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

Interstate movement of fresh Persian lime (*Citrus latifolia*) from Hawaii into the rest of the United States for consumption

A Qualitative, Pathway Initiated Pest Risk Assessment

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Executive Summary

The purpose of this report is to assess the pest risks associated with the interstate movement of commercially produced fresh fruit of Persian lime, *Citrus latifolia* (Rutaceae), from Hawaii into the rest of the United States for consumption.

Based on the market access request submitted by Hawaii, we considered the pathway to include the following processes and conditions: commercially produced undamaged fresh fruit. Production, harvesting, and post-harvesting procedures, and shipping and storage conditions in the shipping area were not considered during this assessment. The pest risk ratings depend on the application of all conditions of the pathway as described in this document; fruit 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 Hawaii to develop a list of pests with quarantine significance for the rest of the United States. These are pests that occur in Hawaii on any host and are associated with the commodity plant species anywhere in the world.

The following organisms are likely to follow the pathway but were not assessed in this document because they have already been determined to pose an unacceptable risk to the rest of the United States. Domestic regulations are in place for these pests:

Pest type	Taxonomy	Scientific name	Code of Federal Regulations
Arthropod	Diptera: Tephritidae	*Bactrocera dorsalis* (Hendel)	7 CFR § 301.32 (2024)

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

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1. Introduction

1.1. Background

The purpose of this report is to present PPQ's assessment of the pest risk associated with the interstate movement of commercially produced fresh fruit of Persian lime (*Citrus latifolia* (Yu.Tanaka ex Yu.Tanaka) Yu.Tanaka) from Hawaii (referred to as the shipping area) into the rest of 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, 2021). The use of biological and phytosanitary terms is consistent with ISPM No. 5, "Glossary of Phytosanitary Terms" (IPPC, 2024).

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 interstate movement of fruits and vegetables for consumption from the State of Hawaii into the rest of the United States is regulated under Title 7 of the Code of Federal Regulations, Part 318 – State of Hawaii and Territories Quarantine Notices (7 CFR Part 318, 2024) and as described in the manual for Hawaii (USDA APHIS, 2024), and in the Agricultural Commodity Import Requirements (ACIR, 2024). Under this regulation, the entry of Persian lime (as *Citrus* spp.) from Hawaii into the PRA area (interstate movement) is authorized provided that one of two post-harvest phytosanitary treatments are applied: forced hot air (FHA, T103-b-1) or irradiation at 150 Gy (T105-a-1), against all fruit flies in the family Tephritidae) (ACIR, 2024). However, FHA is not operationally feasible because there are no facilities in Hawaii that offer it, and, since 2008, the interstate movement of *Citrus* out of Hawaii has been allowed using the approved irradiation treatment.

This commodity risk assessment was initiated in response to a request by Mahi Pono, a Maui farming company, to change the federal regulations to allow entry using only a targeted systems approach (MAR, 2024).

1.3. Potential weediness of the commodity

In some cases, a commodity moving interstate from Hawaii 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 and parts of the U.S., (b) the commodity plant species is widely established or cultivated in the PRA area, or (c) the plant part(s) cannot easily propagate on its

[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.

own or be propagated. We determined that the weed risk of Persian lime does not need to be analyzed because this commodity is already enterable from several countries (ACIR, 2024).

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 moved interstate. The following description includes those conditions and processes the commodity undergoes from production through interstate movement 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 interstate movement of commercially produced fresh fruit of *Citrus latifolia* for consumption.

1.4.2. Summary of the production, harvest, post-harvest, shipping, and storage conditions considered
Production, harvesting, and post-harvesting procedures, and shipping and storage conditions in the shipping 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 entire United States. This list includes pests that are present in Hawaii on any host and are known to be associated with *Citrus latifolia* 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 Hawaii. 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 Hawaii and its association with *Citrus latifolia*. 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 *Citrus latifolia* anywhere in the world and present in Hawaii on any host.

