United States Department of Agriculture

Importation of moth orchid (*Phalaenopsis* spp.) for planting from Germany into the United States and Territories

A Qualitative, Pathway-Initiated Pest Risk Assessment

United States Department of Agriculture

Animal and Plant Health Inspection Service

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Executive Summary

The Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA) prepared this document to assess pest risks associated with importing commercially-produced plants of moth orchid, *Phalaenopsis* spp. (Orchidaceae), for planting from Germany into the United States and Territories. Based on the market access request submitted by Germany, we considered the pathway to include the following processes and conditions: *Phalaenopsis* spp. plants will be grown in APHIS-approved growing media and only in greenhouses that are consistent with U.S. regulation 7 CFR § 319 Subpart H – Plants for Planting and the Plants for Planting Manual. The pest risk ratings depend upon the application of all conditions of the pathway as described. Moth orchid plants produced under different conditions were not evaluated and may have a different pest risk.

Using scientific literature, port-of-entry pest interception data, and information from the government of Germany, we developed a list of pests with quarantine significance for the United States and Territories that occur in Germany (on any host) and are associated with the commodity plant species (anywhere in the world).

We found no organisms that met the threshold for unacceptable consequences of introduction and are potentially able to follow the pathway.

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1. Introduction

1.1. Background

The Plant Epidemiology and Risk Analysis Laboratory of the USDA Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine (PPQ) prepared this document to assess the pest risk associated with the importation of commercially-produced plants of moth orchid (*Phalaenopsis* spp. Blume) for planting from Germany into the United States and Territories (referred to as the PRA area).

This is a qualitative risk assessment; the likelihood of pest introduction is expressed as a qualitative rating rather than in numerical terms. This methodology is consistent with guidelines provided by the International Plant Protection Convention (IPPC) in the International Standard for Phytosanitary Measures (ISPM) No. 11, "Pest Risk Analysis for Quarantine Pests" (IPPC, 2017). The use of biological and phytosanitary terms is consistent with ISPM No. 5, "Glossary of Phytosanitary Terms" (IPPC, 2018).

As defined in ISPM No. 11, this document comprises Stage 1 (Initiation) and Stage 2 (Risk Assessment) of risk analysis. Stage 3 (Risk Management) will be covered in a separate document.

1.2. Initiating event

The importation of plants for planting into the United States is regulated under Title 7 of the Code of Federal Regulation, Part 319 Subpart H – Plants for Planting (7 CFR § 319, 2020) and the Plants for Planting Manual (USDA, 2020). Under this regulation, the entry of *Phalaenopsis* spp. in growing media from the export area into the PRA area is not authorized. This commodity pest list was initiated due to a request by the Federal Ministry of Food and Agriculture (BMEL) and Julius Kühn-Institut (JKI), Federal Research Centre for Cultivated Plants to change the Federal Regulation to allow entry (JKI, 2018).

1.3. Determining if a weed risk analysis for the commodity is needed

In some cases, an imported commodity could become invasive in the PRA area. If warranted, the commodity is then analyzed for weed risk.

Weed risk analyses are not needed for commodities that are already enterable into the PRA area from other countries, for plant species that are widely established (native or naturalized) or cultivated in the PRA area, or for situations in which the imported plant part(s) cannot easily propagate on its own or be propagated. We determined that the weed risk of *Phalaenopsis* does not need to be analyzed because this commodity is already enterable from other countries (7 CFR § 319, 2020).

1.4. Description of the pathway

A pathway is "any means that allows the entry or spread of a pest" (IPPC, 2018). In the context of this document, the pathway is the commodity to be imported, together with all the processes the commodity undergoes (from production through importation and distribution) that may have an impact on pest risk. The following description of this pathway focuses on those relevant

conditions and processes. The conclusions in this document are therefore contingent on the application of all components of the pathway as described.

1.4.1. Description of the commodity
The specific pathway of concern is the importation of rooted cuttings and plants grown in APHIS-approved growing media (7 CFR § 319.37-10, 2020) and only in greenhouses that are consistent with applicable U.S. regulations of *Phalaenopsis* spp. for planting (7 CFR § 319, 2020).

1.4.2. Summary of the production, harvest and post-harvest procedures, and shipping and storage conditions being considered
Rooted cuttings of *Phalaenopsis* spp. will be grown year-round in greenhouses from *in vitro* propagation in tissue culture. Plants will be grown in an active state of foliar growth prior to export. Young plants (rooted with leaves) and pre-finished young plants (rooted with developing panicles) intended for export will be potted in plugs consisting of a mixture of coir and peat or coir only (JKI, 2018).

