about tomato fruits being affected by the pathogen.

Potato is affected by both, common rust of potato and deforming rust (caused by *Aecidium cantensis*). Nevertheless, the two diseases cause different symptoms and signs (fructifications). More specifically, common rust of potato produces typical telia in lesions on leaves and stems, whereas deforming rust produces saucer-shaped aecia and causes leaf and stem distortion (French, 2001a,b). Additional rust fungi reported on *Solanum* species, other than cultivated potato, are described and illustrated by Kern (1933) and Pardo-Cardona (2002). These are differentiated primarily by minor differences in teliospore morphology. *Puccinia solani-tristis* is reported on a number of wild *Solanum* species in Brazil (Mendes et al., 1998); this pathogen and eight other *Puccinia* species are reported from Colombia (Pardo-Cardona, 2002).

Morphology

P. pittieriana produces teliospores and basidiospores (sporidia). Sori are hypophyllous, up to 5 mm in diameter, often fusing and gregarious (CABI, 2015). Teliospores are one-septate, broadly ellipsoid to ovoid, slightly constricted at the septum, smooth, orange to brown and 16–25 × 20–35 µm. The pedicels are 60 × 6 µm and the hyaline basidiospores are 8–18 × 11–25 µm. Single-celled mesospores are occasionally present (Kern, 1933; French, 1981). For further details, see Laundon and Rainbow (1971) and French (2001a).

3.2. Pest distribution

3.2.1. Pest distribution outside the EU

Puccinia pittieriana is indigenous to Central and South America (Figure 1), where it occurs in restricted mountain valleys of the cool highlands. The disease is most common at elevations of 3,000–4,300 m, although it has been also reported from a lower, warmer valley of Peru, at an elevation of 2,700 m (French, 1981). *P. pittieriana* has not been reported from other continents (Table 2).

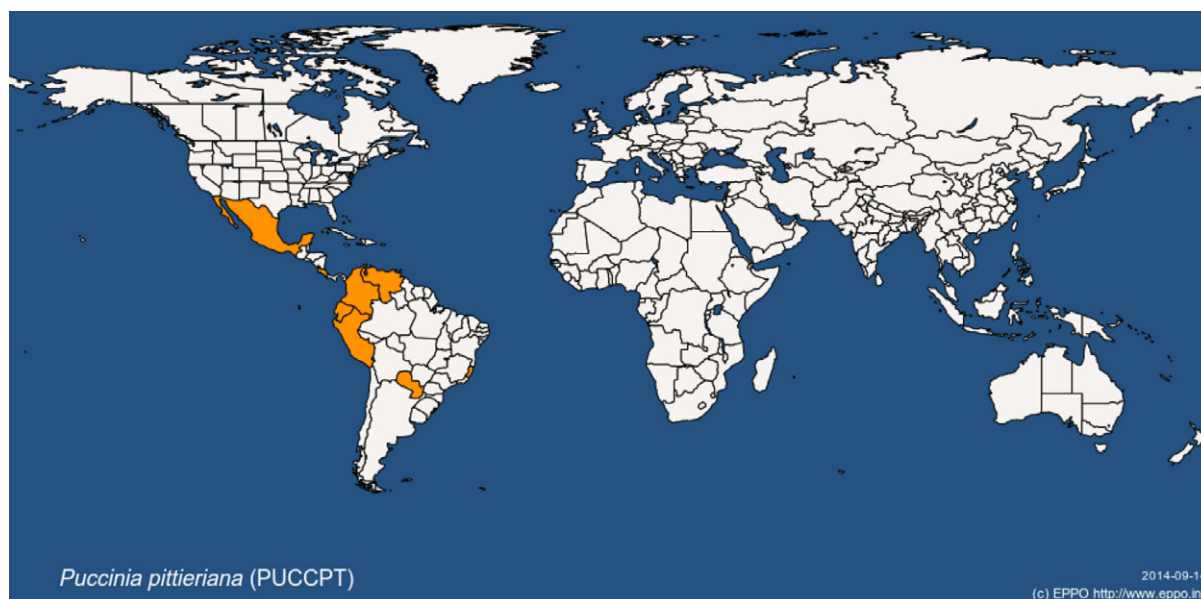


Figure 1: Global distribution map for *Puccinia pittieriana*, extracted from EPPO Global Database (last updated: 14/9/2014; last accessed: 20/8/2017)

