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

Importation of fresh Tahiti lime (*Citrus latifolia*) fruit from Brazil into the continental United States, Hawaii, Puerto Rico, and the U.S. Virgin Islands for consumption

A Qualitative, Pathway Initiated Pest Risk Assessment

Version 2.0

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Executive Summary

The Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA) prepared this document to assess pest risks associated with importing commercially-produced fruit of Tahiti lime, *Citrus latifolia* (Rutaceae), for consumption from Brazil into the continental United States, Hawaii, Puerto Rico, and the U.S. Virgin Islands. Based on the market access submitted by Brazil, we considered the pathway to include the following processes and conditions: Fruit will be free of leaves, twigs, and other plant parts, except for stems that are less than 1 inch long and attached to the fruit. The pest risk ratings depend upon the application of all conditions of the pathway as described. Fruit produced under different conditions were not evaluated and may have a different pest risk.

Using scientific literature, port-of-entry pest interception data, and information from the government of Brazil, we developed a list of pests with quarantine significance for the continental United States, Hawaii, Puerto Rico, and the U.S. Virgin Islands associated with Tahiti lime (in any country) and present in Brazil (on any host).

The pathogens *Elsinoë australis* (sweet orange scab), *Guignardia citricarpa* (citrus black spot), and *Xanthomonas citri* subsp. *citri* (citrus canker) are reported from Tahiti lime, are present in Brazil, and are quarantine pests for the United States (in limited distribution and under official control). USDA APHIS conducted pest risk assessments examining the likelihood that these pathogens could spread through the movement of commercial citrus fruit intended for consumption. USDA APHIS has determined that commercially-packed fruit is not an epidemiologically significant pathway for the introduction and establishment of these pathogens into new areas. These pathogens are regulated, and additional import requirements will be specified in the risk management document as a condition of entry for citrus fruit from Brazil into the continental United States, Hawaii, Puerto Rico, and the U.S. Virgin Islands.

The following organisms are candidates for pest risk management because they meet the threshold for unacceptable consequences of introduction:

Pest type	**Taxonomy**	**Scientific name**	**Likelihood of Introduction overall rating**
Arthropod	Acari: Tenuipalpidae	*Brevipalpus californicus*, *B. obovatus*, *B. papayensis*, *B. phoenicis*, and *B. yothersi* [vectors of *Citrus leprosis virus* (CiLV)]	Low

The following organisms were found to follow the pathway but were not assessed in this risk assessment because domestic regulations are already in place for these pests:

Pest type	**Taxonomy**	**Scientific name**	**Code of Federal Regulation**
Arthropod	Hemiptera: Psyllidae	*Diaphorina citri* Kuwayama	7 CFR § 301.76-2

Pest type	**Taxonomy**	**Scientific name**	**Code of Federal Regulation**
Fungi	Elsinoaceae	*Elsinoë australis* (Bitancourt & Jenk.) syn.: *Sphaceloma australis* Bitancourt & Jenk.)	USDA APHIS, 2010a
Fungi	Botryosphaeriaceae	*Guignardia citricarpa* (Kiely) syn.: *Phyllosticta citricarpa* McAlpine, *Phoma citricarpa*, *Phyllosticta citricola*	USDA APHIS, 2012
Bacteria	Phyllobacteriaceae	*Candidatus* Liberibacter asiaticus’	7 CFR § 301.76-2
Bacteria	Xanthomonadaceae	*Xanthomonas citri* subsp. *citri* (ex Hasse) Gabriel et al. syn.: *X. axonopodis* pv. *citri* (Vauterin, et al.), *X. campestris* pv. *citri* (Hasse) Dye	7 CFR § 301.75-4

Detailed examination and choice of appropriate phytosanitary measures to mitigate pest risk are addressed separately from this document.

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1. Introduction

1.1. Background

The Plant Epidemiology and Risk Analysis Laboratory of the USDA Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine (PPQ) prepared this document to assess the pest risk associated with the importation of commercially-produced fruit of Tahiti lime (*Citrus latifolia* Tanaka) for consumption from Brazil (referred to as the export area) into the continental United States, Hawaii, Puerto Rico, and the U.S. Virgin Islands (referred to as the PRA area).

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

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

1.2. Initiating event

The importation of 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). Quarantine 19 (7 CFR §319.19, 2014, *Citrus Canker and Other Citrus Diseases*) prohibits the importation of citrus plants or plant parts except fruit into the United States. Quarantine 28 (7 CFR §319.28, 2014, *Citrus Fruit*) prohibits the importation of citrus fruit from most countries, including Brazil, where certain diseases occur. Importation of citrus fruit is therefore prohibited except for particular citrus species and varieties grown, packed, and shipped under certain conditions from specific areas as stated in 7 CFR 319.28 and 319.56. These restrictions prevent the introduction of a number of citrus pests including, but not limited to, fruit flies in the genera *Anastrepha* and *Ceratitis*, citrus canker bacteria (*Xanthomonas citri* subsp. *citri*), and sweet orange scab fungus (*Elsinoë australis*). Imported fruit is also subject to regulations that govern domestic interstate movement of fruit from areas quarantined for citrus canker, citrus black spot, or sweet orange scab (7 CFR § 319.19, 2014; USDA, 2011).

Under these regulations, the entry of Tahiti lime from Brazil into the PRA area is not authorized. This commodity risk assessment was initiated due to a request by Ministério da Agricultura, Pecuária, e Abastecimiento (MAPA) to change the Federal regulation to allow entry (MAPA, 2012).

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

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

Weed risk analyses are not needed for commodities that are already enterable into the PRA area from other countries, for plant species that are widely established (native or naturalized) or cultivated in the PRA area, or for situations in which the imported plant parts cannot easily propagate on their own or be propagated. We determined that the weed risk of Tahiti lime does not need to be analyzed because this commodity is already enterable from other countries (APHIS, 2019).

1.4. Description of the pathway

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

<u>1.4.1. Description of the commodity</u>

The specific pathway of concern is the importation of fresh fruit of Tahiti lime for consumption. No stems or leaves will be included with the fruit.

