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

Importation of celery (*Apium graveolens*) from the United Kingdom into the United States for consumption

A Qualitative, Pathway Initiated Pest Risk Assessment

Version 1

January 13, 2023

Agency contact
Plant Pest Risk Analysis (PPRA)
Science and Technology (ST)
Plant Protection and Quarantine (PPQ)
Animal and Plant Health Inspection Service (APHIS)
United States Department of Agriculture (USDA)
920 Main Campus Drive, Suite 400
Raleigh, NC 27606

Executive Summary

The purpose of this report is to assess the pest risks associated with importing commercially produced fresh stalks (stems, leaves) of celery, *Apium graveolens* (Apiaceae), from the United Kingdom into the United States for consumption.

Based on the market access request submitted by the United Kingdom, we considered the pathway to include the following processes and conditions: commercially produced fresh stalks (stems and leaves) of celery that is washed in the field to remove soil and debris. Other production, harvesting, and post-harvesting procedures and shipping and storage conditions in the export area were not considered in this assessment. The pest risk ratings depend on the application of all conditions of the pathway as described in this document; fresh stalks (stems, leaves) of celery produced under different conditions were not evaluated and may pose a different pest risk.

We used scientific literature, port-of-entry pest interception data, and information from the government of the United Kingdom to develop a list of pests with quarantine significance for the United States. These are pests that occur in the United Kingdom on any host and are associated with the commodity plant species anywhere in the world.

The following organisms are candidates for pest risk management because they have met the threshold for unacceptable consequences of introduction and can follow the commodity import pathway.

Pest type	**Taxonomy**	**Scientific name**	**Likelihood of Introduction**
Arthropod	Diptera: Tephritidae	*Euleia heraclei* (L.)	Low
Nematodes	Tylenchida: Anguinidae	*Ditylenchus dipsaci* (Kuehn) Filipjev	Medium*
Fungi & Chromistans	Pleosporales: Pleosporaceae	*Alternaria burnsii* Uppal, Patel & Kamat	Low
Fungi & Chromistans	Peronosporales: Peronosporaceae	*Phytophthora tentaculata* Kröber & Marwitz	Low

**This risk rating applies only to Hawaii or the territories.*

The detailed examination and choice of appropriate phytosanitary measures to mitigate pest risk are addressed in a separate document.

Table of Contents

1. Introduction

1.1. Background

The purpose of this report is to present PPQ's assessment of the pest risk associated with the importation of commercially produced fresh stalks (stems, leaves) of celery (*Apium graveolens* L.) from the United Kingdom (referred to as the export area) into the United States[1] (referred to as the pest risk analysis or PRA area) for consumption.

This is a qualitative risk assessment. The likelihood of pest introduction is expressed as a qualitative rating rather than using numerical terms. This methodology is consistent with guidelines provided by the International Plant Protection Convention (IPPC) in the International Standard for Phytosanitary Measures (ISPM) No. 11, "Pest Risk Analysis for Quarantine Pests" (IPPC, 2017). The use of biological and phytosanitary terms is consistent with ISPM No. 5, "Glossary of Phytosanitary Terms" (IPPC, 2022).

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

1.2. Initiating event

The importation of fruits and vegetables for consumption into the United States is regulated under Title 7 of the Code of Federal Regulations, Part 319.56 (7 CFR §319.56) and as described in the Agricultural Commodity Import Requirements. Under this regulation, the entry of celery from the United Kingdom into the PRA area is not authorized. This commodity risk assessment was initiated in response to a request by The United Kingdom's Department for Environment, Food and Rural Affairs to change the federal regulation to allow entry (DEFRA, 2021).

1.3. Potential weediness of the commodity

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

A weed risk analysis is not required when (a) the commodity is already enterable into the PRA area from other countries, (b) the commodity plant species is widely established or cultivated in the PRA area, or (c) the imported plant part(s) cannot easily propagate on its own or be propagated. We determined that the weed risk of celery does not need to be analyzed because this commodity is already enterable from other countries (7 CFR § 319.56-2t, 2007).

1.4. Description of the pathway

A pathway is "any means that allows the entry or spread of a pest" (IPPC, 2022). In the context of this document, the pathway is the commodity to be imported. The following description

[1]The *United States* includes all states, the District of Columbia, Guam, the Northern Mariana Islands, Puerto Rico, the U.S. Virgin Islands, and any other territory or possession of the United States.

includes those conditions and processes the commodity undergoes from production through importation and distribution that may have an impact on pest risk and therefore were considered in our assessment. Commodities produced under different conditions were not considered.

1.4.1. Description of the commodity

The specific pathway of concern is the importation of fresh stalks (stems and leaves) of celery for consumption.

1.4.2. Summary of the production, harvest, post-harvest, shipping, and storage conditions considered

Celery is washed in the field to remove soil and debris. Other production, harvesting, and post-harvesting procedures and shipping and storage conditions in the export area were not considered during this assessment.

2. Pest List and Pest Categorization

The pest list is a compilation of plant pests of quarantine significance to the United States. This list includes pests that are present in the United Kingdom on any host and are known to be associated with *Apium graveolens* anywhere in the world. Pests are considered quarantine significant 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. Consistent with ISPM No. 5, pests that meet any of these definitions are considered "quarantine pests" and are candidates for analysis. Species with a reasonable likelihood of following the pathway into the PRA area are analyzed to determine their pest risk potential.

2.1. Pest list

We developed the pest list based on scientific literature, port-of-entry pest interception data, and information provided by the government of the United Kingdom. We listed the pests that are of quarantine significance to the PRA area in Table 1. For each pest, we provided evidence for the pest's presence in the United Kingdom and its association with *Apium graveolens*. We indicated the plant parts with which the pest is generally associated and, if applicable, provided information about the pest's distribution in the United States. Pests that are likely to remain associated with the harvested commodity in a viable form are indicated by bolded text and are listed separately in Table 2.

Table 1. List of quarantine pests associated with *Apium graveolens* anywhere in the world and present in the United Kingdom on any host.

Pest name	**Presence in the United Kingdom**	**Host association**	**Plant part(s)** [2]	**Considered further?**[3]
INSECT: Diptera: Bibionidae *Bibio marci* (L.)	Sivell and Sivell, 2021	Sivell and Sivell, 2021; Edwards, 1925	Roots (Hill, 1987) (extrapolated from other host plants)	No. This fly is only associated with celery roots which will not be part of the imported commodity.
INSECT: Diptera: Tephritidae *Euleia heraclei* (L.)	**CABI, 2022; Pitkin et al., 2019**	**CABI, 2022; Krivoshein a and Ozerova, 2016; Leroi, 1973**	**Leaves (Krivosheina and Ozerova, 2016; Leroi, 1973)**	**Yes.** **See section 3.2.1 for assessment.**
INSECT: Lepidoptera: Noctuidae *Agrotis segetum* Denis & Schiffermüller	Bowden et al., 1983; CABI, 2022	CABI, 2022; Charpentier et al., 1978; Szwejda, 2022	Leaves, roots, stems (Esbjerg, 2003; Esbjerg and Sigsgaard, 2014) (extrapolated from other host plants)	No. Larvae feed on hosts at night and hide in the soil during the day (Hill, 1983). Therefore, they are absent from the commodity during harvest. Eggs can be laid in the soil or on the underside of leaves singly or in groups (Esbjerg and Sigsgaard, 2019; Esbjerg and Lauritzen, 2010), however we find no evidence of celery as a common host (Bowden et al., 1983), and therefore believe that the ability for the insect establish via this pathway is very unlikely.

[2] 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.

[3] "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 as part of the Likelihood of Introduction assessment (section 3).

Pest name	Presence in the United Kingdom	Host association	Plant part(s) [2]	Considered further?[3]
FUNGUS ***Alternaria burnsii*** **Uppal, Patel & Kamat**	**Woudenberg et al., 2015a**	**Zhuang, 2005**	**Leaf (Song et al., 2015)**	**Yes.** **This fugus is reported in Florida (Patel and Zhang, 2017; Woudenberg et al., 2015b). We found no evidence of this pest in any other parts of the continental United States, Hawaii, and territories.** **See section 3.2.2 for assessment.**
CHROMISTANS ***Phytophthora tentaculata*** **Kröber & Marwitz**	**Beal et al., 2018**	**Wang et al., 2014**	**Stem and root (Wang et al., 2014)**	**Yes.** **See section 3.2.3 for assessment.**
VIRUS *Alfamovirus Alfalfa mosaic virus* (AMV)	Hull, 1968	Fletcher, 1983	Systemic (Fletcher, 1983). Generally, this pest causes flecking, mosaic, mottle, and necrosis (CABI, 2022).	No. This pest is present in the continental United States (Abdalla and Ali, 2012) and Puerto Rico (Kaiser, 1981) and not under official control. We found no evidence this pest in Hawaii. We consider commodities for consumption to be a dead-end pathway for plant virus diseases. AMV would need to move from an infected shoot or leaf by an insect vector or by mechanical transmission, so it has a negligible likelihood of meeting host material in the PRA area.

Pest name	Presence in the United Kingdom	Host association	Plant part(s) [2]	Considered further?[3]
VIRUS *Nepovirus Arabis mosaic virus* (ArMV)	Walkey, 1967; Wetzel et al., 2002	Walkey, 1967; Mossop et al., 1983	Systemic (Walkey, 1967; Mossop et al., 1983).	No. This pest is present in the continental United States (Çelebi-Toprak et al., 2013 Lockhart, 2006) and not under official control. We found no evidence of this pest in Hawaii and Puerto Rico. We consider commodities for consumption to be a dead-end pathway for plant virus diseases. ArMV would need to move from an infected shoot or leaf by a nematode (*Xiphinema diversicaudatum*) vector (CABI, 2022) or by mechanical transmission, so it has a negligible likelihood of meeting host material in the PRA area.
VIRUS *Potyvirus Celery mosaic virus* (CeMV).	Pemberton and Frost, 1974	Ruiz et al., 2001	Systemic (Ruiz et al., 2001)	No. This pest is present in the continental United States (Hall, 1950) but no evidence in Hawaii and Puerto Rico. We consider commodities for consumption to be a dead-end pathway for plant virus diseases. CeMV would need to move from an infected shoot or leaf by an aphid vector (Ruiz et al., 2001) or by mechanical transmission, so it has a negligible likelihood of meeting host material in the PRA area.

Pest name	Presence in the United Kingdom	Host association	Plant part(s) [2]	Considered further?[3]
VIRUS *Nepovirus Strawberry latent ringspot virus* (SLRSV)	Brunt et al., 1996b; Büchen-Osmond, 2006	Brunt et al., 1996b; Büchen-Osmond, 2006	Systemic (Büchen-Osmond, 2006)	No. This pest is present in the continental United States (Martin et al., 2004; WPBUS, 2021) and not under official control. However, it still may qualify for quarantine pest for Hawaii and/or US territories (PERAL, 2018). We consider commodities for consumption to be a dead-end pathway for plant virus diseases. SLRSV would need to move from an infected shoot or leaf by a nematode vector or by mechanical transmission (Brunt et al., 1996b), so it has a negligible likelihood of meeting host material in the PRA area.
VIRUS *Nepovirus Tomato black ring virus* (TBRV)	Brown and Murant, 1989; Calvert, 1963	Brunt et al., 1996d	Leaf (Brunt et al., 1996d)	No. We consider commodities for consumption to be a dead-end pathway for plant virus diseases. TRSV would need to move from an infected shoot or leaf by a vector nematode or by mechanical transmission (Brunt et al., 1996d), so it has a negligible likelihood of meeting host material in the PRA area.