Table 2: Global distribution of *Puccinia pittieriana* based on information extracted from the EPPO Global Database (last updated: 14/9/2014; last accessed: 20/8/2017) and CABI Invasive Species Compendium (last updated: 20/1/2015; last accessed: 20/8/2017)

Continent	Country	Status	Source
America	Brazil	Present ^(a)	EPPO, CABI
	Colombia	Present, restricted distribution	EPPO
	Costa Rica	Present, restricted distribution	EPPO
	Ecuador	Present, widespread	EPPO
	Mexico	Present, restricted distribution	EPPO
	Peru	Present, restricted distribution	EPPO
	Venezuela	Present, restricted distribution	EPPO

(a): According to EPPO's map (Figure 1), only one region in Brazil is infested (Espírito Santo). According to CABI's Invasive Species Compendium, two regions of Brazil are infested (Espírito Santo and São Paulo); however, in CABI's map, three regions are infested, and none of them corresponds to Espírito Santo.

The pathogen was also reported from Bolivia (Potosí Province) on the wild potato *Solanum platypterum* (Alandia-Borda, 1966), but this record is considered by EPPO (2000) as doubtful. According to the IMI distribution map (IMI, 1994), *P. pittieriana* is also present in Paraguay. However, this report is erroneous because in the cited reference, i.e. Hennings (1904), the author only reports *P. pittieriana* as present in Costa Rica (Chalkley, 2017). CABI Invasive Species Compendium (CABI, 2015) includes Panama in the list of infested countries and cites the paper of Hernández et al. (2007). In that paper, the authors refer to the first report of *Gerwasia pittieriana* on *Rubus* sp. in Panama. *G. pittieriana* is a rust fungus of the Family Phragmidiaceae (Index Fungorum) distinct from *P. pittieriana*, which belongs to the Family Pucciniaceae. *G. pittieriana* was considered in the past as a synonym of *P. pittieriana*.

Based on the above, the Panel considers that there is uncertainty on the presence of the pathogen in Paraguay and Bolivia.

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, *P. pittieriana* is not known to be present in the risk assessment area.

3.3. Regulatory status

3.3.1. Council Directive 2000/29/EC

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

Table 3: *Puccinia pittieriana* 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	
(c)	Fungi	
	Species	Subject of contamination
13.	<i>Puccinia pittieriana</i> Hennings	Plants of Solanaceae, other than fruit and seeds

3.3.2. Legislation addressing the hosts of *Puccinia pittieriana*

Table 4: Regulated hosts and commodities that may involve *Puccinia pittieriana* in Annexes III 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	
10.	Tubers of <i>Solanum tuberosum</i> L., seed potatoes	Third countries other than Switzerland
11.	Plants of stolon- or tuber-forming species of <i>Solanum</i> L. or their hybrids, intended for planting, other than those tubers of <i>Solanum tuberosum</i> L. as specified under Annex III A (10)	Third countries
12.	Tubers of species of <i>Solanum</i> L., and their hybrids, other than those specified in points 10 and 11	Without prejudice to the special requirements applicable to the potato tubers listed in Annex IV, Part A Section I, third countries other than Algeria, Egypt, Israel, Libya, Morocco, Syria, Switzerland, Tunisia and Turkey, and other than European third countries which are either recognised as being free from <i>Clavibacter michiganensis</i> ssp. <i>sepedonicus</i> (Speckermann and Kotthoff) Davis et al., in accordance with the procedure referred to in Article 18(2), or in which provisions recognised as equivalent to the Community provisions on combating <i>Clavibacter michiganensis</i> ssp. <i>sepedonicus</i> (Speckermann and Kotthoff) Davis et al. in accordance with the procedure referred to in Article 18(2), have been complied with
13.	Plants of <i>Solanaceae</i> intended for planting, other than seeds and those items covered by Annex III A (10), (11) or (12)	Third countries, other than European and Mediterranean countries

