



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

Importation of fresh immature coconut (*Cocos nucifera* L.) from Viet Nam into 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 importing commercially produced immature fresh fruits of coconut, *Cocos nucifera* L. (Aracaceae), from Viet Nam into the United States for consumption.

Based on the market access request submitted by Viet Nam, we considered the pathway to include the following processes and conditions: the harvest of immature coconut fruit, where obviously rotten or fallen fruit are discarded in the field. We considered the post-harvest treatment to be removal of at least 75% of the outermost layer (exocarp) and trimming of the husk (mesocarp), resulting in the final marketable product. Immature coconut fruit has a green husk that turns brown at peak maturity. We considered immature fruit where the green husk is completely removed. The pest risk ratings depend on the application of all conditions of the pathway as described in this document; immature fresh fruits of coconut 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 Viet Nam to develop a list of pests with quarantine significance for the PRA area. These are pests that occur in Viet Nam on any host and are associated with the commodity plant species anywhere in the world.

We found no organisms that met the threshold for unacceptable consequences of introduction and can follow the pathway.

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 importation of commercially produced immature fresh fruit of coconut (*Cocos nucifera* L.) from Viet Nam (referred to as the export area) into the United States¹ (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, 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 319.56-3 (7 CFR §319.56) and as described in the [Agricultural Commodity Import Requirements](#). Under this regulation, the entry of coconut fruit from Viet Nam into the United States is not authorized. This commodity risk assessment was initiated in response to a request by the government of Viet Nam to change the federal regulation to allow entry (Trung, 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 United States from other countries, (b) the commodity plant species is widely established (native or naturalized) 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 the commodity does not need to be analyzed because coconut is enterable from other countries to the United States (ACIR, 2022).

1.4. Description of the pathway

¹The *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.

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 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 immature fresh fruit of coconut for consumption.

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

Based on the market access submitted by Viet Nam (Trung, 2021), we considered the pathway to include the harvest of immature coconut fruit, where obviously rotten or fallen fruit are discarded in the field. We considered the post-harvest treatment to be removal of at least 75% of the outermost layer (exocarp) and trimming of the husk (mesocarp) (Trung, 2021), resulting in the final marketable product. Immature coconut fruit has a green husk that turns brown at peak maturity (Siriphanich et al., 2011). We considered immature fruit where the green husk is completely removed.

2. Pest List and Pest Categorization

The pest list is a compilation of plant pests of quarantine significance to the PRA area. This list includes pests that are present in Viet Nam on any host and are known to be associated with *Cocos nucifera* L. 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 United States 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 Viet Nam. We listed the pests that are of quarantine significance to the United States in Table 1. For each pest, we provided evidence for the pest’s presence in Viet Nam and its association with *Cocos nucifera*. 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 *Cocos nucifera* anywhere in the world and present in Viet Nam on any host.

Pest name	Presence in Viet Nam	Host association	Plant part(s) ²	Considered further? ³
MITE: Trombidiformes: Tetranychidae <i>Eutetranychus orientalis</i> (Klein)	Bellotti et al., 2012	CABI, 2022	Leaves (CABI, 2022)	No.
INSECT: Coleoptera: Chrysomelidae <i>Brontispa longissima</i> (Gestro)	Trung, 2021	Singh and Rethinam, 2004	Leaves (Singh and Rethinam, 2004)	No.
INSECT: Coleoptera: Curculionidae <i>Rhynchophorus ferrugineus</i> (Oliver)	CABI, 2022	CABI, 2022	Stem (CABI, 2022)	No.
INSECT: Coleoptera: Curculionidae <i>Xyleborus perforans</i> (Wollaston)	CABI, 2022	CABI, 2022	Stems (CABI, 2022)	No.
INSECT: Coleoptera: Curculionidae <i>Xyleborus similis</i> Ferrari	CABI, 2022	CABI, 2022	Stems (CABI, 2022)	No.
INSECT: Coleoptera: Scarabaeidae <i>Anomala cupripes</i> Hope	Waterhouse, 1993	Waterhouse, 1993	Leaves (Waterhouse, 1993)	No.
INSECT: Coleoptera: Scarabaeidae <i>Oryctes rhinoceros</i> (Linnaeus)	Trung, 2021	Waterhouse, 1993	Stem, leaves (CABI, 2022)	No.
INSECT: Coleoptera: Scarabaeidae <i>Xylotrupes gideon</i> (Linnaeus)	Trung, 2021	Bedford, 1974	Stems, flowers (Bedford, 1974)	No.
INSECT: Hemiptera: Aleyrodidae <i>Aleurocanthus spiniferus</i> (Quaintance)	PHÁP and CÚU, 2011	Evans, 2007	Leaves (Health et al., 2018)	No. Present in Hawaii (Paulson and Kumashiro, 1985).
INSECT: Hemiptera: Aleyrodidae <i>Aleurocanthus woglumi</i> Ashby	CABI, 2022	CABI, 2022	Leaves (Schrader et al., 2019)	No. Present in Florida, Hawaii, Texas (Schrader et al., 2019), and Puerto Rico (Evans, 2008).
INSECT: Hemiptera: Aleyrodidae <i>Aleurodicus destructor</i> Mackie	CABI, 2022	CABI, 2022	Leaves (CABI, 2022)	No.
INSECT: Hemiptera: Coccidae <i>Ceroplastes rubens</i> Maskell	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Leaves, stems, twigs (Miller et al., 2014)	No.

