



Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

Importation of *Chrysanthemum* cuttings and *in vitro* plantlets for propagation from Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, and Vietnam into the continental United States

A Qualitative, Pathway Initiated Pest List

Version 6

July 6, 2021

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Executive Summary

The Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA) prepared this pest list to examine plant pest risks associated with importing commercially-produced cuttings (stems, leaves) and in vitro plantlets of *Chrysanthemum* species, hybrids, and related synonyms (Asteraceae), for propagation from Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, and Vietnam into the continental United States, which includes Alaska. Based on the request for this pest list, we assumed no standard production practices with the following exceptions: no soil, seed, flowers, or roots will be present, and in vitro plantlets will have been produced in aseptic conditions with minimal monitoring for pathogens.

Based on the scientific literature, port-of-entry pest interception data, and information from one government of the export area (Uganda), we developed a list of all potential pests with actionable regulatory status for the continental United States that are known to occur in Ethiopia (ET), Kenya (KE), Tanzania (TZ), Tunisia (TN), Uganda (UG), Belgium (BE), Germany (DE), the Netherlands (NL), Spain (ES), the United Kingdom (UK), Mexico (MX), Costa Rica (CR), Guatemala (GT), El Salvador (SV), Nicaragua (NI), Panama (PA), Bolivia (BO), Brazil (BR), Colombia (CO), or Vietnam (VN) (on any host) and to be associated with the commodity plant species (anywhere in the world). Of these, we found 48 organisms that have a reasonable likelihood of being associated with *Chrysanthemum* cuttings composed of stems with leaves, or with in vitro *Chrysanthemum* plantlets for propagation, presuming no production practices at the point of origin. Based upon a subsequent request, the presence of the 48 organisms was determined for each country. This information is summarized in the table below and is presented in detail with sources of evidence in the remainder of the document.

Taxonomy	Pest name	Country(ies) in which pest is present
MITE: Eriophyidae	<i>Epitrimerus alinae</i> Liro	UK
INSECT: Coleoptera: Curculionidae	<i>Gonipterus gibberus</i> Boisduval	BR
INSECT: Diptera: Agromyzidae	<i>Chromatomyia horticola</i> Goureau (syn. <i>Phytomyza horticola</i> (Goureau))	ES, ET, KE, UG, BE, DE, NL, UK, VN
INSECT: Diptera: Agromyzidae	<i>Liriomyza huidobrensis</i> (Blanchard)	KE, BE, DE, NL, ES, SV, GT, NI, PA, BR, CO, VN
INSECT: Diptera: Psilidae	<i>Psila nigricornis</i> Meigen	UK, Europe
INSECT: Diptera: Tephritidae	<i>Trypeta zoe</i> Meigen	BE, NL, UK
INSECT: Hemiptera: Aleyrodidae	<i>Aleurodicus dispersus</i> (Russell)	KE, BR, CO, ES, GT, NI, PA, SV, VN
INSECT: Hemiptera: Aphididae	<i>Macrosiphoniella oblonga</i> (Mordvilko)	DE, UK, VN
INSECT: Hemiptera: Aphididae	<i>Uroleucon tanacetii</i> (L.)	Widespread in Asia
INSECT: Hemiptera: Coccidae	<i>Ceroplastes brevicauda</i> (Hall)	KE, TZ, UG
INSECT: Hemiptera: Coccidae	<i>Ceroplastes rubens</i> Maskell	KE, TZ, DE, CO, VN
INSECT: Hemiptera: Pseudococcidae	<i>Atrococcus cracens</i> Williams	UK, DE
INSECT: Hemiptera: Pseudococcidae	<i>Maconellicoccus hirsutus</i> (Green)	GT, KE, MX, TZ, TN, CR, BR, CO, VN
INSECT: Lepidoptera: Noctuidae	<i>Chrysodeixis chalcites</i> (Esper)	KE, TN, UG, Africa, BE, DE, NL, ES, UK
INSECT: Lepidoptera: Noctuidae	<i>Chrysodeixis eriosoma</i> Doubleday	VN

Taxonomy	Pest name	Country(ies) in which pest is present
INSECT: Lepidoptera: Noctuidae	<i>Gortyna flavago</i> (Denis & Schiffermüller) (syn. <i>G. ochracea</i> (Hübner))	UK
INSECT: Lepidoptera: Noctuidae	<i>Lacanobia oleracea</i> (L.)	BE, UK
INSECT: Lepidoptera: Noctuidae	<i>Mamestra brassicae</i> (L.)	BE, DE, ES, NL, UK
INSECT: Lepidoptera: Noctuidae	<i>Naenia typica</i> (L.)	UK
INSECT: Lepidoptera: Noctuidae	<i>Phlogophora meticulosa</i> (L.)	DE, BE, DE, ES, FR, NL, UK
INSECT: Lepidoptera: Noctuidae	<i>Spodoptera littoralis</i> (Boisduval)	ET, KE, TZ, TN, UG, Africa
INSECT: Lepidoptera: Noctuidae	<i>Spodoptera litura</i> (F.)	UK, VN
INSECT: Lepidoptera: Tortricidae	<i>Cacoecimorpha pronubana</i> Hübner	Africa (Carter, 1984; Zhang, 1994), TN, DE, NL, ES, UK
INSECT: Lepidoptera: Tortricidae	<i>Cnephasia asseclana</i> (Denis & Schiffermüller) (syn. <i>C. interjectana</i> (Haworth))	UK
INSECT: Lepidoptera: Tortricidae	<i>Cnephasia incertana</i> (Treitschke)	BE, UK
INSECT: Lepidoptera: Tortricidae	<i>Epichoristodes acerbella</i> (Walker)	Africa, ES, KE
INSECT: Lepidoptera: Tortricidae	<i>Epiphyas postvittana</i> Walker	UK
INSECT: Lepidoptera: Tortricidae	<i>Homona coffearia</i> (Nietner)	VN
INSECT: Thysanoptera: Thripidae	<i>Thrips angusticeps</i> Uzel	BE, DE, ES, UK, TN
INSECT: Thysanoptera: Thripidae	<i>Thrips palmi</i> Karny	BR, CR, CO, MX, VN
FUNGUS	<i>Aecidium leucanthemi</i> D.C.	DE
FUNGUS	<i>Asteromella bellunensis</i> Syd.	DE
FUNGUS	<i>Entyloma matricariae</i> Rostr. (syn. <i>Entyloma lagerheimii</i> Cif)	KE, DE, UK
FUNGUS	<i>Paraperonospora tanacetii</i> (Gäum.) Constant.	DE
FUNGUS	<i>Pestalotiopsis cruenta</i> (Syd.) Steyaert	TZ
FUNGUS	<i>Phytophthora chrysanthemi</i> Naher, Hi. Watan., Chikuo & Kageyama	DE
FUNGUS	<i>Phytophthora tentaculata</i> Kröber & Marwitz	ES, DE, US (limited distribution)
FUNGUS	<i>Protomycolopsis leucanthemi</i> Magnus	UK
FUNGUS	<i>Puccinia aecidii-leucanthemi</i> E. Fisch.	DE
FUNGUS	<i>Puccinia balsamitae</i> (F. Strauss) Rabenh.	DE
FUNGUS	<i>Puccinia horiana</i> Henn.*	TN, BE, NL, DE, UK, MX, NI, PA, GT, BR, CO, US (regulatory incidents)

Taxonomy	Pest name	Country(ies) in which pest is present
FUNGUS	<i>Puccinia vulpinae</i> J. Schröt.	DE
FUNGUS	<i>Ramularia bellunensis</i> Speg.	KE, DE, TZ, UK
FUNGUS	<i>Sphaerulina socia</i> (Pass.) Quaedvlieg, Verkley & Crous	DE
FUNGUS	<i>Stagonosporopsis inoxydabilis</i> (Boerema) Crous, Vaghefi & P.W.J. Taylor	NL, UK
FUNGUS	<i>Venturia chrysanthemi</i> E.Müll.	DE
VIRUS	<i>Carnation Italian ringspot virus</i> (CIRV)	DE, NL
VIRUS	<i>Chrysanthemum stem necrosis virus</i> (CSNV)	BE, BR, NL, UK, although all countries report that CSNV has been eradicated

*The regulatory status of this pest is under review.

Detailed examination and choice of appropriate phytosanitary measures to mitigate pest risk are part of the pest risk management phase within APHIS and are not addressed in this document.

Table of Contents

Executive Summary	ii
1. Introduction.....	6
1.1. Background	6
1.2. Initiating event.....	6
1.3. Description of the commodity and pathway.....	6
2. Pest List and Pest Categorization	7
2.1. Pests considered but not included on the pest list.....	7
2.1.1. Pests with weak evidence for association with the commodity or for presence in the export area.....	7
2.1.2. Organisms with non-actionable regulatory status	7
2.1.3. Organisms identified only to the genus level.....	7
2.2. Pest list	8
Table 1. Actionable pests associated with <i>Chrysanthemum</i> cuttings (in any country) and present in the African countries: Ethiopia, Kenya, Tanzania, Tunisia, or Uganda (on any host).	8
Table 2. Actionable pests associated with <i>Chrysanthemum</i> cuttings (in any country) and present in the following European countries: Belgium, Germany, the Netherlands, Spain, or the United Kingdom (on any host).	12
Table 3. Actionable pests associated with <i>Chrysanthemum</i> cuttings (in any country) and present in Mexico (on any host).	21
Table 4. Actionable pests associated with <i>Chrysanthemum</i> cuttings (in any country) and present in Nicaragua, Costa Rica, Panama, Guatemala or El Salvador (on any host).	22
Table 5. Actionable pests associated with <i>Chrysanthemum</i> cuttings (in any country) and present in Bolivia, Brazil, or Colombia (on any host).	24
Table 6. Actionable pests associated with <i>Chrysanthemum</i> cuttings (in any country) and present in Vietnam (on any host).....	26
2.3. Pests identified as potential risks.....	28
3. Summary and Conclusions of Pest List	32
4. Acknowledgements.....	32
5. Literature Cited.....	33
6. Appendix: Pests with non-actionable regulatory status.....	46

1. Introduction

1.1. Background

This document was prepared by the Plant Epidemiology and Risk Analysis Laboratory of the Center for Plant Health Science and Technology, United States Department of Agriculture Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine (PPQ). Our purpose in creating this pest list was to examine pest risks associated with the importation of cuttings and in vitro plantlets of *Chrysanthemum*, synonymous genera, and hybrids for propagation without considering any production information, from Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, and Vietnam into the continental United States, which includes Alaska. For this document, genera considered synonymous to *Chrysanthemum* included *Argyranthemum*, *Dendranthema*, *Glebionis*, *Heteranthemis*, *Leucanthemella*, *Leucanthemopsis*, *Leucanthemum*, *Plagiatus*, *Rhodanthemum*, *Tanacetum*, *Tripleurosperum*, and *Xylanthemum* (USDA-ARS, 2016). Production and harvesting procedures in the exporting areas were not considered when compiling this pest list with the following exceptions: no soil, seed, flowers, or roots will be present, and in vitro plantlets will have been produced in aseptic conditions with minimal monitoring for pathogens.

1.2. Initiating event

The importation of plants for propagation into the United States is regulated under Title 7 of the Code of Federal Regulations, Part 319 Subpart – Plants for Planting and the Plants for Planting Manual (7 CFR §319, 2018; 7 CFR §319.37, 2016; USDA-ARS, 2016; USDA, 2018). *Chrysanthemum* (*Dendranthema*) is prohibited from being imported or offered for entry into the United States due to the ability of this plant material to transport the quarantine pathogen *Puccinia horiana* P. Henn. Under this regulation, the entry of *Chrysanthemum* (and related genera) cuttings and in vitro plantlets for propagation from Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, and Vietnam into the continental United States is currently prohibited. This commodity pest list was initiated due to a request by APHIS in consideration of a regulatory change for *Chrysanthemum* spp. and associated plant pests and a market access request by the government of Uganda.

1.3. Description of the commodity and pathway

A pathway is “any means that allows the entry or spread of a pest” (IPPC, 2012). In the context of this risk assessment, 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. We were specifically requested not to consider the production process for *Chrysanthemum* cuttings in determining pests likely to be associated with the imported plant material.

In this pest list, the specific pathway of concern is the importation of cuttings and in vitro plantlets of *Chrysanthemum* spp., hybrids, and related genera (relevant synonyms, if applicable) for propagation from Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, and Vietnam into the continental United States. The movement of this commodity provides a potential pathway for the introduction or spread of plant pests.

The following description of this pathway focuses on the conditions that may affect plant pest risk, including morphological and physiological characteristics of the commodity, as well as processes that the commodity will undergo from production in Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador,

Nicaragua, Panama, Bolivia, Brazil, Colombia, and Vietnam through importation and distribution in the continental United States. These conditions provided the basis for creating the pest list and assessing the likelihood of introduction of the pests selected for further analysis. Hence, the risk ratings in this risk assessment are contingent upon the application of all components of the pathway as described.

Production and harvesting procedures in the exporting area were not considered as part of the assessment with the following exceptions: no soil, seed, flowers, or roots will be present, and in vitro plantlets will have been produced in aseptic conditions with minimal monitoring for pathogens. Post-harvest procedures in the exporting area and shipping conditions were not considered in compiling the pest list.

2. Pest List and Pest Categorization

The pest list is a compilation of all plant pests with actionable regulatory status for the Continental United States that are present in Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, or Vietnam (on any host) and associated with *Chrysanthemum* species, hybrids, or synonyms (anywhere in the world). Species on the pest list with a reasonable likelihood of being present on *Chrysanthemum* cuttings at the time of harvest could follow the pathway into the continental United States. Pests are considered to be of regulatory significance if they are actionable at U.S. ports of entry. Actionable pests include quarantine pests, regulated non-quarantine pests, pests under official control or considered for official control, and pests that require evaluation for regulatory action.

2.1. Pests considered but not included on the pest list

2.1.1. Pests with weak evidence for association with the commodity or for presence in the export area

Plant Pathogens:

Fungi- *Microbotryum tragopogonis-pratensis* (Pers.) R. Bauer & Oberw. [syn: *Bauhinus tragopogonis-pratensis* (Pers. : Pers.) Moore] was reported in Kenya and primarily infects *Tragopogon* spp. (Farr and Rossman, 2016b), but the single report from *Chrysanthemum* (Farr and Rossman, 2016b) is not well supported, so we considered it unlikely to be associated with *Chrysanthemum* (per NIS consultation, Romberg, 2016).

2.1.2. Organisms with non-actionable regulatory status

We found evidence of the organisms listed in the Appendix being associated with *Chrysanthemum* cuttings and in vitro plants and being present in the one or more of the following countries: Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, and Vietnam; however, because these organisms have non-actionable regulatory status for the continental United States, we did not include them in the pest list for this risk assessment.

2.1.3. Organisms identified only to the genus level

In commodity import risk assessments, the taxonomic unit for pests selected for evaluation beyond the pest categorization stage is usually the species (IPPC, 2013), as we focus assessments on organisms for which biological information is available. Therefore, generally do not assess risk for organisms identified only to the genus level, particularly if the genus in question is reported in the import area. Many genera contain several species, and we cannot know if the unidentified species occurs in the import area and, consequently, if it has actionable regulatory status for the import area. On the other hand, if the genus in question is absent from the import area, any unidentified organisms in the genus can have actionable status; however, because such an organism has not been fully identified, we cannot properly assess the likelihood and consequences of its introduction.

In light of these issues, we usually do not include organisms identified only to the genus level in the main pest list. Instead, we address them separately in this sub-section. The information here can be used by risk managers to determine if measures beyond those intended to mitigate fully identified pests are warranted. Often, mitigation measures developed for identified pests will be effective against the pests for which we have little information, but only risk managers can make this judgment.

For this pest list, we identified the following organisms identified only to the genus level that are reported on *Chrysanthemum* species, hybrids, and synonyms in Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, and Vietnam: *Fusarium* sp. reported on *Chrysanthemum cinerariifolium* from Ethiopia (Farr and Rossman, 2016b).

2.2. Pest list

In Tables 1-6, we list the actionable pests associated with *Chrysanthemum* cuttings (stems and leaves) and in vitro plantlets that occur in Ethiopia, Kenya, Tanzania, Tunisia, or Uganda (Table 1); Belgium, Germany, the Netherlands, Spain, or the United Kingdom (Table 2); Mexico (Table 3); Costa Rica, Guatemala, El Salvador, Nicaragua, or Panama (Table 4); Bolivia, Brazil, or Colombia (table 5); and Vietnam (Table 6). The lists comprise those actionable pests that occur in the 20 countries listed on any host and are associated with *Chrysanthemum* cuttings and in vitro plantlets, whether in the 20 countries of concern or elsewhere in the world. For each pest, we indicate 1) the part of the imported plant species with which the pest is generally associated and 2) whether the pest has a reasonable likelihood of being associated, in viable form, with the commodity following harvesting from the field and prior to any post-harvest processing. We developed this pest list based on the scientific literature and port-of-entry pest interception data. Pests in shaded rows are pests that have been identified as reasonably likely to be associated with the harvested commodity; we summarize these pests in separate tables in which countries are grouped by region (Tables 7-12).

Table 1. Actionable pests associated with *Chrysanthemum* cuttings (in any country) and present in the African countries: Ethiopia, Kenya, Tanzania, Tunisia, or Uganda (on any host).

Pest name	Evidence of presence in ET, KE, TZ, TN, or UG ¹	Association with <i>Chrysanthemum</i> cuttings ²	Plant part(s) association ³	On harvested plant part(s)? ⁴	Remarks
INSECT: Diptera: Agromyzidae <i>Chromatomyia horticola</i> Goureau; syn. <i>Phytomyza horticola</i> (Goureau)	Ethiopia (Griffiths, 1967); Kenya (Spencer, 1990); Uganda (Spencer, 1985)	CABI, 2016	Leaves, stems (CABI, 2016)	Yes, leaves (CABI, 2016)	Synonym <i>Phytomyza horticola</i> is reportable (PestID, 2016)

¹ Country codes: ET (Ethiopia), KE (Kenya), TZ (Tanzania), TN (Tunisia), UG (Uganda)

² If warranted, the host type (i.e., Type 1, Type 2, or Type 4 host) may be indicated for a pest. Host types are explained in *Guidelines for Plant Pest Risk Assessment of Imported Fruit and Vegetable Commodities, Version 6.0* (PPQ, 2012).

³ The plant part(s) listed are those for the plant species under analysis. If the information has been extrapolated, such as from plant part association on other plant species, we note that.

⁴ “Yes” indicates simply that the pest has a reasonable likelihood of being associated with the harvested commodity; the level of pest prevalence on the harvested commodity (low, medium, or high) is qualitatively assessed in Risk Element A1 as part of the Likelihood of Introduction assessment (section 3).