Pest name	Presence in the United Kingdom	Host association	Plant part(s) [2]	Considered further? [3]
PHYTOPLASMA ‘*Candidatus* Phytoplasma asteris’ (16SrI-B)	Lee et al., 2004	Lee et al., 2004	Systemic (Lee et al., 2004)	No. It is present in the continental United States and Hawaii (Borth et al., 2002; Byamukama et al., 2016; Lee et al., 2004). We found no evidence of this pest in Puerto Rico and U.S. Virgin Island. This would need to move from an infected shoot or leaf by a vector. Generally, the vectors are not likely to feed on wilted or discarded greens. The likelihood that ‘*Candidatus* Phytoplasma asteris’ will be able to move from the infected greens to new hosts in the import area is negligible.
PHYTOPLASMA Clover phyllody phytoplasma (16SrI-C)	CABI, 2022	Cui et al., 2021	Systemic (Fránová and Špak, 2013).	No. Present in Florida (Harrison et al., 1997) but no evidence in Hawaii or territories. This would need to move from an infected shoot or leaf by a vector. Generally, the vectors are not likely to feed on wilted or discarded greens. The likelihood that Clover phyllody phytoplasma will be able to move from the infected greens to new hosts in the import area is negligible.

Pest name	Presence in the United Kingdom	Host association	Plant part(s) [2]	Considered further?[3]
NEMATODE ***Ditylenchus dipsaci*** **(Kühn) Filip'ev,**	**Cook et al., 1992**	**Greco, 1993; Musyarofah and Indarti, 2020**	**Root (Musyarofah and Indarti, 2020) and petiole (Vovlas et al., 1993)**	**Yes.** **This is a quarantine pest for Hawaii and Puerto Rico (ARM, 2022).** **See section 3.2.4. for assessment.**
NEMATODE *Zygotylenchus guevarai* (Tobar Jiménez) Braun & Loof,	Barker and Hooper, 1995	Barker and Hooper, 1995	Root (Barker and Hooper, 1995; Vovlas et al., 1976)	

2.2. Pests considered but not included on the pest list

2.2.1. Organisms with non-quarantine status

We found evidence of organisms that are associated with celery and are present in the export area; however, they are not of quarantine significance for the PRA area (see Appendix).

2.2.2. Quarantine pests considered but not included on the pest list

INSECTS:

Agonopterix yeatiana (F.) (Lepidoptera: Elachistidae) is found in the United Kingdom (DEFRA, 2021). While there are several host lists that associate this species with celery (Ellis, 2022; Huisman, 2012), we did not find primary evidence of this species as a pest on celery.

Agonopterix nervosa Haworth (Lepidoptera: Elachistidae) is found in the United Kingdom, however, we only found reports with weak evidence associating it with celery (Carter, 1984).

Autographa gamma (L.), *Ceramica pisi* (L.), *Lacanobia suasa* (Denis & Schiffermüller), and *Melanchra persicariae* (L.) (Lepidoptera: Noctuidae) are all reported in the United Kingdom (Alford et al., 1979; Campbell, 2019; Carreck and Williams, 2002; CABI, 2022). We found one report listing these species as associated with celery (Szwejda, 2022), however, we did not find any primary evidence of these species as a pest on celery.

Cavariella archangelicae (Scopoli) and *C. pastinacae* (L.) (Hemiptera: Aphididae) are found in the United Kingdom (Baker et al., 2022). We found one report of this species associated with celery (Blackman and Eastop, 2000); however, we did not find any primary evidence of this species as a pest on celery.

Korscheltellus lupulina (L.) (Lepidoptera: Hepialidae) is found in the United Kingdom, however, we only found one report with weak evidence associating it with celery (Carter, 1984).

Lacanobia oleracea L. (Lepidoptera: Noctuidae) is found in the United Kingdom (Fayle et al., 2007). We found one report listing these species as associated with celery (Devetak et al., 2010), however, we did not find any primary evidence of this species as a pest on celery.

Liriomyza bryoniae Kaltenbach (Diptera: Agromyzidae) is found in the United Kingdom, primarily as a pest in greenhouses (CABI, 2022). While there are some reports on *Apium* sp. (CABI, 2022; Gil Ortiz, 2009), we did not find any reports specific to *Apium graveolens* or any evidence of this species as a pest on celery.

Liriomyza strigata Meigen (Diptera: Agromyzidae) is found in the United Kingdom (CABI, 2022). While there are some reports on *Apium* sp. (Pitkin et al., 2019), we did not find any primary evidence of this species as a pest on celery.

Phlogophora meticulosa (L.) (Lepidoptera: Noctuidae) is found in the United Kingdom, however, we only found reports with weak evidence associating it with celery (Carter, 1984).

FUNGI:
Entyloma helosciadii Magnus: This pathogen is present in the UK (Watson, 1971)and is reported to be associated with celery leaves (Turner, 1971). However, due to lack of information for its pathogenicity on celery, we did not include this fungus on the pest list.

Paraphoma chrysanthemicola (Hollós) Gruyter, Aveskamp & Verkley. Syn.: *Phoma chrysanthemicola* Hollós: This pathogen is present in the UK (Moslemi et al., 2016) and is not in the United States. Although the host association is reported in CABI (2022), we could not confirm the host association in the primary literature; therefore, we did not include this fungus on the pest list.

VIRUSES:
Nepovirus Grapevine chrome mosaic virus (GCMV): A vector is unknown for this virus (Basso et al., 2017). It is primarily a virus of grape (CABI, 2022) but has been associated with celery (Brunt et al., 1996a; Martelli and Quacquarelli, 2003). While this virus has been reported in the UK (Brunt et al., 1996a; Martelli and Quacquarelli, 2003), it is now considered absent there (CABI, 2022). Therefore, we did not include this virus on the pest list.

Potyvirus Parsnip mosaic virus: This virus is transmitted in the non-persistent manner by aphids (DVP, 1972). This virus is reported in the UK (CABI, 2022; DVP, 1972). Additionally, CABI (2022) reports celery is a host; however, we found no direct evidence of this virus associated with celery. Because we could not confirm the geographic distribution and host association from any primary resource, we did not include this virus on the pest list.

PHYTOPLASMA:
'*Candidatus* Phytoplasma trifolii' (16SrVI-A): This phytoplasma is reported as present in the UK and associated with celery in CABI (2022); however, we could not confirm geographic distribution and host association from any primary resources. Therefore, we did not include the virus on the pest list.

NEMATODES:
Meloidogyne mali Itoh, Ohshima & Ichinohe: This nematode is present in the UK (Prior et al., 2019) but the only host association was from greenhouse trial (EPPO, 2017). We could not find any evidence that this pest naturally infests celery.

Meloidogyne fallax Karssen: This nematode is present in the UK (EPPO, 2013) but host association is only reported based on an greenhouse test (Brinkman et al., 1996; den Nijs et al., 2004). We could not find any other evidence about the association of this pest with celery.

2.3. Pests selected for further analysis or already regulated

We identified four quarantine pests for further analysis (Table 2).

Table 2. Pests selected for further analysis

Pest type	Taxonomy	Species names
Arthropod	Diptera: Tephritidae	*Euleia heraclei* (L.)
Nematodes	Tylenchida: Anguinidae	*Ditylenchus dipsaci* (Kuehn) Filipjev
Fungi & Chromistans	Pleosporales: Pleosporaceae	*Alternaria burnsii* Uppal, Patel & Kamat
Fungi & Chromistans	Peronosporales: Peronosporaceae	*Phytophthora tentaculata* Kröber & Marwitz

3. Assessing Pest Risk Potential

3.1. Introduction

Risk is described by the likelihood of introduction, the potential consequences, and the associated uncertainty. For each pest, we determined if an endangered area exists within the PRA area. The endangered area is defined as the portion of the PRA area where ecological factors favor the pest's establishment and where the pest's presence will likely result in economically important impacts. If a pest causes an unacceptable impact, that means it could adversely affect agricultural production by causing a yield loss of 10 percent or greater, by increasing U.S. production costs, by impacting an environmentally important host, or by impacting international trade. After the endangered area is defined, we assessed the pest's likelihood of introduction into that area via the imported commodity.

The likelihood of introduction is based on the potential entry and establishment of a pest. We qualitatively assessed this using the ratings: Low, Medium, and High. The elements comprising the likelihood of introduction are interdependent; therefore, the model is multiplicative rather than additive. We defined the ratings as follows:

> **High**: This outcome is highly likely to occur because the events required occur frequently.
> **Medium**: This outcome can occur; however, the combination of required events occurs only occasionally.

Low: This outcome is less likely because the exact combination of required events seldom occurs or rarely align properly in time and space.

We addressed uncertainty associated with each element as follows:

Negligible: Additional or more reliable evidence is very unlikely to change the rating.
Low: Additional or more reliable evidence probably will not change the rating.
Moderate: Additional or more reliable evidence may or may not change the rating.
High: Reliable evidence is not available.

3.2. Assessment

3.2.1. *Euleia heraclei* (L.) (Diptera: Tephritidae)
Euleia heraclei is a leaf-mining fly whose larvae feeds within the leaves of celery and other plants within the Apiaceae family ((Krivosheina and Ozerova, 2016; Leroi, 1973). This species has two generations per year (Christenson and Foote, 1960; Krivosheina and Ozerova, 2016). Adult flies are small (5-7 mm), but are considered good fliers (Iosob and Cristea, 2021), though have limited dispersal ability (Girard and Fischer, 2018). We found little information about this pest traveling far from its native area.

The endangered area for *Euleia heraclei* within the PRA area

Climatic suitability: *Euleia heraclei* is present throughout nearly all of Europe (Fauna Europaea Secretariat, 2021), from as far west as Spain and east through much of Russia (Krivosheina and Ozerova, 2016; Shcherbakov, 2020). The distribution records for this species correspond to global Plant Hardiness Zones 2-10 within the continental United States (Takeuchi et al., 2018).

Hosts in PRA area: *Euleia heraclei* only infests plants from Apiaceae (Girard and Fischer, 2018; Iosob and Cristea, 2021; Krivosheina and Ozerova, 2016). Some hosts include *Angelica archangelica* (garden angelica), *Apium graveolens* (celery), *Heracleum dissectum, Heracleum sosnowskyi* (hogweed), *Levisticum officinale* (lovage), *Pastinaca sativa* (parsnip), and *Petroselinum crispum* (parsley) (Krivosheina and Ozerova, 2016).

In the PRA area, hosts such as celery, parsley, and parsnips are grown through the continental United States Most of the celery production in the United States occurs in California, followed by Michigan, Texas, and Florida (Lazicki et al., 2016).

Economically important hosts[4]: Celery, parsley, and parsnips are economically important hosts of *Euleia heraclei*.

Potential consequences on economically important hosts at risk: This pest is likely to cause unacceptable consequences because larvae mine through leaves causing discoloration and death of leaves (Iosob and Cristea, 2021) and potentially cause celery stalks to stay small and have a

[4] As defined by ISPM No. 5, potential economic importance applies to crops, the environment (ecosystems, habitats, or species), and to other specified values such as tourism, recreation and aesthetics (IPPC, 2022).

bitter taste (RHS, 2022). While damage is rarely economically important, this species does occasionally have severe infestations that require chemical control (EPPO, 2000).

Endangered area: The endangered area includes those parts of Plant Hardiness Zones 2 through 10 within the United States where suitable hosts occur.

The likelihood of entry of *Euleia heraclei* into the endangered area via celery imported from the United Kingdom

Risk Element	Risk Rating	Uncertainty Rating	Evidence for rating (and other notes as necessary)
Pest prevalence on the harvested commodity	Medium	Moderate	While this pest is not often an economically important pest, severe infestations can occasionally occur (EPPO, 2000; Girard and Fischer, 2018; Krivosheina and Ozerova, 2016). Because this species is not regularly occurring in commercial celery, we rated the pest prevalence on the commodity as Medium.
Likelihood of surviving post-harvest processing before shipment	Medium	Negligible	Washing celery in the field to remove debris will not reduce this species from the host. We did not consider any other post-harvesting processing, so the previous risk rating remains the same.
Likelihood of surviving transport and storage conditions of the consignment	Medium	Negligible	We did not consider transport and storage conditions, so the previous risk rating remains the same.
Overall Likelihood of Entry	Medium	n/a	n/a

The likelihood of establishment of *Euleia heraclei* into the endangered area via celery imported from the United Kingdom

Risk Element	Risk Rating	Uncertainty Rating	Evidence for rating (and other notes as necessary)
Likelihood of Establishment	Low	Moderate	While celery and other Apiaceae plants are present throughout most of the United States, this species is reported to not disperse far (Girard and Fischer, 2018). Additionally, commodity for consumption that reach the endangered area are likely to be consumed or, if disposed, would go to a commercial landfill. Therefore, commodity for consumption poses a low risk for the introduction of pests into new areas (Gordh and McKirdy, 2014).
Overall Likelihood of Establishment	Low	n/a	n/a

The likelihood of introduction (combined likelihoods of entry and establishment) of *Euleia heraclei* into the endangered area via celery imported from the United Kingdom is Low.