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 Viet Nam	Host association	Plant part(s) ²	Considered further? ³
INSECT: Hemiptera: Coccidae <i>Ceroplastes rusci</i> (Linnaeus)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Leaves, stems, branches, and Fruit (Miller et al., 2014)	No. The insect is an external feeder and would be removed with the exocarp. Present in Florida and Puerto Rico (Garcia Morales et al., 2016). Quarantine for Hawaii, Guam, Northern Mariana Islands, and American Samoa (ARM, 2022).
INSECT: Hemiptera: Pseudococcidae <i>Coccidohystrix insolita</i> Green	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Leaves, stems, branches, and Fruit (Miller et al., 2014)	No. The insect is an external feeder and would be removed with the exocarp. Present in Guam (Garcia Morales et al., 2016).
INSECT: Hemiptera: Pseudococcidae <i>Dysmicoccus lepelleyi</i> (Betrem)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Leaves (Garcia Morales et al., 2016)	No.
INSECT: Hemiptera: Pseudococcidae <i>Dysmicoccus neobrevipes</i> Beardsley	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Roots (Garcia Morales et al., 2016)	No.
INSECT: Hemiptera: Pseudococcidae <i>Exallomochlus hispidus</i> (Morrison)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Stem, shoot, leaf, flower, fruit (Indarwatmi et al., 2021)	No. The mealybugs are on the surface of the fruit (Indarwatmi et al., 2021), and would be removed with the exocarp.
INSECT: Hemiptera: Pseudococcidae <i>Formicococcus polysperes</i> Williams	Firake et al., 2015	Firake et al., 2015	Roots (Firake et al., 2015)	No.
INSECT: Hemiptera: Pseudococcidae <i>Nipaecoccus viridis</i> (Newstead)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Leaves (Garcia Morales et al., 2016)	No. Present in the U.S., but quarantine for American Samoa, Puerto Rico, and the U.S. Virgin Islands (ARM, 2022).
INSECT: Hemiptera: Pseudococcidae <i>Palmicultor palmarum</i> (Ehrhorn)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Leaves (Garcia Morales et al., 2016)	No. Present in the U.S., but quarantine for Guam, Puerto Rico, and the U.S. Virgin Islands (ARM, 2022).

Pest name	Presence in Viet Nam	Host association	Plant part(s) ²	Considered further? ³
INSECT: Hemiptera: Pseudococcidae <i>Planococcus lilacinus</i> (Cockerell)	Trung, 2021	Arokiyaraj et al., 2022	Leaves, flowers, stems (Arokiyaraj et al., 2022)	No.
INSECT: Hemiptera: Pseudococcidae <i>Pseudococcus cryptus</i> Hempel	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Roots, leaves, stems (Garcia Morales et al., 2016)	No.
INSECT: Hemiptera: Pseudococcidae <i>Rastrococcus spinosus</i> (Robinson)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Leaves (Khoo et al., 1991)	No.
INSECT: Hemiptera: Tingidae <i>Stephanitis typica</i> (Distant)	Trung, 2021	Mathen et al., 1988	Leaves (Mathen et al., 1988)	No. Implicated in transmitting diseases (Mathen et al., 1988).
INSECT: Isoptera: Rhinotermitidae <i>Coptotermes curvignathus</i> (Holmgren)	Trung, 2021	CABI, 2022	Roots and stems (CABI, 2022)	No.
INSECT: Lepidoptera: Crambidae <i>Cnaphalocrocis medinalis</i> (Guenée)	Trung, 2021	CABI, 2022	Leaves (CABI, 2022)	No.
INSECT: Lepidoptera: Erebidae <i>Orgyia turbata</i> Butler	CABI, 2022	Waterhouse, 1993	Leaves (Waterhouse, 1993)	No.
INSECT: Lepidoptera: HesperIIDae <i>Erionota thrax</i> (L.)	Trung, 2021	Okolle et al., 2010	Leaves (Okolle et al., 2010)	No. Present in Hawaii (Okolle et al., 2010).
INSECT: Lepidoptera: Limacodidae <i>Cania robusta</i> (Hering)	Ustjuzhanin and Kovtunovich, 2009	Ustjuzhanin and Kovtunovich, 2009	Leaves (Tong et al., 2006)	No.
INSECT: Lepidoptera: Limacodidae <i>Cania siamensis</i> Tams	Ustjuzhanin and Kovtunovich, 2009	Vichitrananda et al., 2008	Leaves (Holloway et al., 1987)	No.
INSECT: Lepidoptera: Limacodidae <i>Chalcoecelis albiguttatus</i> Snellen	Holloway et al., 1987	Holloway et al., 1987	Leaves (Holloway et al., 1987)	No.
INSECT: Lepidoptera: Limacodidae <i>Parasa lepida</i> Cramer	Trung, 2021	Baringbing and Baringbing, 1994	Leaves (Baringbing and Baringbing, 1994)	No.
INSECT: Lepidoptera: Limacodidae <i>Thosea sinensis</i> (Walker)	Trung, 2021	Dean, 1978	Leaves (Gupta et al., 2016)	No.