Pest name	Evidence of presence in ET, KE, TZ, TN, or UG ¹	Association with <i>Chrysanthemum</i> cuttings ²	Plant part(s) association ³	On harvested plant part(s)? ⁴	Remarks
INSECT: Diptera: Agromyzidae <i>Liriomyza huidobrensis</i> (Blanchard)	Kenya (EPPO, 2014)	Malipatil and Ridland, 2008	Leaves (Malipatil and Ridland, 2008)	Yes	<i>L. huidobrensis</i> not in continental United States (Steck and Dixon, 2006; CABI, 2016)
INSECT: Hemiptera: Aleyrodidae <i>Aleurodicus dispersus</i> (Russell)	Kenya (Mware et al., 2010)	Mware et al., 2010	Leaves (Kessing and Mau, 1993)	Yes	HI, FL (EPPO, 2014); Reportable on propagative material (PestID, 2016)
INSECT: Hemiptera: Coccidae <i>Ceroplastes brevicauda</i> (Hall); syn: <i>Gascardia brevicauda</i> (Hall)	Kenya, Tanzania, Uganda (García Morales et al., 2016)	García Morales et al., 2016	Leaves (CABI, 2016)	Yes	No record, genus reportable (PestID, 2016)
INSECT: Hemiptera: Coccidae <i>Ceroplastes rubens</i> Maskell	Kenya, Tanzania (EPPO, 2014)	CABI, 2016; García Morales et al., 2016	Stems, leaves (CABI, 2016)	Yes	FL (Hamon and Williams, 1984); reportable (PestID, 2016)
INSECT: Hemiptera: Cicadellidae <i>Euscelis incisus</i> (Kirschbaum); Cicadellidae	Tunisia (Zahniser, 2007)	CABI, 2016	Stems, leaves (Dietrich, 2008)	No	Genus reportable (PestID, 2016)
INSECT: Hemiptera: Pseudococcidae <i>Maconellicoccus hirsutus</i> (Green)	Kenya, Tanzania (CABI/EPPO, 2004); Tunisia (Halima-Kamel et al., 2015)	García Morales et al., 2016 (<i>Glebionis</i>)	Stems, leaves (García Morales et al., 2016)	Yes	Invasive in FL (Hoy et al., 2006); reportable (PestID, 2016)
INSECT: Lepidoptera: Sphingidae <i>Agrius convolvuli</i> (L.)	Ethiopia, Kenya, Tanzania, Uganda (Carcasson, 1968); Tunisia (Pittaway, 1993)	CABI, 2016	Leaves (CABI, 2016)	No	Numerous synonyms (Pittaway, 2016); large, obvious larvae (CABI, 2016)
INSECT: Lepidoptera: Noctuidae <i>Agrotis segetum</i> Denis & Schiffermuller	Ethiopia (CIE, 1987); Kenya, Tanzania, Tunisia, Uganda (EPPO, 2014)	Plantwise, 2016	Roots, stems, leaves (Plantwise, 2016)	No	Nocturnal feeder, hides in soil by day (Akol et al., 2011)

Pest name	Evidence of presence in ET, KE, TZ, TN, or UG ¹	Association with <i>Chrysanthemum</i> cuttings ²	Plant part(s) association ³	On harvested plant part(s)? ⁴	Remarks
INSECT: Lepidoptera: Tortricidae <i>Cacoecimorpha pronubana</i> Hübner	Tunisia (EPPO, 2014); Africa (Carter, 1984; Zhang, 1994)	CABI, 2016	Cuttings, leaves, flowers (CABI, 2016)	Yes, leaves (CABI, 2016)	Present in OR and WA (Gilligan and Epstein, 2014a); reportable (PestID, 2016; PestID, 2018)
INSECT: Lepidoptera: Noctuidae <i>Chrysodeixis chalcites</i> (Esper)	Kenya, Tunisia, Uganda (CIE, 1977); Africa (Zhang, 1994)	CABI, 2016	Fruit, leaves (CABI, 2016)	Yes, leaves (CABI, 2016)	Eradicated in United States (MPG, 2016); reportable (PestID, 2016)
INSECT: Lepidoptera: Tortricidae <i>Epichoristodes acerbella</i> (Walker)	Kenya (EPPO, 2014); Africa (Zhang, 1994)	CABI, 2016	Cuttings that include stems, and leaves (CABI, 2016)	Yes, leaves (CABI, 2016)	Reportable (PestID, 2016); not in United States (Gilligan and Epstein, 2014b)
INSECT: Lepidoptera: Noctuidae <i>Spodoptera littoralis</i> (Boisduval)	Ethiopia, Kenya, Tanzania, Tunisia, Uganda (CIE, 1967); Africa (Carter, 1984; Zhang, 1994)	CABI, 2016	Fruit, leaves (CABI, 2016)	Yes, leaves (CABI, 2016)	Reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Thrips angusticeps</i> Uzel; Thripidae	Tunisia (Jenser, 1982)	CABI, 2016	Flower, fruit, stems, leaves (CABI, 2016)	Yes	Stems, leaves discolored (CABI, 2016); Reportable (PestID, 2016)
FUNGUS <i>Entyloma matricariae</i> Rostr. (syn. <i>Entyloma lagerheimii</i> Cif)	Kenya (Farr and Rossman, 2016)	<i>Chrysanthemum alpinum</i> and <i>C. leucanthemum</i> (Farr and Rossman, 2016)	Leaves (Saccardo, 1888)	Yes	Causes smut (Farr and Rossman, 2016).
FUNGUS <i>Pestalotiopsis cruenta</i> (Syd.) Steyaert	Tanzania (Farr and Rossman, 2016)	multiple <i>Chrysanthemum</i> spp. (Farr and Rossman, 2016)	Leaves (Farr and Rossman, 2016)	Yes	Causes leaf spot (Farr and Rossman, 2016). Little information is available about this pathogen, and the taxonomy of the genus <i>Pestalotiopsis</i> is suspect. It is uncertain if this report is valid (per NIS consultation, Romberg, 2016).

Pest name	Evidence of presence in ET, KE, TZ, TN, or UG ¹	Association with <i>Chrysanthemum</i> cuttings ²	Plant part(s) association ³	On harvested plant part(s)? ⁴	Remarks
FUNGUS <i>Puccinia horiana</i> Henn.	Tunisia (Farr and Rossman, 2016)	Multiple <i>Chrysanthemum</i> spp. (Farr and Rossman, 2016)	leaves (Demers et al., 2015)	Yes	Reportable/actionable (PestID, 2016). U.S. incursions associated with imported plant materials are immediately eradicated per 7 CFR § 319.37. However, the regulatory status of this pest is under review.
FUNGUS <i>Ramularia bellunensis</i> Speg.	Kenya (Farr and Rossman, 2016; Wandahwa, 1996), Tanzania (Farr and Rossman, 2016)	<i>Chrysanthemum cinerariifolium</i> , <i>C. coccineum</i> , <i>C. segetum</i> , <i>Chrysanthemum</i> sp. (Farr and Rossman, 2016)	Leaves (Farr and Rossman, 2016)	Yes	Causes leaf spots (Farr and Rossman, 2016)
MOLLUSK <i>Lissachatina fulica</i> (Bowdich)	Ethiopia, Kenya, Tanzania (CABI, 2016)	<i>Chrysanthemum coronarium</i> var. <i>coronarium</i> (not necessarily on cuttings) (Venette and Larson, 2004)	Leaves and stems (CABI, 2016)	No	Unlikely to follow pathway because of size of young; adults are large and are visually detectable, as is their feeding damage, and eggs are laid in soil (CABI, 2016)

Table 2. Actionable pests associated with *Chrysanthemum* cuttings (in any country) and present in the following European countries: Belgium, Germany, the Netherlands, Spain, or the United Kingdom (on any host).

Pest name	Evidence of presence in BE, DE, NL, ES, or UK ⁵	Association with <i>Chrysanthemum</i> cuttings ⁶	Plant part(s) association ⁷	On harvested plant part(s)? ⁸	Remarks
ACARI: Eriophyidae <i>Epirimerus alinae</i> Liro	United Kingdom (Alford, 2012)	Alford, 2012	Stems, leaves (Alford, 2012)	Yes	Greenhouse pest (Alford, 2012); reportable (PestID, 2016)
INSECT: Diptera; Agromyzidae <i>Chromatomyia horticola</i> Goureau; syn. <i>Phytomyza horticola</i> (Goureau)	Belgium (De Bryun, 1991); Germany, Spain (Griffiths, 1967); Netherlands (De Meijere, 1926); United Kingdom (Spencer, 1973)	CABI, 2016	Leaves, stems (CABI, 2016)	Yes, leaves (CABI, 2016)	Synonym <i>Phytomyza horticola</i> reportable (PestID, 2016)
INSECT: Diptera: Cecidomyiidae <i>Diarthronomyia chrysanthemi</i> Ahlberg	Germany (EPPO, 1981); United Kingdom (Jones, 1966)	Jones, 1966	Leaves (Jones, 1966)	Yes	
INSECT: Diptera: Agromyzidae <i>Liriomyza huidobrensis</i> (Blanchard)	Belgium, Germany, Netherlands, Spain (EPPO, 2014)	Malipatil and Ridland, 2008	Leaves (Malipatil and Ridland, 2008)	Yes	<i>L. huidobrensis</i> not in continental United States (Steck and Dixon, 2006; CABI, 2016)

⁵ Country codes: BE (Belgium), DE (Germany), NL (Netherlands), ES (Spain), UK (United Kingdom)

⁶ If warranted, the host type (i.e., Type 1, Type 2, or Type 4 host) may be indicated for a pest. Host types are explained in *Guidelines for Plant Pest Risk Assessment of Imported Fruit and Vegetable Commodities, Version 6.0* (PPQ, 2012).

⁷ The plant part(s) listed are those for the plant species under analysis. If the information has been extrapolated, such as from plant part association on other plant species, we note that.

⁸ “Yes” indicates simply that the pest has a reasonable likelihood of being associated with the harvested commodity; the level of pest prevalence on the harvested commodity (low, medium, or high) is qualitatively assessed in Risk Element A1 as part of the Likelihood of Introduction assessment (section 3).

Pest name	Evidence of presence in BE, DE, NL, ES, or UK⁵	Association with Chrysanthemum cuttings⁶	Plant part(s) association⁷	On harvested plant part(s)?⁸	Remarks
INSECT: Diptera: Psilidae <i>Psila nigricornis</i> Meigen	United Kingdom (Yerbury, 1918; Glendenning, 1952); Europe (Alford, 2012)	Alford, 2012	Stools (Alford, 2012)	Yes	Reportable (PestID, 2016)
INSECT: Diptera: Tephritidae <i>Trypeta zoe</i> Meigen	Belgium, Netherlands, United Kingdom (Pitkin, 2016)	Alford, 2012	Leaves (Alford, 2012)	Yes	Not listed in database (PestID, 2016)
INSECT: Hemiptera: Aleyrodidae <i>Aleurodicus dispersus</i> (Russell)	Spain (Canary Islands)(EPPO, 2014;EPPO Global Database, 2013)	CABI, 2016	Leaves (Kessing and Mau, 1993)	Yes	HI and FL (EPPO, 2014); reportable on propagative material (PestID, 2016); distribution in Spain is limited to the Canary Islands (EPPO Global Database, 2013), which supply plants and flowers to other parts of the European Union (Massot, 2011).
INSECT: Hemiptera: Pseudococcidae <i>Atrococcus cracens</i> Williams	United Kingdom (García Morales et al., 2016); Germany (Fauna Europaea, 2018)	García Morales et al., 2016	García Morales et al., 2016	Yes	No records, genus reportable (PestID, 2016)
INSECT: Hemiptera: Coccidae <i>Ceroplastes rubens</i> Maskell	Germany (Schonfeld, 2015)	CABI, 2016; García Morales et al., 2016	Stems, leaves (CABI, 2016)	Yes	FL (Hamon and Williams, 1984); reportable (PestID, 2016)
INSECT: Hemiptera: Cicadellidae <i>Euscelis incisa</i> (Kirschbaum)	Belgium, Germany, Netherlands, Spain, United Kingdom (Zahniser, 2007)	CABI, 2016	Stems, leaves (Dietrich, 2008)	No	Active, easily disturbed insect. Genus reportable (PestID, 2016)

Pest name	Evidence of presence in BE, DE, NL, ES, or UK ⁵	Association with <i>Chrysanthemum</i> cuttings ⁶	Plant part(s) association ⁷	On harvested plant part(s)? ⁸	Remarks
INSECT: Hemiptera: Monophlebidae <i>Gueriniella serratulae</i> (Fabricius)	Spain (García Morales et al., 2016); France, Spain (Fauna Europaea, 2018)	García Morales et al., 2016	Not listed (García Morales et al., 2016)	Unknown	No records (PestID, 2016)
INSECT: Hemiptera: Miridae <i>Lygocoris pabulinus</i> L.	United Kingdom (Jones, 1966)	Jones, 1966	Stems, leaves, flowers (Jones, 1966)	No	Active, easily disturbed insect
INSECT: Hemiptera: Cicadellidae <i>Hauptidia maroccana</i> (Melichar)	United Kingdom (CABI, 2016)	Alford, 2012	Stems, leaves (Alford, 2012)	No	Greenhouse pest (Alford, 2012); Not listed in the database (PestID, 2016); active, easily disturbed insect
INSECT: Hemiptera: Aphididae <i>Macrosiphoniella oblonga</i> (Mordvilko)	Germany, United Kingdom (Heie, 1995)	Heie, 1995; Brightwell and Dransfield, 2016	Stems, leaves (Heie, 1995)	Yes	Reportable (PestID, 2016)
INSECT: Hemiptera: Pseudococcidae <i>Peliococcus chersonensis</i> Kiritschenko	Europe (García Morales et al., 2016)	García Morales et al., 2016	Roots (García Morales et al., 2016)	No	No evidence found to place this species in Belgium, Germany, Netherlands, Spain, or United Kingdom (Fauna Europaea, 2018; CABI, 2016; García Morales et al., 2016)
INSECT: Hemiptera: Pseudococcidae <i>Pelionella manifecta</i> (Borchsenius)	Europe (García Morales et al., 2016)	García Morales et al., 2016	Root (Kaydan et al., 2016)	No	No evidence found to place this species in Belgium, Germany, Netherlands, Spain, or United Kingdom (CABI, 2016; García Morales et al., 2016)
INSECT: Hemiptera: Aphididae <i>Uroleucon tanacetii</i> (L.)	Germany, United Kingdom (Heie, 1995)	Heie, 1995; Brightwell and Dransfield, 2016	Leaves (Heie, 1995)	Yes	Genus reportable (PestID, 2016)
INSECT: Hemiptera: Aphididae <i>Trama troglodytes</i> von Heyden	Germany, United Kingdom (Heie, 1995)	Heie, 1995; Brightwell and Dransfield, 2016	Subterranean parts of plant (Heie, 1995)	No	No records (PestID, 2016)
INSECT: Lepidoptera: Sphingidae <i>Agrius convolvuli</i> (L.)	Belgium, Germany, Netherlands, Spain, United Kingdom (Pittaway, 1993)	CABI, 2016	Leaves (CABI, 2016)	No	Multiple synonyms listed (Pittaway, 2016); large, obvious larvae (CABI, 2016)

Pest name	Evidence of presence in BE, DE, NL, ES, or UK ⁵	Association with <i>Chrysanthemum</i> cuttings ⁶	Plant part(s) association ⁷	On harvested plant part(s)? ⁸	Remarks
INSECT: Lepidoptera: Noctuidae <i>Agrotis segetum</i> Denis & Schiffermuller	Belgium, Germany, Netherlands, Spain, United Kingdom (EPPO, 2014)	Plantwise, 2016	Roots, stems, leaves (Plantwise, 2016)	No	Nocturnal feeder, hides in soil by day (Akol et al., 2011)
INSECT: Lepidoptera: Noctuidae <i>Autographa gamma</i> (L.)	Belgium (Wauters and Legrand, 1996); Germany (Terytze et al., 1987); Netherlands (Theunissen and den Ouden, 1978); United Kingdom (Taylor et al., 1973)	CABI, 2016	Leaves (CABI, 2016)	No	Large larvae that fold leaves (CABI, 2016). Invasions have been via moths; adults are migratory (CABI, 2016). Reportable (PestID, 2016)
INSECT: Lepidoptera: Tortricidae <i>Cacoecimorpha pronubana</i> Hübner	Germany, Netherlands, Spain, United Kingdom (EPPO, 2014)	CABI, 2016	Cuttings, leaves, flowers (CABI, 2016)	Yes, leaves (CABI, 2016)	Present in OR and WA (Gilligan & Epstein, 2014; EPPO, 2014); Reportable (PestID, 2016; PestID, 2018)
INSECT: Lepidoptera: Noctuidae <i>Chrysodeixis chalcites</i> (Esper)	Belgium, Germany, Netherlands, Spain, United Kingdom (Karsholt and Razowski, 1996)	CABI, 2016; PestID, 2016	Fruit, leaves (CABI, 2016)	Yes, leaves (CABI, 2016)	Eradicated in United States (MPG, 2016); reportable (PestID, 2016)
INSECT: Lepidoptera: Tortricidae <i>Cnephasia asseclana</i> (Denis & Schiffermüller) syn. <i>C. interjectana</i> (Haworth)	United Kingdom (Kimber, 2015)	Kimber, 2015	Flowers, leaves (Kimber, 2015)	Yes, leaves (Kimber, 2015)	Continental Europe (Carter, 1984); reportable (PestID, 2016)
INSECT: Lepidoptera: Tortricidae <i>Cnephasia incertana</i> (Treitschke)	Belgium, United Kingdom (Jonko, 2014)	Carter, 1984	Leaves, stems (Carter, 1984)	Yes, leaves (Carter, 1984)	Europe and northern Africa (Carter, 1984); reportable (PestID, 2016)

Pest name	Evidence of presence in BE, DE, NL, ES, or UK ⁵	Association with <i>Chrysanthemum</i> cuttings ⁶	Plant part(s) association ⁷	On harvested plant part(s)? ⁸	Remarks
INSECT: Lepidoptera: Tortricidae <i>Epichoristodes acerbella</i> (Walker)	Spain (EPPO, 2014; Gilligan and Epstein, 2014b)	CABI, 2016	Leaf and stem cuttings (CABI, 2016)	Yes, leaves (CABI, 2016)	Europe (Zhang, 1994); reportable (PestID, 2016)
INSECT: Lepidoptera: Tortricidae <i>Epiphyas postvittana</i> Walker	United Kingdom (Carter, 1984; Noma et al., 2010)	CABI, 2016	Leaves, buds, flowers, fruit (Noma et al., 2010)	Yes, leaves (CABI, 2016)	Under official control in CA (USDA-APHIS, 2007; Noma et al., 2010)
INSECT: Lepidoptera: Noctuidae <i>Gortyna flavago</i> (Denis & Schiffermüller); syn. <i>G. ochracea</i> (Hübner)	United Kingdom (Carter, 1984)	Carter, 1984	Stems (Carter, 1984)	Yes, tunnels into stems (Carter, 1984)	Europe and north Africa (Carter, 1984); reportable (PestID, 2016)
INSECT: Lepidoptera: Hepialidae <i>Korscheltellus lupulina</i> (L.); syn. <i>Hepialus lupulinus</i> (L.)	United Kingdom (Cooper, 2016)	Cooper, 2016	Roots (Cooper, 2016)	No	Widespread in Europe but no countries listed (Carter, 1984; Zhang, 1994); reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Lacanobia oleracea</i> (L.)	Belgium (CABI, 2016); United Kingdom (Kimber, 2015)	CABI, 2016	Leaves, fruit (CABI, 2016)	Yes, eggs on leaves (CABI, 2016)	Reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Mamestra brassicae</i> (L.)	Belgium, Germany, Netherlands, Spain, United Kingdom (EPPO, 2014)	CABI, 2016	Leaves, stems, flowers (CABI, 2016)	Yes, pathway is live plants (Noma et al., 2010)	Europe (Carter, 1984; Zhang, 1994); Reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Naenia typica</i> (L.)	United Kingdom (Carter, 1984; Kimber, 2015)	Carter, 1984	Leaves (Carter, 1984; Kimber, 2015)	Yes, glasshouse pest (Carter, 1984)	Present in Europe (Carter, 1984; Zhang, 1994); No interception record (PestID, 2016)