<u>1.4.2. Summary of the production, harvest and post-harvest procedures, and shipping and storage conditions being considered</u>

Production and harvesting procedures in Brazil have not been specified, so they are not considered as part of the assessment. We consider the fruit to be commercially-produced and free of leaves, twigs, and other plant parts, except for stems that are less than 1 inch long and attached to the fruit. The conclusions for this analysis are dependent on the application of these processes.

Brazil has not specified any shipping or storage conditions, so none are considered as part of the assessment.

2. Pest List and Pest Categorization

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

2.1. Pest list

In Table 1, we list the quarantine pests that occur in the export area on any host and are associated with the commodity species, whether in the export area or elsewhere. For each pest, we indicate 1) the part of the plant the pest is generally associated with and 2) whether we selected the pest for further analysis. Pests selected for further analysis are those that are likely to remain with the commodity in a viable form following harvesting from the field and prior to any post-harvest processing. We developed this pest list based on the scientific literature, port-of-entry pest interception data, and information provided by the government of Brazil. Pests in shaded rows were selected for further evaluation because they are likely to remain associated with the harvested commodity (Table 2); for these pests we also denote U.S. distribution as appropriate.

Table 1. Quarantine pests associated with Tahiti lime (in any country) and present in Brazil (on any host).

Pest name	Presence in Brazil	Host association	Plant part(s) [1]	Considered further?[2]
MITE: Eriophyidae *Tegolophus brunneus* Flechtmann	de Morais, 2019; Flechtmann, 1999	de Morais, 2019	Leaves and fruits (Flechtmann, 1999).	No. See Section 2.2 (Notes on pests identified in the pest list).
MITE: Tenuipalpidae *Brevipalpus californicus* (Banks)	**MAPA, 2012**	**Salinas-Vargas et al., 2013; MAPA, 2012**	**Leaves, stems, and fruits (Jeppson et al., 1975).**	**Yes. Present in the United States (Jeppson et al., 1975).** **Although *B. californicus* is present in the United States, it is an actionable pest for this PRA because it can vector the quarantine disease *Citrus leprosis virus* (CiLV) in Brazil. See section 2.2 (Notes on pests identified in the pest list).**
MITE: Tenuipalpidae *Brevipalpus obovatus* Donnadieu	**MAPA, 2012**	**Salinas-Vargas et al., 2013; MAPA, 2012**	**Leaves, stems, and fruits (Childers, 1994).**	**Yes. Present in the United States (Jeppson et al., 1975; CABI, 2020).** **See regulatory note for *B. californicus*.**

[1] The plant parts 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.

[2] "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 Brazil	Host association	Plant part(s) [1]	Considered further? [2]
MITE: Tenuipalpidae *Brevipalpus papayensis* Baker	**Mineiro et al., 2016**	**Beard et al., 2015**	**Leaves, branches, and fruits (Beard et al., 2015; Mineiro et al., 2016)**	**Yes. Present in Hawaii (Beard et al., 2015).** **Transmits *Citrus leprosis virus C* (Nunes et al., 2018). This species is an actionable pest for this PRA. See Section 2.2 (Notes on pests identified in the pest list).**
MITE: Tenuipalpidae *Brevipalpus phoenicis* (Geijskes)	**Ramos-González et al., 2017**	**Roy et al., 2015**	**Leaves, stems, and fruits (Beard et al., 2015)**	**Yes. Present in the United States (Beard et al., 2015).** ***Brevipalpus phoenicis* transmits *Citrus leprosis virus N* (Roy et al., 2015). This species is an actionable pest for this PRA. See Section 2.2 (Notes on pests identified in the pest list).**
MITE: Tenuipalpidae *Brevipalpus yothersi* Baker	**Salinas-Vargas et al., 2016**	**Salinas-Vargas et al., 2016**	**Leaves, stems, and fruits (Beard et al., 2015; Salinas-Vargas et al., 2016).**	**Yes. Present in Florida and Puerto Rico (Akyazi et al., 2017; Beard et al., 2015).** ***Brevipalpus yothersi* has a strong association with *Citrus leprosis virus C* (Beard et al., 2015). This species is an actionable pest for this PRA. See section 2.2 (Notes on pests identified in the pest list).**
MITE: Tetranychidae *Oligonychus gossypii* (Zacher)	Fazolin et al., 2015	Fazolin et al., 2015	Leaves (Fazolin et al., 2015)	No.

Pest name	**Presence in Brazil**	**Host association**	**Plant part(s)** [1]	**Considered further?**[2]
MITE: Tetranychidae *Schizotetranychus hindustanicus* (Hirst)	Marsaro Júnior et al., 2012; Rios, 2017	Marsaro Júnior et al., 2012; Rios, 2017	Leaves and fruits (Flechtmann, 1999).	No. See Section 2.2 (Notes on pests identified in the pest list).
INSECT: Coleoptera: Chrysomelidae *Costalimaita ferruginea* (F.)	CABI, 2020; Santos et al., 2016	Santos et al., 2016	Leaves. Plant part based on general biology of the beetle (Dias et al., 2017; Santos et al., 2016).	No.
INSECT: Diptera: Cecidomyiidae *Prodiplosis floricola* (Felt)	Carregaro et al., 2009	Duque-Gamboa et al., 2018	Flowers (Duque-Gamboa et al., 2018).	No. Present in New York (Gagné, 1986).
INSECT: Hemiptera: Aleyrodidae *Aleurocanthus woglumi* Ashby	Raga et al., 2011; MAPA, 2012	Aruna et al., 2017; Raga et al., 2011	Leaves (Aruna et al., 2017).	No. Present in Florida, Hawaii, Texas, Puerto Rico, and the U.S. Virgin Islands (Nguyen and Hamon, 1998; Hart et al., 1978; Culliney et al., 2003; Medina-Gaud et al., 1991; UVI, 2019).
INSECT: Hemiptera: Aphididae *Toxoptera citricidus* (Kirkaldy) syn.: *T. citricida* (Kirkaldy)	Guidolin and Cônsoli, 2017; CABI, 2020; MAPA, 2012	Guidolin and Cônsoli, 2017	Leaves (CABI, 2020)	No. Present in Florida, Hawaii, Puerto Rico, and the U.S. Virgin Islands (CABI, 2020; Gottwald et al., 2002; Yokomi et al., 1994).