Pest name	Presence in Hawaii	Host association	Plant part(s) [2]	Considered further?[3]
INSECT: Coleoptera: Cerambycidae *Acalolepta aesthetica* (Olliff)	Collington et al., 2019; Matsunaga and Chun, 2020	Matsunaga and Chun, 2020	Trunk (Matsunaga and Chun, 2020)	No.
INSECT: Diptera: Tephritidae *Bactrocera dorsalis* (Hendel)	**Barr et al., 2014; Heu, 2007; Vargas et al., 2010**	**Leblanc et al., 2012; 2013; Vargas et al., 2007; 2012**	**Fruit (Vargas et al., 2007; 2012)**	**Yes.** **This pest can follow the pathway on fresh fruit and is regulated domestically under 7 CFR § 301.32(2024). We did not analyze this pest in this PRA because the USDA already acknowledges that this pest can be introduced on infested fruit.**
INSECT: Hemiptera: Aleyrodidae *Aleurocanthus woglumi* Ashby	Culliney et al., 2003; Heu, 2007	Aruna et al., 2017; Raga et al., 2011	Leaves (Aruna et al., 2017)	No. Present in the Unites States in Florida (Hart et al., 1978), Hawaii (Culliney et al., 2003), Texas (Meagher and French, 2004), Puerto Rico (Medina-Gaud et al., 1991). and the U.S. Virgin Islands (UVI, 2024).
INSECT: Hemiptera: Aphididae *Aphis citricidus* (Kirkaldy) syn. *Toxoptera citricidus* (Kirkaldy)	Garnsey et al., 1991; Heu, 2007	Dupin, 2017; Guidolin and Cônsoli, 2017; Montes-Rodríguez et al., 2020	Leaves, stems (of *Citrus* spp.; Yokomi et al., 1994)	No. Present in the United States in Florida, Hawaii, Puerto Rico and the U.S. Virgin Islands (CABI, 2024; Gottwald et al., 2002; Yokomi et al., 1994).

[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 Hawaii**	**Host association**	**Plant part(s)** [2]	**Considered further?**[3]
INSECT: Hemiptera: Coccidae *Ceroplastes rubens* Maskell	Ben-Dov, 1993; Heu, 2007; Nakahara, 1981; Zimmerman , 1948	Dupin, 2017	Branches, leaves, stems (Hamon and Williams, 1984)	No. Present in the United States in Florida, Hawaii, Puerto Rico and Guam (Ben-Dov, 1993; Hamon and Williams, 1984).
INSECT: Hemiptera: Liviidae [formerly Psyllidae] *Diaphorina citri* Kuwayama	Conant et al., 2009; Heu, 2007; Matsunaga, 2014	García Garduza et al., 2013; Montes-Rodríguez et al., 2020	Stems (García Garduza et al., 2013; Montes-Rodríguez et al., 2020)	No. Present in the United States in Alabama, Arizona, California, Florida, Georgia, Louisiana, Mississippi, Texas (APHIS, 2024; CABI, 2024), Puerto Rico and the U.S. Virgin Islands (CABI, 2024). This species vectors *Candidatus* Liberibacter asiaticus (citrus greening) and is regulated under Domestic Quarantine, restricted interstate movement (7 CFR § 301.76, 2024).
INSECT: Hemiptera: Pseudococcidae *Maconellicoccus hirsutus* (Green)	Ben-Dov, 1994; Heu, 2007	Cermeli et al., 2002	Fruit, leaves, stems. Plant parts based on general biology of the pest (Cermeli et al., 2002; Williams, 1996).	No. See Section 2.2 for additional information. No Action to St. Thomas (ARM, 2024).
INSECT: Thysanoptera: Thripidae *Frankliniella invasor* Sakimura	Heu, 2007; Sakimura, 1972	Montes-Rodríguez et al., 2020	Flowers (Montes-Rodríguez et al., 2020)	No. Present in the United States in Hawaii and Puerto Rico (Sakimura, 1972).