<u>3.2.2. *Alternaria burnsii* Uppal, Patel & Kamat (Pleosporales: Pleosporaceae)</u>

Alternaria burnsii causes leaf spots and leaf blight on celery and the plants can die in severe cases (Htun et al., 2022; Song et al., 2015; Xu et al., 2022).

Endangered area for *Alternaria burnsii* within the PRA Area

<u>Climatic suitability</u>: *Alternaria burnsii* has been documented in **Africa**: Mozambique; **Asia**: Bangladesh, India, China, Myanmar, Pakistan, Thailand; Turkey (Ankara and Konya provinces); **Europe**: United Kingdom (CABI, 2022; Farr and Rossman, 2022; Htun et al., 2022; Özer and Bayraktar, 2015; Song et al., 2015; Xu et al., 2022). These localities correspond to Plant Hardiness Zones 6-12.

<u>Hosts in PRA area</u>: Hosts of *A. burnsii* include the following, **Apiaceae:** *Apium graveolens* (celery), *Bunium persicum* (black cumin)**,** *Cuminum cyminum* (cumin); **Amaryllidaceae:** *Allium cepa* (onion); **Cucurbitaceae**: *Cucurbita maxima* (winter squash/pumpkin); **Malvaceae:** *Gossypium* sp. (Cotton); **Menispermaceae**: *Tinospora cordifolia* (gurjo); **Pandanaceae**: *Pandanus* sp. (screwpine); **Poaceae:** *Sorghum* sp. (Sorghum), *Zea mays* (maize); **Rhizophoraceae:** *Rhizophora mucronate* (red mangrove) (CABI, 2022; Farr and Rossman, 2022; Htun et al., 2022; Song et al., 2015; Xu et al., 2022).

<u>*Economically important hosts at risk*</u>[a]: Economically important hosts of *A. burnsii* that are present in the United States include celery, onion, winter squash, cotton, maize, sorghum (NASS, 2017; NRCS, 2022).

<u>*Potential consequences on economically important hosts at risk*</u>:
This pest is likely to cause unacceptable consequences. It causes leaf spots and leaf blight, eventually leading to the death of hosts including celery, onion, and maize (Htun et al., 2022; Song et al., 2015; Xu et al., 2022).

<u>*Endangered area:*</u> The endangered area includes areas of the United States and territories within Plant Hardiness Zones 6-12, where suitable hosts occur.

The likelihood of entry of *Alternaria burnsii* into the endangered area via celery plants imported from the United Kingdom

Risk Element	**Risk Rating**	**Uncertainty Rating**	**Evidence for rating (and other notes as necessary)**
Pest prevalence on the harvested commodity	Low	Low	Celery is susceptible to *A. burnsii* from seedling stages to mature plants. Infected seeds and plant debris are the primary inoculum sources of this disease, but the fungus does produce fruiting bodies on lesion surfaces, which could occur on the stems and leaves of celery. This pathogen has a limited distribution in the United Kingdom, and we found no evidence that this species occurs on celery in the UK, so the pest prevalence on celery is expected to be Low.
Likelihood of surviving post-harvest processing before shipment	Low	Low	The fungus produces sparse black mold (fruiting bodies) on the upper surface of the lesion (Song et al., 2015). Symptoms of *A. burnsii* infection are visible and can be excluded during harvesting. Latent infection, however, may not be visible.
Likelihood of surviving transport and storage conditions of the consignment	Low	N/A	We did not consider any specific transport or storage conditions as part of this assessment. Therefore, we did not change the rating.
Likelihood of Entry	Low	Low	

The likelihood of establishment of *Alternaria burnsii* into the endangered area via celery plants imported from the United Kingdom

Risk Element	Risk Rating	Uncertainty Rating	Evidence for rating (and other notes as necessary)
Likelihood of Establishment	Low	Low	Infected seeds and plant debris are the primary inoculum sources of this pathogen. Conidia are mainly spread by wind and rain, causing primary infection. The fungus can survive for several months in warm and dry conditions. It can spread over short distances by insects and agricultural practices. Long periods of leaf wetness due to heavy dew, irrigation, or prolonged rains also favor disease (Song et al., 2015). Additionally, the fungus can overwinter as mycelium and conidia in plant debris remaining in the soil and produce conidia in the following spring when conditions are suitable. However, the intended use of the commodity is consumption and those that reach the endangered area are likely to be consumed or, if disposed, would go to a commercial landfill. Therefore, the commodity poses a low risk for the introduction of pests into new areas (Gordh and McKirdy, 2014).
Overall Likelihood of Establishment	Low		

The likelihood of introduction (combined likelihoods of entry and establishment) of *Alternaria burnsii* into the endangered area via celery plants imported from the United Kingdom is low.

3.2.3. *Phytophthora tentaculata* (Peronosporales: Peronosporaceae)

Phytophthora tentaculata is a stem and root rot pathogen on a range of ornamental and native plants (Rooney-Latham et al., 2015a). It disperses in water and can spread rapidly through nursery material (Rooney-Latham et al., 2015b). *P. tentaculata* is a quarantine pest in the United States, Hawaii and territories (ARM, 2022) although there are few records of this pest in the continental United States (Rooney-Latham and Blomquist, 2014; Rooney-Latham et al., 2019).

Endangered area for *Phytophthora tentaculata* within the PRA Area

Climatic suitability: *Phytophthora tentaculata* has been documented in **Asia**: China, Japan (Beal et al., 2018; Camele et al., 2005; Yang et al., 2017); **Europe**: Italy, Germany, Spain, the Netherlands, and the United Kingdom), **North America**: California (Rooney-Latham and Blomquist, 2014). These localities correspond to Plant Hardiness Zones 5-11 (Takeuchi et al., 2018).

<u>*Hosts in PRA area*</u>: Hosts of *P. tentaculata* include the following: **Apiaceae**: *Apium graveolens* (celery) (Wang et al., 2014); **Asteraceae**: *Calendula arvensis* (field marigold) (Li et al., 2011), *Cichorum intybus* (chicory) (Garibaldi et al., 2010), *Chrysanthemum frutescens* (marguerite) (Kröber and Marwitz, 1993), *Chrysanthemum leucanthemum* (oxeye daisy) (Kröber and Marwitz, 1993), *Gerbera jamesoni* (gerbera daisy) (Rooney-Latham et al., 2015a), *Santolina chamaceyparissus* (lavender cotton) (BONAP, 2022; Pérez Sierra et al., 2012); **Lamiaceae:** *Origanum vulgare* (oregano) (Martini et al., 2009); **Ranunculaceae:** *Delphinium ajacis* (doubtful knight's-spur) (Kröber and Marwitz, 1993); **Rhamnaceae:** *Frangula californica* (coffeeberry) (Rooney-Latham et al., 2015b); **Rosaceae:** *Heteromeles arbutifolia* (toyon) (Rooney-Latham et al., 2015b); **Scrophulariaceae:** *Diplacus aurantiacus* (orange sticky monkey flower) (Rooney-Latham et al., 2015b); **Verbenaceae:** *Verbena* sp. (Kröber and Marwitz, 1993; Moralejo and Puig, 2004). These hosts are present in natural systems and nurseries across the United States (BONAP, 2022; NRCS, 2022).

<u>*Economically important hosts at risk*</u>[a]: Economically important hosts of *P. tentaculata* that are present in the United States include celery (NRCS, 2022; Orton and Arus, 1982), and other hosts i.e., gerbera, oregano, chrysanthemum, delphinium, and verbena (NRCS, 2022). Celery is an important vegetable (Wang et al., 2014). Oregano is cultivated as a culinary herb and the other hosts are important ornamental species (Janke and DeArmond, 2004; NASS, 2017).

<u>*Potential consequences on economically important hosts at risk*</u>: This pest is likely to cause unacceptable consequences because it causes root and stem rots, eventually leading to the death of hosts (Kröber and Marwitz, 1993; Martini et al., 2009; Moralejo and Puig, 2004; Wang et al., 2014). Eighty percent of plants infected with *P. tentaculata* in an oregano nursery died within 30 days of the appearance of symptoms (Martini et al., 2009).

<u>*Endangered area:*</u> The endangered area includes areas of the United States and territories within Plant Hardiness Zones 5-11, where suitable hosts occur.

The likelihood of entry of *Phytophthora tentaculata* into the endangered area via celery plants imported from the United Kingdom

Risk Element	Risk Rating	Uncertainty Rating	Evidence for rating (and other notes as necessary)
Pest prevalence on the harvested commodity	Low	Low	*Phytophthora tentaculata* has been isolated from the basal stem and root materials of symptomatic celery plants (Wang et al., 2014). However, this pathogen has a limited distribution in the United Kingdom, and we found no evidence that this species occurs on celery in the UK, so the pest prevalence on celery is expected to be Low.

Risk Element	**Risk Rating**	**Uncertainty Rating**	**Evidence for rating (and other notes as necessary)**
Likelihood of surviving post-harvest processing before shipment	Low	Low	Severe symptoms of *P. tentaculata* infection are visible at two weeks post-infection (Rooney-Latham et al., 2015a). Plants shipped out earlier than two weeks may not easily exhibit symptoms during inspection.
Likelihood of surviving transport and storage conditions of the consignment	Low	N/A	We did not consider any specific transport or storage conditions as part of this assessment. Therefore, we did not change the rating.
Likelihood of Entry	Low	Low	

The likelihood of establishment of *Phytophthora tentaculata* into the endangered area via celery plants imported from the United Kingdom

Risk Element	**Risk Rating**	**Uncertainty Rating**	**Evidence for rating (and other notes as necessary)**
Likelihood of Establishment	Low	Low	Celery and ornamental hosts of *P. tentaculata* are produced and sold across the United States (Orton and Arus, 1982;NASS, 2017). In the western United States, hosts are present in natural systems (NRCS, 2022). Like other *Phytophthora* spp., *P. tentaculata* spreads by water-borne spores and can spread quickly between nursery plants (Rooney-Latham et al., 2015a; Rooney-Latham et al., 2015b). Once nursery plants are sold and planted outdoors, the pathogen may spread into natural systems. Infested stock persists for years in natural systems and serves as a constant source of inoculum (Rooney-Latham et al., 2015a). However, commodity for consumption that reach the endangered area are likely to be consumed or, if disposed, would go to a commercial landfill. Therefore, commodity for consumption poses a low risk for the introduction of pests into new areas (Gordh and McKirdy, 2014).
Overall Likelihood of Establishment	Low		

The likelihood of introduction (combined likelihoods of entry and establishment) of *Phytophthora tentaculata* into the endangered area via celery plants imported from the United Kingdom is low.

3.2.4 *Ditylenchus dipsaci* (Tylenchida: Anguinidae)

Ditylenchus dipsaci is an endoparasitic nematode and can spread through above ground stems. It feeds on roots, stems, leaves, and bulbs, causing leaf swelling and collapsing and bulb soft rot, often accompanied by rotting because of secondary invasion by bacteria and fungi (Schwartz and Mohan, 1995). This nematode is widely present in the continental United States (CABI, 2022; WPNUS, 2020). However, regulatory action is taken if found on imported commodities destined for Hawaii, Puerto Rico, and other U.S. territories (ARM, 2022). This nematode is carried by seeds and bulbs, and dispersed by wind, water and implements (Sturhan and Brzeski., 1991).