Pest name	Presence in Viet Nam	Host association	Plant part(s) ²	Considered further? ³
INSECT: Lepidoptera: Nymphalidae <i>Amathusia phidippus</i> L.	Jaroš and Spitzer, 2008	Waterhouse, 1993	Leaves (Waterhouse, 1993)	No.
INSECT: Lepidoptera: Nymphalidae <i>Elymnias hypermnestra</i> (L.)	Trung, 2021	Boireau, 1995	Leaves (Boireau, 1995)	No.
INSECT: Lepidoptera: Pyralidae <i>Tirathaba rufivena</i> (Walker)	Trung, 2021	Beaudoin-Ollivier et al., 2017	Leaves, flowers (Beaudoin-Ollivier et al., 2017)	No.
INSECT: Lepidoptera: Tortricidae <i>Archips machlopi</i> (Meyrick)	Soumia et al., 2019	Waterhouse, 1993	Leaf (Waterhouse, 1993)	No.
INSECT: Lepidoptera: Zygaenidae <i>Artona catoxantha</i> Hampson	Trung, 2021	Winotai, 2014	Leaves (Winotai, 2014)	No.
INSECT: Orthoptera: Acrididae <i>Chondracris rosea</i> (De Geer)	Trung, 2021	CABI, 2022	Leaves (CABI, 2022)	No.
INSECT: Orthoptera: Acrididae <i>Valanga nigricornis</i> (Burmeister)	CABI, 2022	Benigno and Soewarno, 1985	Leaves (Hadi and Irianto, 2019)	No.
GASTROPOD: Mollusca: Bradybainidae <i>Acusta tourannensis</i> (Soulevet)	Thanh and Do Duc, 2022	Lai, 1984	Stem (Lai, 1984)	No.
BACTERIA ' <i>Candidatus Phytoplasma asteris</i> ' 16SrI-B	Alvarez et al., 2013; Harrison and Carpio, 2006	Babu et al., 2021	Systemic (Babu et al., 2021)	No. See section 2.2
NEMATODE <i>Hemicriconemoides mangiferae</i> Siddiqi	CABI, 2022; MacGowan, 1984	Saeed, 1974	Soil, Root (Saeed, 1974)	No. Present in California and Florida (CABI, 2022).

2.2. Notes on pests identified in the pest list

'*Candidatus Phytoplasma asteris*' 16SrI-B is Present in the United States in over 10 states (WPBUS, 2022). No evidence of presence in Puerto Rico or Hawaii. Phytoplasmas are transmissible by grafting and spread naturally by insect vectors (Weintraub and Beanland, 2006). These vectors are highly unlikely to be present with the harvested fruit, or to contact the fruit after entry into the United States. Without vectors, this phytoplasma cannot move from the

imported produce to plants in the field; therefore, the likelihood that this pest will establish is negligible.

2.3. Pests considered but not included on the pest list

Phytophthora meadii (McRae) (Oomycetes: Peronosporales) is not listed in ARM (2022), however, the genus is quarantined. It is found in Vietnam (Stamps, 1984) and has a limited distribution in the United States where it is found only in Hawaii (Aragaki and Uchida, 1994). Coconut fruit was recently shown to be an experimental host (Solpot and Cumagun, 2021), however, there is no evidence it attacks coconut in nature, therefore, we did not include the pest in Table 1.

2.3.1. Organisms with non-quarantine status

We found evidence of organisms that are associated with coconut and are present in Viet Nam; however, they are not of quarantine significance for the United States (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.

2.4. Pests selected for further analysis or already regulated

No quarantine pests were identified that could follow the pathway. Thus, no pests were selected for further analysis.

3. Summary

We found no quarantine pests that are likely to follow the pathway.