Pest name	Evidence of presence in BE, DE, NL, ES, or UK ⁵	Association with <i>Chrysanthemum</i> cuttings ⁶	Plant part(s) association ⁷	On harvested plant part(s)? ⁸	Remarks
INSECT: Lepidoptera: Noctuidae <i>Phlogophora meticulosa</i> (L.)	Germany (Wagner, 2005-2016); Belgium, United Kingdom, France, Germany, Spain, the Netherlands (Fauna Europaea, 2018)	Carter, 1984; Alford, 2012	Leaves (Alford, 2012)	Yes, glasshouse pest (Carter, 1984)	Present in Europe (Carter, 1984; Zhang, 1994); Reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Spodoptera littoralis</i> (Boisduval)	Belgium, Spain (EPPO, 2014)	CABI, 2016	Fruit, leaves (CABI, 2016)	Yes, leaves (CABI, 2016)	Reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Spodoptera litura</i> (Fabricius)	United Kingdom (Jones, 1966)	Noma et al., 2010	Stems, leaves (Noma et al., 2010)	Yes	Reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Frankliniella intonsa</i> (Trybom)	Netherlands (PestID, 2016)	PestID, 2016	Fruit, inflorescence (CABI, 2016)	unknown	Recategorized as non-reportable on August 9, 2004 (PestID, 2018)
INSECT: Thysanoptera: Thripidae <i>Thrips angusticeps</i> Uzel	Belgium, Germany, Spain, United Kingdom (EPPO, 2014)	CABI, 2016	Flower, fruit, stems, leaves (CABI, 2016)	Yes	Causes discolored stems and leaves (CABI, 2016); reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Thrips flavus</i> Schrank	Germany, Spain [Natural History Museum, 2014]; United Kingdom (Morison, 1968)	CABI, 2016	Flowers (CABI, 2016)	No	Reportable (PestID, 2016)
MILLIPEDE <i>Blaniulus guttulatus</i> (Bosc); Blaniulidae	United Kingdom (CABI, 2016)	Alford, 2012	Roots (Alford, 2012)	No	No interception records (PestID, 2016)
FUNGUS <i>Aecidium leucanthemi</i> D.C.	Germany (Farr and Rossman, 2016)	<i>Chrysanthemum leucanthemum</i> (Farr and Rossman, 2016)	Leaves (Farr and Rossman, 2016)	Yes	
FUNGUS	Germany (Farr	<i>Chrysanthemum</i>	Leaves (Farr	Yes	

Pest name	Evidence of presence in BE, DE, NL, ES, or UK ⁵	Association with <i>Chrysanthemum</i> cuttings ⁶	Plant part(s) association ⁷	On harvested plant part(s)? ⁸	Remarks
<i>Asteromella bellunensis</i> Syd.	and Rossman, 2016	<i>corymbosum</i>	and Rossman, 2016)		
FUNGUS <i>Entyloma matricariae</i> Rostr. syn. <i>Entyloma lagerheimii</i> Cif	Germany, UK, (Farr and Rossman, 2016)	<i>Chrysanthemum alpinum</i> and <i>C. leucanthemum</i> (Farr and Rossman, 2016)	Leaves, fruit Boekhout et al., 2006	Yes	Causes smut (Farr and Rossman, 2016).
FUNGUS <i>Paraperonospora tanacetii</i> (Gäum.) Constant.	Germany (Farr and Rossman, 2016)	<i>Chrysanthemum vulgare</i> , <i>Dendranthema indica</i> (Farr and Rossman, 2016)	Leaves (Constantine scu, 1989)	Yes	
FUNGUS <i>Phytophthora chrysanthemi</i> Naher, Hi. Watan., Chikuo & Kageyama	Germany (Götz et al., 2017; Naher et al., 2011)	<i>Chrysanthemum X morifolium</i> (Lin et al., 2017; Naher et al., 2011), <i>Chrysanthemum indicum</i> (Götz et al., 2017)	Stems, roots (Naher et al., 2011)	Yes	Reported in the US [limited distribution in Ohio (Lin et al., 2017)], but is considered a regulatory incident. Pathogen remains reportable/actionable at U.S. ports of entry (PestID, 2018)
FUNGUS <i>Phytophthora tentaculata</i> Kröber & Marwitz	Spain, Germany, United States (limited distribution) (Farr and Rossman, 2016)	<i>Chrysanthemum frutescens</i> , <i>C. leucanthemum</i> (Farr and Rossman, 2016)	Roots, stems (Farr and Rossman, 2016)	Yes (under evaluation by NPAG – check status)	
FUNGUS <i>Protomyces leucanthemi</i> Magnus	United Kingdom (Farr and Rossman, 2016)	<i>Chrysanthemum leucanthemum</i> , <i>C. integrifolium</i> , <i>C. segetum</i> , <i>Chrysanthemum</i> sp. (Farr and Rossman, 2016)	leaves, stems (Bacigálová and Mullenko, 2005)	Yes	
FUNGUS <i>Puccinia aecidii-leucanthemi</i> E. Fisch.	Germany (Farr and Rossman, 2016)	<i>Chrysanthemum leucanthemum</i> , <i>Leucanthemum</i> sp., <i>L. vulgare</i> (Farr and Rossman, 2016)	Leaves (Saccardo, 1905 via Index Fungorum, 2018)	Yes	
FUNGUS <i>Puccinia balsamitae</i> (F. Strauss) Rabenh.	Germany (Farr and Rossman, 2016)	<i>Chrysanthemum balsamita</i> , <i>C. balsamita</i> subsp. <i>majus</i> , <i>C.</i>	Leaves, stems (Gjaerum, 1986)	Yes	

Pest name	Evidence of presence in BE, DE, NL, ES, or UK ⁵	Association with <i>Chrysanthemum</i> cuttings ⁶	Plant part(s) association ⁷	On harvested plant part(s)? ⁸	Remarks
		<i>macrophyllum</i> , <i>Pyrethrum balsamita</i> , <i>Tanacetum balsamita</i> , <i>T. balsamitoides</i> , <i>T. cilicicum</i> (Farr and Rossman, 2016)			
FUNGUS <i>Puccinia horiana</i> Henn.	Belgium, Netherlands, Germany, United Kingdom, United States (regulatory incidents) (Farr and Rossman, 2016)	Multiple <i>Chrysanthemum</i> spp. (Farr and Rossman, 2016)	leaves (Demers et al., 2015)	Yes	Reportable/actionable (PestID, 2018). U.S. incursions associated with imported plant materials are immediately eradicated per 7 CFR § 319.37. However, the regulatory status of this pest is under review.
FUNGUS <i>Puccinia vulpinae</i> J. Schröt.	Germany (Farr and Rossman, 2016)	<i>Tanacetum vulgare</i> (Farr and Rossman, 2016)	Leaves (Zoölogisch Museum Amsterdam, 2016)	Yes	
FUNGUS <i>Ramularia bellunensis</i> Speg.	Germany, United Kingdom (Farr and Rossman, 2016)	<i>Chrystantheumum cinerariifolium</i> , <i>C. coccineum</i> , <i>C. segetum</i> , <i>Chrysanthemum</i> sp. (Farr and Rossman, 2016)	Leaves (Farr and Rossman, 2016)	Yes	Causes leaf spots (Farr and Rossman, 2016)
FUNGUS <i>Sphaerulina socia</i> (Pass.) Quaedvlieg, Verkley & Crous	Germany (Farr and Rossman, 2016)	Multiple <i>Chrysanthemum</i> spp. (Farr and Rossman, 2016)	Leaves (Farr and Rossman, 2016)	Yes	U.S. distribution cannot be verified, there was a single report in Wisconsin in 1949 (Farr and Rossman, 2018)
FUNGUS <i>Stagonosporopsis inoxydabilis</i> (Boerema) Crous, Vaghefi & P.W.J. Taylor	Netherlands, United Kingdom (Farr and Rossman, 2016)	<i>Chrysanthemum parthenii</i> (Farr and Rossman, 2016)	Leaves (Farr and Rossman, 2016)	Yes	Reports from CA are spurious (Romberg, 2016)
FUNGUS <i>Venturia chrysanthemi</i> E.	Germany (Farr and Rossman, 2016)	<i>C. leucanthemum</i> (Farr and	Stems (Schmid-Heckel et	Yes	

Pest name	Evidence of presence in BE, DE, NL, ES, or UK⁵	Association with Chrysanthemum cuttings⁶	Plant part(s) association⁷	On harvested plant part(s)?⁸	Remarks
Müll.		Rossman, 2016)	al., 1988)		
VIRUS <i>Carnation Italian ringspot virus (CIRV)</i>	Germany, Netherlands (Koenig et al., 2009)	<i>Chrysanthemum zawadskii</i> var. <i>latilobum</i> (Seo et al., 2015)	Leaves, whole plants (Seo et al., 2015)	Yes	First reports were in England, from plant material of Italian and American origin (Hollings et al., 1970), but we did not find additional reports from any of these countries when researching this virus for the pest list.
VIRUS <i>Chrysanthemum stem necrosis virus (CSNV)</i>	Belgium (De Jonghe et al., 2013), Netherlands, United Kingdom (EPPO, 2005) Although all countries report that CSNV has been eradicated (EPPO, 2005; De Jonghe et al., 2013)	<i>Chrysanthemum x morifolium</i> (De Jonghe et al., 2013)	Leaves, stem (Gleason et al., 2009)	Yes	All countries report that CSNV has been eradicated (EPPO, 2005; De Jonghe et al., 2013). Virus was found in United Kingdom on cuttings imported from Brazil (Mumford et al., 2003) but reported eradicated from locations in the EU

Table 3. Actionable pests associated with *Chrysanthemum* cuttings (in any country) and present in Mexico (on any host).

Pest name	Evidence of presence in MX ⁹	Association with <i>Chrysanthemum</i> cuttings ¹⁰	Plant part(s) association ¹¹	On harvested plant part(s)? ¹²	Remarks
INSECT: Hemiptera: Pseudococcidae <i>Maconellicoccus hirsutus</i> (Green)	CABI/EPPO 2004	<i>Glebionis</i> sp. García Morales et al., 2016	Stems, leaves (García Morales et al., 2016)	Yes	Invasive in FL (Hoy et al., 2006); reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Thrips palmi</i> Karny	CABI/EPPO, 2004	CABI, 2016	Leaves, flowers (CABI, 2016)	Yes	HI, FL (EPPO, 2014); reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Frankliniella inutilis</i> Priesner; Thripidae	PestID, 2016	PestID, 2016	Unknown	Unknown	Not a vector (Ochoa et al., 1996)
FUNGUS <i>Puccinia horiana</i> Henn.	Mexico, United States (regulatory incidents) (Farr and Rossman, 2016)	Multiple <i>Chrysanthemum</i> spp. (Farr and Rossman, 2016)	Leaves (Demers et al., 2015)	Yes	The regulatory status of this pest is under review.

⁹ Country code: MX (Mexico)

¹⁰ If warranted, the host type (i.e., Type 1, Type 2, or Type 4 host) may be indicated for a pest. Host types are explained in *Guidelines for Plant Pest Risk Assessment of Imported Fruit and Vegetable Commodities, Version 6.0* (PPQ, 2012).

¹¹ The plant part(s) listed are those for the plant species under analysis. If the information has been extrapolated, such as from plant part association on other plant species, we note that.

¹² “Yes” indicates simply that the pest has a reasonable likelihood of being associated with the harvested commodity; the level of pest prevalence on the harvested commodity (low, medium, or high) is qualitatively assessed in Risk Element A1 as part of the Likelihood of Introduction assessment (section 3).

Table 4. Actionable pests associated with *Chrysanthemum* cuttings (in any country) and present in Nicaragua, Costa Rica, Panama, Guatemala or El Salvador (on any host).

Pest name	Evidence of presence in CR, SV, GT, NI, or PA ¹³	Association with <i>Chrysanthemum</i> cuttings ¹⁴	Plant part(s) association ¹⁵	On harvested plant part(s)? ¹⁶	Remarks
INSECT: Diptera: Agromyzidae <i>Liriomyza huidobrensis</i> (Blanchard)	El Salvador, Guatemala, Nicaragua, Panama (EPPO, 2014)	<i>Chrystantemum</i> sp. (Malipatil and Ridland, 2008)	Leaves (Malipatil and Ridland, 2008)	Yes	<i>L. huidobrensis</i> not in mainland United States (Steck and Dixon, 2006; CABI, 2016)
INSECT: Coleoptera: Scarabaeidae <i>Ceraspis brunneipennis</i> (Bates)	Costa Rica (PestID, 2016)	PestID, 2016	Flowers, leaves (PestID, 2016)	Yes	
INSECT: Hemiptera: Aleyrodidae <i>Aleurodicus dispersus</i> (Russell)	El Salvador, Guatemala, Nicaragua, Panama (EPPO, 2014)	CABI, 2016	Leaves (Kessing and Mau, 1993)	Yes	HI, FL (EPPO, 2014); reportable on propagative material (PestID, 2016)
INSECT: Hemiptera: Pseudococcidae <i>Maconellicoccus hirsutus</i> (Green)	Costa Rica (IPPC, 2014); Guatemala (CABI/EPPO 2004)	<i>Chrysanthemum</i> sp. (Milonas and Partsinevelos, 2017)	Stems, leaves (Garcia Morales et al., 2016)	Yes	Invasive in FL (Hoy et al., 2006); reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Thrips palmi</i> Karny	Costa Rica (EPPO, 2014)	CABI, 2016	Leaves, flowers (CABI, 2016)	Yes	HI, FL (EPPO, 2014); reportable (PestID, 2016)

¹³ Country codes: CR (Costa Rica), SV (El Salvador), GT (Guatemala), NI (Nicaragua), PA (Panama)

¹⁴ If warranted, the host type (i.e., Type 1, Type 2, or Type 4 host) may be indicated for a pest. Host types are explained in *Guidelines for Plant Pest Risk Assessment of Imported Fruit and Vegetable Commodities, Version 6.0* (PPQ, 2012).

¹⁵ The plant part(s) listed are those for the plant species under analysis. If the information has been extrapolated, such as from plant part association on other plant species, we note that.

¹⁶ “Yes” indicates simply that the pest has a reasonable likelihood of being associated with the harvested commodity; the level of pest prevalence on the harvested commodity (low, medium, or high) is qualitatively assessed in Risk Element A1 as part of the Likelihood of Introduction assessment (section 3).

Pest List for Chrysanthemum cuttings and in vitro plants from 20 countries

Pest name	Evidence of presence in CR, SV, GT, NI, or PA¹³	Association with Chrysanthemum cuttings¹⁴	Plant part(s) association¹⁵	On harvested plant part(s)?¹⁶	Remarks
FUNGUS <i>Puccinia horiana</i> Henn.	Nicaragua, Panama, Guatemala (Farr and Rossman, 2016), United States (intercepted / actions taken)	Multiple <i>Chrysanthemum</i> spp. (Farr and Rossman, 2016)	Leaves (Demers et al., 2015)	Yes	Reportable/actionable (PestID, 2018). U.S. incursions associated with imported plant materials are immediately eradicated per 7 CFR § 319.37. However, the regulatory status of this pest is under review.

Table 5. Actionable pests associated with *Chrysanthemum* cuttings (in any country) and present in Bolivia, Brazil, or Colombia (on any host).

Pest name	Evidence of presence in BO, BR, or CO ¹⁷	Association with <i>Chrysanthemum</i> cuttings ¹⁸	Plant part(s) association ¹⁹	On harvested plant part(s)? ²⁰	Remarks
INSECT: Coleoptera: Scarabaeidae <i>Ancognatha scarabaeoides</i> Erichson	Colombia (PestID, 2016)	PestID, 2016	Root (Vallejo and Morón, 2008)	No	Reportable (PestID, 2016)
INSECT: Coleoptera: Curculionidae <i>Gonipterus gibberus</i> Boisduval	Brazil (Fenilli, 1982)	CABI, 2016	Leaves, stems (CABI, 2016)	Yes	Egg attached to leaf surface (Marelli, 1928)
INSECT: Diptera: Agromyzidae <i>Liriomyza huidobrensis</i> (Blanchard)	Brazil, Colombia (EPPO, 2014)	Malipatil and Ridland, 2008	Leaves (Malipatil and Ridland, 2008)	Yes	<i>L. huidobrensis</i> not in mainland United States (Steck & Dixon, 2006; CABI, 2016)
INSECT: Hemiptera: Aleyrodidae <i>Aleurodicus dispersus</i> (Russell)	Brazil, Colombia (EPPO, 2014)	CABI, 2016	Leaves (Kessing and Mau, 1993)	Yes	HI, FL (EPPO, 2014); reportable on propagative material (PestID, 2016)
INSECT: Hemiptera: Coccidae <i>Ceroplastes rubens</i> Maskell	Colombia (Kondo, 2008)	CABI, 2016; García Morales et al., 2016	Stems, leaves (CABI, 2016)	Yes	FL (Hamon and Williams, 1984); reportable (PestID, 2016)
INSECT: Hemiptera: Pseudococcidae <i>Maconellicoccus hirsutus</i> (Green)	Brazil (EPPO 2014); Colombia (Kondo et al., 2012)	<i>Chrysanthemum</i> sp. (Milonas and Partsinevelos, 2017)	Stems, leaves (García Morales et al., 2016)	Yes	Invasive in FL (Hoy et al., 2006); reportable (PestID, 2016)

¹⁷ Country codes: BO (Bolivia), BR (Brazil), CO (Colombia)

¹⁸ If warranted, the host type (i.e., Type 1, Type 2, or Type 4 host) may be indicated for a pest. Host types are explained in *Guidelines for Plant Pest Risk Assessment of Imported Fruit and Vegetable Commodities, Version 6.0* (PPQ, 2012).

¹⁹ The plant part(s) listed are those for the plant species under analysis. If the information has been extrapolated, such as from plant part association on other plant species, we note that.

²⁰ “Yes” indicates simply that the pest has a reasonable likelihood of being associated with the harvested commodity; the level of pest prevalence on the harvested commodity (low, medium, or high) is qualitatively assessed in Risk Element A1 as part of the Likelihood of Introduction assessment (section 3).

Pest name	Evidence of presence in BO, BR, or CO ¹⁷	Association with <i>Chrysanthemum</i> cuttings ¹⁸	Plant part(s) association ¹⁹	On harvested plant part(s)? ²⁰	Remarks
INSECT: Lepidoptera: Geometridae <i>Cannagara aorisaria</i> Walker	Colombia (PestID, 2016)	PestID, 2016	Flowers (PestID, 2016)	No	Reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Frankliniella auripes</i> Hood	Colombia (PestID, 2016)	PestID, 2016	Flowers (PestID, 2016)	No	Reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Frankliniella schultzei</i> (Trybom)	Brazil (PestID, 2016)	PestID, 2016	Flowers (PestID, 2016)	No	Deregulated - DEEP 12/05/2011 (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Thrips palmi</i> Karny	Brazil (Monteiro et al., 1995); Colombia (EPPO, 2014)	CABI, 2016	Leaves, flowers (CABI, 2016)	Yes	HI, FL (EPPO, 2014); reportable (PestID, 2016)
FUNGUS <i>Puccinia horiana</i> Henn.	Brazil, Colombia (Farr and Rossman, 2016), United States (regula- tory incidents)	Multiple <i>Chrysanth-emum</i> spp. (Farr and Rossman, 2016)	Leaves (Demers et al., 2015)	Yes	Reportable/actionable (PestID). U.S. incursions associated with imported plant materials are immediately eradicated per 7 CFR § 319.37. However, the regulatory status of this pest is under review.
VIRUS <i>Chrysanthemum</i> <i>Stem Necrosis Virus</i>	Brazil (EPPO, 2005)	<i>Chrysanthemum</i> sp. (EPPO, 2005; Bezerra et al., 1999)	Whole plant (EPPO, 2005)	Yes	
MOLLUSK <i>Lissachatina fulica</i> (Bowdich)	Bolivia, Brazil (CABI, 2016)	<i>Chrysanthemum</i> <i>coronarum</i> var. <i>coronarum</i> (not necessarily on cuttings) (Venette and Larson, 2004)	Leaves and stems (CABI, 2016)	No	Unlikely to follow pathway because of size of young; adults are large and are visually detectable and eggs are laid in soil (CABI, 2016)

Table 6. Actionable pests associated with *Chrysanthemum* cuttings (in any country) and present in Vietnam (on any host).