Plants will be packaged in the greenhouse by wrapping them in paper and laying them loose in new cardboard boxes, or they will be packaged in standing trays (JKI, 2018). The boxes will be stacked onto pallets, sealed in foil, shipped to the airport in trucks, and moved to aircraft pallets (JKI, 2018). All transport will be in climate-controlled environments with temperatures between 16 and 25 °C (60.8-77 °F) (JKI, 2018).

2. Pest List and Pest Categorization

The pest list is a compilation of plant pests of quarantine significance for the PRA area. This includes pests that are both present in Germany (on any host) and are known to be associated with *Phalaenopsis* spp. (anywhere in the world). Pests are considered to be of quarantine significance if they are not present in the PRA area, are regulated non-quarantine pests, are pests considered for or under Federal official control, or are pests that require evaluation for regulatory action. Consistent with ISPM 5, pests that meet any of these definitions are considered "quarantine pests" and are candidates for analysis. Species with a reasonable likelihood of following the pathway into the PRA area are analyzed to determine their pest risk potential.

We found no pests of quarantine significance that are both present in Germany (on any host) and associated with *Phalaenopsis* spp. (anywhere in the world).

2.1. Pests considered but not included on the pest list

2.1.1. Organisms with non-quarantine status
We found evidence of organisms that are associated with *Phalaenopis* spp., and are present in the export area, but are not quarantine significant for the PRA area. These organisms are listed in Appendix A.

2.1.2. Quarantine pests with weak evidence for association with the commodity or for presence in the export area

Arthropods: *Ceroplastes stellifer* (Westwood) (syn.: *Vinsonia stellifera*) (Hemiptera: Coccidae) was associated with *Phalaenopsis* spp. through an interception record. (PestID, 2020; Swezey, 1945). We found no other information in the literature associating *C. stellifer* with *Phalaenopsis* spp. Due to the lack of association with the commodity in the literature, we did not include *C. stellifer* on the pest list.

Halyomorpha halys (Stål) (Hemiptera: Pentatomidae) is listed as using *Phalaenopsis* spp. as hosts in the Crop Protection Compendium (CABI, 2019). We found no further information in the literature associating *H. halys* with *Phalaenopsis* spp., so we did not include it on the pest list.

Orchidophilus aterrimus (Waterhouse) and *O. epidendri* Prena (Coleoptera: Curculionidae) are reported as adventive but not established in Germany and the United States (Prena, 2008). We found no further information in the literature placing these weevils in Germany, so we did not include them on the pest list.

Pathogens: We found only one report of *Colletotrichum orchidophilum* and *C. orchidearum* in Germany; a single isolate that was collected from dead and dying leaves of *Eria javanica* in a Munich Botanical Garden greenhouse in 1895 (Damm et al., 2012). This one specimen was identified as *C. orchidophilum* and later reclassified as *C. orchidearum* (Damm et al., 2012; Damm et al., 2019). Therefore, there is no evidence of *C. orchidophilum* in Germany and only one report of *C. orchidearum.*

2.1.3. Organisms identified only to the genus level

For this risk assessment, we found evidence that the following organism identified only to the genus level is reported on *Phalaenopsis* in Germany: *Bradysia* spp. (Diptera: Sciaridae) (JKI, 2018).

In commodity import risk assessments, the taxonomic unit for pests selected for evaluation beyond the pest categorization stage is usually the species (IPPC, 2017). We generally do not assess risk for organisms identified only to the genus level, particularly if the genus in question is reported in the PRA area. Many genera contain multiple species, and we cannot know if the unidentified species occurs in the PRA area and, consequently, if it is regulated in the PRA area. However, if the genus in question is absent from the PRA area, the genus can be regulated. Because the organism has not been fully identified, however, we cannot properly assess the likelihood and consequences of its introduction. We list those genera here so that risk managers may determine if measures beyond those intended to mitigate fully identified pests are warranted.

2.2. Pests selected for further analysis

We identified no quarantine pest for further analysis.

3. Summary and Conclusions of Risk Assessment

Of the organisms associated with *Phalaenopsis* worldwide and present in the export area, we identified none that are quarantine pests for the PRA area.