Annex V	Plants, plant products and other objects which must be subject to a plant health inspection (at the place of production if originating in the Community, before being moved within the Community—in the country of origin or the consignor country, if originating outside the Community) before being permitted to enter the Community
Part A	Plants, plant products and other objects originating in the Community
Section I	Plants, plant products and other objects which are potential carriers of harmful organisms of relevance for the entire Community and which must be accompanied by a plant passport
1.3.	Plants of stolon- or tuber-forming species of <i>Solanum</i> L. or their hybrids, intended for planting.
2.2.	Plants of <i>Solanaceae</i> , other than those referred to in point 1.3 intended for planting, other than seeds.
2.4.	Seeds of <i>Helianthus annuus</i> L., <i>Solanum lycopersicum</i> L. and <i>Phaseolus</i> L.
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 Without prejudice to the plants, plant products and other objects listed in Part I.
1.5.	Tubers of <i>Solanum tuberosum</i> L., intended for planting.
Part B	PLANTS, PLANT PRODUCTS AND OTHER OBJECTS ORIGINATING IN TERRITORIES, OTHER THAN THOSE TERRITORIES REFERRED TO IN PART A
Section 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 Cruciferae, Gramineae, <i>Trifolium</i> spp., originating in Argentina, Australia, Bolivia, Chile, New Zealand and Uruguay, genera <i>Triticum</i> , <i>Secale</i> and <i>X Triticosecale</i> from Afghanistan, India, Iran, Iraq, Mexico, Nepal, Pakistan, South Africa and the USA, <i>Citrus</i> L., <i>Fortunella</i> Swingle and <i>Poncirus</i> Raf., and their hybrids, <i>Capsicum</i> spp., <i>Helianthus annuus</i> L., <i>Solanum lycopersicum</i> L., <i>Medicago sativa</i> L., <i>Prunus</i> L., <i>Rubus</i> L., <i>Oryza</i> spp., <i>Zea mais</i> L., <i>Allium ascalonicum</i> L., <i>Allium cepa</i> L., <i>Allium porrum</i> L., <i>Allium schoenoprasum</i> L. and <i>Phaseolus</i> L.
3.	Fruits of: — <i>Citrus</i> L., <i>Fortunella</i> Swingle, <i>Poncirus</i> Raf., and their hybrids, <i>Momordica</i> L. and <i>Solanum melongena</i> L.
4.	Tubers of <i>Solanum tuberosum</i> L.

3.4. Entry, establishment and spread in the EU

3.4.1. Host range

The main natural hosts of *P. pittieriana* are cultivated potatoes (*Solanum tuberosum*) and tomatoes (*Solanum lycopersicum*) as well as the wild potato *Solanum demissum* (CABI, 2015). Other wild Solanaceae affected by the pathogen are *Solanum caripense* and *Solanum nigrum-americanum* in Colombia, as well as *Solanum chacoense*, *Solanum colombianum*, *Solanum microdontum* and *Solanum spegazzinii* (CABI, 2015).

For a list of experimental hosts of the family Solanaceae, see Reddick (1932) and Buritica et al. (1968).

The Panel focusses this pest categorisation on cultivated potato (*S. tuberosum*) and tomato (*S. lycopersicum*) as the only cultivated hosts of *P. pittieriana*.

3.4.2. Entry

Is the pest able to enter into the EU territory?

YES, the pathogen could enter the EU territory through the living host plants and the infested soil attached to potato tubers pathways

The PLH Panel identified the following pathways for the entry of the pathogen from infested third countries into the EU territory:

- living host plants, excluding tubers, true seeds, seedlings, micropropagated plants and stolons; fruits are considered as a separate pathway;
- infested soil attached to potato tubers;
- dead host plants (e.g. specimens for scientific purposes, collections, herbaria);
- fruits of host plants.

Of the above-mentioned pathways, the living host plants and the infested soil attached to potato tubers are considered major pathways for the entry of the pathogen into the EU territory. However, uncertainty exists on whether the pathogen can enter the risk assessment area through infested soil attached to potato tubers, as there is a lack of knowledge on the longevity of the survival of teliospores in soil (see Section 3.1.2). Dead host plants and fruits of host plants are considered minor pathways: the volumes of dead host plants traded for scientific purposes are insignificant, there is no trade of potato fruits, and there is no report of tomato fruits being affected by the pathogen.

Under the current EU legislation, all major pathways of entry are closed.

Entry of the pathogen into the risk assessment area by natural means and more specifically through wind-disseminated inoculum (basidiospores) from South or Central America seems unlikely, because, in contrast to urediniospores (absent in *P. pittieriana*), produced by other rust fungi, basidiospores are short-lived, and thus, they can only spread over relatively short distances by wind (CABI, 2015).