Pest name	Evidence of presence in VN ²¹	Association with <i>Chrysanthemum</i> cuttings ²²	Plant part(s) association ²³	On harvested plant part(s)? ²⁴	Remarks
INSECT: Diptera: Agromyzidae <i>Chromatomyia horticola</i> Goureau; syn. <i>Phytomyza horticola</i> (Goureau)	Tran, 2009	CABI, 2016	Leaves, stems (CABI, 2016)	Yes, leaves (CABI, 2016)	Synonym <i>Phytomyza horticola</i> reportable (PestID, 2016)
INSECT: Diptera: Agromyzidae <i>Liriomyza huidobrensis</i> (Blanchard)	Malipatil and Ridland, 2008; EPPO, 2014	Malipatil and Ridland, 2008	Leaves (Malipatil & Ridland, 2008)	Yes	<i>L. huidobrensis</i> not in mainland United States (Steck and Dixon, 2006; CABI, 2016)
INSECT: Hemiptera: Aleyrodidae <i>Aleurodicus dispersus</i> (Russell)	Waterhouse, 1993	CABI, 2016	Leaves (Kessing & Mau, 1993)	Yes	HI, FL (EPPO, 2014); reportable on propagative material (PestID, 2016)
INSECT: Hemiptera: Coccidae <i>Ceroplastes rubens</i> Maskell	Waterhouse, 1993	CABI, 2016; Garcia Morales et al., 2016	Stems, leaves (CABI, 2016)	Yes	FL (Hamon and Williams, 1984); reportable (PestID, 2016)
INSECT: Hemiptera: Pseudococcidae <i>Maconellicoccus hirsutus</i> (Green)	CABI/EPPO 2004; Williams and Granara de Willink, 1992	<i>Chrysanthemum</i> sp. (Milonas and Partsinevelos, 2017)	Stems, leaves (Garcia Morales et al., 2016)	Yes	Invasive in FL (Hoy et al., 2006); reportable in US (PestID, 2016)
INSECT: Hemiptera: Aphididae <i>Macrosiphoniella oblonga</i> (Mordvilko)	Widespread in Asia (Blackman and Eastop, 2016)	Heie, 1995; Brightwell and Dransfield, 2016	Leaves (Heie, 1995)	Yes	Reportable (PestID, 2016)

²¹ Country code: VN (Vietnam)

²² If warranted, the host type (i.e., Type 1, Type 2, or Type 4 host) may be indicated for a pest. Host types are explained in *Guidelines for Plant Pest Risk Assessment of Imported Fruit and Vegetable Commodities, Version 6.0* (PPQ, 2012).

²³ The plant part(s) listed are those for the plant species under analysis. If the information has been extrapolated, such as from plant part association on other plant species, we note that.

²⁴ “Yes” indicates simply that the pest has a reasonable likelihood of being associated with the harvested commodity; the level of pest prevalence on the harvested commodity (low, medium, or high) is qualitatively assessed in Risk Element A1 as part of the Likelihood of Introduction assessment (section 3).

Pest name	Evidence of presence in VN ²¹	Association with <i>Chrysanthemum</i> cuttings ²²	Plant part(s) association ²³	On harvested plant part(s)? ²⁴	Remarks
INSECT: Hemiptera: Aphididae <i>Trama troglodytes</i> von Heyden	Widespread in Asia (Blackman and Eastop, 2016)	Heie, 1995	Subterranean plant parts (Heie, 1995)	No	Never reported (PestID, 2016)
INSECT: Hemiptera: Aphididae <i>Uroleucon tanacetii</i> (L.)	Widespread in Asia (Blackman and Eastop, 2016)	Heie, 1995; Brightwell and Dransfield, 2016	Leaves (Heie, 1995)	Yes	Genus is reportable (PestID, 2016)
INSECT: Lepidoptera: Sphingidae <i>Agrius convolvuli</i> (L.)	Waterhouse, 1993; Savela, 2015	CABI, 2016	Leaves (CABI, 2016)	No	Synonyms listed (Pittaway, 2016); large, obvious larvae (CABI, 2016)
INSECT: Lepidoptera: Noctuidae <i>Agrotis segetum</i> Denis & Schiffermuller	Waterhouse, 1993	Plantwise, 2016	Roots, stems, leaves (Plantwise, 2016)	No	Nocturnal feeder, hides in soil by day (Akol et al., 2011)
INSECT: Lepidoptera: Noctuidae <i>Chrysodeixis eriosoma</i> Doubleday	Waterhouse, 1993; Zhang, 1994	CABI, 2016	Stems, leaves (CABI, 2016)	Yes	HI (EPPO, 2014)
INSECT: Lepidoptera: Tortricidae <i>Homona coffearia</i> (Nietner)	Waterhouse, 1993	CABI, 2016	Larvae produce webbed nests on leaves (CABI, 2016)	Yes	Parasites maintain populations at minor pest status (CABI, 2016)
INSECT: Lepidoptera: Noctuidae <i>Spodoptera litura</i> (Fabricius)	Waterhouse, 1993; Noma et al., 2010	Noma et al., 2010	Stems, leaves (Noma et al., 2010)	Yes	High invasive risk (Venette et al., 2003); reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Thrips palmi</i> Karny	Quyen et al., 2008	CABI, 2016	Leaves, flowers (CABI, 2016)	Yes	HI, FL (EPPO, 2014); reportable (PestID, 2016)
MOLLUSK <i>Lissachatina fulica</i> (Bowdich)	CABI, 2016	<i>Chrysanthemum coronarium</i> var. <i>coronarium</i> (Venette and Larson, 2004)	Leaves and stems (CABI, 2016)	No	Unlikely to follow pathway because of size of young; adults are large and are visually detectable and eggs are laid in soil (CABI, 2016)

2.3. Pests identified as potential risks

All organisms identified as actionable pests for the continental United States and as having a reasonable likelihood of being associated with the commodity plant part(s) at the time of harvest and remaining with the commodity, in viable form, throughout the harvesting process are listed in Tables 7-11.

Table 7. Actionable pests from Ethiopia, Kenya, Tanzania, Tunisia or Uganda identified as reasonably likely to be associated with the commodity plant part.

Pest type	Taxonomy	Scientific name
Arthropod	Order: Family	Genus species
Arthropod	Diptera: Agromyzidae	<i>Liriomyza huidobrensis</i>
Arthropod	Diptera: Agromyzidae	<i>Chromatomyia horticola</i>
Arthropod	Hemiptera: Pseudococcidae	<i>Maconellicoccus hirsutus</i>
Arthropod	Hemiptera: Aleyrodidae	<i>Aleurodicus dispersus</i>
Arthropod	Hemiptera: Coccidae	<i>Ceroplastes brevicauda</i>
Arthropod	Hemiptera: Coccidae	<i>Ceroplastes rubens</i>
Arthropod	Lepidoptera: Noctuidae	<i>Spodoptera littoralis</i>
Arthropod	Lepidoptera: Noctuidae	<i>Chrysodeixis chalcites</i>
Arthropod	Lepidoptera: Tortricidae	<i>Cacoecimorpha pronubana</i>
Arthropod	Lepidoptera: Tortricidae	<i>Epichoristodes acerbella</i>
Arthropod	Thysanoptera	<i>Thrips angusticeps</i>
Fungus	N/A	<i>Entyloma matricariae</i> Rostr.
Fungus	N/A	<i>Pestalotiopsis cruenta</i> (Syd.) Steyaert
Fungus	N/A	<i>Puccinia horiana</i> Henn.*
Fungus	N/A	<i>Ramularia bellunensis</i> Speg.

* The regulatory status of this pest is under review.

Table 8. Pests from Belgium, Germany, the Netherlands, Spain, or the United Kingdom identified as reasonably likely to be associated with the commodity plant part.

Pest type	Taxonomy	Scientific name
Arthropod	Order: Family	Genus species
Arthropod	Hemiptera: Aleyrodidae	<i>Aleurodicus dispersus</i>
Arthropod	Lepidoptera: Tortricidae	<i>Cacoecimorpha pronubana</i>
Arthropod	Lepidoptera: Tortricidae	<i>Cnephasia asseclana</i>
Arthropod	Lepidoptera: Tortricidae	<i>Cnephasia incertana</i>
Arthropod	Lepidoptera: Tortricidae	<i>Epichoristodes acerbella</i>
Arthropod	Lepidoptera: Tortricidae	<i>Epiphyas postvittana</i>
Arthropod	Thysanoptera: Thripidae	<i>Thrips angusticeps</i>
Fungus	N/A	<i>Asteromella bellunensis</i> Syd.
Fungus	N/A	<i>Entyloma matricariae</i> Rostr.
Fungus	N/A	<i>Paraperonospora tanacetii</i> (Gäum.) Constant.
Fungus	N/A	<i>Phytophthora chrysanthemi</i> Naher, Hi. Watan., Chikuo & Kageyama
Fungus	N/A	<i>Phytophthora tentaculata</i> Kröber & Marwitz
Fungus	N/A	<i>Protomycolopsis leucanthemi</i> Magnus
Fungus	N/A	<i>Puccinia aecidii-leucanthemi</i> E. Fisch.
Fungus	N/A	<i>Puccinia balsamitae</i> (F. Strauss) Rabenh.
Fungus	N/A	<i>Puccinia horiana</i> Henn.**
Fungus	N/A	<i>Puccinia vulpinae</i> J. Schröt.
Fungus	N/A	<i>Ramularia bellunensis</i> Speg.
Fungus	N/A	<i>Sphaerulina socia</i> (Pass.) Quaedvlieg, Verkley & Crous
Fungus	N/A	<i>Stagonosporopsis inoxydabilis</i> (Boerema) Crous, Vaghefi & P.W.J. Taylor
Fungus	N/A	<i>Venturia chrysanthemi</i> E. Müll.
Virus*	N/A	<i>Chrysanthemum stem necrosis virus</i> (CSNV)
Virus	N/A	<i>Carnation Italian ringspot virus</i> (CIRV)

* Analyst determines if enough information is known to assign a family to viruses/viroids that have not been approved by the ICTV.

** The regulatory status of this pest is under review.

Table 9. Pests from Mexico identified as reasonably likely to be associated with the commodity plant part.

Pest type	Taxonomy	Scientific name
Arthropod	Order: Family	Genus species
Arthropod	Hemiptera: Pseudococcidae	<i>Maconellicoccus hirsutus</i>
Arthropod	Thysanoptera: Thripidae	<i>Thrips palmi</i>
Fungus	N/A	<i>Puccinia horiana</i> Henn.*

* The regulatory status of this pest is under review.

Table 10. Pests from Costa Rica, El Salvador, Guatemala, Nicaragua, or Panama identified as reasonably likely to be associated with the commodity plant part.

Pest type	Taxonomy	Scientific name
Arthropod	Order: Family	<i>Genus species</i>
Arthropod	Diptera: Agromyzidae	<i>Liriomyza huidobrensis</i>
Arthropod	Hemiptera: Aleyrodidae	<i>Aleurodicus dispersus</i>
Arthropod	Hemiptera: Pseudococcidae	<i>Maconellicoccus hirsutus</i>
Arthropod	Thysanoptera: Thripidae	<i>Thrips palmi</i>
Fungus	N/A	<i>Puccinia horiana</i> Henn.*

*The regulatory status of this pest is under review.

Table 11. Pests from Brazil, Bolivia, or Colombia identified as reasonably likely to be associated with the commodity plant part.

Pest type	Taxonomy	Scientific name
Arthropod	Order: Family	<i>Genus species</i>
Arthropod	Coleoptera: Curculionidae	<i>Gonipterus gibberus</i>
Arthropod	Diptera: Agromyzidae	<i>Liriomyza huidobrensis</i>
Arthropod	Hemiptera: Aleyrodidae	<i>Aleurodicus dispersus</i>
Arthropod	Hemiptera: Coccidae	<i>Ceroplastes rubens</i>
Arthropod	Hemiptera: Pseudococcidae	<i>Maconellicoccus hirsutus</i>
Arthropod	Thysanoptera: Thripidae	<i>Thrips palmi</i>
Fungus	N/A	<i>Puccinia horiana</i> Henn.**
Virus*	N/A	<i>Chrysanthemum stem necrosis virus</i> (CSNV)

* Analyst determines if enough information is known to assign a family to viruses/viroids that haven't been approved by the ICTV.

**The regulatory status of this pest is under review.

Table 12. Pests from Vietnam identified as reasonably likely to be associated with the commodity plant part.

Pest type	Taxonomy	Scientific name
Arthropod	Order: Family	Genus species
Arthropod	Diptera: Agromyzidae	<i>Liriomyza huidobrensis</i>
Arthropod	Hemiptera: Aleyrodidae	<i>Aleurodicus dispersus</i>
Arthropod	Hemiptera: Aphididae	<i>Macrosiphoniella oblonga</i>
Arthropod	Hemiptera: Aphididae	<i>Uroleucon tanacetii</i>
Arthropod	Hemiptera: Coccidae	<i>Ceroplastes rubens</i>
Arthropod	Lepidoptera: Noctuidae	<i>Chrysodeixis eriosoma</i>
Arthropod	Lepidoptera: Noctuidae	<i>Spodoptera litura</i>
Arthropod	Lepidoptera: Tortricidae	<i>Homona coffearia</i>
Arthropod	Thysanoptera: Thripidae	<i>Thrips palmi</i>

3. Summary and Conclusions of Pest List

Of the organisms associated with *Chrysanthemum* cuttings and in vitro plantlets worldwide and present in Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, or Vietnam, we identified 49 organisms that are actionable pests for the continental United States and have a reasonable likelihood of being associated with the commodity following harvesting from the field and prior to any post-harvest processing.

Detailed examination and choice of appropriate phytosanitary measures to mitigate pest risk are part of the pest risk management phase within APHIS and are not addressed in this document.

4. Acknowledgements

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6. Appendix: Pests with non-actionable regulatory status

We found some evidence of the following organisms being associated with *Chrysanthemum* cuttings or in vitro plantlets and being present in one or more of the 20 countries of considered in this pest list (Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, and Vietnam). Because these organisms have non-actionable regulatory status for the continental United States, we did not list them in Tables 1-6 of this pest list, and we did not evaluate the strength of the evidence for their association with *Chrysanthemum*. 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 Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, or Vietnam.

We list these organisms along with the references supporting their potential association with *Chrysanthemum* cuttings or in vitro plantlets, their potential presence in one or more the countries of concern (Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia Brazil, Colombia, and Vietnam), their presence in the continental United States (if applicable), and their regulatory status for the continental United States. For organisms not present in the continental United States, we also provide justification for their non-actionable status.

Organism	Evidence and/or other notes
INSECT: Hemiptera: Diaspididae <i>Aonidomytilus albus</i> (Cockerell)	<i>Chrysanthemum</i> (CABI, 2016); Kenya, Tanzania, Uganda, Brazil (Nakahara, 1982); Mexico (EPPO, 2014); Colombia (Kondo, 2001); US (Nakahara, 1982); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Aphididae <i>Aphis fabae</i> Scopoli	<i>Chrysanthemum</i> (Alford, 2012); Widespread in Europe, Africa, and North America (Alford, 2012; Blackman and Eastop, 2016); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Aphididae <i>Aphis gossypii</i> Glover	<i>Chrysanthemum</i> (Alford, 2012); Cosmopolitan (Alford, 2012; Blackman and Eastop, 2016); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Aleyrodidae <i>Bemisia tabaci</i> (Gennadius); syn. <i>Bemisia argentifolii</i> Bellows & Perring	<i>Chrysanthemum</i> (CABI, 2016); Vietnam (Waterhouse, 1993); Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Mexico, Costa Rica, El Salvador, Guatemala, Nicaragua, Panama, Bolivia, Brazil, Colombia, Belgium, Germany, Netherlands, Spain, UK, US (EPPO, 2014); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Geometridae <i>Biston betularia</i> (L.)	<i>Chrysanthemum</i> (Alford, 2012); Europe (Carter, 1984); Europe and North America (Zhang, 1994); US (MPG, 2016); Non-reportable (PestID, 2018)
INSECT: Hemiptera: Aphididae <i>Brachycaudus helichrysi</i> Kaltenbach	<i>Chrysanthemum</i> (Alford, 2012); Germany (Schliephake and Karl, 1995); Netherlands (De Bokx and Piron, 1990); UK (Hartfield and Campbell, 1996); Cosmopolitan (Blackman and Eastop, 2016); US (Oetting et al., 1977); Non-reportable

Organism	Evidence and/or other notes
	(PestID, 2016)
MITE: Tenuipalpidae <i>Brevipalpus obovatus</i> Donnadieu	<i>Chrysanthemum</i> (Alford, 2012); Kenya, Tanzania, Uganda, Belgium, Spain (CIE, 1988a); Mexico (Schotman, 1989); Costa Rica (Aguilar and Murillo, 2012); US (Schotman, 1989); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Miridae <i>Calocoris norvegicus</i> (Gmelin); syn. <i>Closterotomus norvegicus</i>	<i>Chrysanthemum</i> (Alford, 2012); Germany, UK (Alford, 2012); US (UC IPM, 2014); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Coccidae <i>Ceroplastes floridensis</i> Comstock	<i>Chrysanthemum</i> (Alford, 2012); Vietnam (Ben-Dov, 1993); Kenya, Tanzania, Uganda, Mexico, Costa Rica, Guatemala, Nicaragua, Panama, Brazil, Colombia (CABI/EPPO, 2010); Tunisia (Jendoubi et al., 2012); US (CABI/EPPO, 2010); Non-reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Chaetanaphothrips orchidii</i> (Moulton)	<i>Chrysanthemum</i> (Alford, 2012); Mexico (Stannard, 1968); Costa Rica, Brazil (CIE, 1988b); US (Stannard, 1968); Non-reportable (PestID, 2016)
INSECT: Diptera: Agromyzidae <i>Chromatomyia syngenesiae</i> Hardy; syns. <i>Phytomyza chrysanthemi</i> ; <i>P. syngenesiae</i> (Hardy)	<i>Chrysanthemum</i> (Alford, 2012); Europe (Alford, 2012) & North America (Alford, 2012); Synonym non-reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Chrysodeixis includens</i> (Walker)	<i>Chrysanthemum</i> (CABI, 2016); Nicaragua (Manley, 1983); Brazil (Camargo, 2001); Colombia (Rodriguez et al., 1984); North, Central, & South America (Zhang, 1994); US (MPG, 2016); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Tortricidae <i>Cnephasia longana</i> (Haworth)	<i>Chrysanthemum</i> (Alford, 2012); Belgium, Germany, Netherlands, Spain, UK (Karsholt and Razowski, 1996); US (Coop et al., 1989); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Coccidae <i>Coccus hesperidum</i> L.	<i>Chrysanthemum</i> (CABI, 2016); Vietnam, Kenya, Tanzania, Ethiopia, Uganda, Mexico, El Salvador, Panama, Brazil, Colombia, Belgium, Germany, Spain, UK (Ben-Dov, 1993); Tunisia, Costa Rica, Guatemala (CIE, 1972a); Netherlands (CABI, 2016); US (Ben-Dov, 1993); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Coccidae <i>Coccus viridis</i> (Green)	<i>Chrysanthemum</i> (CABI, 2016); Vietnam (Waterhouse, 1993); Ethiopia, Kenya, Tanzania, Uganda, Mexico, El Salvador, Guatemala, Nicaragua, Bolivia, Brazil, Colombia (EPPO, 2014); Costa Rica (MAGS, 2009); UK (Malumphy & Tresedor, 2012); US (Fasulo, 2007); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Aphididae <i>Coloradoa rufomaculata</i> (Wilson)	<i>Chrysanthemum</i> (Alford, 2012); Cosmopolitan (Alford, 2012; Blackman and Eastop, 2016); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Diaspididae <i>Diaspidiotus perniciosus</i> (Comstock); syn. <i>Comstockaspis perniciosus</i>	<i>Chrysanthemum</i> (CABI, 2016); Vietnam (Danzig, 1993); Tunisia, Brazil, Germany, Netherlands, Spain (EPPO, 2014); Mexico (Borchsenius, 1966); Bolivia (); US (García Morales et al., 2016); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Tortricidae <i>Dichrorampha sedatana</i> (Busck)	<i>Chrysanthemum</i> (CABI, 2016); UK (Zhang, 1994); US (MPG, 2016); Not listed in PestID (PestID, 2016)
INSECT: Thysanoptera: Thripidae	<i>Chrysanthemum</i> (Alford, 2012); Europe [invasive] and eastern