Endangered Area for *Ditylenchus dipsaci* within the PRA area

Climatic suitability: *Ditylenchus dipsaci* is present in **Africa**: Algeria, Kenya, Morocco, Nigeria, Réunion, South Africa, Tunisia; **Asia**: Armenia, Azerbaijan, China (Gansu, Hebei, Henan, Shandong, Sichuan, Xinjiang), Georgia, Iran, Iraq Israel, Japan, Jordan, Kazakhstan, Kyrgyzstan, Oman, Pakistan, South Korea, Syria, Turkey, Uzbekistan, Yemen; **Europe**: Albania, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, Malta, Moldova, Netherlands, North Macedonia, Norway, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom (England, Scotland, Wales), **North America**: Canada, Costa Rica, Dominican Republic, Haiti, Mexico, United States; **Oceania**: Australia, New Zealand; **South America**: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela (CABI, 2022).

These areas fall within Plant Hardiness Zones 1 through 13 (Takeuchi et al., 2018). Hawaii, Puerto Rico, and the U. S. Virgin Islands are within these zones.

Hosts in PRA area:
Ditylenchus dipsaci has a wide host range and can infest over 450 plant species, including **Apiaceae**: *Apium graveolens* (celery), **Fabaceae**: *Medicago sativa* (alfalfa), *Phaseolus* spp. (bean); **Liliaceae**: *Allium* spp. (chives, garlic, and onion); **Poaceae**: *Zea mays* (corn); and **Solanaceae**: *Nicotiana tabacum* (tobacco) (CABI, 2022; NRCS, 2022).

Economically important hosts at risk[a]: Economically important hosts in the endangered area include alfalfa, corn, onion and celery.

Potential consequences on economically important hosts at risk: *Ditylenchus dipsaci* parasitism causes swelling and distortion in the aerial parts of host plants and necrosis, or rotting of stem bases, bulbs, tubers, and rhizomes (CABI, 2022). It causes severe damage in celery crops i.e., distortion of the petioles and swelling and/or blister-like areas of the epidermis (Vovlas et al., 1993).

<u>*Endangered area:*</u> The area endangered by *D. dipsaci* includes any locations in Hawaii, Puerto Rico, and other U.S. territories where hosts occur, as these regions are within Plant Hardiness Zones 9-13.

The likelihood of entry of *Ditylenchus dipsaci* into the endangered area via celery plants imported from the United Kingdom

Risk Element	Risk Rating	Uncertainty Rating	Evidence for rating (and other notes as necessary)
Pest prevalence on the harvested commodity	Medium	Low	*Ditylenchus dipsaci* causes damage to celery (Greco, 1993). This pest is widespread in UK (CABI, 2022).
Likelihood of surviving post-harvest processing before shipment	Medium	Low	Celery plant affected by *D. dipsaci* are likely to be detected and culled at harvest or in the packinghouse. A fraction of infected plant parts may be asymptomatic and go undetected.
Likelihood of surviving transport and storage conditions of the consignment	Medium	N/A	*Ditylenchus dipsaci* can survive in near or below freezing temperatures (Schwartz and Mohan, 1995) and can continue to develop, reproduce, and damage the plants during storage (Turini et al., 2020). Transport and storage conditions were not considered in the pest risk analysis; therefore, the rating remains unchanged.
Likelihood of Entry	Medium	Low	

The likelihood of establishment of *Ditylenchus dipsaci* into the endangered area via celery plants imported from the United Kingdom

Risk Element	Risk Rating	Uncertainty Rating	Evidence for rating (and other notes as necessary)
Likelihood of Establishment	Low	Low	*D. dipsaci* can spread through infested soil, water, equipment, or plant material (Schwartz and Mohan, 1995). Due to the large host range of *D. dipsaci*, hosts are readily available in most areas. However, commodity for consumption that reach the endangered area are likely to be consumed or, if disposed, would go to a commercial landfill. Therefore, commodity for consumption poses a low risk for the introduction of pests into new areas (Gordh and McKirdy, 2014).
Overall Likelihood of Establishment	Low		

The likelihood of introduction (combined likelihoods of entry and establishment) of *Ditylenchus dipsaci* into the endangered area via celery plants imported from the United Kingdom is Low.

4. Summary

The following pests are considered quarantine significant for the United States. The pests have a reasonable likelihood of following the commodity pathway and would likely cause unacceptable consequences if introduced into the PRA area (Table 3). Thus, the pests are candidates for risk management.

Table 3. Summary of quarantine pests that are candidates for risk management

Pest type	Scientific name	Likelihood of Introduction	Notes
Arthropod	*Euleia heraclei* (L.)	Low	
Nematode	*Ditylenchus dipsaci* (Kuehn) Filipjev	Medium	
Chromista	*Phytophthora tentaculata* Kröber & Marwitz	Low	
Fungus	*Alternaria burnsii* Uppal, Patel & Kamat	Low	

Our assessment of risk is contingent on the application of all components of the pathway as described in section 1.4. The detailed examination and choice of appropriate phytosanitary measures to mitigate pest risk are addressed in a separate document.

5. Literature Cited

7 CFR § 319.56. U.S. Code of Federal Regulations, Title 7, Part 319.56 (7 CFR § 319.56 Subpart L). eCFR :: 7 CFR Part 319 Subpart L -- Fruits and Vegetables.

IPPC. 2021. International Standards for Phytosanitary Measures, Publication No. 11: Pest Risk Analysis for Quarantine Pests. Food and Agriculture Organization of the United Nations, Secretariat of the International Plant Protection Convention (IPPC), Rome, Italy. 36 pp.

IPPC. 2022. International Standards for Phytosanitary Measures, Publication No. 5: Glossary of Phytosanitary Terms. Food and Agriculture Organization of the United Nations, Secretariat of the International Plant Protection Convention (IPPC), Rome, Italy. 35 pp.

7 CFR § 319.56-2t. 2007. U.S. Code of Federal Regulations, Title 7, Part 319 (7 CFR § 319.56-2t - Administrative instructions: Conditions governing the entry of certain fruits and vegetables).

Abdalla, O., and A. Ali. 2012. First report of *Alfalfa mosaic virus* associated with severe mosaic and mottling of pepper (*Capsicum annuum*) and white clover (*Trifolium repens*) in Oklahoma. Plant Disease 96(11):1705-1705.

Aboughanem-Sabanadzovic, N., T. W. Allen, M. Broome, A. Lawrence, W. F. Moore, and S. Sabanadzovic. 2014. First report of kudzu (*Pueraria montana*) infections by *Tobacco ringspot virus* in Mississippi. Plant Disease 98(12):1746-1747.

Alfieri, S. A., C. Wehlburg, K. R. Langdon, and J. W. Kimbrough. 1984. Index of Plant Diseases in Florida (Bulletin 11). Florida Deparment of Agriculture & Consumer Services, Gainesville, FL. 389 pp.

Alford, D., P. Carden, E. Dennis, H. Gould, and J. Vernon. 1979. Monitoring codling and tortrix moths in United Kingdom apple orchards using pheromone traps. Annals of Applied Biology 91(2):165-178.

Anderson, N., and C. Morgan. 1958. Life-histories and habits of the clover mite, *Bryobia praetiosa* Koch, and the brown mite, *B. arborea* M. & A., in British Columbia (Acarina: Tetranychidae). The Canadian Entomologist 90(1):23-42.

Anon. n.d. Plant-feeding nematodes known to be associated with: celery - *Apium graveolens*. University of California. http://plpnemweb.ucdavis.edu/nemaplex/hostlists/celeryhostlist.htm.

ARM. 2022. Agricultural Risk Management (ARM) System. United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine. https://arm.aphis.edc.usda.gov/.

Baker, E., R. D. Dransfield, and R. Brightwell. 2022. Current British Aphid Checklist. Last accessed 12/12/2022, https://influentialpoints.com/aphid/Checklist_of_aphids_in_Britain.htm.

Barker, A. D. P., and D. J. Hooper. 1995. The first record of the root-endoparasitic nematode *Zygotylenchus guevarai* in Britain. Annals of Applied Biology 126(3):571-574.

Basso, M. F., T. V. M. Fajardo, and P. Saldarelli. 2017. Grapevine virus diseases: economic impact and current advances in viral prospection and management. Revista Brasileira de Fruticultura 39.

Beal, L., I. Waghorn, J. Scrace, and B. Henricot. 2018. First report of *Phytophthora tentaculata* affecting Santolina in the UK. New Disease Reports 37:8-8.

Blackman, R. L., and V. F. Eastop. 2000. Aphids on the World's Crops: An Identification and Information Guide (2nd ed.). John Wiley & Sons, Ltd., New York. 466 pp.

BONAP. 2022. BONAP's Taxonomic Data Center (TDC): North American Vascular Flora (http://bonap.net/tdc).

Borth, W., R. Hamasaki, D. Ogata, S. Fukuda, and J. Hu. 2002. First report of phytoplasmas infecting watercress in Hawaii. Plant Disease 86(3):331-331.

Bowden, J., J. Cochrane, B. Emmett, T. Minall, and P. Sherlock. 1983. A survey of cutworm attacks in England and Wales, and a descriptive population model for *Agrotis segetum* (Lepidoptera: Noctuidae). Annals of Applied Biology 102(1):29-47.

Brinkman, H., J. J. M. Goossens, and H. R. Van Riel. 1996. Comparative host suitability of selected crop plants to *Meloidogyne chitwoodi* Golden et al. 1980 and *M. fallax* Karssen 1996. Anzeiger für Schädlingskunde, Pflanzenschutz, Umweltschutz 69(6):127-129.

Brown, D. J. F., and A. F. Murant. 1989. Differences between isolates of the English serotype of tomato black ring virus in their transmissibility by an English population of *Longidorus attenuatus* (Nematoda : Dorylaimoidea). Revue de Nématologie 12(1):51-56.

Brunt, A. A., K. Crabtree, M. J. Dallwitz, A. J. Gibbs, L. Watson, and E. J. Zurcher. 1996a. Plant Viruses Online: Descriptions and Lists from the VIDE Database. Grapevine Chrome Mosaic Nepovirus.

Brunt, A. A., K. Crabtree, M. J. Dallwitz, A. J. Gibbs, L. Watson, and E. J. Zurcher. 1996b. Plant Viruses Online: Descriptions and Lists from the VIDE Database. Strawberry Latent Ringspot (?) Nepovirus.

Brunt, A. A., K. Crabtree, M. J. Dallwitz, A. J. Gibbs, L. Watson, and E. J. Zurcher. 1996c. Plant Viruses Online: Descriptions and Lists from the VIDE Database. Tobacco ringspot nepovirus.

Brunt, A. A., K. Crabtree, M. J. Dallwitz, A. J. Gibbs, L. Watson, and E. J. Zurcher. 1996d. Plant Viruses Online: Descriptions and Lists from the VIDE Database. Tomato Black Ring Nepovirus.

Büchen-Osmond, C. 2006. The Universal Virus Database ICTVdB: Strawberry latent ringspot virus. International Committee on Taxonomy of Viruses.

Byamukama, E., C. Tande, J. Olson, L. Hesler, K. Grady, T. Nleya, and F. Mathew. 2016. First detection of aster yellows associated with Phytoplasma on *Camelina sativa* in South Dakota. Plant Disease 100(12):2523-2523.

CABI. 2022. Crop Protection Compendium. Commonwealth Agricultural Bureau International (CABI). https://www.cabi.org/cpc/.

Calvert, E. L. H. B. D. 1963. Outbreaks of *Tomato black ring virus* in onion and leek crops in Northern Ireland. Horticultural Research 2:115-120.

Camele, I., C. Marcone, and G. Cristinzio. 2005. Detection and identification of *Phytophthora* species in southern Italy by RFLP and sequence analysis of PCR-amplified nuclear ribosomal DNA. European Journal of Plant Pathology 113(1):1-14.

Campbell, C. A. 2019. New and resurgent insect pests on low trellis hops. Agricultural and Forest Entomology 21(2):209-218.