In the last 5 years, there was no import of potatoes or tomatoes from the countries known to be infested by *P. pittieriana* (search performed on Eurostat database 28/8/2017).

There is no record of interception of *P. pittieriana* in the Europhyt database (search performed on 29 August 2017).

3.4.3. Establishment

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

YES. The pathogen could potentially establish in the risk assessment area, as the hosts are widely distributed and suitable climatic conditions occur in part of the EU territory.

3.4.3.1. EU distribution of main host plants

The main cultivated hosts of *P. pittieriana*, i.e. potato (*S. tuberosum*) and tomato (*S. lycopersicum*), are widely grown in the risk assessment area (Tables 5 and 6).

Table 5: Area cultivated with potatoes (*S. tuberosum*) in the EU between 2011 and 2015 (in 1,000 ha). Source: Eurostat, extracted on 28/8/2017

Countries ^(a)	2011	2012	2013	2014	2015	Mean of EU potato-growing area (in 1,000 ha)
EU28	1,922.24	1,797.69	1,741.15	1,662.22	1,649.96	1,754.65
Poland	393	373	337	267.1	292.5	332.52
Germany	258.7	238.3	242.8	244.8	236.7	244.26
Romania	248.35	229.27	207.61	202.67	190.15	215.61
France	158.64	154.09	160.96	168.02	167.26	161.79
Netherlands	159.23	150	156	156	155.66	155.38
United Kingdom	146	149	139	141	129	140.80
Belgium	82.34	67	75.4	80.37	78.69	76.76
Spain	79.87	72.02	72.43	75.96	71.68	74.39
Italy	61.6	58.65	50.39	52.35	50.42	54.68
Denmark	41.6	39.5	39.6	19.6	42	36.46
Lithuania	37.3	31.7	28.3	26.8	23.03	29.43
Portugal	26.5	25.05	26.76	27.21	24.62	26.03
Sweden	27.7	24.7	23.88	23.78	23.11	24.63
Greece	28.45	24.16	24.69	23.83	20.5	24.33

Countries ^(a)	2011	2012	2013	2014	2015	Mean of EU potato-growing area (in 1,000 ha)
Czech Republic	26.45	23.65	23.21	23.99	22.68	24.00
Finland	24.4	20.7	22.1	22	21.9	22.22
Austria	22.85	21.78	21.13	21.38	20.37	21.50
Hungary	20.97	25.08	20.95	20.98	18.74	21.34
Bulgaria	16.22	14.9	12.77	10.2	11.02	13.02
Latvia	14.4	12.2	12.4	11.1	10.2	12.06
Croatia	10.88	10.23	10.23	10.31	10.05	10.34

Potatoes are also grown to a lesser extent in Ireland, Slovakia, Estonia, Cyprus, Slovenia, Malta and Luxembourg.

(a): Only EU Member States growing more than 10,000 ha are reported.

Table 6: Area cultivated with tomatoes (*S. lycopersicum*) in the EU between 2011 and 2015 (in 1,000 ha). Source: Eurostat, extracted on 28/8/2017

Countries ^(a)	2011	2012	2013	2014	2015	Mean of EU tomato-growing area (in 1,000 ha)
EU28	254.58	229.83	230.45	248.08	256.27	243.842
Italy	103.78	91.85	95.19	103.11	107.18	100.222
Spain	51.2	48.61	46.62	54.75	58.13	51.862
Romania	31.64	29.75	28.07	24.43	24.56	27.69
Greece	19.73	15.98	16.66	17.25	17.36	17.396
Portugal	16.75	15.41	15.63	18.46	18.66	16.982
Poland	13.5	13.1	11.8	13.5	13.8	13.14

Tomatoes are also grown to a lesser extent in France, Bulgaria, Hungary, the Netherlands, Lithuania, Slovakia, Belgium, Croatia, Germany, the Czech Republic, Cyprus, Austria, Slovenia, Finland, the United Kingdom, Sweden, Denmark and Ireland.

(a): Only Member States growing more than 10,000 ha are reported.