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6. Appendix Pests with non-quarantine (or otherwise non-actionable) regulatory status

We found some evidence of the below listed organisms being associated with *Phalaenopsis* spp. and being present in Germany. Because these organisms are not quarantine significant for the Untided States and Territories (PestID, 2020; or as defined by ISPM 5, IPPC, 2018), we did not list them in Table 1 of this risk assessment. Moreover, we did not evaluate the strength of the evidence for their association with *Phalaenopsis* or their presence in Germany. Because we did not evaluate the strength of the evidence, we consider the following pests to have only "potential" association with the commodity and presence in Germany.

We list these organisms along with the references supporting their potential presence in Germany, their presence in the United States and Territories, and their potential association with the *Phalaenopsis*. If any of the organisms listed in the table are **not** present in the United States and Territories, we also provide justification for their non-quarantine status.

Organism	In Germany	In U.S.	Host association	Notes
ARTHROPODS				
ACARI				
Acaridae				
Tyrophagus putrescentiae (Schrank)	Franz et al., 1997	CABI, 2019	Kim et al., 2015	
Tenuipalpidae				
Brevipalpus phoenicis (Geijskes)	Hatzinikolis, 1986	CABI, 2019	Labanowski and Soika, 2011	
Tenuipalpus pacificus Baker	JKI, 2018	Denmark, 2010; Beard et al., 2012	JKI, 2018	
Tetranychidae				
Tetranychus urticae Koch	JKI, 2018; CABI, 2019	CABI, 2019; Bolland et al., 1998	JKI, 2018	
INSECTA				
DIPTERA				
Sciaridae				
Bradysia impatiens (Johannsen) syn.: *B. difformis* Frey	Han et al., 2015; Menzel et al., 2003	Mohrig et al., 2012	Han et al., 2015	
HEMIPTERA				
Coccidae				
Coccus hesperidum L.	Schönfeld, 2015; CABI, 2019	García Morales et al., 2016	CABI, 2019	
Diaspididae				
Chrysomphalus aonidum (L.)	CABI, 2019	García Morales et al., 2016	Nakahara, 1981	

Organism	In Germany	In U.S.	Host association	Notes
Parlatoria proteus (Curtis)	García Morales et al., 2016; Miller and Davidson, 2005	García Morales et al., 2016	García Morales et al., 2016; Miller and Davidson, 2005	
Pinnaspis strachani (Cooley)	García Morales et al., 2016	García Morales et al., 2016	Borchsenius, 1966	
Pseudococcidae				
Planococcus citri (Risso)	Afifi et al., 2010	García Morales et al., 2016	CABI, 2019	
Pseudococcus longispinus (Targioni Tozzetti)	CABI, 2019; Mani and Shivaraju, 2016	García Morales et al., 2016	García Morales et al., 2016; Mani and Shivaraju, 2016	
THYSANOPTERA				
Thripidae				
Frankliniella intonsa (Trybom)	CABI, 2019	CABI, 2019	Kim et al., 2015	
Frankliniella occidentalis (Pergrande)	JKI, 2018; Baker et al., 2007	CABI, 2019	JKI, 2018; CABI, 2019	
Thrips tabaci Lindeman	CABI, 2019	CABI, 2019	Kim et al., 2015	
MOLLUSKS				
Gastrodontidae				
Zonitoides arboreus (Say)	Godan, 1983	Godan, 1983; Hollingsworth and Sewake, 2002; Van der Schalie, 1948	Hollingsworth and Sewake, 2002	
Limacidae				
Deroceras laeve Müller	CABI, 2019	CABI, 2019; Martorell and Medina Guad, 1974	Martorell and Medina Guad, 1974	
Lehmannia marginata (Müller) syn.: *Limax marginatus* Müller	Godan, 1983	Robinson, 1999	Kim et al., 2015	
FUNGI AND CHROMISTANS				
Athelia rolfsii (Curzi) C.C. Tu & Kimbr. syn.: *Sclerotium rolfsii*	Farr and Rossman, 2019; JKI, 2018	Farr and Rossman, 2019	Farr and Rossman, 2019	
Botryotinia fuckeliana (de Bary) Whetzel, syn.: *Botrytis cinerea* Pers.: Fr.	Farr and Rossman, 2019; JKI, 2018	Farr and Rossman, 2019	Farr and Rossman, 2019	
Cladosporium oxysporum Berk. & M.A. Curtis	Farr and Rossman, 2019	Farr and Rossman, 2019	Farr and Rossman, 2019	