Organism	Evidence and/or other notes
<i>Echinothrips americanus</i> Morgan	US [native](Alford, 2012); Non-reportable (PestID, 2016)
INSECT: Coleoptera: Meloidae <i>Epicauta pestifera</i> Werner; syn. <i>E. marginata</i>	<i>Chrysanthemum</i> (Weigel, 1923); Brazil (Acioli et al., 2014); US (Arnett, 1985); Not listed in PestID (PestID, 2016)
INSECT: Diptera: Syrphidae <i>Eristalis tenax</i> (L.)	<i>Chrysanthemum</i> (Alford, 2012); Europe [native] and US [introduced] (Alford, 2012); Not listed in PestID (PestID, 2016)
INSECT: Hemiptera: Cicadellidae <i>Eupteryx melissae</i> Curtis	<i>Chrysanthemum</i> (Alford, 2012); UK (Bantock, 2008); US (Bartelt, 2011); Non-reportable (PestID, 2016)
INSECT: Dermaptera: Forficulidae <i>Forficula auricularia</i> L.	<i>Chrysanthemum</i> (Alford, 2012); Widespread in Europe (Alford, 2012); US (Capinera, 2010); Non-reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Frankliniella intonsa</i> (Trybom)	<i>Chrysanthemum</i> (CABI, 2016); Belgium, Germany, Netherlands, Spain, UK (CABI/EPPO, 1999); US (Nakahara, 1982); Non-reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Frankliniella occidentalis</i> (Pergande)	<i>Chrysanthemum</i> (Alford, 2012); Kenya, Guatemala, Costa Rica, Brazil, Colombia (Nakahara, 1982); Tunisia, UK (Kirk and Terry, 2003); Uganda, Belgium, Germany, Spain (EPPO, 2014); US (Kirk and Terry, 2003); Non-reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Frankliniella tritici</i> (Fitch)	<i>Chrysanthemum</i> (CABI, 2016); Spain (CABI, 2016); US (Lewis, 1973; Cluever et al., 2015); Non-reportable (PestID, 2016)
INSECT: Orthoptera: Gryllotalpidae <i>Gryllotalpa gryllotalpa</i> (L.)	<i>Chrysanthemum</i> (CABI, 2016); Belgium (Jansen, 2004); Germany (Schreiber, 2004); Netherlands (Tempelman, 2002); Spain (CABI, 2016); UK (Sheppard and Marshall, 2004; US (Frank et al., 2004); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Helicoverpa zea</i> (Boddie); syn. <i>Heliothis obsoleta</i> (auct.)	<i>Chrysanthemum</i> (Weigel, 1923); Mexico, Costa Rica, El Salvador, Guatemala, Nicaragua, Panama, Bolivia, Brazil, Colombia (EPPO, 2014); North, Central, & South America (Carter, 1984; Zhang, 1994); US (Arnett, 1985); Non-reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Heliethrips haemorrhoidalis</i> (Bouché); syn. <i>H. adonidium</i> Haliday	<i>Chrysanthemum</i> (Alford, 2012); Vietnam (Waterhouse, 1993); Kenya, Tanzania, Uganda, Bolivia, Brazil, Belgium, Germany, Netherlands, Spain (CIE, 1961); Panama (CABI, 2016); Colombia (Escobar et al., 1985); UK (Mound, 1976); US (CIE, 1961); Non-reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Hercinothrips femoralis</i> (Reuter)	<i>Chrysanthemum</i> (CABI, 2016); Tanzania, Brazil, Spain (CIE, 1979); US (CIE, 1979); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Hydraecia micacea</i> (Esper)	<i>Chrysanthemum</i> (Alford, 2012); Europe (Alford, 2012); Europe & North America (Carter, 1984; Zhang, 1994); US (MPG, 2016); No records (PestID, 2016)
INSECT: Hemiptera: Ortheziidae <i>Insignorthesia insignis</i> (Browne)	<i>Chrysanthemum</i> (CABI, 2016); Kenya, Tanzania, Brazil (CIE, 1957); Uganda (Epila, 1986); Mexico, El Salvador, Guatemala, Panama, Germany (García Morales et al., 2016); Colombia, Belgium (CABI, 2016); US (García Morales et al., 2016); Non-reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Limothrips cerealium</i> Haliday	<i>Chrysanthemum</i> (Alford, 2012); Belgium, Germany, Netherlands, Spain (CIE, 1968); US (CIE, 1968); Non-reportable (PestID, 2016)
INSECT: Diptera: Agromyzidae <i>Liriomyza sativae</i> Blanchard	<i>Chrysanthemum</i> (Alford, 2012); Europe [introduced] and North America [native] (Alford, 2012); Non-reportable (PestID, 2016)

Organism	Evidence and/or other notes
INSECT: Diptera: Agromyzidae <i>Liriomyza trifolii</i> Burgess	<i>Chrysanthemum</i> (Alford, 2012); Vietnam, Ethiopia, Kenya, Tanzania, Tunisia, Costa Rica, Guatemala, Brazil, Colombia, Belgium, Netherlands, Spain, UK (EPPO, 2014); Mexico (Martinez, 2002); US (EPPO, 2014); Non-reportable (PestID, 2016)
INSECT: Coleoptera: Curculionidae <i>Listroderes costirostris</i> Schönherr	<i>Chrysanthemum</i> (CABI, 2016); Spain, Brazil, Bolivia (Morrone, 1993); US (O'Brien and Wibmer, 1982); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Aphididae <i>Macrosiphoniella sanborni</i> (Gillette)	<i>Chrysanthemum</i> (Alford, 2012); Brazil, Colombia (Schotman, 1989); UK (Blackman and Eastop, 2016); Cosmopolitan (Blackman and Eastop, 2016); US (Blackman and Eastop, 2016); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Pentatomidae <i>Murgantia histrionica</i> (Hahn)	<i>Chrysanthemum</i> (CABI, 2016); Mexico (Barrios-Diaz, 2004); US (Arnett, 1985); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Aphididae <i>Myzus persicae</i> Sulzer	<i>Chrysanthemum</i> (Alford, 2012); Vietnam (Waterhouse, 1993); Ethiopia, Kenya, Tanzania, Uganda (Millar, 1994); Tunisia, Belgium, Germany, Netherlands, Spain, UK (CIE, 1979); Mexico, Costa Rica, El Salvador, Guatemala, Bolivia, Brazil, Colombia (Smith and Cermeli, 1979); worldwide (Blackman and Eastop, 2016); US (Smith and Parron, 1978); Non-reportable (PestID, 2016)
INSECT: Diptera: Agromyzidae <i>Nemorimyza maculosa</i> (Malloch); syn. <i>Amauromyza maculosa</i> (Malloch)	<i>Chrysanthemum</i> (Alford, 2012); Reported from <i>Chrysanthemum</i> (Alford, 2012); established in US (Stegmaier Jr., 1967); Synonym Non-reportable (PestID, 2016)
INSECT: Hemiptera: Aphididae <i>Neomyzus circumflexus</i> (Buckton); syn. <i>Aulacorthum circumflexum</i> (Buckton)	<i>Chrysanthemum</i> (Alford, 2012); Tunisia (CABI, 2016); Cosmopolitan (Blackman and Eastop, 2016); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Pseudococcidae <i>Nipaecoccus viridis</i> (Newstead)	<i>Chrysanthemum</i> (García Morales et al., 2016); Kenya, Tanzania, Uganda, Mexico, Vietnam (García Morales et al., 2016); FL (Stocks and Hodges, 2010); Non-quarantine (USDA, 2021)
INSECT: Lepidoptera: Noctuidae <i>Noctua pronuba</i> (L.)	<i>Chrysanthemum</i> (Alford, 2012); Tunisia (Soures, 1948); Germany (Pape, 1964); UK (Heath and Emmet, 1979); Europe & Africa (Carter, 1984; Zhang, 1994); US (MPG, 2016); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Crambidae <i>Omiodes indicata</i> (Fabricius)	<i>Chrysanthemum</i> (CABI, 2016); Vietnam (Waterhouse, 1993); Brazil (Camargo, 2001); US (BAMONA, 2016; MPG, 2016); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Crambidae <i>Ostrinia nubilalis</i> (Hübner)	<i>Chrysanthemum</i> (CABI, 2016); Tunisia, Belgium, Germany, Netherlands, Spain, UK (EPPO, 2014); Europe, Africa, & North America (Carter, 1984; Zhang, 1994); US (Arnett, 1985; MPG, 2016); Non-reportable (PestID, 2016)
INSECT: Coleoptera: Curculionidae <i>Otiorhynchus sulcatus</i> (Fabricius)	<i>Chrysanthemum</i> (CABI, 2016); Belgium, Germany, Spain, UK (EPPO, 2014); US (O'Brien and Wibmer, 1982); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Peridroma saucia</i> (Hübner)	<i>Chrysanthemum</i> (Alford, 2012); Tunisia (Soures, 1948); Mexico, Costa Rica, Guatemala, Brazil (Hampson, 1903); Colombia (Chacon & Rojas, 1981); Belgium, Germany,

Organism	Evidence and/or other notes
	Netherlands, Spain, UK (Nowacki and Fibiger, 1996); Cosmopolitan except for Oriental tropics (Zhang, 1994); US (MPG, 2016); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Pseudococcidae <i>Phenacoccus solenopsis</i> Tinsley	<i>Chrysanthemum</i> (CABI, 2016); Vietnam (Nguyen and Huynh, 2008); Mexico, Panama (Williams and Granara de Willink, 1992); Guatemala, Brazil (Hodges et al., 2008); Nicaragua (Maes, 2009); Colombia (De Willinck et al., 2007); Netherlands (Jansen, 2004); US (McKenzie, 1967); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Cercopidae <i>Philaenus spumarius</i> (L.)	<i>Chrysanthemum</i> (Alford, 2012); Widespread in Europe (Alford, 2012); US (DeLong and Severin, 1950); Non-reportable (PestID, 2016)
MITE: Tarsonemidae <i>Phytonemus pallidus</i> (Banks)	<i>Chrysanthemum</i> (CABI, 2016); Mexico (Diaz-Castro, 1981); Costa Rica (Ochoa et al., 1996); Brazil (Flechtmann, 1967); Colombia (Urueta Sandino and Alzate, 1978); Belgium (Heungens, 1986); Germany (Hauschildt, 1978); Netherlands (Heungens and Daele, 1980); UK (Vernon et al., 1965); US (USDA, 1971); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Pseudococcidae <i>Planococcus citri</i> (Risso); syn. <i>Pseudococcus citri</i> (Risso)	<i>Chrysanthemum</i> (Weigel, 1923); Vietnam (Waterhouse, 1993); Brazil, Colombia, Costa Rica, El Salvador, Guatemala, Mexico, Spain, Tunisia, UK (García Morales et al., 2016); US (García Morales et al., 2016); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Tortricidae <i>Platynota stultana</i> Walsingham	<i>Chrysanthemum</i> (CABI, 2016); Mexico (EPPO, 2014); Spain (Groenen and Baixeras, 2013); Europe (Zhang, 1994); US (Zhang, 1994; MPG, 2016); Non-reportable (PestID, 2016)
MITE: Tarsonemidae <i>Polyphagotarsonemus latus</i> Banks;	<i>Chrysanthemum</i> (Alford, 2012); Vietnam (Duong, 1998); Ethiopia, Kenya, Tanzania, Uganda, Nicaragua, Brazil, Colombia, Belgium, Germany, Netherlands, Spain, UK (CIE, 1986); Costa Rica (Aguilar and Murillo, 2012); Panama (CABI, 2016); US (CIE, 1986); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Pseudococcidae <i>Pseudococcus longispinus</i> Targioni Tozzetti; syn. <i>Pseudococcus adonidum</i> (L.)	<i>Chrysanthemum</i> (Weigel, 1923); Brazil, Colombia, Costa Rica, El Salvador, Germany, Guatemala, Mexico, Netherlands, Panama, Vietnam (Miller, 2014); US, widespread (Miller, 2014); Non-reportable (PestID, 2016)
INSECT: Diptera: Cecidomyiidae <i>Rhopalomyia chrysanthemii</i> Ahlberg; syn. <i>Diarthronomyia hypogaea</i> Loew	<i>Chrysanthemum</i> (CABI, 2016); UK (Natural History Museum, 2014); Colombia (unconfirmed: CABI, 2016), Germany (Fauna Europaea, 2018), US (Fauna Europaea, 2018; Schotman, 1989); Non- Reportable (PestID, 2016)
INSECT; Hemiptera: Coccidae <i>Saissetia coffeae</i> (Walker)	<i>Chrysanthemum</i> (Weigel, 1923); Vietnam (Waterhouse, 1993); Ethiopia, Tanzania, Costa Rica, El Salvador, Guatemala, Brazil, Colombia (CIE, 1973); Kenya, Uganda, Panama, Germany, Spain (Ben-Dov, 1993); Mexico (CABI, 2016; Maes, 2004); Belgium, Netherlands, UK (CABI, 2016); US (Ben-Dov, 1993); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Arctiidae <i>Spilosoma virginica</i> Fabricius; syn. <i>Diacrisia virginica</i> (Fabricius)	<i>Chrysanthemum</i> (Weigel, 1923); Widespread in North America (Zhang, 1994); Non-reportable (PestID, 2016)

Organism	Evidence and/or other notes
INSECT: Lepidoptera: Noctuidae <i>Spodoptera albula</i> (Walker)	<i>Chrysanthemum</i> (CABI, 2016); Costa Rica, Nicaragua, Colombia (CABI, 2016); Central & South America (Zhang, 1994); US (BAMONA, 2016; MAGS, 2009); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Spodoptera eridania</i> Stoll	<i>Chrysanthemum</i> (CABI, 2016); Mexico, Nicaragua, Brazil (EPPO, 2014); Central & South America (Zhang, 1994); US (EPPO, 2014; MPG, 2016); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Spodoptera exigua</i> (Hübner)	<i>Chrysanthemum</i> (Alford, 2012); Vietnam (Waterhouse, 1993); Ethiopia, Kenya, Tanzania, Tunisia, Mexico, Germany, Spain (CIE, 1972b); Costa Rica (MAGS, 2009); Nicaragua (Perez et al., 2000); Belgium (Smagghe, 2000); UK (Tremewan, 2002); Europe, Africa, Southeast Asia (Carter, 1984; Zhang, 1994); US (CIE, 1972b; MPG, 2016); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Spodoptera frugiperda</i> Smith	<i>Chrysanthemum</i> (CABI, 2016); Mexico (Sifuentes, 1978); Costa Rica, El Salvador, Guatemala, Panama, Bolivia, Brazil, Colombia, Germany (EPPO, 2014); Nicaragua (Huis, 1981); Central & South America (Zhang, 1994); US (Greathead and Greathead, 1992; MPG, 2016); Non-reportable (PestID, 2016)
MITE: Tetranychidae <i>Tetranychus cinnabarinus</i> (Boisduval)	<i>Chrysanthemum</i> (CABI, 2016); Kenya (Anyango, 2003); Tunisia (Grissa and Sahraoui, 2007); Uganda (Nyiiri and Mutinga, 1977); Mexico (Urias Lopez and Sanchez, 1983); Costa Rica (Ochoa, 1990); Brazil (Samways, 1979); Colombia (Guerrero and Bellotti, 1980); Spain (Garcia, 1986); UK (Foster and Barker, 1978); US (Mollet and Sevacherian, 1984); Non-reportable (PestID, 2016)
MITE: Tetranychidae <i>Tetranychus ludeni</i> Zacher	<i>Chrysanthemum</i> (Wandahwa et al., 1996); Kenya (Wandahwa et al., 1996); Brazil, Colombia, Costa Rica, El Salvador, Mexico, Nicaragua, Spain (CABI, 2016); Non-quarantine (USDA, 2021)
MITE: Tetranychidae <i>Tetranychus urticae</i> Koch	<i>Chrysanthemum</i> (CABI, 2016); Vietnam (Waterhouse, 1993); Kenya, Tanzania, Tunisia, Uganda, Mexico, Costa Rica, Brazil, Colombia, Belgium, Germany, Netherlands, Spain, UK (CIE, 1996); US (CIE, 1996); Non-reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Thrips hawaiiensis</i> (Morgan)	<i>Chrysanthemum</i> (CABI, 2016); Vietnam, Mexico (Nakahara, 1982); Uganda (CIE, 1983); Spain (Goldarazena, 2011); US (Nakahara, 1982); Non-reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Thrips nigropilosus</i> Uzel	<i>Chrysanthemum</i> (Alford, 2012); Kenya; Tanzania, Belgium, Germany, Netherlands, UK (CIE, 1980); US (CIE, 1980); Non-reportable (PestID, 2016)
INSECT: Thysanoptera: Thripidae <i>Thrips tabaci</i> Lindeman	<i>Chrysanthemum</i> (Alford, 2012); Vietnam (Waterhouse, 1993); Ethiopia, Kenya, Tanzania, Uganda, Mexico, Costa Rica, Brazil, Colombia, Belgium, Germany, Netherlands, UK (UK CAB International, 1969); Tunisia (Jenser, 1982); Nicaragua (Rueda and Shelton, 2003); US (UK CAB International, 1969); Non-reportable (PestID, 2016)
INSECT: Hemiptera: Aleyrodidae <i>Trialeurodes vaporariorum</i> Westwood	<i>Chrysanthemum</i> (Alford, 2012); Ethiopia, Kenya, El Salvador, Guatemala, Brazil, Netherlands (Byrne, 1990); Mexico (Lopez and Botto, 1995); Costa Rica, Colombia, Belgium, Germany, Spain UK (EPPO, 2014); Panama