Pest name	Presence in Hawaii	Host association	Plant part(s) [2]	Considered further?[3]
INSECT: Thysanoptera: Thripidae *Pezothrips kellyanus* (Bagnall)	Heu, 2007; Mound, 2017; Mound et al., 2016	Arboleda Restan, 2022; Gutiérrez, 2015	Flowers, fruitlets (of citrus; Navarro-Campos et al., 2013)	No. Larvae are external feeders under the calyx of young fruitlets; the fruit scarring expands as the fruit grows. Mature larvae drop from the fruitlets to the soil where they pupate (Navarro-Campos et al., 2013).
INSECT: Thysanoptera: Thripidae *Thrips orientalis* (Bagnall)	Mound et al., 2016	Childers and Beshear, 1992	Flowers (Childers and Beshear, 1992)	No. Present in the United States in Florida, Guam and the U.S. Virgin Islands (Childers and Beshear, 1992; Mound et al., 2016).
INSECT: Thysanoptera: Thripidae *Thrips palmi* Karny	Heu, 2007; Mound et al., 2016	Childers and Beshear, 1992	Flowers (Childers and Beshear, 1992)	No. Present in the United States in Florida (Childers and Beshear, 1992).

2.2. Notes on pests identified in the pest list

Maconellicoccus hirsutus (Green) (Hemiptera: Pseudococcidae). The pink hibiscus mealybug (PHMB) is considered a quarantine pest when intercepted at ports of entry (ARM, 2024). However, PHMB is already established in most of the climatically suitable areas of the United States, including several U.S. states and territories (Alabama, California, Florida, Georgia, Guam, Hawaii, Louisiana, New York, Oklahoma, South Carolina, Tennessee and Texas, as well as American Samoa, Guam, Puerto Rico, and the U.S. Virgin Islands; Bográn and Ludwig, 2007; CABI, 2024; Garcia Morales et al., 2016; Setchell, 1924), so there are limited locations where it could be introduced where it does not already occur. Further, this species is not currently under any official control in the United States where established and, although potential impacts in the United States have been modeled (Ranjan, 2006), there is no past or recent evidence that it has caused significant economic or environmental harm in the United States. This is likely due to the successful establishment and suppressive actions of biological control agents that were introduced with it or otherwise already present in the United States (Amalin et al., 2009; Andreason et al., 2019; Beardsley, 1985; Kairo et al., 2000; Mani, 1989; Michaud and Evans, 2000; Reddy et al., 2009; Roltsch et al., 2006). In addition, although we found one report of PHMB being associated with *C. latifolia* (Cermeli et al., 2002), it is not commonly found on citrus (Diepenbrock and Ahmed, 2020). Because of a very limited remaining endangered area, lack of impacts and an official control program, and a weak association with *C. latifolia*, we did not consider this pest further.

2.3. Pests considered but not included on the pest list
Arthropods

2.3.1. Organisms with non-quarantine status

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

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

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

Arthropod

The Mediterranean fruit fly, *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae) is a quarantine species for the continental United States (ARM, 2024) that is present in Hawaii (Vargas et al., 2010). Although it is occasionally cited as a pest of *Citrus* spp., the only evidence we found for *C. latifolia* as a host was a laboratory study (de Sousa et al., 2020) where a slight amount of oviposition took place in the fruit. We found no evidence of *C. latifolia* as a host under field situations. Hence, lacking evidence for *C. latifolia* as a host in the field, we did not include it on Table 1.

Nipaecoccus viridis (Newstead) (Hemiptera: Pseudococcidae) is a quarantine pest for American Samoa and Puerto Rico and a non-quarantine pest for the mainland (ARM, 2024). This pest is present in the United States in Hawaii (Ahemed and Deeter, 2022; Ben-Dov, 1994), Florida (Ahmed et al., 2023; Deeter and Ahmed, 2023; Depenbrock and Ahmed, 2020), and Texas (Deeter and Ahmed, 2023). *Nipaecoccus viridis* has been reported from several species of citrus, including Key lime, *C. aurantifolia* (Ben-Dov, 1994; Deeter and Ahmed, 2023); however, we found no record of this species infesting *C. latifolia*. Hence, lacking evidence of *C. latifolia* as a host, we did not include it on Table 1.