Pest name	**Presence in Brazil**	**Host association**	**Plant part(s)** [1]	**Considered further?** [2]
INSECT: Hemiptera: Cicadellidae *Oncometopia clarior* (Walker)	de Miranda et al., 2009	Rodríguez, 2014	Leaves and stems. Plant part association based on behavior on host plant *Dioscorea rotundata* (Alvarez et al., 2012).	No.
INSECT: Hemiptera: Coccidae *Ceroplastes sinensis* Del Guerco	MAPA, 2012	Phuong, 2018; Martin, 2018	Leaves and stems (MAPA, 2012; Martin, 2018).	No. Present in California, North Carolina, Pennsylvania, and Virginia (García Morales et al., 2016). Action only to Hawaii, Guam, and the U.S. Virgin Islands (PestID, 2019)
INSECT: Hemiptera: Ortheziidae *Praelongorthezia praelonga* (Douglas) syn.: *Orthezia praelonga* Douglas	Culik et al., 2009; Kondo et al., 2013	Kondo et al., 2013	Leaves, flowers, and stems (Kondo et al., 2013).	No. Present in Puerto Rico and the U.S. Virgin Islands (Morrison, 1952).
INSECT: Hemiptera: Pseudococcidae *Dysmicoccus texensis* Tinsley	Culik et al., 2011; Granara de Willink, 2009	Ben-Dov, 1994; Granara de Willink, 2009	Roots and fruits. Plant parts based on general biology of the pest (de Souza et al., 2007; Culik et al., 2011).	No. Present in Texas, Puerto Rico, and the U.S. Virgin Islands (García Morales et al., 2016). Action only to Hawaii and U.S. Territories (PestID, 2020b).

Pest name	**Presence in Brazil**	**Host association**	**Plant part(s)** [1]	**Considered further?** [2]
INSECT: Hemiptera: Pseudococcidae *Maconellicoccus hirsutus* (Green)	Culik et al., 2013	Cermeli et al., 2002	Leaves, stems and fruits. Plant parts based on general biology of the pest (Cermeli et al., 2002; Williams, 1996).	No. Present in California, Florida, Georgia, Hawaii, Louisiana, South Carolina, Texas, Puerto Rico, and the U.S. Virgin Islands (García Morales et al., 2016). No Action to St. Thomas (PestID, 2020b).
INSECT: Hemiptera: Psyillidae *Diaphorina citri* Kuwayama	MAPA, 2012; Nava et al., 2007	Halbert and Núñez, 2004	Leaves and shoots (Halbert and Núñez, 2004; Shivankar et al., 2000).	No. Present in Alabama, Arizona, California, Florida, Georgia, Hawaii, Louisiana, Mississippi, South Carolina, Texas, Puerto Rico, and the U.S. Virgin Islands (Mead, 2014) but under official control (7 CFR § 301.76, 2012).
INSECT: Lepidoptera: Gracillariidae *Phyllocnistis citrella* Stainton	de Jesus et al., 2008; MAPA, 2012	Singh and Roa, 1978	Leaves, shoots, and fruits (Heppner, 1993; Heppner, 1995; Singh and Roa, 1978).	No. Present in Alabama, California, Florida, Louisiana, Hawaii, Texas, Puerto Rico, and the U.S. Virgin Islands (CABI, 2020; Heppner, 2016 ; UVI, 2019) Larvae usually mine leaves, and rarely the rind of the fruit (CABI, 2020; Heppner, 1995). The mines occur on young fruit and are very conspicuous (Heppner, 1995). Infested fruit are highly unlikely to be harvested.

Pest name	**Presence in Brazil**	**Host association**	**Plant part(s)** [1]	**Considered further?**[2]
INSECT: Lepidoptera Hesperiidae *Achlyodes pallida* (Felder) syn.: *A. selva* Evans	Maes, 2004; Warren et al., 2003	Fernández, 2016	Leaves (Fernández, 2016).	No. *Achlyodes pallida* is a neotropical species and has been reported from southern Texas (Braby et al., 2014; Warren et al., 2003). We found no further information, however, about *A. pallida* being established in the United States.
FUNGUS *Elsinoë australis* (Bitancourt & Jenk.) syn.: *Sphaceloma australis* Bitancourt & Jenk.	CABI, 2020; EPPO, 1997cb; MAPA, 2012;	Kunta et al., 2013	Leaves, fruits, twigs (Timmer et al., 2000)	No, analyzed previously. Restricted distribution in the United States (Texas, Louisiana, Mississippi, Florida, and Arizona) and under official control (USDA APHIS, 2010a).
FUNGUS *Guignardia citricarpa* (Kiely) syn.: *Phyllosticta citricarpa* McAlpine, *Phoma citricarpa*, *Phyllosticta citricola*	CABI, 2020; MAPA, 2012	Baldassari et al., 2008	Leaves, stems, fruits (Kotze, 1963)	No, analyzed previously. Present in Florida but is under official control (USDA APHIS, 2010b).
FUNGUS *Lasiodiplodia brasiliensis* M.S.B. Netto, M.W. Marques & A.J.L. Phillips	Correia et al., 2016; Farr and Rossman, 2020	Bautista-Cruz et al., 2019	Branches (Bautista-Cruz et al., 2019)	No, not associated with fruit.
FUNGUS *Lasiodiplodia pseudotheobromae* A.J.L. Phillips, A. Alves & Crous	Farr et la., 2019; Nogueira Júnior et al., 2017	Bautista-Cruz et al., 2019	Branches (Bautista-Cruz et al., 2019)	No, not associated with fruit.
FUNGUS *Lasiodiplodia subglobosa* A. R. Machado & O. L. Pereira	Farr and Rossman, 2020; Poletto et al., 2016	Bautista-Cruz et al., 2019	Branches (Bautista-Cruz et al., 2019)	No, not associated with fruit.