Organism	Evidence and/or other notes
	(CABI, 2016); US (Byrne, 1990); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Trichoplusia ni</i> (Hübner)	<i>Chrysanthemum</i> (CABI, 2016); Vietnam (Waterhouse, 1993); Ethiopia, Kenya, Tanzania, Tunisia, Mexico, Nicaragua, Bolivia, Brazil, Netherlands, Spain (CIE, 1974); Costa Rica (MAGS, 2009); UK (Kloet and Hincks, 1967); Europe & North America (Zhang, 1994); US (MPG, 2016); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Pyralidae <i>Udea rubigalis</i> (Guenee); syn. <i>Phlyctaenia rubigalis</i>	<i>Chrysanthemum</i> (Weigel, 1923); North, Central, & South America (Zhang, 1994); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Nymphalidae <i>Vanessa cardui</i> (L.); syn. <i>Cynthia cardui</i> L.	<i>Chrysanthemum</i> (CABI, 2016); Europe & UK (Hoskins, 2016); cosmopolitan except South America (Zhang, 1994); US (BAMONA, 2015; MPG, 2016); Non-reportable (PestID, 2016)
INSECT: Lepidoptera: Noctuidae <i>Xestia c-nigrum</i> (L.)	<i>Chrysanthemum</i> (CABI, 2016); Vietnam (De Joannis, 1928); Mexico, El Salvador (Lafontaine, 1998); Belgium, Germany, Netherlands, Spain, UK (Nowacki and Fibiger, 1996); Europe, Africa, & North America (Carter, 1984; Zhang, 1994); US (MPG, 2016); Non-reportable (PestID, 2016)
NEMATODE <i>Aphelenchoides besseyi</i> Christie	Infects <i>Chrysanthemum morifolium</i> stems and leaves in Kenya, Tanzania, Uganda, Belgium, Brazil, El Salvador, Panama, Vietnam, Mexico, and US (CABI, 2016).
NEMATODE <i>Aphelenchoides ritzemabosi</i> (Schwartz) Steiner & Buhner	Infects <i>Chrysanthemum morifolium</i> stems and leaves in Africa, Belgium, Germany, UK, Netherlands, Spain, Brazil, Central America, Mexico (CABI, 2016)
FUNGUS <i>Alternaria alternata</i> (Fr.:Fr.) Kiessl. (Syn.: <i>Alternaria tenuis</i>)	Infects <i>Chrysanthemum segetum</i> , <i>C. morifolium</i> , <i>C. cinerariifolium</i> in Kenya, and US (Farr and Rossman, 2016)
FUNGUS <i>Alternaria leucanthemi</i> Nelen (syn: <i>Teretispora leucanthemi</i> (Nelen) E.G. Simmons, syn. <i>Alternaria chrysanthemi</i> E.G. Simmons & Crosier)	Infects <i>Chrysanthemum maximum</i> in Germany and US (Farr and Rossman, 2016a)
FUNGUS <i>Alternaria tenuissima</i> (Nees & T. Nees : Fr.) Wiltshire	Infects <i>Chrysanthemum cinerariifolium</i> , <i>C. x morifolium</i> (Dominguez-Serrano et al., 2016; Farr and Rossman, 2016a); present in Mexico and US (Farr and Rossman, 2016)
FUNGUS <i>Athelia rolfsii</i> (Curzi) Tu & Kimbr. syn. <i>Sclerotium rolfsii</i> Sacc.	Multiple <i>Chrysanthemum</i> spp., in Brazil, Colombia, Mexico, Ethiopia, Kenya, Tanzania, Uganda, Costa Rica, Nicaragua, Panama, Guatemala, El Salvador, Spain, Germany, and US (Farr and Rossman, 2016a)

Organism	Evidence and/or other notes
FUNGUS <i>Bipolaris setariae</i> (Sawada) Shoemaker (<i>Cochliobolus setariae</i> (S. Ito & Kurib.) Drechsler ex Dastur (teleomorph) Syn. <i>Drechslera setariae</i> (Shoemaker) Subram. & B.L. Jain	Infects leaves of <i>C. cinerariifolium</i> in Ethiopia and US (Farr and Rossman, 2016a)
FUNGUS <i>Calonectria morganii</i> Crous, Alfenas & M.J. Wingf. – [Alternate State (Anamorph): <i>Cylindrocladium scoparium</i> Morg.]	Infects cuttings (Alfieri et al., 1984) of <i>Chrysanthemum × morifolium</i> (Crous, 2002) and is present in Brazil, Belgium, Mexico, and US (Farr and Rossman, 2016a)
FUNGUS <i>Ceratobasidium anceps</i> (Bres. & Syd.) H. Jacks.	Causes a web-blight on leaves and petioles of <i>C. leucanthemum</i> in Germany, UK, Brazil, and US (Farr and Rossman, 2016a)
FUNGUS <i>Cercospora beticola</i> Sacc.	Infects leaves of <i>Chrysanthemum coronarium</i> , and <i>C. segetum</i> in Kenya, Ethiopia, Tanzania, Uganda, Brazil, Colombia, Costa Rica, El Salvador, Nicaragua, Panama, Spain, Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Cercospora bidentis</i> Tharp	Infects leaves of <i>Chrysanthemum coronarium</i> , <i>C. anthelminticum</i> , <i>C. coronarium</i> var. <i>spatosum</i> , <i>C. indicum</i> , <i>C. leucanthemum</i> , <i>C. maximum</i> , <i>C. morifolium</i> , <i>C. segetum</i> , <i>C. sinense</i> , <i>Chrysanthemum</i> sp. in Brazil, Panama, Tanzania, Kenya, UK, and US (Farr and Rossman, 2016a)
FUNGUS <i>Cercospora chrysanthemi</i> Heald & F.A. Wolf; syn. <i>Cercospora chrysanthemi-coronarii</i> Sawada	Infects multiple <i>Chrysanthemum</i> spp. in Brazil and US (Farr and Rossman, 2016a)
FUNGUS <i>Cladosporium macrocarpum</i> Preuss	Infects <i>Chrysanthemum maximum</i> in Germany, Netherlands, UK, and US (Farr and Rossman, 2016a)
FUNGUS <i>Coleosporium tussilaginis</i> (Pers.) Lév.	Infects <i>Chrysanthemum carinatum</i> in Belgium, Germany, Netherlands, Spain, UK, Brazil, Bolivia, and US (Farr and Rossman, 2016)
FUNGUS <i>Colletotrichum acutatum</i> J.H. Simmonds	Infects leaves of <i>Chrysanthemum</i> sp. in the Netherlands and US (Farr and Rossman, 2016a)
FUNGUS <i>Colletotrichum carthami</i> (Fukui) S. Uematsu, Kageyama, Moriwaki & Toy. Sato; Syn. <i>Colletotrichum</i>	Infects leaves of <i>Chrysanthemum</i> sp. in the Netherlands and US (Farr and Rossman, 2016a)

Organism	Evidence and/or other notes
<i>chrysanthemi</i> (Hori) Sawad	
FUNGUS <i>Colletotrichum destructivum</i> O'Gara	Infects leaves of <i>Chrysanthemum cinerariifolium</i> in Tanzania, the Netherlands, and US (Farr and Rossman, 2016a)
FUNGUS <i>Colletotrichum gloeosporioides</i> (Penz.) Penz. & Sacc.	Infects leaves and stems of <i>Chrysanthemum cinerariifolium</i> and <i>Chrysanthemum</i> in Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Germany, UK, Netherlands, Spain, Guatemala, El Salvador, Nicaragua, CR, Panama, Colombia, Brazil, Bolivia, Mexico, and US (Farr and Rossman, 2016a)
FUNGUS <i>Corynespora cassiicola</i> (Berk. & M.A. Curtis) C.T. Wei	Infects stems of <i>Chrysanthemum</i> sp. in Brazil, Panama, Germany, Mexico, Guatemala, Tanzania, UK, and US. (Farr and Rossman, 2016)
FUNGUS <i>Entyloma calendulae</i> (Oudem.) de Bary	Infects leaves of <i>Chrysanthemum</i> sp. in Spain, Germany, UK, Tunisia, Kenya, Netherlands, Colombia, Mexico, and US (Farr and Rossman, 2016)
FUNGUS <i>Erysiphe pisi</i> var. <i>pisii</i> DC. syn. <i>Erysiphe communis</i> DC.	Infects leaves and stems of <i>Chrysanthemum</i> sp. in Ethiopia, Kenya, Tunisia, Tanzania, Uganda, Germany, UK, Netherlands, Belgium, Spain, Guatemala, El Salvador, Colombia, Brazil, and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium acuminatum</i> Ellis & Everh; syn. <i>Gibberella acuminata</i> Wollenw.	<i>Chrysanthemum</i> sp., <i>C. x morifolium</i> on leaves in Colombia, Brazil, Kenya, Spain, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium cerealis</i> (Cooke) Sacc. syn. = <i>Fusarium roseum</i> f. <i>cereale</i> (Cooke) W.C. Snyder & H.N. Hansen	Infects stems of <i>Chrysanthemum</i> × <i>morifolium</i> in Germany, Spain, and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium chlamydosporum</i> Wollenw. & Reinking syn. <i>Fusarium fusarioides</i> (Gonz. Frag. & Cif.) C. Booth	Infects stems of <i>Chrysanthemum</i> sp., <i>Chrysanthemum cinerariifolium</i> in Brazil, Kenya, Tanzania, and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium equiseti</i> (Corda) Sacc	Infects <i>Chrysanthemum cinerariifolium</i> and <i>Chrysanthemum</i> sp. in Brazil, Ethiopia, Kenya, Tanzania, Guatemala, Panama, Spain, and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium filiferum</i> (Preuss) Wollenw. syn. <i>Fusarium scirpi</i> var. <i>filiferum</i> (Preuss) Wollenw	Infects leaves of <i>Chrysanthemum</i> , <i>Chrysanthemum cinerariifolium</i> in Kenya, Tanzania, Kenya, Costa Rica, Guatemala, Mexico, Colombia, and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium haematococcum</i> Nalim, Samuels & Geiser; syn.	Infects stems of <i>C. cinerariifolium</i> in Brazil and US (Farr and Rossman 2016)

Organism	Evidence and/or other notes
<i>Nectria haematococca</i> Berk. & Broome	
FUNGUS <i>Fusarium lateritium</i> Nees : Fr	Infects <i>Chrysanthemum cinerariifolium</i> in Kenya, Tanzania, Costa Rica, El Salvador, Panama, Belgium, Germany, Brazil, UK, and US (Farr and Rossman, 2016).
FUNGUS <i>Fusarium moniliforme</i> J. Sheld.	Infects <i>Chrysanthemum</i> sp., <i>C. morifolium</i> in Kenya, Colombia, Nicaragua, Guatemala, Costa Rica, Brazil, Mexico, Tanzania, Spain, Germany, and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium oxysporum</i> f. sp. <i>conglutinans</i> (Wollenw.) W.C. Snyder & H.N. Hansen	Causes wilt in <i>Chrysanthemum</i> sp. in Brazil, Netherlands, Panama, Mexico, and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium oxysporum</i> f. sp. <i>tracheiphilum</i> (Sm.) Snyder & Hansen; syn. <i>Fusarium tracheiphilum</i> E.F. Sm.	Infects stems of <i>Chrysanthemum</i> × <i>morifolium</i> in Brazil, Mexico, and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium oxysporum</i> Schltdl.: Fr.	Infects stems (vascular system) of <i>Chrysanthemum cinerariifolium</i> , <i>C. morifolium</i> , <i>C. solani</i> , <i>Chrysanthemum</i> sp., <i>Chrysanthemum</i> × <i>morifolium</i> in Ethiopia, Brazil, Ethiopia, Tunisia, Tanzania, Kenya, El Salvador, Nicaragua, Guatemala, Panama, Mexico, UK, Netherlands, Germany, Spain, Belgium, Brazil, Colombia, and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium poae</i> (Peck) Wollenw. syn. <i>Fusarium tricinctum</i> f. sp. <i>poae</i> (Peck) W.C. Snyder & H.N. Hanse	Causes <i>Chrysanthemum</i> sp. bud rot; present in Spain, Brazil, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium roseum</i> Link : Fr.	Infects stems of multiple <i>Chrysanthemum</i> spp. in Brazil, Mexico, El Salvador, Nicaragua and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium solani</i> (Mart.) Sacc	Infects stems of multiple <i>Chrysanthemum</i> spp. in Brazil, El Salvador, Nicaragua, and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium solani</i> var. <i>coeruleum</i> (Lib. ex Sacc.) Booth; syn. <i>Fusarium coeruleum</i> Lib. ex Sacc.	Infects stems of <i>Chrysanthemum cinerariifolium</i> in Brazil and US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium sporotrichioides</i> Sherb.	Infects leaves of <i>Chrysanthemum</i> sp. in Brazil, Tanzania, Germany, and the US (Farr and Rossman, 2016)
FUNGUS <i>Fusarium verticillioides</i> (Sacc.)	<i>Chrysanthemum</i> sp. in Brazil (Mendes et al., 1998); also in Nicaragua, Guatemala, Mexico, Spain, Germany, Vietnam

Organism	Evidence and/or other notes
Nirenberg; syn. <i>Fusarium moniliforme</i> var. <i>intermedium</i> Neish & M. Legg.	and US (Farr and Rossman, 2016)
FUNGUS <i>Globisporangium debaryanum</i> (R. Hesse) Uzuhashi, Tojo & Kakish. syn. <i>Pythium debaryanum</i>	<i>Chrysanthemum morifolium</i> , <i>Chrysanthemum</i> sp. in Brazil, Colombia, Mexico, Tanzania, Costa Rica, the Netherlands, Germany, and US (Farr and Rossman, 2016)
FUNGUS <i>Globisporangium irregulare</i> (Buisman) Uzuhashi, Tojo & Kakish. syn. <i>Pythium irregulare</i>	<i>Chrysanthemum morifolium</i> , <i>Chrysanthemum</i> sp. in Brazil, Mexico, the Netherlands, Spain, and US (Farr and Rossman, 2016)
FUNGUS <i>Globisporangium mamillatum</i> (Meurs) Uzuhashi, Tojo & Kakish. syn. <i>Pythium mamillatum</i> Meurs	<i>Chrysanthemum</i> sp. in Brazil, the Netherlands and US (Farr and Rossman, 2016)
FUNGUS <i>Globisporangium megalacanthum</i> (de Bary) Uzuhashi, Tojo & Kakish. syn. <i>Pythium megalacanthum</i> de Bary	<i>Chrysanthemum morifolium</i> , <i>Chrysanthemum</i> sp. in Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Globisporangium rostratum</i> (E.J. Butler) Uzuhashi, Tojo & Kakish. syn. <i>Pythium rostratum</i> E.J. Butler	<i>Chrysanthemum</i> sp. in Brazil, Netherlands, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Globisporangium splendens</i> (Hans Braun) Uzuhashi, Tojo & Kakish. syn. <i>Pythium splendens</i> Hans Braun	<i>Chrysanthemum morifolium</i> , <i>Chrysanthemum</i> sp. in Belgium, the Netherlands, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Globisporangium ultimum</i> (Trow) Uzuhashi, Tojo & Kakish. syn. <i>Pythium ultimum</i> Trow	<i>Chrysanthemum morifolium</i> , <i>Chrysanthemum</i> sp. in Brazil, Colombia, Mexico, Kenya, Tanzania, Costa Rica, the Netherlands, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Golovinomyces cichoracearum</i> (DC.) V. P. Heluta; syn. <i>Erysiphe cichoracearum</i> DC.; <i>Erysiphe cichoracearum</i> var. <i>cichoracearum</i> DC.	Infects <i>Chrysanthemum</i> sp. in Germany, Spain, Belgium, Netherlands, Brazil, Colombia, Bolivia, Mexico, Kenya, Tanzania, Uganda, Ethiopia, El Salvador, Guatemala, Nicaragua, Costa Rica, Panama, and US (Farr and Rossman, 2016)

Organism	Evidence and/or other notes
FUNGUS <i>Golovinomyces orontii</i> (Castagne) Heluta; syn. <i>Erysiphe orontii</i> Castagne; <i>Erysiphe polyphaga</i> Hammarl	Infects leaves and stems of <i>Chrysanthemum carinatum</i> , <i>C. coronarium</i> , <i>C. frutescens</i> , <i>C. roseum</i> , <i>C. carinatum</i> , and <i>C. coronarium</i> in Italy, UK, Germany, Spain, Netherlands, Mexico, Guatemala, Brazil, Kenya, Tanzania, and US. (Farr and Rossman, 2016)
FUNGUS <i>Itersonilia perplexans</i> Derx.	Infects stems and leaves of <i>Chrysanthemum</i> sp. in the Netherlands, UK, and the U.S. (Farr and Rossman, 2016)
FUNGUS <i>Lasiodiplodia theobromae</i> (Pat.) Griffon & Maubl. syn. <i>Botryodiplodia theobromae</i> Pat.	Infects stems of <i>Chrysanthemum</i> sp. in most of the 20 countries listed, apart from Northern Europe; also present in US (Farr and Rossman, 2016)
FUNGUS <i>Macrophomina phaseolina</i> (Tassi) Goid. syn. <i>Rhizoctonia bataticola</i> (Taubenh.) E.J. Butler	Infects multiple <i>Chrysanthemum</i> spp. in Brazil, Colombia, Mexico, Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Nicaragua, Panama, and US (Farr and Rossman, 2016)
FUNGUS <i>Paraperonospora leptosperma</i> (de Bary) Constant.	Infects <i>Chrysanthemum</i> spp., <i>Dendranthema</i> sp. in Spain, Germany, UK and US (Farr and Rossman, 2016)
FUNGUS <i>Paraphoma chrysanthemicola</i> (Hollós) Gruyter, Aveskamp & Verkley	Infects <i>Chrysanthemum indicum</i> , <i>C. morifolium</i> , <i>Chrysanthemum</i> sp. in the Netherlands, Germany, UK and US (Farr and Rossman, 2016)
FUNGUS <i>Peronospora radii</i> de Bary	multiple <i>Chrysanthemum</i> spp., <i>Dendranthema</i> sp. in Mexico, Belgium, Spain, Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Phoma glomerata</i> (Corda) Wollenw. & Hochapfel	Infects <i>Chrysanthemum</i> sp. in Kenya, Tanzania, the Netherlands, Germany, and US (Farr and Rossman, 2016)
FUNGUS <i>Phoma herbarum</i> var. <i>herbarum</i> Westend.	Infects multiple <i>Chrysanthemum</i> spp. in Ethiopia, Kenya, Belgium, the Netherlands, Spain, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Phoma multirostrata</i> var. <i>microspora</i> (Allesch.) Boerema	Infects multiple <i>Chrysanthemum</i> spp. in the Netherlands and US (Farr and Rossman, 2016)
FUNGUS <i>Phoma omnivirens</i> Aveskamp, Gruyter & Verkley	Infects <i>Chrysanthemum indicum</i> in Tanzania, Belgium, and the Netherlands (Farr and Rossman, 2016); opportunistic, soil-inhabiting saprophyte (Romberg, 2016)
FUNGUS <i>Phyllosticta chrysanthemi</i> Ellis & Dearn.	Infects multiple <i>Chrysanthemum</i> spp. in Brazil and US (Farr and Rossman, 2016)
FUNGUS <i>Phymatotrichopsis omnivora</i> (Shear) Hennebert	Infects stems of <i>Chrysanthemum cinerariifolium</i> , <i>C. leucanthemum</i> , <i>C. × morifolium</i> in Mexico and US (Farr and Rossman, 2016)
FUNGUS	Infects <i>Chrysanthemum cinerariifolium</i> , <i>C. morifolium</i> in