3.4.3.2. Climatic conditions affecting establishment

The geographical distribution of *P. pittieriana* (Figure 2) suggests that in the risk assessment area, the pathogen could find climatic conditions suitable for establishment and epidemic development, especially in the northern and eastern parts of the EU territory.

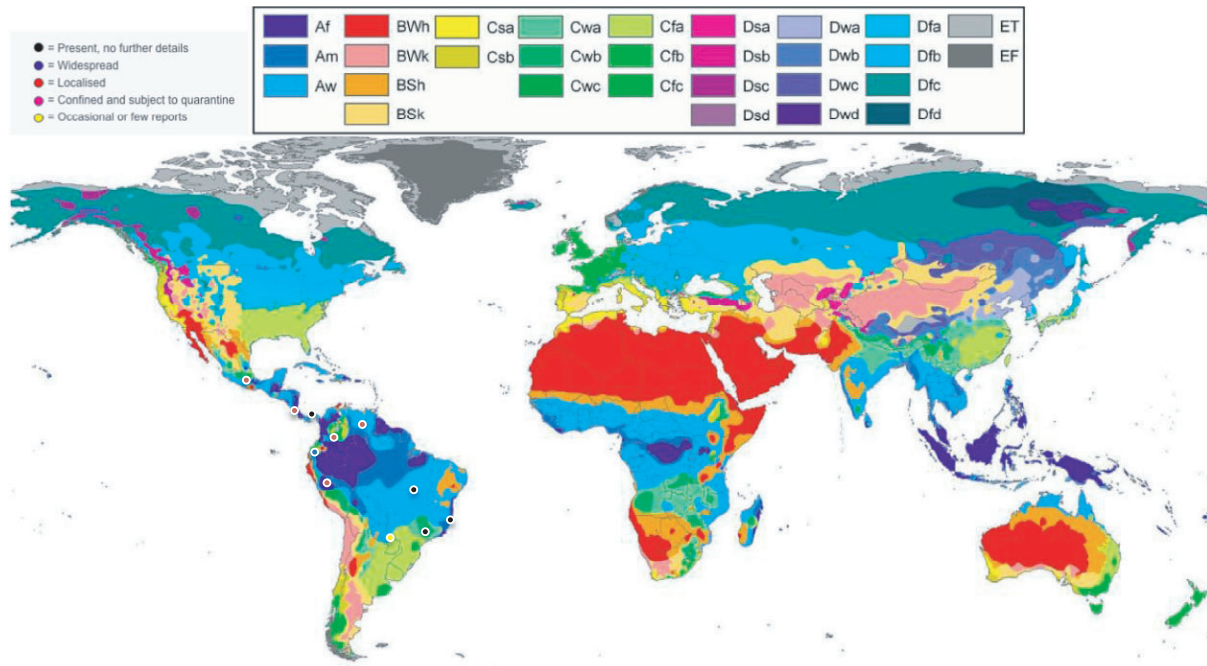


Figure 2: Köppen–Geiger climate type world map (Peel et al., 2007). Dots represent the distribution of *Puccinia pittieriana* according to CABI Invasive Species Compendium (last updated: 20/1/2015; last accessed: 20/08/2017) and Chalkley (2017)

3.4.4. Spread

3.4.4.1. Vectors and their distribution in the EU (if applicable)

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

YES, by natural and human-assisted means

Following its establishment in the EU territory, the pathogen could potentially spread by both natural and human-assisted means.

Spread by natural means. *P. pittieriana* can spread by wind-disseminated basidiospores. However, the potential of *P. pittieriana* for spread by wind is lower than that for other rust fungi that produce urediniospores (absent in *P. pittieriana*), due to the limitation for long-distance dispersal of the basidiospores (French, 2001a). Basidiospores are short-lived and not produced in large numbers or at temperatures above 15°C (see Section 3.1.2).

Spread by human assistance. The pathogen could also spread by the movement of infected living or dead (e.g. crop residues) plant material, or with the crop residues or soil infested by teliospores and accompanying the movement/trade of potato tubers (with the uncertainty mentioned in Section 3.4.2) (EPPO, 1988).

3.5. Impacts

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

YES, the introduction of *P. pittieriana* could cause yield and quality losses to potato and tomato production in the risk assessment area.

According to CABI (2015) and the literature search performed by the Panel, yield/quality losses due to common rust of potato have not been quantified in any of the countries in which the disease has been reported. *P. pittieriana* only appears to be a limiting factor for potato production in northern Ecuador, sometimes in Colombia and only rarely in Peru (CABI, 2015).