Pest name	**Presence in Brazil**	**Host association**	**Plant part(s)** [1]	**Considered further?**[2]
BACTERIUM *Xanthomonas citri* subsp. *citri* (ex Hasse) Gabriel et al. syn.: *X. axonopodis* pv. *citri* (Vauterin, et al.), *X. campestris* pv. *citri* (Hasse) Dye	Christiano et al., 2007; MAPA, 2012	Christiano et al., 2007	Leaves, fruits twigs (Timmer et al., 2000)	No, analyzed previously. Restricted distribution in the United States (Florida, Louisiana, and Texas) (USDA APHIS, 2020) and under official control.
BACTERIUM *'Candidatus* Liberibacter asiaticus' Jagoueix, Bové, & Garnier	MAPA, 2012; Texeira et al., 2005	Cellier et al., 2014	Branches, fruits, roots (Timmer et al., 2000)	No. see section 2.2
VIROID *Apscaviroid Citrus dwarfing viroid* (CDVd)	Eiras et al, 2010	Katsarou et al., 2020	Within plant tissues (Katsarou et al., 2020)	Present in the continental United States (Vidalakis et al., 2010); no evidence found for seed transmission or natural vectors. Typically moved by graft transmission (Katsarou et al., 2020). This viroid is not be considered further, as fruit for consumption is considered a dead-end pathway.
VIROID *Hostuviroid Hop stunt viroid* (HSVd)	Eiras et al., 2010	Katsarou et al., 2020	Whole plant; viroid can be found in the plant sap (Sano et al., 1988)	Present in the continental United States (CABI, 2020); no evidence of seed transmission or natural vectors (CABI, 2020). This viroid is not be considered further, as fruit for consumption is considered a dead-end pathway.

Pest name	Presence in Brazil	Host association	Plant part(s) [1]	Considered further?[2]
VIRUS *Cilevirus Citrus leprosis virus C*	Nunes et al., 2018	Rodríguez-Ramírez et al., 2019	Leaves, branches, and fruits (Rodríguez-Ramírez et al., 2019). In known host plants, virus only causes local lesion infections and not systemic infection (Roy et al., 2015).	Transmitted by *Brevipalpus yothersi* (Rodríguez-Ramírez et al., 2019) and *B. papayensis* (Nunes et al., 2018). See section 2.2 (Notes on pests identified in the pest list).
VIRUS *Dichorhavirus Citrus leprosis N*	Ramos-González et al., 2017	Roy et al., 2015	Leaves, branches, and fruits (Ramos-González et al., 2017; Roy et al., 2015). In known host plants, virus only causes local lesion infections and not systemic infection (Roy et al., 2015).	Transmitted by *Brevipalpus phoenicis* (Ramos-González et al., 2017). See section 2.2 (Notes on pests identified in the pest list).

2.2. Notes on pests identified in the pest list

Due to the post-harvest procedures (i.e. washing, brushing, disinfecting, and waxing) surface-feeding pests are not likely to follow the pathway.

***Candidatus* Liberibacter asiaticus**. All plants and plant parts (including leaves), except fruit, of: *Aegle marmelos, Aeglopsis chevalieri*, … *Citrus* spp., … and *Zanthoxylum fagara* are considered regulated articles for Asian citrus psyllid and citrus greening in 7 CFR § 301.76-2(a) (7 CFR § 301.76, 2011). Citrus fruit for consumption are highly unlikely to introduce "*Ca*. L. asiaticus" into the United States (7 CFR § 301.76, 2011), for several reasons. First, fruit is not known to be a host article of the vector, Asian Citrus Psyllid (*Diaphorina citri* Kuwayama). Second, infected citrus fruit cannot spread "*Ca*. L. asiaticus" (EPPO, 1997b), as no mechanism exists for this phloem-limited bacterium to be transmitted from fruit. Third, although some evidence indicates that "*Ca*. L. asiaticus" may be seed-transmitted (Tirtawidjaja, 1981), it has not been demonstrated that the organism persists in seedlings grown from infected seed, or that the disease is expressed (Shatters Jr, 2008).

***Citrus leprosis virus C, Citrus leprosis N* (CiLV) and *Brevipalpus* spp.** We refer here to the C and N types of leprosis included in *Citrus leprosis virus.* This pathogen was previously considered to be present in United States, but extensive surveying revealed that it is no longer present (Childers et al., 2003). CiLV is vectored by mites of the genus *Brevipalpus.* The fruit alone is not a pathway for the pathogen. Symptomatic fruit would likely be culled at the packinghouse. Four *Brevipalpus* species (*B. californicus, B. obovatus, B. papayensis*, and *B. phoenicis*) are vectors, and one other, *B. yothersi* is strongly associated with the viruses. These are present in Brazil where the disease is present and could introduce the pathogen into the United States via commercially-produced citrus. Therefore, we analyzed the pathogen in this risk assessment specifically for its potential to be introduced by the vectoring mites. All five mite species could be regulated on this commodity if justified by the risk associated with the pathogen.

2.3. Pests considered but not included on the pest list

2.3.1. Organisms with non-quarantine status

We found evidence of organisms that are associated with Tahiti lime and are present in the export area but are not quarantine significant for the PRA area. These organisms are listed in Appendix A.

Armored scales (Hemiptera: Diaspididae): These insects are highly unlikely to establish via the pathway of fruits and vegetables intended for consumption due to their very limited ability to disperse to new host plants (Miller et al., 1985; PERAL, 2007). Further, diaspidids are considered non-actionable at U.S. ports of entry on fruits and vegetables for consumption (NIS, 2008). For these reasons, armored scales are not included in Table 1 but are included in Appendix A even if they are not present in the PRA area.

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

Anastrepha fraterculus (Wiedemann), ***Anastrepha serpentina*** (Wiedemann), and ***Anastrepha striata*** Schiner (Diptera: Tephritidae) are present in Brazil (CABI, 2020) and listed as associated with lime (Condor, 1973). Tahiti lime, however, is not mentioned specifically. Due to the lack of direct evidence of an association of these fruit flies with Tahiti lime, we did not include them on the pest list.