Organism	Evidence and/or other notes
<i>Phytophthora cactorum</i> (Lebert & Cohn) J. Schröt.	Belgium, the Netherlands, Spain, Germany, UK, Brazil, Mexico, Kenya, Tanzania, and US (Farr and Rossman, 2016)
FUNGUS <i>Phytophthora cinnamomi</i> Rands	Infects <i>Chrysanthemum cinerariifolium</i> in Brazil, Bolivia, Mexico, Costa Rica, Panama, Guatemala, El Salvador, Netherlands, Spain, Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Phytophthora citricola</i> Sawada	Infects <i>Chrysanthemum maximum</i> in Mexico, Guatemala, Brazil, Netherlands, Spain, Germany, UK, and US (Farr and Rossman, 2016), No action for continental US but actionable for PR and USVI (PestID 5-5-2016)
FUNGUS <i>Phytophthora cryptogea</i> Pethybr. & Laff.	Infects <i>Chrysanthemum cinerariifolium</i> , <i>C. frutescens</i> , <i>Chrysanthemum</i> sp., <i>Chrysanthemum</i> × <i>morifolium</i> in Brazil, Mexico, Netherlands, Spain, Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Phytophthora drechsleri</i> Tucker	Infects <i>Chrysanthemum cinerariifolium</i> , <i>Chrysanthemum</i> sp. in Brazil, Colombia, the Netherlands, Spain, Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Phytophthora nicotianae</i> Breda de Haan	Infects <i>Chrysanthemum coronarium</i> , <i>Chrysanthemum</i> × <i>morifolium</i> , <i>Chrysanthemum</i> sp. in Brazil, Colombia, Ethiopia, Kenya, Tanzania, Tunisia, Costa Rica, Nicaragua, Panama, Guatemala, El Salvador, the Netherlands, Spain, Germany, UK, Mexico, and US (Farr and Rossman, 2016)
FUNGUS <i>Phytopythium vexans</i> (de Bary) Abad, de Cock, Bala, Robideau, Lodhi & Lévesque; syn. <i>Pythium vexans</i> de Bary	Infects <i>Chrysanthemum morifolium</i> , <i>Chrysanthemum</i> sp. in Brazil, Tanzania, the Netherlands, and US (Farr and Rossman, 2016)
FUNGUS <i>Plectosphaerella cucumerina</i> (Lindf.) W. Gams; syn: <i>Plectosporium tabacinum</i>	Infects <i>Chrysanthemum morifolium</i> in Germany, UK, Guatemala, and US (Farr and Rossman, 2016)
FUNGUS <i>Plenodomus chrysanthemi</i> (Zachos, Constantinou & Panag.) Gruyter, Aveskamp & Verkley (<i>Phoma tracheiphila</i> f. sp. <i>chrysanthemi</i> K.F. Baker, L.H. Davis, S. Wilh. & W.C. Snyder)	Infects <i>Chrysanthemum</i> sp., <i>C. x morifolium</i> in Europe in general, no specific locations in this source, look for further evidence elsewhere (Farr and Rossman, 2016)
FUNGUS <i>Pleospora herbarum</i> (Pers. : Fr.) Rabenh.	Infects <i>Chrysanthemum frutescens</i> , <i>C. leucanthemum</i> , <i>Chrysanthemum indicum</i> , <i>Chrysanthemum integrifolium</i> , <i>Chrysanthemum</i> sp., <i>Chrysanthemum</i> × <i>morifolium</i> in Brazil, Mexico, Kenya, Tanzania, Tunisia, Spain, Germany, and US (Farr and Rossman, 2016)

Organism	Evidence and/or other notes
FUNGUS <i>Pleospora penicillus</i> (J.C. Schmidt) Fuckel	Infects <i>Chrysanthemum leucanthemum</i> , <i>Chrysanthemum integrifolium</i> in Spain, Germany, UK, and US (Farr and Rossman, 2016), saprophytic fungus, so perhaps exclude from listing due to lack of association as a disease causing organism (Romberg, 2016)
FUNGUS <i>Podosphaera fuliginea</i> (Schltdl.) U. Braun & S. Takam. (<i>Sphaerotheca fuliginea</i> (Schltdl.) Pollacci)	Infects multiple <i>Chrysanthemum</i> spp. in Brazil, Mexico, Ethiopia, Uganda, Belgium, the Netherlands, Germany, Spain, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Podosphaera fusca</i> (Fr. : Fr.) U. Braun & S. Takam.	Infects <i>Chrysanthemum burbankii</i> , <i>Chrysanthemum carinatum</i> , <i>Chrysanthemum coronarium</i> , <i>Chrysanthemum segetum</i> in Mexico, Belgium, the Netherlands, Germany, Spain, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Puccinia absinthii</i> DC.	Infects <i>Tanacetum balsamita</i> and <i>T. diversifolium</i> in Mexico, Spain, Germany, UK, and US (Farr and Rossman, 2016). This primarily infects <i>Artemisia</i> spp., so not sure how likely it would be to be associated with <i>Tanacetum</i> spp. or <i>Chrysanthemum</i> spp.
FUNGUS <i>Puccinia chrysanthemi</i> Roze	Infects multiple <i>Chrysanthemum</i> spp. in Brazil, Colombia, Kenya, Tanzania, Spain, Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Puccinia cnici-oleracei</i> Pers. syn. <i>Puccinia leucanthemi</i> Pass.	Infects multiple <i>Chrysanthemum</i> spp. hosts, present in Brazil, Colombia, Mexico, Ethiopia, Kenya, Tanzania, Uganda, Nicaragua, Panama, Guatemala, El Salvador, Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Puccinia diplachnis</i> Arthur	Infects <i>Chrysanthemum leucanthemum</i> , present in Brazil, Mexico, Costa Rica, Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Puccinia stipae</i> Arthur	<i>Chrysanthemum graveolens</i> in Bolivia and US (Farr and Rossman, 2016), report infected <i>Chrysanthemum</i> spurious (Romberg, 2016)
FUNGUS <i>Puccinia tanacetii</i> DC. syn. <i>Puccinia pyrethri</i> Rabenh.	Infects multiple <i>Chrysanthemum</i> spp. in Brazil, Colombia, Belgium, Spain, Germany, UK, Mexico, and US (Farr and Rossman, 2016)
FUNGUS <i>Pythium aphanidermatum</i> (Edson) Fitzp.	Infects <i>Chrysanthemum morifolium</i> , <i>Chrysanthemum</i> sp. in Brazil, Mexico, Vietnam, Kenya, Tanzania, Costa Rica, Panama, Spain, and US (Farr and Rossman, 2016)
FUNGUS <i>Ramularia tanacetii</i> Lind	Infects <i>Leucanthemum vulgare</i> , <i>Tanacetum</i> spp. in Germany and US (Farr and Rossman, 2016)
FUNGUS <i>Rhizoctonia solani</i> J.G. Kühn	Infects multiple <i>Chrysanthemum</i> spp. in Brazil, Colombia, Bolivia, Mexico, Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Costa Rica, Nicaragua, Panama, Guatemala, El Salvador, Belgium, Netherlands, Spain, Germany, UK, and US (Farr and Rossman, 2016)

Organism	Evidence and/or other notes
FUNGUS <i>Sclerotinia minor</i> Jagger	Infects <i>Chrysanthemum cinerariifolium</i> and <i>C. x morifolium</i> in Brazil, Spain, US (Farr and Rossman, 2016), and Kenya (Farr and Rossman, 2016a; Wandahwa et al., 1996)
FUNGUS <i>Sclerotinia sclerotiorum</i> (Lib.) de Bary	Infects multiple <i>Chrysanthemum</i> spp. in Brazil, Colombia, Bolivia, Mexico, Vietnam, Ethiopia, Tanzania, Costa Rica, Nicaragua, Panama, Guatemala, El Salvador, the Netherlands, Spain, Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Scopinella caulicola</i> (Fuckel) Malloch	Infects <i>Tanacetum</i> in Germany, UK, and US (Farr and Rossman, 2016), consider omitting from the list since it is likely primarily a saprophyte (per NIS consultation, Romberg, 2016)
FUNGUS <i>Septoria cercosporoides</i> Trail	Infects <i>Chrysanthemum leucanthemum</i> , <i>C. maximum</i> , <i>C. parthenium</i> , <i>Chrysanthemum</i> sp. in UK and US (Farr and Rossman, 2016)
FUNGUS <i>Septoria chrysanthemella</i> Sacc.	Infects multiple <i>Chrysanthemum</i> spp., in Brazil, Kenya, Tanzania, the Netherlands, Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Septoria leucanthemi</i> Sacc. & Speg.	Infects multiple <i>Chrysanthemum</i> spp. in Colombia, Guatemala, Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Septoria obesa</i> Syd.	Infects <i>Chrysanthemum indicum</i> , <i>Chrysanthemum</i> sp., <i>Chrysanthemum x morifolium</i> in Germany and US (Farr and Rossman, 2016)
FUNGUS <i>Sordaria destruens</i> (Shear) Hawker	Infects <i>Chrysanthemum cinerariifolium</i> in Kenya and Tunisia (Farr and Rossman, 2016), likely a saprophyte, omit if this is confirmed
FUNGUS <i>Stagonosporopsis chrysanthemi</i> (Stevens) Crous, Vaghefi & P.W. Taylor; syn. <i>Stagonosporopsis ligulicola</i> var. <i>ligulicola</i> (Baker, Dimock & Davis) Aveskamp, Gruyter & Verkley	Infects multiple <i>Chrysanthemum</i> spp. in Brazil, the Netherlands, Germany, and US (Farr and Rossman, 2016)
FUNGUS <i>Stemphylium botryosum</i> Wallr.	Infects <i>Chrysanthemum morifolium</i> , <i>Chrysanthemum</i> sp. in Brazil, Colombia, Mexico, Guatemala, and US (Farr and Rossman, 2016)
FUNGUS <i>Stemphylium lycopersici</i> (Enjoji) W. Yamam. (<i>Stemphylium floridanum</i>)	Infects <i>Chrysanthemum morifolium</i> , <i>Chrysanthemum</i> sp. in Brazil, Costa Rica, and US (Farr and Rossman, 2016)
FUNGUS <i>Stromatoseptoria castaneicola</i> (Desm.) Quaedvlieg, Verkley &	Infects leaves of <i>Chrysanthemum indicum</i> , <i>C. maximum</i> , <i>C. sp.</i> , and <i>C. x morifolium</i> in Spain, UK, and US (Farr and Rossman, 2016)

Organism	Evidence and/or other notes
Crous; syn. <i>Cylindrosporium castaneae</i> (Lév.) Krenner	
FUNGUS <i>Synchytrium aureum</i> J. Schröt.	Infects <i>Chrysanthemum leucanthemum</i> , <i>C. leucanthemum</i> var. <i>montanum</i> in the Netherlands, Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Thielaviopsis basicola</i> (Berk. & Broome) Ferraris	Infects <i>Chrysanthemum morifolium</i> , <i>Chrysanthemum</i> sp. in Brazil, Colombia, Mexico, Belgium, the Netherlands, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Tilletiopsis minor</i> Nyland	Infects <i>Chrysanthemum</i> sp. in the Netherlands and US (Farr and Rossman, 2016)
FUNGUS <i>Verticillium albo-atrum</i> Reinke & Berthold	Infects <i>Chrysanthemum frutescens</i> , <i>C. leucanthemum</i> , <i>C. x morifolium</i> , <i>Chrysanthemum</i> sp. in Brazil, Tanzania, Tunisia, Nicaragua, Guatemala, El Salvador, the Netherlands, Germany, UK, and US (Farr and Rossman, 2016)
FUNGUS <i>Verticillium dahliae</i> Kleb.	Infects <i>Chrysanthemum indicum</i> , <i>C. maximum</i> , <i>Chrysanthemum</i> × <i>morifolium</i> , <i>Chrysanthemum</i> sp. in Brazil, Mexico, Kenya, Tanzania, Tunisia, the Netherlands, Spain, Germany, UK, and US (Farr and Rossman, 2016)
BACTERIUM ' <i>Candidatus</i> Phytoplasma asteris'	Infects stems and leaves of <i>Chrysanthemum coronarium</i> , <i>C. frutescens</i> , <i>C. morifolium</i> (CABI, 2016), <i>C. hortorum</i> , and <i>Chrysanthemum</i> sp. (Farr and Rossman, 2016) in Africa, Belgium, Germany, Spain, Brazil, Central America, Mexico, US (CABI, 2016), Tanzania, and Panama (Farr and Rossman, 2016)
BACTERIUM <i>Dickeya chrysanthemi</i> (Burkholder) Samson; syn. <i>Erwinia chrysanthemi</i> (Burkholder et al.) Young et al.	Infects stems and leaves (Horst and Nelson, 1997) of multiple <i>Chrysanthemum</i> spp. in Kenya, Costa Rica, Guatemala, Panama, Bolivia, Brazil, Colombia, Belgium, Germany, Netherlands, Spain, UK, and US (CABI, 2016)
BACTERIUM <i>Dickeya zeae</i> Samson et al.	Infects <i>Chrysanthemum morifolium</i> in Mexico, Costa Rica, Brazil, Colombia, Germany, Netherlands, Spain, UK, and US (CABI, 2016)
BACTERIUM <i>Pseudomonas cichorii</i> (Swingle) Stapp	Infects leaves and stems of multiple <i>Chrysanthemum</i> spp. (CABI, 2016; Horst and Nelson, 1997) in UK, Spain, Germany (Farr and Rossman, 2016), and US (CABI, 2016; Horst and Nelson, 1997)
BACTERIUM <i>Pseudomonas corrugata</i> Roberts & Scarlett (1981), emend. Sutra et al. 1997	Tanzania (Black et al., 1999; CABI, 2016), Germany, Spain, UK (Bradbury, 1986; CABI, 2016; Kohn, 1982; Lopez et al., 1994; Naumann, 1980; Scarlett et al., 1978), Mexico (CABI, 2016; Yáñez-Morales et al., 2003), Brazil (CABI, 2016).
BACTERIUM <i>Pseudomonas syringae</i> pv.	Infects <i>C. indicum</i> stems, in Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, UK, Netherlands,

Organism	Evidence and/or other notes
<i>syringae</i> van Hall	Spain, Brazil, Guatemala, El Salvador, Panama, Mexico, and US (CABI, 2016)
BACTERIUM <i>Pseudomonas viridiflava</i> (Burkholder) Dowson	Infects <i>C. indicum</i> stems in Kenya, Tanzania, Uganda, Belgium, Germany, UK, Netherlands, Spain, Brazil, and US (CABI, 2016)
BACTERIUM <i>Rhizobium radiobacter</i> (Beijerinck & van Delden) Young; syn. <i>Agrobacterium tumefaciens</i>	Infects stems and crowns (Horst and Nelson, 1997) of <i>C. coronarium</i> , <i>C. frutescens</i> (CABI, 2016), <i>C. indicum</i> , and <i>Chrysanthemum</i> sp. (Farr and Rossman, 2016) in Ethiopia, Kenya, Tanzania, Uganda, Belgium, Germany, UK, Netherlands, Bolivia, Brazil, Colombia, Central America, Mexico, and US (CABI, 2016)
BACTERIUM <i>Rhodococcus fascians</i> (Tilford,) Goodfellow	Infects leaves and stems (Oduro, 1975) of <i>Chrysanthemum indicum</i> , <i>Chrysanthemum</i> sp. (Farr and Rossman, 2016) in Uganda, Tanzania, Nicaragua, Guatemala, Panama, Brazil, Colombia, Germany, UK, Vietnam, Mexico, and US (Farr and Rossman, 2016)
VIRUS <i>Carnation necrotic fleck virus</i> (CNFV)	CNFV, in the genus Closterovirus is reported to infect <i>Chrysanthemum</i> spp. when transmitted by aphids in Australia (Moran, 1994), and this was the only report associated with <i>Chrysanthemum</i> we found. CNFV is reported in US only <i>Dianthus</i> spp. hosts (CABI, 2018), so this is not an actionable pathogen. Other countries where CNFV is reported include Colombia, Belgium, Germany, the Netherlands, Spain, and UK (CABI CPC, 2018).
VIROID <i>Chrysanthemum stunt viroid</i>	Infects <i>Dendranthema morifolium</i> , <i>Chrysanthemum praealtum</i> , <i>D. indicum</i> and <i>Tanacetum parthenium</i> in Belgium, Germany, Netherlands, UK, Brazil, and US (EPPO, 2016)
VIRUS <i>Chrysanthemum virus B</i>	Infects <i>Chrysanthemum frutescens</i> and <i>C. vestitum</i> in Belgium, Germany, UK, Netherlands, and US (CABI, 2016; Adams and Antoniw, 2006)
VIRUS <i>Cucumber mosaic virus</i>	Infects <i>C. vestitum</i> in Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, UK, Netherlands, Spain, Brazil, Colombia, Costa Rica, El Salvador, Panama, Vietnam, Mexico and US (CABI, 2016)
VIRUS <i>Impatiens necrotic spot tospovirus</i>	Infects <i>Chrysanthemum</i> sp. and <i>C. morifolium</i> in Uganda, Belgium, Germany, UK, Netherlands, Spain, South America, Costa Rica, Mexico, and US (CABI, 2016; Verma et al., 2007)
VIRUS <i>Iris yellow spot virus</i>	Infects <i>Chrysanthemum</i> sp. in Brazil, the Netherlands, Spain, Guatemala, US (Sansford and Woodhall, 2007), Kenya, Tunisia, Uganda, Belgium, Germany, UK, Brazil, Guatemala, and Mexico (CABI, 2016)
VIRUS <i>Pelargonium zonate spot virus</i>	PZSV is reported to infect <i>Chrysanthemum segetum</i> (Gallitelli, 1987) and <i>Chrysanthemum coronarium</i> ; it is

Organism	Evidence and/or other notes
(PZSV)	distributed in Italy, France Spain, and US (California)(EPPO Global Database, 2013; Liu and Sears, 2007). Only Spain is among the 20 countries in the scope of our pest list.
VIRUS <i>Potato X potexvirus</i>	Verma et al., 2007
VIRUS <i>Potato virus Y</i>	Infects leaves and stems of <i>C. morifolium</i> in Ethiopia, Tanzania, Tunisia, Belgium, Germany, UK, Netherlands, Spain, Brazil, Colombia, Costa Rica, El Salvador, Vietnam, Mexico, and US (CABI, 2016)
VIRUS <i>Soybean mosaic virus</i>	Infects leaves and stems of <i>Chrysanthemum</i> in Ethiopia, Tanzania, Uganda, Germany, Brazil, Colombia, and US (CABI, 2016)
VIRUS <i>Tomato aspermy virus</i>	Infects leaves, cuttings, flowers (Horst and Nelson, 1997) of <i>C. indicum</i> in UK (Horst and Nelson, 1997) and US (Adams and Antoniow, 2006)
VIRUS <i>Tomato spotted wilt virus</i>	Infects <i>C. morifolium</i> (CABI, 2016) and <i>C. indicum</i> (Verma et al., 2003) in Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, UK, Netherlands, Spain, Bolivia, Brazil, Colombia, Costa Rica, Mexico, and US (CABI, 2016)
VIRUS <i>Tobacco streak virus</i>	Infects <i>Chrysanthemum</i> sp. in Brazil, Mexico, Netherlands, UK, and US (CABI, 2016)
VIRUS <i>Zucchini yellow mosaic virus</i>	This virus has a broad, worldwide distribution, including US, Tunisia, Belgium, Germany, the Netherlands, Spain, UK, Mexico, Costa Rica, Panamá, Brazil, and Vietnam (CABI, 2018). ZYMV has been reported to infect <i>Chrysanthemum morifolium</i> in China (Niu et al., 2015).



Host status of 10 reclassified plant taxa for quarantine pests of *Chrysanthemum* species

Version 3

July 6, 2021

Agency contact

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Background and initiating event

This document was prepared by the United States Department of Agriculture Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine (PPQ) Science and Technology (S&T) Plant Pest Risk Analysis (PPRA).