Carreck, N. L., and I. H. Williams. 2002. Food for insect pollinators on farmland: insect visits to flowers of annual seed mixtures. Journal of Insect Conservation 6:13-23.

Carter, D. J. 1984. Pest Lepidoptera of Europe: with special reference to the British Isles. Springer Science & Business Media.

Çelebi-Toprak, F., J. Thompson, K. Perry, and M. Fuchs. 2013. *Arabis mosaic virus* in grapevines in New York State. Plant Disease 97(6):849-849.

Chant, D. 1956. Predacious spiders in orchards in south-eastern England. Journal of Horticultural Science 31(1):35-46.

Charpentier, R., B. Charpentier, and O. Zethner. 1978. The bacterial flora of the midgut of two Danish populations of healthy fifth instar larvae of the turnip moth, *Scotia segetum*. Journal of Invertebrate Pathology 32(1):59-63.

Christenson, L., and R. H. Foote. 1960. Biology of fruit flies. Annual Review of Entomology 5(1):171-192.

Cook, R., K. Mizen, R. Plowright, and P. York. 1992. Observations on the incidence of plant parasitic nematodes in grassland in England and Wales. Grass and Forage Science 47(3):274-279.

Cui, W., A. Zamorano, N. Quiroga, A. Bertaccini, and N. Fiore. 2021. Ribosomal protein coding genes *SSU12p* and *LSU36p* as molecular markers for phytoplasma detection and differentiation. Phytopathologia Mediterranea 60(2):281-292.

Davis, M., and E. Grafius. 1994. First record of *Aphis helianthi* (Homoptera: Aphididae) as a pest of celery. The Great Lakes Entomologist 27(2):2.

DEFRA. 2021. Market access request and prerequisite information for celery to be exported from the United Kingdom to the United States. Department for Environment, Food and Rural Affairs (DEFRA), York, United Kingdom. 11 pp.

den Nijs, L. J. M. F., H. Brinkman, and A. T. C. der Sommen. 2004. A Dutch contribution to knowledge on phytosanitary risk and host status of various crops for *Meloidogyne chitwoodi* Golden et al., 1980 and *M. fallax* Karssen, 1996: an overview. Nematology 6(3):303-312.

Devetak, M., M. Vidrih, and S. Trdan. 2010. Cabbage moth (*Mamestra brassicae* [L.]) and bright-line brown-eyes moth (*Mamestra oleracea* [L.]) - presentation of the species, their monitoring and control measures. Acta Agriculturae Slovenica 95(2):149-156.

Divol, F., F. Vilaine, S. Thibivilliers, J. Amselem, J. C. Palauqui, C. Kusiak, and S. Dinant. 2005. Systemic response to aphid infestation by *Myzus persicae* in the phloem of *Apium graveolens*. Plant Molecular Biology 57(4):517-540.

Dunn, J., and J. Kirkley. 1966. Studies on the aphid, *Cavariella aegopodii* Scop: On secondary hosts other than carrot. Annals of Applied Biology 58(2):213-217.

DVP. 1972. Parsnip mosaic virus. Descriptions of Plant Viruses (DPV); DPV NO: 91 (https://www.dpvweb.net/).

Edwards, F. 1925. A Synopsis of British Bibionidae and Scatopsidae (Diptera). Pages 263-275 *in* W. B. Brierley and D. W. Cutler, (eds.). Annals of Applied Biology. Cambridge University Press.

Ellis, W. 2022. Leafminers and plant galls of Europe. Amsterdam, The Netherlands. Last accessed https://bladmineerders.nl/.

EPPO. 2000. Guidelines on good plant protection practice: Umbelliferous Crops (PP 2/22(1)). European and Mediterranean Plant Protection Organization, Paris. 22 pp.

EPPO. 2013. First report of *Meloidogyne fallax* in the United Kingdom (2013/217). European and Mediterranean Plant Protection Organization.

EPPO. 2017. Pest Risk Analysis for *Meloidogyne mali*, apple root-knot nematode. European and Mediterranean Plant Protection Organization Organisation (EPPO).

EPPO. 2022. European and Mediterranean Plant Protection Organization (EPPO) Global Database. EPPO. https://gd.eppo.int/.

Erwin, D. C., and O. K. Ribeiro. 1996. *Phytophthora* Diseases Worldwide. The American Phytopathological Society, St. Paul, MN. 562 pp.

Esbjerg, P. 2003. Cutworm (*Agrotis segetum*) forecasting: Two decades of scientific and practical development in Denmark. IOBC/WPRS Bulletin 26(3):239-244.

Esbjerg, P., and A. J. Lauritzen. 2010. Oviposition response of the Turnip moth to soil moisture. Acta Agriculturae Scandinavica Section B–Soil and Plant Science 60(1):89-94.

Esbjerg, P., and L. Sigsgaard. 2014. Phenology and pest status of *Agrotis segetum* in a changing climate. Crop Protection 62:64-71.

Esbjerg, P., and L. Sigsgaard. 2019. Temperature dependent growth and mortality of *Agrotis segetum*. Insects 10(1):7.

Eschen, R., S. Hunt, C. Mykura, A. C. Gange, and B. C. Sutton. 2010. The foliar endophytic fungal community composition in *Cirsium arvense* is affected by mycorrhizal colonization and soil nutrient content. Fungal Biology 114(11-12):991-998.

Farr, D. F., and A. Y. Rossman. 2022. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. *in*. https://nt.ars-grin.gov/fungaldatabases/.

Fauna Europaea Secretariat. 2021. *Euleia heraclei* (Linnaeus, 1758) | Fauna Europaea (fauna-eu.org). Museum für Naturkunde Leibniz-Institut für Evolutions- und Biodiversitätsforschung. https://fauna-eu.org/.

Fayle, T. M., R. E. Sharp, and M. E. N. Majerus. 2007. The effect of moth trap type on catch size and Composition in British lepidoptera. British Journal of Entomology and Natural History 20:221-232.

Ferriol, I., S. Ruiz-Ruiz, and L. Rubio. 2011. Detection and absolute quantitation of *Broad bean wilt virus* 1 (BBWV-1) and BBWV-2 by real time RT-PCR. Journal of virological methods 177(2):202-205.

Ferris, H. 2012. Nemaplex: *Xiphinema diversicaudatum*. University of California.

Fletcher, J. 1983. New plant disease records in New Zealand: Additional hosts of *Alfalfa mosaic virus*. New Zealand Journal of Agricultural Research 26(3):403-404.

Fránová, J., and J. Špak. 2013. First Report of a 16SrI-C Phytoplasma infecting celery (*Apium graveolens*) with stunting, bushy top and phyllody in the Czech Republic. Journal of Phytopathology 161(9):666-670.

French, A. M. 1989. California Plant Disease Host Index. California Department of Food and Agriculture, Division of Plant Industry, Sacramento, CA. 394 pp.

Furk, C., and S. Vedjhi. 1990. Organophosphorus resistance in *Aphis gossypii* (Hemiptera: Aphididae) on chrysanthemum in the UK. Annals of Applied Biology 116(3):557-561.

García-Morales, M., B. D. Denno, D. R. Miller, D. L. Miller, Y. Ben-Dov, and N. B. Hardy. 2016. ScaleNet: A literature-based model of scale insect biology and systematics. http://scalenet.info.

Garibaldi, A., G. Gilardi, and M. Gullino. 2010. First report of collar and root rot caused by *Phytophthora tentaculata* on witloof chicory (*Cichorium intybus*) in Italy. Plant Disease 94(12):1504-1504.

Gil Ortiz, R. 2009. Biosystematic contributions to Agromyzidae (Diptera), Universidad Politecnica de Valencia.

Gillespie, D., J. Shipp, D. Raworth, and R. Foottit. 2001. *Aphis gossypii* Glover, melon/cotton aphid, *Aulacorthum solani* (Kaltenbach), foxglove aphid, *Macrosiphum euphorbiae* (Thomas), potato aphid, and *Myzus persicae* (Sulzer), green peach aphid (Homoptera:

Aphididae). Pages 44-49 Biological Control Programmes in Canada, 1981-2000. CABI Publishing Wallingford UK.

Ginns, J. H. 1986. Compendium of Plant Disease and Decay Fungi in Canada, 1960-1980. Canadian Government Publishing Centre.

Girard, P., and S. Fischer. 2018. Biologie et gestion de la mouche du céleri en production de livèche. Revue Suisse de Viticulture, Arboriculture et Horticulture 50(6):332-343.

Godfrey, L., and W. Chaney. 1995. Temporal and spatial distribution patterns of aphids (Homoptera: Aphididae) on celery. Journal of Economic Entomology 88(2):294-301.

Goff, M. L. 1986. Spider mites (Acari: Tetranychidae) in the Hawaiian islands. International Journal of Acarology 12(1):43-49.

Gordh, G., and S. McKirdy (eds.). 2014. The Handbook of Plant Biosecurity: Principles and practices for the identification, containment and control of organisms that threaten agriculture and the environment globally. Springer. 723 pp.

Goss, E. M., M. Kreitman, and J. Bergelson. 2005. Genetic diversity, recombination and cryptic clades in *Pseudomonas viridiflava* infecting natural populations of *Arabidopsis thaliana*. Genetics 169(1):21-35.

Greco, N. 1993. Reviews: epidemiology and management of *Ditylenchus dipsaci* on vegetable crops in Southern Italy. Nematropica:247-251.

Groenewald, M., J. Z. Groenewald, U. Braun, and P. W. Crous. 2006. Host range of *Cercospora apii* and *C. beticola* and description of *C. apiicola*, a novel species from celery. Mycologia 98(2):275-285.

Guerber, J. C., B. Liu, J. C. Correll, and P. R. Johnston. 2003. Characterization of diversity in *Colletotrichum acutatum* sensu lato by sequence analysis of two gene introns, mtDNA and intron RFLPs, and mating compatibility. Mycologia 95(5):872-895.

Halbert, S. E., G. Remaudière, and S. E. Webb. 2000. Newly established and rarely collected aphids (Homoptera: Aphididae) in Florida and the southeastern United States. Florida Entomologist:79-91.

Hall, D. H. 1950. An etiological and host range study of celery mosaic in Utah.

Harris, K. 1973. Aphidophagous Cecidomyiidae (Diptera): taxonomy, biology and assessments of field populations. Bulletin of Entomological Research 63(2):305-325.

Harrison, N., D. Legard, R. DiBonito, and P. Richardson. 1997. Detection and differentiation of phytoplasmas associated with diseases of strawberry in Florida. Plant disease 81(2):230-230.

Hayder, B., B. K. Agarwala, and I. K. Kaddou. 2012. New records of aphids of the Subfamily Aphidinae (Homoptera: Aphididae) infested herbaceous plants and shrubs for Iraqi aphid fauna. Advances in Bioresearch 3(4):66-75.

Hill, D. S. 1983. Agricultural Insect Pests of the Tropics and Their Control (2nd ed.). Cambridge University Press, New York. 746 pp.

Hill, D. S. 1987. Agricultural Insect Pests of Temperate Regions and Their Control. Cambridge University Press, Cambridge, MA. 659 pp.

Htun, A. A., H. F. Liu, L. He, Z. Z. Xia, S. L. L. Aung, and J. X. Deng. 2022. New species and new record of *Alternaria* from onion leaf blight in Myanmar. Mycological Progress 21(1):59-69.

Huisman, K. 2012. The micro moth genus *Agonopterix* in the Netherlands (Lepidoptera: Elachistidae: Depressariinae). Nederlandse Faunistische Mededelingen 37:45-104.

Hull, R. 1968. Virus diseases of garden lupin in Great Britain. Annals of Applied Biology 61(3):373-380.

Iosob, G.-A., and T. O. Cristea. 2021. Observations regarding the celery fly (*Euleia heraclei* L.) in lovage (*Levisticum officinale* Wdj Koch) culture from vegetable research and development station Bacau. Biologie 30(2):54-59.