Acromyrmex hispidus Santschi, ***Atta cephalotes*** (L.), and ***Atta sexdens*** (L.) (Hymenoptera: Formicidae) are present in Brazil (CABI, 2020; Maes, 2004; Silva-Pinhati et al., 2004) and listed as associated with lime (Condor, 1973). Tahiti lime, however, is not mentioned specifically. Due to the lack of direct evidence of an association of these leaf cutter ants with Tahiti lime, we did not include them on the pest list.

Argyrotaenia sphaleropa Meyrick (Lepidoptera: Tortricidae) and ***Oiketicus kirbyi*** Guilding (Lepidoptera: Psychidae) are present in Brazil (Maes, 2004; Meneguim and Hohmann, 2007), and listed as associated with lime (Condor, 1973). Tahiti lime, however, is not mentioned specifically. Due to the lack of direct evidence of an association of these moths with Tahiti lime, we did not include them on the pest list.

Ceratitis capitata (Wiedemann) (Diptera: Tephritidae) is present in Brazil (MAPA, 2012) and listed as associated with lime (Condor, 1973). Tahiti lime, however was not specifically mentioned. Due to a lack of direct evidence of an association of this fruit fly and Tahiti lime, we did not include it on the pest list.

Neosilba glaberrima (Wiedemann) and ***N. pendula*** (Bezzi) are present in Brazil and associated with lime (Dos Santos et al., 2017).Tahiti lime, however was not specifically mentioned. Due to a lack of direct evidence of an association of these flies and Tahiti lime, we did not include it on the pest list.

2.4. Pests selected for further analysis

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

Table 2. Pest selected for further analysis.

Pest type	Taxonomy	Scientific name
Arthropod	Acari: Tenuipalpidae	*Brevipalpus californicus, B. obovatus, B. papayensis, B. phoenicis,* and *B. yothersi* [vectors of *Citrus leprosis virus* (CiLV)]

3. Assessing Pest Risk Potential

3.1. Introduction

For each pest analyzed, we estimate its overall pest risk potential. Risk is described by the likelihood of an adverse event, the potential consequences, and the uncertainty associated with these parameters. For each pest, we determine if there is an endangered area within the PRA area. The endangered area is defined as the portion of the PRA area where ecological factors favor pest establishment and where pest presence will likely result in economically important losses. If a pest causes an unacceptable impact (i.e., is a threshold pest), that means it will adversely affect agricultural production (e.g., causes 10 percent or greater yield loss or increasing production costs ect.), an environmentally important host, or international trade. Once an endangered area has been determined, the overall risk of each pest is then determined by assessing the likelihood of its introduction into the endangered area on the imported commodity.

The likelihood of introduction is based on the likelihoods of entry and establishment. We qualitatively assess risk using the ratings Low, Medium, and High. The risk factors comprising the likelihood of introduction are interdependent; therefore, the model is multiplicative rather than additive. We define the different risk categories as follows:

High: Pest introduction is highly likely to occur.

Medium: Pest introduction is possible, but for that to happen, the exact combination of required events needs to occur.

Low: Pest introduction is unlikely to occur because one or more of the required events are unlikely to happen or because the full combination of required events is unlikely to align properly in time and space.

Uncertainty is addressed within the assessment as follows:

Negligible uncertainty: Additional or better evidence is very unlikely to change the rating.

Low uncertainty: Additional or better evidence probably will not change rating.

Moderate uncertainty: Additional or better evidence may or may not change rating.
High uncertainty: Reliable evidence is not available.

3.2. Assessment results

3.2.1. *Brevipalpus californicus*, *B. obovatus*, *B. papayensis*, *B. phoenicis* and *B. yothersi* vectors of *Citrus leprosis virus* (CiLV)

Brevipalpus spp. are vectors of *Citrus leprosis virus* (CiLV), which is not present in the United States (Childers and Rodrigues, 2005). CiLV only infects *Citrus* spp. (Rodrigues et al., 2003) and is transmitted by its mite vectors (Rodrigues et al., 2003). CiLV is not transmitted from the mites to their offspring through the eggs (Rodrigues et al., 2003; Rodrigues et al., 1997). *Brevipalpus* spp. are slow moving, which limits their natural ability to disperse (Jeppson et al., 1975) and spread the virus to healthy trees.

Defining the endangered area for *Brevipalpus californicus*, *B. obovatus*, *B. papayensis*, *B. phoenicis*, and *B. yothersi* [vectors of *Citrus leprosis virus C*, *Citrus leprosis N* (CiLV)] within the continental United States, Hawaii, Puerto Rico, and the U.S. Virgin Islands

Endangered area element	**Evidence and notes**
Climatic suitability	CiLV is not present in the United States (Childers and Rodrigues, 2005). CiLV only naturally infects *Citrus* spp. (Rodrigues et al., 2003). Therefore the likely U.S. distribution of CiLV would be limited to areas where citrus is grown. This corresponds to Plant Hardiness Zones 8-11 (USDA-NRCS, 2019; Takeuchi et al., 2018).
Hosts in PRA Area	CiLV only naturally infects *Citrus* spp. (Rodrigues et al., 2003).
Economically important hosts at risk[a]	Most varieties of commercial citrus are susceptible to CiLV (Childers and Rodrigues, 2005; USDA-NRCS, 2019).
Pest potential on economically important hosts at risk	An outbreak of CiLV would kill citrus trees (Childers and Rodrigues, 2005).
Defined Endangered Area	The area endangered by CiLV comprises those areas with citrus hosts in Zones 8-11.

a As defined by ISPM No. 11, supplement 2, "economically important hosts" refers to both commercial and non-market (environmental) plants (IPPC, 2017).