PPRA previously identified quarantine pests associated with the importation of cuttings and *in vitro* plantlets of *Chrysanthemum*, synonymous genera, and hybrids for propagation from Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, and Vietnam into the continental United States (Smith et al., 2018). This pest list identified 49 pests of quarantine importance for the United States, which are summarized in Table 1.

As a result of a recent revision to the taxonomy of the genus *Chrysanthemum*, 10 taxa were reclassified into other genera and species (listed below). The purpose of this report is to determine if any of the newly reclassified plant taxa are hosts of the previously identified quarantine pests (Smith et al., 2018) as this could expand the list of synonymous genera susceptible to these pests. We also checked for quarantine pests of the reclassified plant taxa that can attack *Chrysanthemum*; we did this to determine if the reclassification also affected the original quarantine pest list (Smith et al., 2018).

- *Archanthemis marschalliana* (Willd.) Lo Presti & Oberpr. (syn. *Chrysanthemum biebersteinianum* Adams),
- *Brachanthemum fruticosum* (Ledeb.) DC. (syn. *Chrysanthemum fruticosum* Ledeb.),
- *Coleostephus multicaulis* (Desf.) Durieu (syn. *Chrysanthemum multicaule* Desf.),
- *Coleostephus myconis* (L.) Cass. (syn. *Chrysanthemum myconis* L.),
- *Hulteniella integrifolia* (Richardson) Tzvelev (syn. *Chrysanthemum integrifolium* Richardson),
- *Mauranthemum paludosum* (Poir.) Vogt & Oberpr. (syn. *Chrysanthemum paludosum* Poir.),
- *Nipponanthemum nipponicum* (Franch. ex Maxim.) Kitam. (syn. *Chrysanthemum nipponicum* (Franch. ex Maxim.) Matsum.),
- *Nivellea nivellei* (Braun-Blanq. & Maire) B. H. Wilcox et al. (syn. *Chrysanthemum nivellei* Braun-Blanq. & Maire),
- *Opisthopappus taihangensis* (Y. Ling) C. Shih (syn. *Chrysanthemum taihangensis* Y. Ling),
- *Pentzia incana* (Thunb.) Kuntze (syn. *Chrysanthemum incanum* Thunb.).

Consistent with the previous report (Smith et al., 2018), production and harvesting procedures in the exporting areas were not considered when determining host status with the following exceptions: no soil, seed, flowers, or roots will be present, and *in vitro* plantlets were produced in aseptic conditions with minimal monitoring for pathogens.

Quarantine pests of *Chrysanthemum*

The following 49 pests were previously identified as quarantine pests for the continental United States, are present in Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the

Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, or Vietnam (on any host), and are associated with *Chrysanthemum* species, hybrids, or synonyms (anywhere in the world) (Table 1) (Smith et al., 2018).

Table 1. Quarantine pests previously identified as associated with *Chrysanthemum* cuttings or *in vitro* plantlets anywhere in the world and present in Ethiopia (ET), Kenya (KE), Tanzania (TZ), Tunisia (TN), Uganda (UG), Belgium (BE), Germany (DE), the Netherlands (NL), Spain (ES), the United Kingdom (UK), Mexico (MX), Costa Rica (CR), Guatemala (GT), El Salvador (SV), Nicaragua (NI), Panama (PA), Bolivia (BO), Brazil (BR), Colombia (CO), or Vietnam (VN) on any host.

Pest name	Presence in country	Association with <i>Chrysanthemum</i>
MITE: Eriophyidae <i>Eptrimerus alinae</i> Liro	UK (Alford, 2012)	Alford, 2012
INSECT: Coleoptera: Curculionidae <i>Gonipterus gibberus</i> Boisdual	BR (Fenilli, 1982)	CABI, 2016
INSECT: Diptera: Agromyzidae <i>Chromatomyia horticola</i> Goureau (syn. <i>Phytomyza horticola</i> (Goureau))	ES, ET (Griffiths, 1967), KE (Spencer, 1990), UG (Spencer, 1985), BE (De Bryun, 1991), DE, NL (De Meijere, 1926), UK (Spencer, 1973), VN (Tran, 2009)	CABI, 2016
INSECT: Diptera: Agromyzidae <i>Liriomyza huidobrensis</i> (Blanchard)	KE, BE, DE, NL, ES, SV, GT, NI, PA, BR, CO (EPPO, 2014), VN (Malipatil and Ridland, 2008; EPPO, 2014)	Malipatil and Ridland, 2008
INSECT: Diptera: Psillidae <i>Psila nigricornis</i> Meigen	UK (Yerbury, 1918; Glendenning, 1952), Europe (Alford, 2012)	Alford, 2012
INSECT: Diptera: Tephritidae <i>Trypeta zoe</i> Meigen	BE, NL, UK (Pitkin, 2016)	Alford, 2012
INSECT: Hemiptera: Aleyrodidae <i>Aleurodicus dispersus</i> (Russell)	KE (Mware et al., 2010), BR, CO, ES, GT, NI, PA, SV (EPPO, 2014), VN (Waterhouse, 1993)	Mware et al., 2010
INSECT: Hemiptera: Aphididae <i>Macrosiphoniella oblonga</i> (Mordvilko)	DE, UK (Heie, 1995), VN (Blackman and Eastop, 2016)	Heie, 1995; Brightwell and Dransfield, 2016
INSECT: Hemiptera: Aphididae <i>Uroleucon tanacetii</i> (L.)	Widespread in Asia (Blackman and Eastop, 2016)	Heie, 1995; Brightwell and Dransfield, 2016
INSECT: Hemiptera: Coccidae <i>Ceroplastes brevicauda</i> (Hall)	KE, TZ, UG (García Morales et al., 2016)	García Morales et al., 2016
INSECT: Hemiptera: Coccidae <i>Ceroplastes rubens</i> Maskell	KE, TZ (EPPO, 2014); DE (Schonfeld, 2015), CO (Kondo, 2008), VN (Waterhouse, 1993)	CABI, 2016; García Morales et al., 2016
INSECT: Hemiptera: Pseudococcidae <i>Atrococcus cracens</i> Williams	UK (García Morales et al., 2016), DE (Fauna Europaea,	Garcia Morales et al., 2016

Pest name	Presence in country	Association with <i>Chrysanthemum</i>
	2018)	
INSECT: Hemiptera: Pseudococcidae <i>Maconellicoccus hirsutus</i> (Green)	GT, KE, MX, TZ (CABI/EPPO, 2004), TN (Halima-Kamel et al., 2015), CR (IPPC, 2014), BR (EPPO 2014), CO (Kondo et al., 2012), VN (Williams and Granara de Willink, 1992)	García Morales et al., 2016
INSECT: Lepidoptera: Noctuidae <i>Chrysodeixis chalcites</i> (Esper)	KE, TN, UG (CIE, 1977), Africa (Zhang, 1994), BE, DE, NL, ES, UK (Karsholt and Razowski, 1996)	CABI, 2016
INSECT: Lepidoptera: Noctuidae <i>Chrysodeixis eriosoma</i> Doubleday	VN (Waterhouse, 1993; Zhang, 1994)	CABI, 2016
INSECT: Lepidoptera: Noctuidae <i>Gortyna flavago</i> (Denis & Schiffermüller) (syn. <i>G. ochracea</i> (Hübner))	UK (Carter, 1984)	Carter, 1984
INSECT: Lepidoptera: Noctuidae <i>Lacanobia oleracea</i> (L.)	BE (CABI, 2016), UK (Kimber, 2015)	CABI, 2016
INSECT: Lepidoptera: Noctuidae <i>Mamestra brassicae</i> (L.)	BE, , DE, ES, NL, UK (EPPO, 2014)	CABI, 2016
INSECT: Lepidoptera: Noctuidae <i>Naenia typica</i> (L.)	UK (Carter, 1984; Kimber, 2015)	Carter, 1984
INSECT: Lepidoptera: Noctuidae <i>Phlogophora meticulosa</i> (L.)	DE (Wagner, 2005-2016), BE, DE, ES, FR, NL, UK (Fauna Europaea, 2018)	Carter, 1984; Alford, 2012
INSECT: Lepidoptera: Noctuidae <i>Spodoptera littoralis</i> (Boisduval)	ET, KE, TZ, TN, UG (CIE, 1967), Africa (Carter, 1984; Zhang, 1994)	CABI, 2016
INSECT: Lepidoptera: Noctuidae <i>Spodoptera litura</i> (F.)	UK (Jones, 1966), VN (Waterhouse, 1993; Noma et al., 2010)	Noma et al., 2010
INSECT: Lepidoptera: Tortricidae <i>Cacoecimorpha pronubana</i> Hübner	Africa (Carter, 1984; Zhang, 1994), TN, DE, NL, ES, UK (EPPO, 2014)	CABI, 2016
INSECT: Lepidoptera: Tortricidae <i>Cnephasia asseclana</i> (Denis & Schiffermüller) (syn. <i>C. interjectana</i> (Haworth))	UK (Kimber, 2015)	Kimber, 2015
INSECT: Lepidoptera: Tortricidae <i>Cnephasia incertana</i> (Treitschke)	BE, UK (Jonko, 2014)	Carter, 1984
INSECT: Lepidoptera: Tortricidae <i>Epichoristodes acerbella</i> (Walker)	Africa (Zhang, 1994); ES, KE (EPPO, 2014; Gilligan and Epstein, 2014)	CABI, 2016
INSECT: Lepidoptera: Tortricidae <i>Epiphyas postvittana</i> Walker	UK (Carter, 1984; Noma et al., 2010)	CABI, 2016
INSECT: Lepidoptera: Tortricidae	VN (Waterhouse, 1993)	CABI, 2016

Pest name	Presence in country	Association with <i>Chrysanthemum</i>
<i>Homona coffearia</i> (Nietner)		
INSECT: Thysanoptera: Thripidae <i>Thrips angusticeps</i> Uzel	BE, DE, ES, UK (EPPO, 2014), TN (Jenser, 1982)	CABI, 2016
INSECT: Thysanoptera: Thripidae <i>Thrips palmi</i> Karny	BR (Monteiro et al., 1995), CR, CO (EPPO, 2014), MX (CABI/EPPO, 2004), VN (Quyên et al., 2008)	CABI, 2016
FUNGUS <i>Aecidium leucanthemi</i> D.C.	DE (Farr and Rossman, 2016)	<i>C. leucanthemum</i> (Farr and Rossman, 2016)
FUNGUS <i>Asteromella bellunensis</i> Syd.	DE (Farr and Rossman, 2016)	<i>C. corymbosum</i> (Farr and Rossman, 2016)
FUNGUS <i>Entyloma matricariae</i> Rostr. (syn. <i>Entyloma lagerheimii</i> Cif)	KE (Farr and Rossman, 2016), DE, UK (Farr and Rossman, 2016)	<i>C. alpinum</i> and <i>C. leucanthemum</i> (Farr and Rossman, 2016)
FUNGUS <i>Paraperonospora tanacetii</i> (Gäum.) Constant.	DE (Farr and Rossman, 2016)	<i>C. vulgare</i> , <i>D. indica</i> (Farr and Rossman, 2016)
FUNGUS <i>Pestalotiopsis cruenta</i> (Syd.) Steyaert	TZ (Farr and Rossman, 2016)	<i>Chrysanthemum</i> spp. (Farr and Rossman, 2016)
FUNGUS <i>Phytophthora chrysanthemi</i> Naher, Hi. Watan., Chikuo & Kageyama	DE (Götz et al., 2017; Naher et al., 2011)	<i>C. x morifolium</i> (Lin et al., 2017; Naher et al., 2011), <i>C. indicum</i> (Götz et al., 2017)
FUNGUS <i>Phytophthora tentaculata</i> Kröber & Marwitz	ES, DE, US (limited distribution) (Farr and Rossman, 2016)	<i>C. frutescens</i> , <i>C. leucanthemum</i> (Farr and Rossman, 2016)
FUNGUS <i>Protomyces leucanthemi</i> Magnus	UK (Farr and Rossman, 2016)	<i>Chrysanthemum</i> sp., <i>C. leucanthemum</i> , <i>C. integrifolium</i> , <i>C. segetum</i> (Farr and Rossman, 2016)
FUNGUS <i>Puccinia aecidii-leucanthemi</i> E. Fisch.	DE (Farr and Rossman, 2016)	<i>C. leucanthemum</i> , <i>Leucanthemum</i> sp., <i>L. vulgare</i> (Farr and Rossman, 2016)
FUNGUS <i>Puccinia balsamitae</i> (F. Strauss) Rabenh.	DE (Farr and Rossman, 2016)	<i>C. balsamita</i> , <i>C. balsamita</i> subsp. <i>majus</i> , <i>C. macrophyllum</i> , <i>Pyrethrum balsamita</i> , <i>Tanacetum balsamita</i> , <i>T. balsamitoides</i> , <i>T. cilicicum</i> (Farr and Rossman, 2016)
FUNGUS <i>Puccinia horiana</i> Henn.	TN (Farr and Rossman, 2016), BE, NL, DE, UK, MX, NI, PA, GT, BR, CO, US regulatory incidents) (Farr and Rossman, 2016)	<i>Chrysanthemum</i> spp. (Farr and Rossman, 2016)
FUNGUS	DE (Farr and Rossman,	<i>Tanacetum vulgare</i> (Farr

Pest name	Presence in country	Association with <i>Chrysanthemum</i>
<i>Puccinia vulpinae</i> J. Schröt.	2016)	and Rossman, 2016)
FUNGUS <i>Ramularia bellunensis</i> Speg.	KE (Farr and Rossman, 2016; Wandahwa, 1996), DE, TZ, UK (Farr and Rossman, 2016)	<i>Chrysanthemum</i> sp., <i>C. cinerariifolium</i> , <i>C. coccineum</i> , <i>C. segetum</i> (Farr and Rossman, 2016)
FUNGUS <i>Sphaerulina socia</i> (Pass.) Quaedvlieg, Verkley & Crous	DE (Farr and Rossman, 2016)	<i>Chrysanthemum</i> spp. (Farr and Rossman, 2016)
FUNGUS <i>Stagonosporopsis inoxydabilis</i> (Boerema) Crous, Vaghefi & P.W.J. Taylor	NL, UK (Farr and Rossman, 2016)	<i>C. parthenii</i> (Farr and Rossman, 2016)
FUNGUS <i>Venturia chrysanthemi</i> E.Müll.	DE (Farr and Rossman, 2016)	<i>C. leucanthemum</i> (Farr and Rossman, 2016)
VIRUS <i>Carnation Italian ringspot virus</i> (CIRV)	DE, NL (Koenig et al., 2009)	<i>C. zawadskii</i> var. <i>latilobum</i> (Seo et al., 2015)
VIRUS <i>Chrysanthemum stem necrosis virus</i> (CSNV)	BE (De Jonghe et al., 2013), BR, NL, UK (EPPO, 2005), although all countries report that CSNV has been eradicated (EPPO, 2005; De Jonghe et al., 2013)	<i>C. x morifolium</i> (De Jonghe et al., 2013)
VIRUS <i>Tomato leaf curl New Delhi virus</i>	ES (Juárez et al., 2014), TN (Mnari-Hattab et al., 2015)	<i>Chrysanthemum</i> (Ashwathappa et al., 2020)

Quarantine pests associated with 10 reclassified plant taxa

We reviewed the scientific literature to determine the host status of the 10 reclassified plant taxa for the 49 quarantine pests identified above (Table 1). For each pest, we looked for evidence of its association with the commodity plant species. We also looked for any additional quarantine pests that are associated with the 10 reclassified plant taxa that also affect *Chrysanthemum* and are present in one or more of the countries of export. Pests are considered to be of quarantine significance if they (a) are not present in the PRA area, (b) are actionable at U.S. ports of entry, (c) are regulated non-quarantine pests, (d) are under Federal official control, or (e) require evaluation for regulatory action. For each of these pests, we provided evidence of the pest's presence in the export area and its association with the commodity plant species. We also indicated the plant parts with which the pest is generally associated and provided information about the pest's distribution in the United States, if any.

The following two pests were identified as quarantine pests for the continental United States, are present in Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, or Vietnam (on any host), and are associated with *Archanthemis marschalliana*, *Brachanthemum fruticosum*, *Coleostephus multicaulis*, *C. myconis*, *Hulteniella integrifolia*, *Mauranthemum paludosum*, *Nipponanthemum nipponicum*, *Nivellea nivellei*, *Opisthopappus taihangensis*, or *Pentzia incana* (anywhere in the world) (Table 2). Pests that are likely to remain associated with the harvested commodity in a viable form are indicated by shaded rows.

Table 2. Quarantine pests associated with 10 plant taxa cuttings or in vitro plantlets anywhere in the world and present in Ethiopia (ET), Kenya (KE), Tanzania (TZ), Tunisia (TN), Uganda (UG), Belgium (BE), Germany (DE), the Netherlands (NL), Spain (ES), the United Kingdom (UK), Mexico (MX), Costa Rica (CR), Guatemala (GT), El Salvador (SV), Nicaragua (NI), Panama (PA), Bolivia (BO), Brazil (BR), Colombia (CO), or Vietnam (VN) on any host.

Pest name	Presence in country	Association with 10 plant taxa	Association with plant part(s)	Notes
INSECT: Hemiptera: Aphididae <i>Macrosiphoniella yomogifoliae</i> (Shinji)	VN (Blackman and Eastop, 2006)	<i>Nipponanthemum nipponicum</i> (Franch. ex Maxim.) Kitam. (as <i>C. nipponicum</i>), <i>C. morifolium</i> , <i>Tanacetum</i> spp. (Blackman and Eastop, 2006)	Leaf (Yoshitomi et al., 2015)	
FUNGUS <i>Golovinomyces artemisiae</i> (Grev.) Heluta. Syn.: <i>Erysiphe artemisiae</i> Grev.	ES, DE, UK (Braun, 1995)	<i>Nipponanthemum nipponicum</i> (Bradshaw et al., 2017), <i>Chrysanthemum zawadskii</i> var. <i>latilobum</i> (Cho et al., 2017)	Leaf (Bradshaw et al., 2017)	Causes powdery mildew in leaves (Bradshaw et al., 2017). See note below.

***Golovinomyces artemisiae* (Grev.) Heluta.** This genus is reportable at U.S. ports of entry (AQAS, 2021). Bradshaw et al. (2017) reports a record of this pathogen in the United States; another paper indicates this record is for an herbarium specimen housed in Japan (MUMH1041 on *Artemisia vulgaris*) that was collected in Ohio in 1999 (Takamatsu et al., 2013). No further details are given and we found no additional records of this pathogen in the United States. Therefore, we considered this weak evidence of presence in the United States.

Summary

Of the 49 quarantine organisms associated with *Chrysanthemum* cuttings and *in vitro* plantlets worldwide and present in Ethiopia, Kenya, Tanzania, Tunisia, Uganda, Belgium, Germany, the Netherlands, Spain, the United Kingdom, Mexico, Costa Rica, Guatemala, El Salvador, Nicaragua, Panama, Bolivia, Brazil, Colombia, or Vietnam, none were associated with the 10 reclassified plant taxa. However, we did find two new quarantine pests, *Macrosiphoniella yomogifoliae* and *Golovinomyces artemisiae*, associated with the reclassified plant taxon *Nipponanthemum nipponicum* and with *Chrysanthemum* spp. Of these new pests, *M. yomogifoliae* is present in Vietnam and *G. artemisiae* is present in Germany, Spain, and the United Kingdom.

Detailed examination and choice of appropriate phytosanitary measures to mitigate pest risk are part of the pest risk management phase within APHIS and are not addressed in this document.

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