Organism	In Germany	In U.S.	Host association	Notes
Colletotrichum gloeosporioides (Penz.) Penz. & Sacc. syn.: *Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk	CABI, 2019	CABI, 2019	Farr and Rossman, 2019	
Fusarium oxysporum Schltdl.: Fr.	Farr and Rossman, 2019; JKI, 2018	Farr and Rossman, 2019	Farr and Rossman, 2019	
Fusarium proliferatum (Matsush.) Nirenberg ex Gerlach & Nirenberg	Farr and Rossman, 2019; JKI, 2018	Farr and Rossman, 2019	Farr and Rossman, 2019	
Fusarium solani (Mart.) Sacc.	Farr and Rossman, 2019	Farr and Rossman, 2019	Farr and Rossman, 2019	
Lasiodiplodia theobromae (Pat.) Griffon & Maubl. syn.: *Botryodiplodia theobromae* Pat	CABI, 2019	CABI, 2019	Farr and Rossman, 2019	
Nigrospora oryzae (Berk. & Broome) Petch	Farr and Rossman, 2019	Farr and Rossman, 2019	Royal Botanical Gardens, 2019	
Phyllosticta capitalensis Henn.	Farr and Rossman, 2019	Farr and Rossman, 2019	Farr and Rossman, 2019	
Phytophthora cactorum (Lebert & Cohn) J. Schröt	Farr and Rossman, 2019; JKI, 2018	Farr and Rossman, 2019; Cating and Palmateer, 2010	Cating and Palmateer, 2010; JKI, 2018	
Phytophthora palmivora (E.J. Butler) E.J. Butler	JKI, 2018	Farr and Rossman, 2019	Farr and Rossman, 2019	
Phytophthora parasitica Dastur, syn.: *P. nicotianae* Breda de Haan	JKI, 2018	Farr and Rossman, 2019	Farr and Rossman, 2019	
Rhizoctonia solani J.G. Kühn, syn.: *Thanatephorus cucumeris* (A.B. Frank) Donk	Farr and Rossman, 2019; JKI, 2018	Farr and Rossman, 2019	Farr and Rossman, 2019	
BACTERIA AND PHYTOPLASMAS				
*Acidovorax cattleyae (*Pavarino) syn.: *Pseudomonas cattleyae* (Pavarino) Savulescu	Locally present in greenhouses (JKI, 2018)	FL, CA (CABI, 2019)	Jensen, 1970	
Dickeya chrysanthemi (Burkholder et al.) Samson et al. syn.: *Erwinia chrysanthemi* (Burkholder et al.) Young et al.	Limited distribution (JKI, 2018; CABI, 2019)	CABI, 2019	JKI, 2018; CABI, 2019	

Organism	In Germany	In U.S.	Host association	Notes
Dickeya dadantii Samson et al.	CABI, 2019	FL, CA (CABI, 2019)	CABI, 2019	
Dickeya zeae Samson et al.	CABI 2019	CABI 2019; Pritchard et al., 2013	CABI 2019	
Pectobacterium carotovorum subsp. *carotovorum (*Jones) Hauben et al., Gardan et al.	CABI, 2019; JKI, 2018	CABI, 2019	CABI, 2019; JKI, 2018	
VIRUSES AND VIROIDS				
Carmovirus Carnation mottle virus (CarMV)	CABI, 2019	Present in CA, CO, OH, PA, WI (CABI, 2019)	Zheng and Jan, 2011	Not in PestID (PestID, 2019). Widely distributed except in Africa (CABI, 2019)
Cucumovirus Cucumber mosaic virus (CMV)	CABI, 2019	CABI, 2019	Zheng et al., 2007	
Dichorhavirus Orchid Fleck Virus (OFV)	Kondo et al., 2003	Kondo et al., 2003	Kondo et al., 2003	
Orthotospovirus Impatiens necrotic spot virus (INSV)	CABI, 2019; JKI, 2018	CABI, 2019	CABI, 2019; JKI, 2018	
Potexvirus Cymbidium mosaic virus (CymMV)	Locally present in greenhouses (JKI, 2018)	CABI, 2019	Jensen, 1970	
Tobamovirus Odontoglossum ringspot virus (ORSV)	JKI, 2018	CA, FL, HI, PA, TX, VA, PR (CABI, 2019)	Jensen, 1970; JKI, 2018	Not in PestID (PestID, 2019). Worldwide distribution (CABI, 2019)
Tobamovirus Tobacco mosaic virus (TMV)	JKI, 2018	CABI, 2019	Villalobos Calderón et al., 2009	
Tospovirus Tomato spotted wilt virus (TSWV)	CABI, 2019; JKI, 2018	CABI, 2019	CABI, 2019; JKI, 2018	