Virus

Dichorhavirus orchidaceae (Orchid Fleck Virus - OFV) is categorized as quarantine for the continental United States and Puerto Rico (ARM, 2024). Ramos-Gonzalez et al. (2017) mention the association of OFV strains with *C. latifolia*, along with other *Citrus* spp. However, the cited resources from Ramos-Gonzalez et al. (2017) did not mention any association between OFV and *C. latifolia* (Cruz-Jaramillo et al., 2014; Ramos-Gonzalez et al., 2017; Roy et al., 2015a; Roy et al., 2015b). Beltran-Beltran et al. (2020) also mention an association between OFV with *C. latifolia*, but it only refers to ‘lime’ and did not distinguish between the two lime species mentioned (*C. latifolia* and *C. aurantifolia*). Lastly, another article evaluated the transmission of OFV by one of its known vectors (*Brevipalpus californicus*) to various *Citrus* spp. and did not observe any transmission of OFV to *C. latifolia* (García-Escamilla et al., 2018). Therefore, due

to the lack of evidence for host association of *C. latifolia* and OFV, we did not consider it further.

2.4. Pests selected for further analysis or already regulated

The following pests can follow the commodity pathway. However, they were not assessed because they were previously determined to pose an unacceptable risk to the PRA area and domestic regulations are in place. These pests are candidates for risk mitigation.

Pest type	Scientific name	Code of Federal Regulation
Arthropod	*Bactrocera dorsalis* (Hendel)	7 CFR § 301.32 (2024)

3. 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[a]	Notes
Arthropod	*Bactrocera dorsalis* (Hendel)	N/A	7 CFR § 301.32 (2024)

[a] N/A: The likelihood of introduction was not assessed for Select Agents and Program Pests - federal regulations are in place for these pests because they were previously determined to pose an unacceptable risk to U.S. agriculture or natural resources.

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.

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6. Appendix: Pests with non-quarantine status

We found evidence that the organisms listed below are associated with *Citrus latifolia* and are present in Hawaii; however, none are of quarantine significance for the United States (ARM, 2024, or as defined by ISPM No. 5 (IPPC, 2024)). Although we did not intensively evaluate the evidence, we provide references supporting each pest's potential presence in Hawaii, presence in the United States (if applicable), and association with *Citrus latifolia*. If any of the organisms are **not** present in the United States, we also provided justification for their non-quarantine status. Unless otherwise noted, these organisms are non-actionable at U.S. ports of entry (ARM, 2024).

Organism	**In Hawaii**	**In U.S.**	**Host Association**	**Notes**
MITE: Acaridae *Tyrophagus putrescentiae* (Schrank)	Garrett and Haramoto, 1967; Goff, 1987	CABI, 2024	Rios, 2017	N/A
MITE: Eriophyidae *Aceria sheldoni* (Ewing)	Garrett and Haramoto, 1967; Goff, 1987	CABI, 2024; Childers et al., 2017	CABI, 2024; Childers et al., 2017	The pest is established in the United States and is not under official control. Genus is Quarantine for all ports (ARM, 2024).
MITE: Eriophyidae *Phyllocoptruta oleivora* (Ashmead)	CABI, 2024; Garrett and Haramoto, 1967	CABI, 2024; Childers et al., 2017	Mesa Cabo et al., 2020; Mineiro and Raga, 2020; Montes-Rodríguez et al., 2020; Quiros-Gonzalez, 2000	N/A
MITE: Tarsonemidae *Polyphagotarsonemus latus* (Banks)	Garrett and Haramoto, 1967; Goff, 1987; Heu, 2007	CABI, 2024	Mesa Cabo et al., 2020; Montes-Rodríguez et al., 2020; Rios, 2017	N/A

Organism	In Hawaii	In U.S.	Host Association	Notes
MITE: Tenuipalpidae *Brevipalpus californicus* (Banks)	Garrett and Haramoto, 1967; Heu, 2007; Jeppson et al., 1975	CABI, 2024	Childers and Ueckermann, 2020; León and Mondaca, 2020; Salinas-Vargas et al., 2016	N/A
MITE: Tenuipalpidae *Brevipalpus obovatus* Donnadieu	Garrett and Haramoto, 1967; Goff, 1987; Heu, 2007	CABI, 2024	Mesa and Valencia, 2013	N/A
MITE: Tenuipalpidae *Brevipalpus phoenicis* (Geijskes); syns. *Brevipalpus papayensis* Baker; *Brevipalpus yothersi* Baker [per GBIF, 2024]	Beard et al., 2015; Garrett and Haramoto, 1967; Goff, 1987; Heu, 2007	CABI, 2024	Childers and Ueckermann, 2020; Mineiro and Raga, 2020; Montes-Rodríguez et al., 2020; Salinas-Vargas et al., 2013; 2016	N/A
MITE: Tetranychidae *Eutetranychus banksi* (Mcgregor)	Garrett and Haramoto, 1967; Goff, 1987	CABI, 2024; Childers and Ueckermann, 2020	Childers and Ueckermann, 2020; Rios, 2017	N/A
MITE: Tetranychidae *Panonychus citri* (McGregor)	Garrett and Haramoto, 1967; Goff, 1987	CABI, 2024	Mineiro and Raga, 2020; Montes-Rodríguez et al., 2020; Rios, 2017	N/A
MITE: Tetranychidae *Tetranychus urticae* Koch	CABI, 2024; Heu, 2007	CABI, 2024	Arboleda Restan, 2022; Gutiérrez, 2015	N/A