More specifically, greatest losses were reported in northern Ecuador close to the equatorial line, where potatoes are produced in a plateau area in Carchi and Tungurahua provinces. Considerable parts of this area are above 3,000 m in altitude, with conditions very favourable for the development of the disease (Velastegui, 1991).

Serious losses were occasionally reported in Colombia in the Departments of Nariño, Caldas and Tolima (Chardon and Toro, 1930; Castaño, 1952).

Common rust has been observed in Peru only in the highlands of Junin and La Libertad (French et al., 1972), primarily on the eastern watershed of the Andes at altitudes of 2,700–4,300 m (French, 1981) where it is restricted to a few locations by the microclimate or inoculum availability. Losses are seldom severe even though symptoms may be conspicuous, primarily on the lower leaves, some of which may drop.

As the literature referring to the impacts of the pathogen is very old, there is uncertainty on the yield/quality losses currently caused by the pathogen in the infested countries. Nevertheless, it is expected that the introduction of *P. pittieriana* could impact the potato and tomato production in the EU territory but its magnitude is unknown.

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 likelihood of pest entry can be mitigated if host plant material is sourced from pest-free areas or pest-free places of production and is inspected both at the place of origin and the EU entry point. In infested areas, agricultural practices and fungicide sprays are available for disease management.

Measures for preventing the entry of the pathogen into the risk assessment area include:

- sourcing host plant material from pest-free areas or pest-free places of production;
- phytosanitary certificate for the export of host plant material from infested countries;
- inspection of host plant material prior to export to the EU and at the EU entry point.

Measures for preventing the establishment and spread of the pathogen in the risk assessment area include:

- crop residue management;
- use of resistant varieties;
- use of fungicides;
- restrict the movement of infected plant material including crop residues, and soil adherent to potato tubers.

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

The feasibility and effectiveness of measures to prevent the entry into and spread within the risk assessment area of *P. pittieriana* may be limited by the following factors:

- difficulty to detect the teliospores in the soil;
- difficulty to detect the pathogen on latently infected host plant material.

3.6.2. Control methods

Cultural Control and Sanitary Measures

In the infested areas of Peru, where the disease is severe, farmers often choose to plant potatoes in fields with microclimates less favourable to the disease (French et al., 1972).

Chemical Control

Based on the results of the literature search performed by the Panel, there is hardly any information if chemical control is practiced in the infested countries for the management of common rust of potato. French et al. (1972) reported that chemical control is not common in Peru, although applications of metiram every 7–10 days reduce disease incidence.

Field studies conducted in the infested areas have shown that the systemic fungicides oxycarboxin, propiconazole and pyracarbolid as well as the organic fungicides folpet, maneb, thiram and zineb were effective in controlling the disease (Diaz and Echeverria, 1963; Quijano and Molina Valero, 1988; Velastegui, 1991).

Host Resistance

According to field studies conducted in two locations in Ecuador, 12 out of 136 potato cultivars showed adequate resistance to common rust of potato (Coronel-Orijalva, 1970). No other information was found during the literature search conducted by the Panel on the use of resistant potato cultivars for the management of common rust of potato in the infested countries.

3.7. Uncertainty

- 1) **Entry:** The current geographical distribution of the pathogen is not well established because of (i) lack of recent information on the pest status in the countries of Central and South America reported in the past as infested, and (ii) erroneous reports of the pathogen being present in some countries, e.g. Bolivia and Paraguay (see Section 3.2.1).
- 2) **Entry:** It is not known if the pathogen could enter the risk assessment area through (a) infested soil attached to potato tubers, as there is lack of knowledge on the longevity of the survival of teliospores in soil (see Section 3.4.2) and (b) trade of tomato fruits because of absence of reports of tomato fruits being affected by the pathogen (see Section 3.4.2).
- 3) **Spread:** Uncertainty on the distance over which the wind-disseminated basidiospores can travel, because of lack of knowledge.
- 4) **Impacts:** Uncertainty on the yield/quality losses currently caused by the pathogen in the infested countries, because of lack of recent information.

The Panel considers that none of the above uncertainties could affect the conclusion of this pest categorisation.