The likelihood of entry of *Brevipalpus californicus*, *B. obovatus*, *B. papayensis*, *B. phoenicis*, and *B. yothersi* vectors of *Citrus leprosis virus* (CiLV) into the endangered area via Tahiti lime imported from Brazil

Risk Element	Risk Rating	Uncertainty Rating	Evidence for rating (and other notes as necessary)
Pest prevalence on the harvested commodity	High	Mod	We know of no field practices that would reduce the prevalence of *Brevipalpus* spp. in the field and thus reduce the prevalence of CiLV. CiLV is not transmitted from mites to their offspring through the eggs (Rodrigues et al., 2003; Rodrigues et al., 1997), so the progeny of an infected mother mite would not acquire the disease unless they fed on infected plant tissue. Depending on climate, *Brevipalpus* spp. may produce several generations per year, some of which may be parthenogenetic (Jeppson et al., 1975).
Likelihood of surviving post-harvest processing before shipment	Medium	Low	Mites can be removed from citrus fruits by packinghouse processes (EPPO, 1997a), such as those described in section 1.4, but 10 to 40 percent of mites on oranges and grapefruits may survive post-harvest treatment if they are protected by the pedicel disk of the fruit (SAG, 2002). This is a significant reduction, but without a specific requirement for washing with detergent, *Brevipalpus* spp. are unlikely to be completely removed from the pathway. Consequently, we decreased the previous rating by only one level.
Likelihood of surviving transport and storage conditions of the consignment	Medium	Low	No shipping or storage conditions are considered for the purpose of this risk assessment. For this reason the rating from the previous risk element remains unchanged.
Overall Likelihood of Entry	Medium	N/A	N/A

The likelihood of establishment of *Brevipalpus californicus*, *B. obovatus*, *B. papayensis*, *B. phoenicis,* and *B. yothersi* vectors of *Citrus leprosis virus* (CiLV) in the endangered area via Tahiti lime imported from Brazil

Risk Element	Risk Rating	Uncertainty Rating	Evidence for rating (and other notes as necessary)
Likelihood of Establishment	Low	Low	CiLV cannot be spread from citrus fruit into the United States without a vector; therefore, the exported fruits themselves are not a pathway of introduction for CiLV. Mites that acquire the virus from feeding on citrus trees can transmit the virus throughout their lifetime, through successive molts (Rodrigues et al., 2003). The Tenuipalpidae family is characterized as slow moving (Jeppson et al., 1975), which decreases the likelihood that infected *Brevipalpus* spp. will disperse naturally from citrus fruit imported for consumption.

The likelihood of introduction (combined likelihoods of entry and establishment) of *Brevipalpus californicus*, *B. obovatus*, *B. papayensis*, *B. phoenicis,* and *B. yothersi* vectors of *Citrus leprosis virus* (CiLV) into the endangered area via Tahiti lime imported from Brazil is Low.

4. Summary and Conclusions of Risk Assessment

Of the organisms associated with Tahiti lime worldwide and present in the export area, we identified two organisms that are quarantine pests for the PRA area, are likely to exceed the threshold for unacceptable consequences in the PRA area, and have reasonable likelihoods of following the commodity pathway (Table 3). Thus, these pests are candidates for risk management. These results represent a baseline estimate of the risks associated with the import commodity pathway as described in section 1.4.

Table 3. Summary of pests selected for further evaluation and determined to be candidates for risk management. All of these pests meet the threshold for unacceptable consequences of introduction and have reasonable likelihoods of following the commodity pathway.

Pest type	Taxonomy	Scientific name	Likelihood of Introduction overall rating
Arthropod	Acari: Tenuipalpidae	*Brevipalpus californicus*, *B. obovatus*, *B. papayensis*, *B. phoenicis,* and *B. yothersi* [vectors of *Citrus leprosis virus* (CiLV)]	Low

Detailed examination and choice of appropriate phytosanitary measures to mitigate pest risk are not addressed in this document.

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6. Appendix

We found some evidence of the listed organisms being associated with Tahiti lime and present in Brazil. Because these organisms are not quarantine significant for the continental United States, Hawaii, Puerto Rico, or the U.S. Virgin Islands (PestID, 2019; or as defined by ISPM 5, IPPC, 2018), we did not list them in Table 1 of this risk assessment. Moreover, we did not evaluate the strength of the evidence for their association with Tahiti lime or their presence in Brazil. 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 Brazil.

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

Organism	In Brazil	In U.S.	Host Association	Notes
MITE: Acaridae *Tyrophagus putrescentiae* (Schrank)	Rios, 2017	CABI, 2020	Rios, 2017	
MITE: Eriophyidae *Phyllocoptruta oleivora* Ashmead	Quiros-Gonzalez, 2000	CABI, 2020	Quiros-Gonzalez, 2000	
MITE: Tarsonemidae *Polyphagotarsonemus latus* (Banks)	Rios, 2017	CABI, 2020	Gerson, 1992	
MITE: Tetranychidae *Eutetranychus banksi* (McGregor)	Rios, 2017	CABI, 2020	Rios, 2017	
MITE: Tetranychidae *Panonychus citri* (McGregor)	Rios, 2017; Zanardi et al., 2018	CABI, 2020	Childers and Abou-Setta, 1999	
MITE: Tetranychidae *Tetranychus mexicanus* McGregor	Rios, 2017; Quiros-Gonzalez, 2000	EPPO, 2020	Rios, 2017; Quiros-Gonzalez, 2000	
MITE: Tetranychidae *Tetranychus urticae* Koch	CABI, 2020	CABI, 2020	Gutiérrez, 2015	
INSECT: Coleoptera: Curculionidae *Naupactus godmanni* (Crotch) syn.: *N. cervinus* Boheman	CABI, 2020; Lanteri et al., 2002	Gyeltshen and Hodges, 2009	CABI, 2020; López et al., 2014	
INSECT: Hemiptera: Aleyrodidae *Aleurodicus dispersus* Russell	CABI, 2020	CABI, 2020	Dupin, 2017	No evidence of presence in the U.S. Virgin Islands.