IPPC. 2017. International Standards For Phytosanitary Measures, Publication No. 11: Pest Risk Analysis for Quarantine Pests. Food and Agriculture Organization of the United Nations, Secretariat of the International Plant Protection Convention (IPPC), Rome, Italy. 40 pp.

Jakob, K., E. M. Goss, H. Araki, T. Van, M. Kreitman, and J. Bergelson. 2002. *Pseudomonas viridiflava* and *P. syringae*—natural pathogens of *Arabidopsis thaliana*. Molecular Plant-Microbe Interactions 15(12):1195-1203.

Janke, R., and J. DeArmond. 2004. A grower's guide oregano (MF-2621). Kansas State University, Manhattan, KS. 4 pp.

Jones, D., and J. Granett. 1982. Feeding site preferences of seven lepidopteran pests of celery. Journal of Economic Entomology 75(3):449-453.

Kaiser, W. J. 1981. Diseases of chickpea, lentil, pigeon pea, and tepary bean in continental United States and Puerto Rico. Economic Botany 35(3):300-320.

Knowlton, G., and M. Palmer. 1952. Celery field aphids in Utah. Journal of the Kansas Entomological Society 25(2):69-71.

Krieger, D. 1971. Rearing several aphid species on synthetic diet. Annals of the Entomological Society of America 64(5):1176-1177.

Krivosheina, M., and N. Ozerova. 2016. To the biology of celery fly *Euleia heraclei* (Linnaeus, 1758)(Diptera: Tephritidae)-pest of alien Apiaceae species in Moscow Region. Russian Entomological Journal 25(2):209-213.

Kröber, H., and R. Marwitz. 1993. *Phytophthora tentaculata* sp. nov. und *Phytophthora cinnamomi* var. *parvispora* var. nov., zwei neue Pilze von Zierpflanzen in Deutschland (*Phytophthora tentaculata* sp. nov. and *Phytophthora cinnamoml* var. *parvispora* var. nov., two new fungi from ornamental plants in Germany). Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz/Journal of Plant Diseases and Protection:250-258.

Lazicki, P., D. Geisseler, and W. R. Horwath. 2016. Celery Production in California. The California Department of Food and Agriculture Fertilizer Research and Education Program. 3 pp.

Lee, I.-M., D. Gundersen-Rindal, R. Davis, K. Bottner, C. Marcone, and E. Seemüller. 2004. '*Candidatus* Phytoplasma asteris', a novel phytoplasma taxon associated with aster yellows and related diseases. International Journal of Systematic and Evolutionary Microbiology 54(4):1037-1048.

Lenne, J. M. 1990. A World List of Fungal Diseases of Tropical Pasture Species (Phytopathological Paper No. 31). International Mycological Institute, Centro Internacional de Agricultura Tropical, Wallingford, UK. 162 pp.

Leroi, B. 1973. A study of natural populations of the celery leaf-miner, *Philophylla heraclei* L.(Diptera, Tephritidae) II. Importance of changes of mines for larval populations. Researches on Population Ecology 15(1):163-182.

Li, M., T. Asano, H. Suga, and K. Kageyama. 2011. A multiplex PCR for the detection of *Phytophthora nicotianae* and *P. cactorum*, and a survey of their occurrence in strawberry production areas of Japan. Plant Disease 95(10):1270-1278.

Lockhart, B. 2006. Occurrence of *Arabis mosaic virus* in hostas in the United States. Plant Disease 90(6):834-834.

Lowe, A. 1968. Alate aphids trapped over 8 years at two sites in Canterbury, New Zealand. New Zealand Journal of Agricultural Research 11(4):829-848.

Malhotra, S. 2006. Celery. Pages 317-336 Handbook of herbs and spices. Elsevier.

Marić, I., D. Marčić, R. Petanović, and P. Auger. 2017. Biodiversity of spider mites (Acari: Tetranychidae) in Serbia: a review, new records and key to all known species. Acarologia 58(1):3-14.

Martelli, G. P., and A. Quacquarelli. 2003. Descriptions of Plant Viruses: *Grapevine chrome mosaic virus*. Rothamsted Research.

Martin, R., I. Tzanetakis, J. Barnes, and J. Elmhirst. 2004. First report of *Strawberry latent ringspot virus* in strawberry in the United States and Canada. Plant Disease 88(5):575-575.

Martini, P., A. Pane, F. Raudino, A. Chimento, S. Scibetta, and S. Cacciola. 2009. First report of *Phytophthora tentaculata* causing root and stem rot of oregano in Italy. Plant Disease 93(8):843-843.

Matić, S., G. Gilardi, M. Varveri, A. Garibaldi, and M. L. Gullino. 2019. Molecular diversity of *Alternaria* spp. from leafy vegetable crops, and their sensitivity to azoxystrobin and boscalid. Phytopathologia Mediterranea 58(3):519-533.

Meade, T., and D. J. Hare. 1995. Integration of host plant resistance and *Bacillus thuringiensis* insecticides in the management of lepidopterous pests of celery. Journal of Economic Entomology 88(6):1787-1794.

Miller, G. L., A. S. Jensen, C. Favret, M. A. Metz, and R. R. Parmenter. 2016. The first report of the aphids (Hemiptera: Sternorrhyncha: Aphididae) of the Valles Caldera National Preserve, New Mexico, USA. Proceedings of the Entomological Society of Washington 118(2):289-296.

Moralejo, E., and M. Puig. 2004. First report of *Phytophthora tentaculata* on *Verbena* sp. in Spain. Plant Pathology 53:806.

Moslemi, A., P. K. Ades, T. Groom, P. W. Crous, M. E. Nicolas, and P. W. Taylor. 2016. Paraphoma crown rot of pyrethrum (*Tanacetum cinerariifolium*). Plant Disease 100(12):2363-2369.

Mossop, D. W., P. R. Fry, and B. R. Young. 1983. New plant disease records in New Zealand: *Arabis mosaic virus* in celery, lettuce, and Chinese cabbage; *Tomato spotted wilt virus* in celery. New Zealand Journal of Agricultural Research 26(2):257-259.

Musyarofah, A., and S. Indarti. 2020. Host range of stem and bulb rot parasite nematode (*Ditylenchus dipsaci*). Pages 137-141 *in* Key Engineering Materials. Trans Tech Publications

NASS. 2017. National Agricultural Statistics Service. Agricultural Statistics 2018. Washington, D.C.: U.S. Government Printing Office.

Newhall, A. 1953. Blights and other ills of celery. Plant Diseases, theyear book ofagriculture:408-417.

NRCS. 2022. PLANTS Database. United States Department of Agriculture, Natural Resources Conservation Service. https://plants.sc.egov.usda.gov/java/nameSearch.

Orton, T., and P. Arus. 1982. Genetic studies of populations of wild celery (*Apium graveolens* L.) in California. Annals of Botany 49(4):461-468.

Özer, G., and H. Bayraktar. 2015. Determination of fungal pathogens associated with *Cuminum cyminum* in Turkey. Plant Protection Science 51(2):74-79.

Palumbo, J. C. 2003. The emergence of the foxglove aphid, *Aulacorthum solani*, as an economic pest of lettuce in the desert Southwest.

Patel, J. S., and S. Zhang. 2017. First report of Alternaria blight of pitahaya (*Hylocereus undatus*) caused by *Alternaria* sp. in South Florida of the United States. Plant Disease 101(6):1046-1046.

Pemberton, A., and R. Frost. 1974. *Celery mosaic virus* in England. Plant Pathology 23(1):20-24.

PERAL. 2018. Pest Categorization: *Nepovirus Strawberry latent ringspot virus* (SLRSV or SLRV); Picornovirales: Secoviridae. United States Department of Agricultrue, Plant Epidemiology and Risk Analysis Laboratory, Raleigh, NC.

Pérez Sierra, A. M., B. Mora Sala, M. León Santana, J. García Jiménez, and P. Abad Campos. 2012. Enfermedades causadas por *Phytophthora* en viveros de plantas ornamentales. Boletin de Sanidad Vegetal: Plagas 38(1):143-156.

Pitkin, B., W. Ellis, C. Plant, and R. Edmunds. 2019. The leaf and stem miners of British flies and other insects. Last accessed 12/16/2022, http://www.ukflymines.co.uk/index.php.

Pollok, J., M. Mansfield, B. Gugino, and S. May. 2012. First report of leaf curl on celery caused by *Colletotrichum acutatum* in the United States. Plant Disease 96(11):1692-1692.

Prior, T., H. Tozer, R. Yale, E. P. Jones, R. Lawson, and L. Jutson. 2019. First report of *Meloidogyne mali* causing root galling to elm trees in the UK. New Disease Reports 39:10.

Pscheidt, J. W., and C. M. Ocamb. 2022. Iris, bulbous and rhizomatous (*Iris* spp.)-viruses. Pacific Northwest Plant Disease Management Handbook, Oregon State University. Last accessed October 5, 2022, https://pnwhandbooks.org/node/2933.

Putnam, M. L., and M. L. Miller. 2007. *Rhodococcus fascians* in herbaceous perennials. Plant Disease 91(9):1064-1076.

Raabe, R. D., I. L. Conners, and A. P. Martinez. 1981. Checklist of Plant Diseases in Hawaii including Records of Microorganisms, Principally Fungi, Found in the State, Manoa, Hawaii. 319 pp.

Reitz, S. R., G. S. Kund, W. G. Carson, P. A. Phillips, and J. T. Trumble. 1999. Economics of reducing insecticide use on celery through low-input pest management strategies. Agriculture, ecosystems & environment 73(3):185-197.

RHS. 2022. Celery leaf mining fly. Royal Horticultural Society (RHS), London, UK. Last accessed

Richardson, M. J. 1979. An Annotated List of Seed-Borne Diseases: Phytopathological Papers, Commonwealth Mycological Institute, No.23 pp.320 pp.

Rooney-Latham, S., and C. Blomquist. 2014. First report of root and stem rot caused by *Phytophthora tentaculata* on *Mimulus aurantiacus* in North America. Plant Disease 98(7):996-996.

Rooney-Latham, S., C. Blomquist, K. Kosta, Y. Gou, and P. Woods. 2019. *Phytophthora* species are common on nursery stock grown for restoration and revegetation purposes in California. Plant Disease 103(3):448-455.

Rooney-Latham, S., C. Blomquist, T. Swiecki, and E. Bernhardt. 2015a. *Phytophthora tentaculata*. Forest Phytophthoras 5(1):1-8.

Rooney-Latham, S., C. L. Blomquist, T. Swiecki, E. Bernhardt, and S. J. Frankel. 2015b. First detection in the US: New plant pathogen, *Phytophthora tentaculata,* in native plant nurseries and restoration sites in California. Native Plants Journal 16(1):23-27.

Ruiz, J. J., B. Pico, G. Li, V. D'Antonio, B. Falk, and C. F. Quiros. 2001. Identification of markers linked to a celery mosaic virus resistance gene in celery. Journal of the American Society for Horticultural Science 126(4):432-435.

Salgado-Herrera, M. 2017. Characterization of Bacteria Community and Evaluation of Anthropogenic and Natural Disturbances in Surface Waters Quality of Sabana River in the Luquillo Experimental Forest in Puerto Rico, Universidad del Turabo (Puerto Rico).

Schwartz, H. F., and S. K. Mohan. 1995. Compendium of Onion and Garlic Diseases. APS Press, Saint Paul, Minnesota. 54 pp. .

Serdani, M., M. Curtis, M. L. Miller, J. Kraus, and M. L. Putnam. 2013. Loop-mediated isothermal amplification and polymerase chain reaction methods for specific and rapid detection of *Rhodococcus fascians*. Plant Disease 97(4):517-529.

Shaw, C. G. 1973. Host Fungus Index for the Pacific Northwest--I. Hosts (Bulletin 756). Washington Agricultural Experiment Station, Pullman, WA. 121 pp.

Shcherbakov, M. V. 2020. A review of leaf-miner tephritid flies (Diptera, Tephritidae) of the south-eastern part of West Siberia, Russia. Acta Biologica Sibirica 6:637.