4. Conclusions

Puccinia pittieriana meets the criteria assessed by EFSA for consideration as a potential quarantine pest for the EU territory (See Table 7).

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

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest	Key uncertainties
Identity of the pest (Section 3.1)	The identity of the pest is clearly defined and there are reliable methods for its detection and identification	The identity of the pest is clearly defined and there are reliable methods for its detection and identification	None
Absence/ presence of the pest in the EU territory (Section 3.2)	The pest is not known to occur in the EU	The pest is not known to occur in the EU	None
Regulatory status (Section 3.3)	The pest is currently officially regulated on plants of Solanaceae, other than fruit and seeds (Dir 2000/29/EC)	The pest is currently officially regulated as a quarantine pest on plants of Solanaceae, other than fruit and seeds (Dir 2000/29/EC)	None

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
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	The pest could potentially enter, establish and spread in the EU Main pathways of entry: <ul style="list-style-type: none"> • Living host plants • Infested soil attached to potato tubers Under the current EU legislation, these pathways are closed	The pest could potentially spread in the EU Main pathways: <ul style="list-style-type: none"> • Living host plants • Infested soil attached to potato tubers 	The current geographical distribution of the pathogen is not well established (uncertainty 1) Lack of knowledge on the longevity of the survival of teliospores in soil (uncertainty 2) The distance over which the wind-disseminated basidiospores can travel is unknown (uncertainty 3)
Potential for consequences in the EU territory (Section 3.5)	The introduction and spread of the pest in the EU could impact the potato and tomato production, although the magnitude is unknown	The spread of the pest in the EU could impact the potato and tomato production, although the magnitude is unknown	Uncertainty on the yield/quality losses currently caused by the pathogen (Uncertainty 4)
Available measures (Section 3.6)	Phytosanitary measures are available to prevent the entry of the pathogen into the EU, e.g. sourcing host plant material from pest-free areas or pest-free places of production, inspection at the place of origin and the EU entry point. There are no fully effective measures to prevent establishment and spread	There are no fully effective measures to prevent the spread of the pathogen in the EU	The current geographical distribution of the pathogen is not well established (uncertainty 1) Lack of knowledge on the longevity of the survival of teliospores in soil (uncertainty 2) The distance over which the wind-disseminated basidiospores can travel is unknown (uncertainty 3)
Conclusion on pest categorisation (Section 4)	<i>P. pittieriana</i> meets all the criteria assessed by EFSA above for consideration as a potential Union quarantine pest	<i>P. pittieriana</i> is not known to occur in the EU. Therefore, it does not meet at least one of the criteria assessed by EFSA for consideration as a Union regulated non-quarantine pest	None
Aspects of assessment to focus on/ scenarios to address in future if appropriate	None		

References

- Alandia-Borda S, 1966. Nuevas identificaciones de hongos parasiticos de plantas economicas de Bolivia. Turrialba, 16, 398–401.
- Bettgenhaeuser J, Gilbert B, Ayliffe M and Moscou MJ, 2014. Nonhost resistance to rush pathogens—a continuation of contiuua. *Front Plant Science*, 5, 664. Published online 2014 Dec 11. <https://doi.org/10.3389/fpls.2014.00664>
- Buritica P, Orjuela J and Bustamante E, 1968. La roya de la papa en Colombia y sus implicaciones. *Agricultura Tropical (Colombia)*, 24, 221–222.
- CABI, 2015. Invasive species compendium. Available online: <http://www.cabi.org/isc/>
- Castaña JJ, 1952. Roya de la papa. *Agricultura Tropical (Bogota)*, 8, 47–48.
- Chalkley D, 2017. Systematic Mycology and Microbiology Laboratory, ARS, USDA. Invasive Fungi. Common potato and tomato rust - *Puccinia pittieriana*. Available online: <https://nt.ars-grin.gov/taxadescriptions/factsheets/index.cfm?thisapp=Pucciniapittieriana>