Organism	**In Hawaii**	**In U.S.**	**Host Association**	**Notes**
INSECT: Coleoptera: Curculionidae *Naupactus cervinus* Boheman	Rodriguero et al., 2023	CABI, 2024; Rodriguero et al., 2023	CABI, 2024; Sumano López et al., 2014	N/A
INSECT: Hemiptera: Aleyrodidae *Aleurodicus dispersus* Russell	CABI, 2024; Evans, 2008; Heu, 2007	CABI, 2024; Evans, 2008	Dupin, 2017	N/A
INSECT: Hemiptera: Aleyrodidae *Aleurothrixus floccosus* (Maskell)	Evans, 2008; Paulson and Beardsley, 1986	CABI, 2024	Dupin, 2017; Montes-Rodríguez et al., 2020	N/A
INSECT: Hemiptera: Aleyrodidae *Aleurotrachelus trachoides* (Back)	CABI, 2024; Evans, 2008; Heu, 2007	CABI, 2024; Evans, 2008	Vieira-Lima, 2018	N/A
INSECT: Hemiptera: Aleyrodoidae *Singhiella citrifolii* (Morgan); syn. *Dialeurodes citrifolii* (Morgan) [per CABI, 2024]	CABI, 2024; Evans, 2008; Heu, 2007	CABI, 2024; Evans, 2008; Peña and Baranowski, 1992	Montes-Rodríguez et al., 2020; Peña and Baranowski, 1992	N/A
INSECT: Hemiptera: Aphidae *Aphis gossypii* Glover	CABI, 2024; Heu, 2007	CABI, 2024	Montes-Rodríguez et al., 2020	N/A
INSECT: Hemiptera: Aphidae *Aphis spiraecola* Patch	CABI, 2024; Heu, 2007	CABI, 2024	Dupin, 2017; Montes-Rodríguez et al., 2020	N/A
INSECT: Hemiptera: Aphidae *Myzus persicae* (Sulzer)	CABI, 2024; Heu, 2007	CABI, 2024	Gutiérrez, 2015	N/A
INSECT: Hemiptera: Aphidae *Aphis aurantii* Boyer de Fonscolombe; syn. *Toxoptera aurantii* (Bayer de Foscolombe) [per Favret, 2024]	CABI, 2024; Heu, 2007	CABI, 2024	Dupin, 2017; Montes-Rodríguez et al., 2020	N/A