Sivell, O., and D. Sivell. 2021. The genome sequence of the St Mark's fly, *Bibio marci* (Linnaeus, 1758). Wellcome Open Research 6.

Smith, K. 1949. A new virus disease of *Tropaeolum* and other plants. Gardeners' Chronicle 125.

Song, J., Y. Wang, Y. Shi, and B. Li. 2015. Dr. Baoju Li's notes on diagnosis (85): Identification and control of celery *Alternaria* leaf spot (in Chinese). China Vegetables (8):68-69.

Stace-Smith, R. n. d. Descriptions of Plant Viruses: *Tobacco ringspot Virus*. Rothamsted Research.

Stevenson, J. A. 1975. The Fungi of Puerto Rico and the American Virgin Islands. Reed Herbarium, Baltimore, MD. 743 pp.

Sturhan, D., and M. W. Brzeski. 1991. Stem and Bulb Nematodes, *Ditylenchus* spp. Pages 423-462 in W. R. Nickle, (ed.). Manual of Agricultural Nematology. CRC Press, Boca Raton, FL.

Szwejda, J. H. 2022. Butterfly pests (Lepidoptera) occurring on vegetable crops in Poland. Journal of Horticultural Research 30(2):20.

Takeuchi, Y., G. Fowler, and A. S. Joseph. 2018. SAFARIS: Global Plant Hardiness Zone Development. North Carolina State University, Center for Integrated Pest Management; United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Science and Technology, Plant Epidemiology and Risk Analysis Laboratory. https://safaris-test.cipm.info/testsafarispestmodel/StartupServlet?phz.

Turini, T. A., S. K. Dara, J. O. Becker, R. F. Smith, C. L. Swett, B. J. Aegerter, R. M. Davis, S. A. Fennimore, E. T. Natwick, S. B. Orloff, A. I. Putman, B. B. Westerdahl, and W. R. G. 2020. UC IPM Pest Management Guidelines: Onion and Garlic (UC ANR Publication 3453). University of California, Agriculture and Natural Resources (UC ANR), Richmond, CA.

Turner, G. J. 1971. Fungi and Plant Disease in Sarawak. Phytopathological Papers 13:1-55.

USDA-ARS. 1960. Index of Plant Diseases in the United States. USDA Agriculture Handbook No. 165.

Vaghefi, N., J. R. Kikkert, F. S. Hay, G. D. Carver, L. B. Koenick, M. D. Bolton, L. E. Hanson, G. A. Secor, and S. J. Pethybridge. 2018. Cryptic diversity, pathogenicity, and evolutionary species boundaries in *Cercospora* populations associated with Cercospora leaf spot of *Beta vulgaris*. Fungal Biology 122(4):264-282.

Vovlas, N., R. Inserra, and F. Lamberti. 1976. Osservazioni sull'epidemiologia e sulla patogenicità di Zygotylenchus guevarai (Tobar) Braun et Loof. Nematologia mediterranea.

Vovlas, N., V. Melillo, and L. Catalano. 1993. *Ditylenchus dipsaci,* causal agent of severe damage in celery crops in apulia (southern Italy). Nematologia Mediterranea:55-57.

Walkey, D. G. A. 1967. Chlorotic stunt of lettuce caused by *Arabis mosaic virus*. Plant Pathology 16(1):20-22.

Wang, S., and Z. Pu. 1993. Identification of celery staple viruses in Nanjing (in Chinese). Acta Agriculturae Shanghai 9(3):76-82.

Wang, T., W. Zhao, and R.-D. Qi. 2014. First report of *Phytophthora tentaculata* causing stem and root rot on celery in China. Plant Disease 98(3):421-421.

Watson, A. J. 1971. Foreign Bacterial and Fungus Diseases of Food, Forage, and Fiber Crops: An Annotated List (Agriculture Handbook No. 418). United States Department of Agriculture, Agricultural Research Service, Washington, DC. 111 pp.

Webb, S. 2006. Insect management for celery and parsley. Department of Entomology and Nematology Document ENY-463, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville.

Wetzel, T., M. Fuchs, M. Bobko, and G. Krczal. 2002. Size and sequence variability of the *Arabis mosaic virus* protein 2A. Archives of Virology 147(8):1643-1653.

Williams, M. A. J. 1987. CMI Descriptions of Pathogenic Fungi and Bacteria, No. 932; *Acremonium apii*. CAB International 94.

Woudenberg, J., M. Seidl, J. Groenewald, M. De Vries, J. Stielow, B. Thomma, and P. Crous. 2015a. Alternaria section *Alternaria:* Species, formae speciales or pathotypes? Studies in mycology 82:1-21.

Woudenberg, J., N. Van Der Merwe, Ž. Jurjević, J. Z. Groenewald, and P. W. Crous. 2015b. Diversity and movement of indoor *Alternaria alternata* across the mainland USA. Fungal Genetics and Biology 81:62-72.

WPBUS. 2021. Widely Prevalent Bacteria of the United States. Center for Invasive Species and Ecosystem Health, University of Georgia, Georgia, USA. https://www.prevalentbacteria.org/index.html.

WPNUS. 2020. Widely prevalent nematodes of the United States. Center for Invasive Species and Ecosystem Health, University of Georgia. https://www.prevalentnematodes.org/. .

Xiao, C.-L., and S. Saito. 2016. Prevalence and incidence of postharvest diseases of blueberries in California. Pages 129-134 *in* XI International Vaccinium Symposium 1180.

Xu, X., L. Zhang, X. Yang, H. Cao, J. Li, P. Cao, L. Guo, X. Wang, J. Zhao, and W. Xiang. 2022. *Alternaria* spp. associated with leaf blight of maize in Heilongjiang Province, China. Plant Disease 106(2):572-584.

Yan, Y., L. Peng, W.-X. Liu, F.-H. Wan, and M. K. Harris. 2011. Host plant effects on alkaline phosphatase activity in the whiteflies, *Bemisia tabaci* Biotype B and *Trialeurodes vaporariorum*. Journal of Insect Science 11(1):9.

Yang, X., B. M. Tyler, and C. Hong. 2017. An expanded phylogeny for the genus *Phytophthora*. IMA fungus 8(2):355-384.

Zhuang, W. (ed.). 2005. Fungi of Northwestern China. Mycotaxon Ltd., Ithaca, New York. 430 pp.

6. Appendix: Pests with non-quarantine status

We found evidence that the organisms listed below are associated with celery and are present in the United Kingdom; however, none are of quarantine significance for the PRA area (ARM, 2021, or as defined by ISPM No. 5). Although we did not intensively evaluate the evidence, we provide references supporting each pest's potential presence in the United Kingdom, presence in the PRA area (if applicable), and association with celery. If any of the organisms are **not** present in the PRA area, we also provided justification for their non-quarantine status. Unless otherwise noted, these organisms are non-actionable at U.S. ports of entry (ARM, 2021).

Organism	**In the United Kingdom**	**In U.S.**	**Host Association**	**Notes**
MITE: Tombidiformes: Tetranychidae *Bryobia praetiosa Koch*	Chant, 1956	Anderson and Morgan, 1958; Goff, 1986	Marić et al., 2017	
INSECT: Diptera: Psilidae *Chamaepsila rosae* (F.)	CABI, 2022	CABI, 2022	CABI, 2022; Malhotra, 2006	
INSECT: Hemiptera: Aleyrodidae *Trialeurodes vaporariorum* Westwood	CABI, 2022	CABI, 2022	CABI, 2022; Yan et al., 2011	
INSECT: Hemiptera: Aphididae *Aphis fabae* Scopoli	CABI, 2022	CABI, 2022	CABI, 2022; Godfrey and Chaney, 1995	
INSECT: Hemiptera: Aphididae *Aphis gossypii* Glover	Furk and Vedjhi, 1990	CABI, 2022	CABI, 2022; Davis and Grafius, 1994	
INSECT: Hemiptera: Aphididae *Aphis spiraecola* Patch	CABI, 2022	CABI, 2022	CABI, 2022; Webb, 2006	
INSECT: Hemiptera: Aphididae *Aulacorthum solani* (Kaltenbach)	CABI, 2022	CABI, 2022	CABI, 2022; Palumbo, 2003	
INSECT: Hemiptera: Aphididae *Brachycaudus helichrysi* Kaltenbach	CABI, 2022	CABI, 2022	Blackman and Eastop, 2000	
INSECT: Hemiptera: Aphididae *Cavariella aegopodii* (Scopoli)	Dunn and Kirkley, 1966	Miller et al., 2016	Blackman and Eastop, 2000; Dunn and Kirkley, 1966; Lowe, 1968	
INSECT: Hemiptera: Aphididae *Cavariella theobaldi* (Gillette & Bragg)	Baker et al., 2022	Knowlton and Palmer, 1952	Blackman and Eastop, 2000; Knowlton and Palmer, 1952	

Organism	In the United Kingdom	In U.S.	Host Association	Notes
INSECT: Hemiptera: Aphididae *Dysaphis apiifolia* (Theobald)	Baker et al., 2022	Godfrey and Chaney, 1995	Blackman and Eastop, 2000; Godfrey and Chaney, 1995; Hayder et al., 2012	
INSECT: Hemiptera: Aphididae *Dysaphis crataegi* (Kaltenbach)	Baker et al., 2022	Blackman and Eastop, 2000	Blackman and Eastop, 2000	
INSECT: Hemiptera: Aphididae *Hyadaphis foeniculi* Passerini	Harris, 1973	CABI, 2022; Halbert et al., 2000	Blackman and Eastop, 2000; Hayder et al., 2012	
INSECT: Hemiptera: Aphididae *Macrosiphum euphorbiae* (Thomas)	CABI, 2022	CABI, 2022	Blackman and Eastop, 2000; CABI, 2022	
INSECT: Hemiptera: Aphididae *Myzus ornatus* Laing	CABI, 2022	CABI, 2022	Krieger, 1971	
INSECT: Hemiptera: Aphididae *Myzus persicae* (Sulzer)	CABI, 2022	CABI, 2022	Divol et al., 2005; Gillespie et al., 2001	
INSECT: Hemiptera: Aphididae *Rhopalosiphoninus latysiphon* (Davidson)	CABI, 2022	CABI, 2022	Blackman and Eastop, 2000	
INSECT: Hemiptera: Coccidae *Coccus viridis* (Green)	CABI, 2022	CABI, 2022	García-Morales et al., 2016	
INSECT: Hemiptera: Pseudococcidae *Planococcus citri* (Risso)	García-Morales et al., 2016	García-Morales et al., 2016	García-Morales et al., 2016	
INSECT: Hemiptera: Pseudococcidae *Pseudococcus calceolariae* (Maskell)	García-Morales et al., 2016	García-Morales et al., 2016	García-Morales et al., 2016	
INSECT: Hemiptera: Pseudococcidae *Pseudococcus viburni* (Signoret)	García-Morales et al., 2016	García-Morales et al., 2016	García-Morales et al., 2016	
INSECT: Lepidoptera: Crambidae *Ostrinia nubilalis* (Hübner)	CABI, 2022	CABI, 2022	Carter, 1984	
INSECT: Lepidoptera: Elachistidae *Depressaria pastinacella* (Duponchel)	Carter, 1984	Carter, 1984	Carter, 1984	