- Chardon CE and Toro R, 1930. Mycological explorations of Colombia. Journal of Department of Agriculture Puerto Rico, 14, 195–369.
- Coronel-Orijalva MA, 1970. *Determinacion de las resistencias a "lancha" y "toya" y otras características germoplasmicas en papa*. Universidad Central del Ecuador (Quito), Tesis Ing. Agr. 80 pp.
- Diaz JR and Echeverria J, 1963. Chemical control of *Puccinia pittieriana* on potatoes in Ecuador. Plant Disease Reporter, 47, 800–801.
- 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), 1988. Datasheets on quarantine organisms. No 155, *Puccinia pittieriana*. Bulletin OEPP/EPPO Bulletin, 18, 517–519.
- EPPO (European and Mediterranean Plant Protection Organization), 2000. Corrections to PQR3.9, quarantine pests for Europe, maps of quarantine pests for Europe. Paris, France. Available online: <http://archives.eppo.org/EPPORreporting/2000/Rse-0001.pdf>
- EPPO (European and Mediterranean Plant Protection Organization), 2017. EPPO Global Database. Available online: <https://gd.eppo.int>
- 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
- French ER, 1981. Common rust. In: *Compendium of Potato Diseases*. APS Press, Saint Paul, Minnesota, USA, 65 pp.
- French ER, 2001a. Common rust. In: *Compendium of Potato Diseases (2nd Edition)*. Minnesota, USA, APS Press, Saint Paul. pp. 20–21.
- French ER, 2001b. Deforming rust. In: *Compendium of Potato Diseases*. 2nd Edition. APS Press, Saint Paul, Minnesota, USA, 21 pp.
- French ER, Torres H, de Icochea TA, Salazar L, Fribourg C, Fernandez EN, Martin A, Franco J, de Scurrah MM, Herrera IA, Vise C, Lazo L and Hidalgo OA, 1972. Enfermedades de la papa en el Peru (Potato diseases in Peru). Boletín Técnico No 77, Estación Experimental Agrícola La Molina, 36 pp.
- Hennings P, 1904. Einigeneue pilze aus Costarica und Paraguay. Hedwigia, 43, 147–149.
- Hernández JR, Pipenbring M and Vega Rios MB, 2007. A new species, *Dicheirinia panamensis*, and new records of rust fungi from Panama. Mycological Progress, 6, 81–91.
- IMI, 1994. *Distribution Maps of Plant Diseases, Map No 460*. CAB International, Wallingford, UK.
- Kern FD, 1933. The microcyclic species of *Puccinia* on *Solanum*. Mycologia, 25, 435–441.
- Laundon GF and Rainbow AF, 1971. Descriptions of Fungi and Bacteria: *Puccinia pittieriana*. IMI Descriptions of Fungi and Bacteria, No 29, Wallingford, UK, CAB International.
- Mendes MAS, da Silva VL, Dianese JC, Ferreira MASV, dos Santos CEN, Neto EG, Urben AF and Castro C, 1998. *Fungos em plantas no Brasil*. Embrapa-SPI/Embrapa-Cenargen, Brasília, DF, Brazil. 555 pp.
- NCBI, 2009. *Entrez cross-database search engine*. National Center for Biotechnology Information, Maryland, USA. Available online: <http://www.ncbi.nlm.nih.gov/sites>
- Pardo-Cardona VM, 2002. Especies microciclicas de *Puccinia* Persoon sobre *Solanum* L. in Colombia. Caldasia, 23, 427–434.
- Peel MC, Finlayson BL and McMahon TA, 2007. Updated world map of the Köppen-Geiger climate classification. Hydrology and Earth System Sciences, 11, 1633–1644.
- Quijano SO and Molina Valero LA, 1988. Control químico de la roya (*Puccinia pittieriana* Henn.) en papa de la variedad Parda Pastusa en el departamento de Nariño. Revista de Ciencias Agrícolas (Colombia), 10, 31–49.
- Reddick D, 1932. Some diseases of wild potatoes in Mexico. Phytopathology, 22, 609–612.
- Velastegui JR, 1991. Control químico de *Puccinia pittieriana* P. Henn., agente de la roya de la papa, con fungicidas sistémicos. In *Memorias del V seminario Nacional de Sanidad Vegetal*, 7–9 Junio 1988, Universidad de Cuenca, Ecuador, pp. 104–105.

Abbreviations

DG SANCO	Directorate General for Health and Consumers
EPPO	European and Mediterranean Plant Protection Organization
IPPC	International Plant Protection Convention
LSU	large subunit
PLH	EFSA Panel on Plant Health
TFEU	Treaty on the Functioning of the European Union
ToR	Terms of Reference