Organism	In Hawaii	In U.S.	Host Association	Notes
INSECT: Hemiptera: Coccidae *Ceroplastes cirripediformis* Comstock	Ben-Dov, 1993; Heu, 2007	Ben-Dov, 1993; Hammon and Williams, 1984	Dupin, 2017	N/A
INSECT: Hemiptera: Coccidae *Coccus hesperidum* (Linnaeus)	Ben-Dov, 1993; CABI, 2024; Heu, 2007	CABI, 2024; Ben-Dov, 1993; Hammon and Williams, 1984	Montes-Rodríguez et al., 2020	N/A
INSECT: Hemiptera: Coccidae *Coccus viridis* (Green)	Ben-Dov, 1993; García Morales et al., 2016; Heu, 2007	Ben-Dov, 1993; García Morales et al., 2016	Dupin, 2017	N/A
INSECT: Hemiptera: Coccidae *Kilifia acuminata* (Signoret)	CABI, 2024; Ben-Dov, 1993	Ben-Dov, 1993	Montes-Rodríguez et al., 2020	N/A
INSECT: Hemiptera: Coccidae *Saissetia oleae* (Olivier)	CABI, 2024; Ben-Dov, 1993	CABI, 2024; Ben-Dov, 1993	Donkersley et al., 2018	N/A
INSECT: Hemiptera: Diaspididae[4] *Aonidiella aurantii* (Maskell)	Love and Paul, 2013	García Morales et al., 2016;	García Morales et al., 2016; Jansen and Alferink, 2023	N/A
INSECT: Hemiptera: Diaspididae[4] *Chrysomphalus aonidum* (Linnaeus)	Heu, 2007; Kondo, 2022	CABI, 2024; Kondo, 2022	Montes-Rodríguez et al., 2020	N/A
INSECT: Hemiptera: Diaspididae[4] *Lepidosaphes beckii* (Newman)	Heu, 2007; Kondo, 2022; Nakahara, 1981	García Morales et al., 2016; Kondo, 2022	Jansen and Alferink, 2023; Montes-Rodríguez et al., 2020	N/A

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

Organism	**In Hawaii**	**In U.S.**	**Host Association**	**Notes**
INSECT: Hemiptera: Diaspididae[4] *Lepidosaphes gloveri* (Packard)	CABI, 2024; Kondo, 2022	CABI, 2024; Kondo, 2022	Montes-Rodríguez et al., 2020	N/A
INSECT: Hemiptera: Diaspididae[4] *Parlatoria pergandii* Comstock	Kondo, 2022 Heu, 2007; Nakahara, 1981	García Morales et al., 2016; Kondo, 2022	Martins et al., 2022; Montes-Rodríguez et al., 2020	N/A
INSECT: Hemiptera: Diaspididae[4] *Parlatoria ziziphi* (Lucas)	Heu, 2007; Kondo, 2022; Nakahara, 1981	García Morales et al., 2016; Kondo, 2022	Jansen and Alferink, 2023; Montes-Rodríguez et al., 2020	N/A
INSECT: Hemiptera: Diaspididae[4] *Pinnaspis aspidistrae* (Signoret)	Heu, 2007; Nakahara, 1981	García Morales et al., 2016	Cassino and Rodrigues, 2005	N/A
INSECT: Hemiptera: Diaspididae[4] *Pinnaspis strachani* (Cooley)	Heu, 2007; Kondo, 2022; Nakahara, 1981	CABI, 2024; Kondo, 2022	Montes-Rodríguez et al., 2020	N/A
INSECT: Hemiptera: Diaspididae[4] *Pseudaonidia trilobitiformis* (Green)	Kondo, 2022; Matsunaga et al., 2019	Kondo, 2022	Mille et al., 2016; Montes-Rodríguez et al., 2020	N/A
INSECT: Hemiptera: Diaspididae[4] *Unaspis citri* (Comstock)	CABI, 2024; García Morales et al., 2016; Kondo, 2022	CABI, 2024; García Morales et al., 2016; Kondo, 2022	Dupin, 2017; Martins et al., 2022	N/A
INSECT: Hemiptera: Monophlebidae *Icerya purchasi* Maskell	CABI, 2024; Zimmerman, 1948	CABI, 2024	Dupin, 2017; Montes-Rodríguez et al., 2020	N/A
INSECT: Hemiptera: Pseudococcidae *Planococcus citri* (Risso) syn. *Pseudococcus citri* (Risso) [per García Morales et al., 2016]	Heu, 2007; Zimmerman, 1948	CABI, 2024	Montes-Rodríguez et al., 2020	N/A