Organism	In the United Kingdom	In U.S.	Host Association	Notes
INSECT: Lepidoptera: Noctuidae *Agrotis ipsilon* (Hufnagel)	CABI, 2022	CABI, 2022	CABI, 2022	
INSECT: Lepidoptera: Noctuidae *Peridroma saucia* (Hübner)	CABI, 2022	CABI, 2022	CABI, 2022; Jones and Granett, 1982	
INSECT: Lepidoptera: Noctuidae *Spodoptera exigua* (Hübner)	CABI, 2022	CABI, 2022	CABI, 2022; Jones and Granett, 1982; Reitz et al., 1999	
INSECT: Lepidoptera: Noctuidae *Trichoplusia ni* (Hübner)	CABI, 2022	CABI, 2022	Jones and Granett, 1982; Meade and Hare, 1995	
INSECT: Lepidoptera: Noctuidae *Xestia c-nigrum* (L.)	CABI, 2022	CABI, 2022	CABI, 2022	
FUNGUS A*cremonium apii* (M.A. Sm. & Ramsey) W. Gams.; syn. *Cephalosporium apii* Smith & Ramsey	Eschen et al., 2010	Newhall, 1953; Williams, 1987	Ginns, 1986; Williams, 1987	This pathogen is present in the continental United States since 1950s and is not under official control.
FUNGUS *Alternaria alternata* (Fr.: Fr.) Keissl. syn. *Alternaria tenuissima* (Nees & T. Nees : Fr.) Wiltshire	Matić et al., 2019	Alfieri et al., 1984; French, 1989; Raabe et al., 1981; Stevenson, 1975	French, 1989	
FUNGUS *Alternaria dauci* (J.G. Kühn) J.W. Groves & Skolko	Farr and Rossman, 2022	French, 1989; Raabe et al., 1981; Stevenson, 1975	Ginns, 1986	
FUNGUS *Alternaria porri* (Ellis) Cif.	Scotland (Farr and Rossman, 2022)	French, 1989; Raabe et al., 1981; Stevenson, 1975	Farr and Rossman, 2022	
FUNGUS *Alternaria radicina* Meier, Drechsler & E.D. Eddy	Farr and Rossman, 2022	USDA-ARS, 1960	Farr and Rossman, 2022	

Organism	In the United Kingdom	In U.S.	Host Association	Notes
FUNGUS *Alternaria solani* Sorauer	Farr and Rossman, 2022	French, 1989; Raabe et al., 1981; Stevenson, 1975	Farr and Rossman, 2022	
FUNGUS *Aphanomyces euteiches* Drechsler	Farr and Rossman, 2022	USDA-ARS, 1960	Farr and Rossman, 2022	
FUNGUS *Berkeleyomyces basicola* (Berk. & Broome) W.J. Nel, Z.W. de Beer, T.A. Duong & M.J. Wingf. syn.: *Thielaviopsis basicola* (Berk. & Broome) Ferraris	CABI, 2022	CABI, 2022	CABI, 2022	
FUNGUS *Botrytis cinerea* Pers. : Fr. syn. *Botryotinia fuckeliana* (de Bary) Whetzel; *Botrytis vulgaris* Link : Fr.	Farr and Rossman, 2022; Richardson, 1979	French, 1989; Raabe et al., 1981; Stevenson, 1975	Ginns, 1986; Shaw, 1973	
FUNGUS *Cercospora apii* Fresen. syn.: *Cercospora penicillata* var. *apii* Fuckel	Vaghefi et al., 2018	French, 1989; Raabe et al., 1981; Stevenson, 1975	Shaw, 1973; Stevenson, 1975	
FUNGUS *Cercospora beticola* Sacc.	Vaghefi et al., 2018	French, 1989; Raabe et al., 1981; Stevenson, 1975	Groenewald et al., 2006	
FUNGUS *Chaetomium succineum* L.M. Ames	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Colletotrichum acutatum* J.H. Simmonds	Guerber et al., 2003	Pollok et al., 2012	Pollok et al., 2012	
FUNGUS *Colletotrichum orbiculare* Damm, P.F. Cannon & Crous	Farr and Rossman, 2022	Alfieri et al., 1984; Raabe et al., 1981; Stevenson, 1975	Farr and Rossman, 2022	

Organism	**In the United Kingdom**	**In U.S.**	**Host Association**	**Notes**
FUNGUS *Erysiphe heraclei* DC	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Fusarium solan*i (Mart.) Sacc. syn.: *Neocosmospora solani* (Mart.) L. Lombard & Crous	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Haplotrichum curtisii* (Berk.) Hol.-Jech; syn. *Corticium vagum* Berk. & M.A. Curtis	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Leveillula taurica* (Lév.) G. Arnaud; syn.: *Erysiphe taurica* Lév. *Oidiopsis taurica* (Lév.) E.S. Salmon	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Mycocentrospora acerina* (R. Hartig) Deighton; syn. *Ansatospora macrospora* (Neerg.) A.G. Newhall, *Cercospora acerina* R. Hartig, *Cercospora ailanthi* P. Syd.	Farr and Rossman, 2022	USDA-ARS, 1960	Farr and Rossman, 2022; Xiao and Saito, 2016	
FUNGUS *Olpidium brassicae* (Woronin) P.A. Dang.	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Paraphoma fimeti* (Brunaud) Gruyter, Aveskamp & Verkley; syn.: *Phoma fimeti* Brunaud	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Phoma complanata* (Tode : Fr.) Desm. syn.: Calophoma complanata (Tode : Fr.) Qian Chen & L. Cai	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
CHROMISTS *Phytophthora cryptogea* Pethybr. & Laff.	Erwin and Ribeiro, 1996	Erwin and Ribeiro, 1996	Erwin and Ribeiro, 1996	
FUNGUS *Plectosphaerella cucumerina* (Lindf.) W. Gams. syn.: *Plectosporium tabacinum* (J.F.H. Beyma) M.E. Palm, W. Gams & Nirenberg	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	

Organism	In the United Kingdom	In U.S.	Host Association	Notes
FUNGUS *Pseudocercosporella pastinacae* (P. Karst.) U. Braun. syn.: *Filiella pastinacae* (P. Karst.) Videira & Crous	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	Present in the continental United States for a long time (USDA-ARS, 1960)
FUNGUS *Puccinia apii* Desm.	Farr and Rossman, 2022		Farr and Rossman, 2022	Non-reportable pest (ARM, 2022)
FUNGUS *Pythium debaryanum* R. Hesse. syn.: *Globisporangium debaryanum* (R. Hesse) Uzuhashi, Tojo & Kakish	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Pythium irregulare* Buisman. syn.: *Globisporangium irregulare* (Buisman) Uzuhashi, Tojo & Kakish.	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Pythium mastophorum* Drechsler. Syn.: *Globisporangium mastophorum* (Drechsler) Uzuhashi, Tojo & Kakish.	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	Present in the continental United states for a long time (USDA-ARS, 1960).
FUNGUS *Pythium ultimum* Trow. syn.: *Globisporangium ultimum* (Trow) Uzuhashi, Tojo & Kakish.	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Ramularia heraclei* (Oudem.) Sacc. syn.: *Ramularia heraclei* var. *apii-graveolentis* Sacc. & Ber	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	Present in the continental United States for a long time (USDA-ARS, 1960).
FUNGUS *Rhizoctonia crocorum* (Pers. : Fr.) DC. syn.: *Helicobasidium purpureum* (Tul.) Pat., *Thanatophytum crocorum* (Pers. : Fr.) Nees	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Rhizoctonia solani* J.G. Kühn syn.: *Pellicularia filamentosa* (Pat.) D.P. Rogers: *Thanatephorus cucumeris* (A.B. Frank) Donk	Farr and Rossman, 2022	Alfieri et al., 1984; Lenne, 1990; Stevenson, 1975; USDA-ARS, 1960	Farr and Rossman, 2022	

Organism	**In the United Kingdom**	**In U.S.**	**Host Association**	**Notes**
FUNGUS *Sarocladium strictum* (W. Gams) Summerb. syn.: *Acremonium strictum* W. Gams	Eschen et al., 2010	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Sclerotinia minor* Jagger	CABI, 2022	CABI, 2022	CABI, 2022	
FUNGUS *Sclerotinia sclerotiorum* (Lib.) de Bary	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Septoria apii* Chester. syn.: *Septoria apiicola* Speg., *Septoria apii-graveolentis* Dorogin, *Septoria petroselini* var. *apii* Briosi & Cavara	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Septoria petroselini* (Lib.) Desm.	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Stemphylium vesicarium* (Wallr.) E.G. Simmons. syn.: *Sporidesmium putrefaciens* Fuckel	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Stemphylium botryosum* Wallr.	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Subplenodomus apiicola* (Kleb.) Gruyter, Aveskamp & Verkley; syn: *Phoma apiicola* Kleb.	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Trichoderma harzianum* Rifai	CABI, 2022	Farr and Rossman, 2022	CABI, 2022	
FUNGUS *Uromyces lineolatus* (Desm.) J. Schröt.	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Verticillium albo*-atrum Reinke & Berthold	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS *Verticillium nigrescens* Pethybr.Syn.: *Gibellulopsis nigrescens* (Pethybr.) Zare, W. Gams & Summerb.	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	Present in the continental United States for a long time (Farr and Rossman, 2022).
VIRUS *Cucumovirus Cucumber mosaic virus* (CMV)	CABI, 2022	CABI, 2022	CABI, 2022	

Organism	In the United Kingdom	In U.S.	Host Association	Notes
Fabavirus Broad bean wilt virus (BBWV)	CABI, 2022; Smith, 1949	(Ferriol et al., 2011; Pscheidt and Ocamb, 2022)	CABI, 2022; Wang and Pu, 1993	Present in the continental United States and not regulated in Hawaii and territories
VIRUS *Nepovirus Tobacco ringspot virus* (TRSV)	Brunt et al., 1996c; Stace-Smith, n. d	Abougha nem-Sabanadz ovic et al., 2014. It is actually widesprea d in the United States (CABI, 2022).	Brunt et al., 1996c	
VIRUS *Orthotospovirus Tomato spotted wilt virus* (TSWV)	CABI, 2022	CABI, 2022	CABI, 2022	
BACTERIUM *Candidatus Liberibacter* solanacearum Liefting	EPPO, 2022	EPPO, 2022	EPPO, 2022	
BACTERIUM *Pectobacterium carotovorum* subsp. *carotovorum* (Jones) Hauben et al.	CABI, 2022	CABI, 2022	CABI, 2022	
BACTERIUM *Pseudomonas cichorii* (Swingle) Stapp	CABI, 2022	CABI, 2022	CABI, 2022	
BACTERIUM *Pseudomonas marginalis* pv. *marginalis* (Brown) Stevens	CABI, 2022	CABI, 2022	CABI, 2022	
BACTERIUM *Pseudomonas syringae* van Hall	CABI, 2022	CABI, 2022	CABI, 2022	
BACTERIUM *Pseudomonas viridiflava* (Burkholder) Dowson	CABI, 2022	Goss et al., 2005; Jakob et al., 2002; Raabe et al., 1981; Salgado-Herrera, 2017	CABI, 2022	

Organism	In the United Kingdom	In U.S.	Host Association	Notes
BACTERIUM *Rhizobium radiobacter* (Beijerinck & van Delden) Young et al.	CABI, 2022	CABI, 2022	CABI, 2022	
BACTERIUM *Dickeya chrysanthemi* (Burkholder et al.) Samson et al. syn.: *Erwinia chrysanthemi* (Burkholder et al.) Young et al.	CABI, 2022	CABI, 2022	CABI, 2022	
BACTERIUM *Rhodococcus fascians* (Tilford) Goodfellow syn.: *Corynebacterium fascians* (Tilford) Dowson	Serdani et al., 2013	Serdani et al., 2013	Putnam and Miller, 2007	
PHYTOPLASMA '*Candidatus Phytoplasma* pruni'	CABI, 2022	EPPO, 2022	EPPO, 2022	
NEMATODE *Longidorus elongatus* (de Man) Micoletzky	CABI, 2022	CABI, 2022	CABI, 2022	
NEMATODE *Pratylenchus thornei* Sher & Allen	CABI, 2022	CABI, 2022	CABI, 2022	
NEMATODE *Meloidogyne arenaria* (Neal) Chitwood	CABI, 2022	CABI, 2022	CABI, 2022	
NEMATODE *Meloidogyne incognita* (Kofoid & White, 1919) Chitwood	CABI, 2022	CABI, 2022	CABI, 2022	
NEMATODE *Trichodorus primitivus* (de Man) Micoletzky	CABI, 2022	CABI, 2022	Anon, n.d.	
NEMATODE *Xiphinema diversicaudatum* (Micoletzky) Thorne	CABI, 2022	CABI, 2022	Ferris, 2012	