Organism	In Brazil	In U.S.	Host Association	Notes
INSECT: Hemiptera: Aleyrodidae *Aleurothrixus floccosus* Maskell	MAPA, 2012	CABI, 2020	Dupin, 2017	
INSECT: Hemiptera: Aleyrodidae *Aleurotrachelus trachoides* (Back)	Kumar et al., 2016	Kumar et al., 2016	Vieira Lima, 2018	
INSECT: Hemiptera: Aleyrodidae *Dialeurodes citri* (Ashmead)	dos Santos Pulici, 2018; MAPA, 2012	CABI, 2020	dos Santos Pulici, 2018	No evidence of presence in Hawaii or the U.S. Virgin Islands.
INSECT: Hemiptera: Aleyrodidae *Singhiella citrifolii* Morgan, syn.: *Dialeurodes citrifolii* (Morgan)	Cassino and Rodigues, 2005; MAPA, 2012; Sombra et al., 2018	Nguyen et al., 2007	Peña and Baranowski, 1992	No evidence of presence in Hawaii and the U.S. Virgin Islands.
INSECT: Hemiptera: Aphididae *Aphis fabae* Scopoli syn.: *A. citricola* Van Der Goot	CABI, 2020	CABI, 2020	Almaguer-Vargas and Ayala-Garay, 2014	No evidence of presence in U.S. Virgin Islands.
INSECT: Hemiptera: Aphididae *Aphis spiraecola* Patch	CABI, 2020	CABI, 2020	Godoy-Ceja and Cortex-Madrigal, 2018; Vargas et al., 2015	
INSECT: Hemiptera: Aphididae *Myzus persicae* (Sulzer)	CABI, 2020	CABI, 2020	Gutiérrez, 2015	No evidence of presence in the U.S. Virgin Islands.
INSECT: Hemiptera: Aphididae *Toxoptera aurantii* (Boyer de Fonscolombe) syn.: *Aphis aurantii* (Boyer de Fonscolombe)	MAPA, 2012	CABI, 2020	Cambero-Nava et al., 2019; Godoy-Ceja and Cortex-Madrigal, 2018; Vargas et al., 2015	
INSECT: Hemiptera: Cicadellidae *Hortensia similis* (Walker) syn.: *Cicadella similis* (Walker)	Maes, 2004	Genung and Mead, 1969; Mariño-Cárdenas et al., 2010; Osborn, 1935	Fernandes et al., 2010	No evidence of presence in Hawaii.

Organism	In Brazil	In U.S.	Host Association	Notes
INSECT: Hemiptera: Coccidae *Ceroplastes cirripediformis* Comstock	García Morales et al., 2016	García Morales et al., 2016	Dupin, 2017	
INSECT: Hemiptera: Coccidae *Coccus hesperidum* L.	MAPA, 2012	García Morales et al., 2016	Fernández, 2016	
INSECT: Hemiptera: Coccidae *Coccus viridis* (Green)	MAPA, 2012	García Morales et al., 2016	Dupin, 2017; Vargas et al., 2015	
INSECT: Hemiptera: Coccidae *Saissetia coffeae* (Walker)	García Morales et al., 2016	García Morales et al., 2016	Vargas et al., 2015	
INSECT: Hemiptera: Coccidae *Saissetia oleae* Olivier	García Morales et al., 2016	García Morales et al., 2016; CABI, 2020	Phuong, 2018	
INSECT: Hemiptera: Diaspididae[3] *Aonidiella aurantii* (Maskell)	Bock and Tarrag, 1995	n/a	Bock and Tarrag, 1995	
INSECT: Hemiptera: Diaspididae *Aonidiella comperei* McKenzie	García Morales et al., 2016	n/a	Ramos-Portilla and Caballero, 2017	
INSECT: Hemiptera: Diaspididae *Chrysomphalus aonidum* (L.) syn. *C. ficus* Ashmead	MAPA, 2012	n/a	Fernández, 2016	
INSECT: Hemiptera: Diaspididae *Lepidosaphes beckii* Newman, syn. *Mytilococcus beckii* Lupo	Bock and Tarrag, 1995	n/a	Bock and Tarrag, 1995	

[3] All armored scales (Diaspididae) are non-actionable at U.S. ports of entry on fruits and vegetables for consumption (NIS, 2008). Because they are non-actionable, we did not need to determine whether they occur in the United States

Organism	In Brazil	In U.S.	Host Association	Notes
INSECT: Hemiptera: Diaspididae *Lepidosaphes gloverii* (Packard) syn. *Mytilococcus gloverii* Lindinger	Bock and Tarrag, 1995	n/a	Almaguer-Vargas and Ayala-Garay, 2014; Bock and Tarrag, 1995; González et al., 2005	
INSECT: Hemiptera: Diaspididae *Parlatoria cinerea* Hadden	García Morales et al., 2016	n/a	PestID, 2020a	
INSECT: Hemiptera: Diaspididae *Parlatoria pergandii* Comstock	Bock and Tarrag, 1995; MAPA, 2012	n/a	Bock and Tarrag, 1995	
INSECT: Hemiptera: Diaspididae *Parlatoria ziziphi* (Lucas)	García Morales et al., 2016	n/a	PestID, 2020a	
INSECT: Hemiptera: Diaspididae *Pinnaspis aspidistrae* (Signoret)	Almeida et al., 2018; Bock and Tarrag, 1995; MAPA, 2012	n/a	Almeida et al., 2018; Bock and Tarrag, 1995	
INSECT: Hemiptera: Diaspididae *Pseudaonidia trilobitiformis* (Green)	García Morales et al., 2016; MAPA, 2012	n/a	Mille et al., 2016	
INSECT: Hemiptera: Diaspididae *Selenaspidus articulatus* (Morgan)	Almeida et al., 2018; MAPA, 2012	n/a	Almeida et al., 2018; Vargas et al., 2015	
INSECT: Hemiptera: Diaspididae *Unaspis citri* (Comstock)	Bock and Tarrag, 1995; MAPA, 2012	n/a	Bock and Tarrag, 1995; Dupin, 2017	
INSECT: Hemiptera: Margarodidae *Icerya purchasi* Maskell, syn.: *Pericerya purchasi* Ortega	García Morales et al., 2016	García Morales et al., 2016; Nakahara, 1983	Godoy-Ceja and Cortex-Madrigal, 2018	
INSECT: Hemiptera: Pseudococcidae *Ferrisia virgata* (Cockerell)	García Morales et al., 2016	García Morales et al., 2016; CABI, 2020	Dupin, 2017; Kondo et al., 2008	