Organism	**In Hawaii**	**In U.S.**	**Host Association**	**Notes**
INSECT: Hemiptera: Pseudococcidae *Pseudococcus jackbeardsleyi* Gimpel and Miller	CABI, 2024; García Morales et al., 2016	CABI, 2024; García Morales et al., 2016	Jansen and Alferink, 2023; Montes-Rodríguez et al., 2020	N/A
INSECT: Hemiptera: Pseudococcidae *Pseudococcus odermatti* Miller & Williams	Heu, 2007; Miller and Williams, 1997	Miller and Williams, 1997	Miller and Williams, 1997	N/A
INSECT: Lepidoptera: Gracillariidae *Phyllocnistis citrella* Stainton Citrus Leafminer	Heu, 2007; Nagamine and Heu, 2003	CABI, 2024; Xiao et al., 2007	Dupin, 2017; Montes-Rodríguez et al., 2020	N/A
INSECT: Thysanoptera: Thripidae *Frankliniella insularis* (Franklin)	Heu, 2007; Mound et al., 2017	CABI, 2024; Childers and Beshear, 1992	Childers and Beshear, 1992; Montes-Rodríguez et al., 2020	N/A
INSECT: Thysanoptera: Thripidae *Heliothrips haemorrhoidalis* (Bouche)	CABI, 2024; Heu, 2007	CABI, 2024	Hernández-Ayar et al., 2009	N/A
INSECT: Thysanoptera: Thripidae *Scirtothrips citri* (Moulton)	Heu, 2007; Mound et al., 2017	CABI, 2024; Mound et al., 2017	Mound et al., 2017	N/A
CHROMISTAN *Cephaleuros virescens* Künze	Keith et al., 2006	Morton, 1987	Dewdney, 2020; Marlatt et al., 1983; Mossler and Nesheim, 2001	N/A
CHROMISTAN *Phytophthora nicotianae* Breda de Haan; syn. *Phytophthora parasitica*	Raabe et al., 1981	Serrato-Diaz et al., 2022	Tarnowski et al., 2009	N/A

Organism	**In Hawaii**	**In U.S.**	**Host Association**	**Notes**
CHROMISTAN *Phytophthora palmivora* (E.J. Butler)	CABI, 2024; Puig et al., 2021b	CABI, 2024; Puig et al., 2021b; de Jensen et al., 2023; Puig, 2023	Tarnowski et al., 2009	N/A
FUNGUS *Diaporthe citri* (F. A. Wolf); Anamorph: *Phomopsis citri*	Nelson, 2008a; Raabe et al., 1981	CABI, 2024; EPPO, 2024	Marlatt et al., 1983; Tarnowski et al., 2009	Commonly called melanose of citrus (Tarnowski et al., 2009).
FUNGUS *Elsinoë fawcetti*; Syn. *Sphaceloma citri* (E.E. Butler) Cif. Anamorph: *Sphaceloma fawcettii* Jenkins	Nelson, 2008b; Raabe et al., 1981	CABI, 2024	Elliott et al., 2023	N/A
FUNGUS *Glomerella cingulata* (Stonem.) Spauld. & Schrenk; syn. *Colletotrichum gloeosporioides* (Penz.) Sacc.	CABI, 2024; Raabe et al, 1981	CABI, 2024	Villa-Ruano et al., 2024	N/A
FUNGUS *Fusarium solani* (Mart.)	Swett and Uchida, 2015	Jensen and Abad, 2009; Vélez-Rodríguez and Rivera-Vargas, 2007	Carreras-Villaseñor et al., 2022	N/A
FUNGUS *Lasiodiplodia theobromae* (Pat.) Griffon & Maubl.	CABI, 2024; Nishijima, 1993; Puig et al., 2021a	CABI, 2024; Puig et al., 2021a; Puig, 2023; Serrato-Diaz et al., 2013	Bautista-Cruz et al., 2018	N/A
FUNGUS *Penicillium digitatum* (Pers.: Fr.) Sacc.	CABI, 2024	CABI, 2024	CABI, 2024; Villa-Ruano et al., 2024	N/A

Organism	In Hawaii	In U.S.	Host Association	Notes
FUNGUS *Penicillium italicum*	CABI, 2024; Raabe et al., 1981	CABI, 2024	Sandoval-Contreras et al., 2018	N/A
NEMATODE *Tylenchulus semipenetrans*	EPPO, 2024; Raabe et al., 1981	CABI, 2024	McSorley et al., 1982; Torres-López et al., 2024)	N/A
VIRUS *Closterovirus tristezae*; syn. Citrus tristeza virus (CTV)	Melzer et al., 2005; 2010	CABI, 2024; EPPO, 2024; Yokomi et al., 1994	Contreras-Maya et al., 2022	The pest is established in the United States and is not under official federal control.