Organism	In Brazil	In U.S.	Host Association	Notes
INSECT: Hemiptera: Pseudococcidae *Planococcus citri* (Risso)	MAPA, 2012; García Morales et al., 2016	García Morales et al., 2016	Fernández, 2016; Kondo et al., 2008; Peña and Baranowski, 1992	
INSECT: Hymenoptera: Formicidae *Solenopsis geminata* (F.)	CABI, 2020	CABI, 2020	Almaguer-Vargas and Ayala-Garay, 2014	
INSECT: Lepidoptera: Papilionidae *Papilio cresphontes* Cramer	Gantes et al., 2013	CABI, 2020	Fernández, 2016; Godoy-Ceja and Cortex-Madrigal, 2018	No evidence of presence in Hawaii, Puerto Rico, or the U.S. Virgin Islands.
INSECT: Lepidoptera: Pyralidae *Amyelois transitella* (Walker)	Maes, 2004; EPPO, 2016	EPPO, 2016	Lara-Villalón et al., 2017	No evidence of presence in Hawaii, Puerto Rico, or the U.S. Virgin Islands.
INSECT: Thysanoptera: Thripidae *Chaetanaphothrips orchidii* (Moulton)	MAPA, 2012	CABI, 2020	Hernández-Ayar et al., 2009	No evidence of presence in the U.S.
INSECT: Thysanoptera: Thripidae *Frankliniella insularis* (Franklin)	Maes, 2004	CABI, 2020; Hoddle et al., 2012	Hernández-Ayar et al., 2009	No evidence of presence in the U.S. Virgin Islands.
FUNGUS *Aithaloderma citri* (Briosi & Pass.) Woron, syn.: *Capnodium citri* Penz.	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Alternaria alternata* (Fr.: Fr.) Keissl. syn.: *A. citri* Ellis & N. Pierce	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Armillaria mellea* Vahl: Fr.) P. Kumm.	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020; Timmer et al., 2000	
FUNGUS *Aspergillus flavus* Link: Fr.	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	

Organism	In Brazil	In U.S.	Host Association	Notes
FUNGUS *Botryosphaeria dothidea* (Moug.: Fr.) Ces. & De Not.	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Botrytis cinerea* Pers.: Fr.	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Colletotrichum acutatum* Simmonds ex Simmonds	CABI, 2020; MAPA, 2012; Mendes and Urben, 2019	CABI, 2020	Mendes and Urben, 2019; CABI, 2020	
FUNGUS *Diaporthe citri* (H.S. Fawc.) F.A. Wolf	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Diaporthe rudis* (Fr.: Fr.) Nitschke syn.: *D. medusaea* Nitschke	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Eremothecium coryli* (Peglion) Kurtzman) syn.: *Nematospora coryli* Peglion	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Fusarium solani* (Mart.) Sacc.	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Glomerella cingulata* (Stonem.) Spauld. & Schrenk, syn.: *Colletotrichum gloeosporioides* (Penz.) Penz. & Sacc.	Farr and Rossman, 2020; Lima et al., 2011	Farr and Rossman, 2020; McMillan Jr. and Timmer, 1989	Farr and Rossman, 2020	
FUNGUS *Lasiodiplodia theobromae* (Pat.) Griffon & Maubl. syn.: *Botryosphaeria rhodina* (Berk. & M.A. Curtis) Arx	Mendes and Urben, 2019; Correia et al., 2016	Farr and Rossman, 2020;	Farr and Rossman, 2020; Correia et al., 2016	
FUNGUS *Macrophomina phaseolina* (Tassi) Goid.	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	

Organism	In Brazil	In U.S.	Host Association	Notes
FUNGUS *Neoscytalidium dimidiatum* (Penz.) Crous & Slippers syn.: *Hendersonula toruloidea* Nattrass	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Phyllosticta capitalense* Henn.	Farr and Rossman, 2019	Farr and Rossman, 2019	Farr and Rossman, 2019	
FUNGUS *Phytophthora citrophthora* (R.E. Sm. & E.H. Sm.) Leonian	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Phytophthora nicotianae* Breda de Haan, syn.: *P. nicotianae* var. *parasitica* (Dastur) G.M. Waterhouse	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Penicillium digitatum* (Pers.: Fr.) Sacc.	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Penicllium italicum* Wehmer	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Pythium aphanidermatum* (Edson) Fitzp.	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Rhizoctonia solani* J. G. Kuhn syn.: *Thanatephorus cucumeris* (A.B. Frank) Donk, *Pellicularia filamentosa* (Pat.) D.P. Rogers	Farr and Rossman, 2020	Farr and Rossman, 2019	Farr and Rossman, 2020	
FUNGUS *Schizophyllum commune* Fr.: Fr.	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
FUNGUS *Sclerotinia sclerotiorum* (Lib.) de Bary	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	

Organism	**In Brazil**	**In U.S.**	**Host Association**	**Notes**
FUNGUS *Thielaviopsis basicola* (Berk. & Broome) Ferraris syn.: *Chalara elegans* Nag Raj & W.B. Kendr.	Farr and Rossman, 2020	Farr and Rossman, 2020	Farr and Rossman, 2020; Timmer et al., 2000	
FUNGUS *Zasmidium citri-griseum* (F.E. Fisher) U. Braun, syn.: *Mycosphaerella citri* Whiteside	Mendes and Urben, 2019	Farr and Rossman, 2020	Farr and Rossman, 2020	
VIRUS *Closterovirus Citrus tristeza virus* (CTV)	CABI, 2020; MAPA, 2012	CABI, 2020; Timmer et al., 2000	CABI, 2020; Timmer et al., 2000	Non-actionable based on distribution.
VIROID *Pospiviroid Citrus exocortis viroid* (CEVd)	CABI, 2020; MAPA, 2012	CABI, 2020	Katsarou et al., 2020	