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.

4. Literature Cited

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5. Appendix: Pests with non-quarantine status

We found evidence that the organisms listed below are associated with coconut and are present in Viet Nam; however, none are of quarantine significance for the United States (ARM, 2022, 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 Viet Nam, presence in the United States (if applicable), and association with the coconut. 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, 2022).

Organism	In Viet Nam	In U.S.	Host Association	Notes
MITE: Trombidiformes: Tenuipalpidae <i>Brevipalpus phoenicis</i> (Geijskes)	CABI, 2022	CABI, 2022	CABI, 2022	
INSECT: Coleoptera: Anthribidae <i>Araecerus fasciculatus</i> (DeGeer)	CABI, 2022	CABI, 2022	CABI, 2022	
INSECT: Coleoptera: Silvanidae <i>Oryzaephilus surinamensis</i> (Linnaeus)	CABI, 2022	CABI, 2022	CABI, 2022	
INSECT: Coleoptera: Tenebrionidae <i>Tribolium castaneum</i> (Herbst)	CABI, 2022	CABI, 2022	CABI, 2022	
INSECT: Hemiptera: Aleyrodidae <i>Aleurodicus dispersus</i> Russell	CABI, 2022	CABI, 2022	CABI, 2022	
INSECT: Hemiptera: Aphididae <i>Aphis gossypii</i> Glover	CABI, 2022	CABI, 2022	CABI, 2022	
INSECT: Hemiptera: Coccidae <i>Ceroplastes floridensis</i> Comstock	CABI, 2022	CABI, 2022	CABI, 2022	
INSECT: Hemiptera: Coccidae <i>Ceroplastes stellifer</i> Westwood	Garcia Morales et al., 2016	Not present in the U.S.	Garcia Morales et al., 2016	
INSECT: Hemiptera: Coccidae <i>Coccus hesperidum</i> (Linnaeus)	Garcia Morales et al., 2016	Not present in the U.S.	Garcia Morales et al., 2016	
INSECT: Hemiptera: Coccidae <i>Coccus viridis</i> (Green)	Garcia Morales et al., 2016	Not present in the U.S.	Garcia Morales et al., 2016	
INSECT: Hemiptera: Coccidae <i>Eucalymnatus tessellatus</i> (Signoret)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Coccidae <i>Milviscutulus mangiferae</i> (Green)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	

Organism	In Viet Nam	In U.S.	Host Association	Notes
INSECT: Hemiptera: Coccidae <i>Parasaissetia nigra</i> (Nietner)	Trung, 2021	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Coccidae <i>Prococcus acutissimus</i> (Green)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Coccidae <i>Saissetia coffeae</i> (Walker)	Trung, 2021	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Coccidae <i>Vinsonia stellifera</i> Westwood	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Action only when destined to Guam, Samoa (ARM, 2022)
INSECT: Hemiptera: Diaspididae ⁴ <i>Aonidiella aurantii</i> (Maskell)	Dao et al., 2018	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Aonidiella comperei</i> Mckenzie	Garcia Morales et al., 2016	N/A	Garcia Morales et al., 2016	Present in the U.S. Virgin islands (Garcia Morales et al., 2016)
INSECT: Hemiptera: Diaspididae ⁴ <i>Aonidiella inornata</i> Mckenzie	Dao et al., 2018	N/A	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Aonidiella orientalis</i> (Newstead)	Suh, 2016; Гура and Шипулин, 2021	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Present in Florida, Puerto Rico, and U.S. Virgin Islands (Garcia Morales et al., 2016)
INSECT: Hemiptera: Diaspididae ⁴ <i>Aspidiotus destructor</i> Signoret	Trung, 2021	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Aspidiotus excisus</i> Green	Dao et al., 2018	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Aulacaspis tubercularis</i> Newstead	Trung, 2021	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Present in Florida (Garcia Morales et al., 2016)
INSECT: Hemiptera: Diaspididae ⁴ <i>Lepidosaphes karkarica</i> Williams & Watson	Dao et al., 2018	N/A	Dao et al., 2018	

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 Viet Nam	In U.S.	Host Association	Notes
INSECT: Hemiptera: Diaspididae ⁴ <i>Chrysomphalus aonidum</i> (Linnaeus)	Trung, 2021	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Chrysomphalus dictyospermi</i> (Morgan)	CABI, 2022	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Hemiberlesia lataniae</i> (Signoret)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Hemiberlesia palmae</i> (Cockerell)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Lepidosaphes beckii</i> (Newman)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Lepidosaphes gloverii</i> (Packard)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Parlatoria ziziphi</i> (Lucas)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Pinnaspis aspidistrae</i> (Signoret)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Pinnaspis strachani</i> (Cooley)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Pseudaonidia trilobitiformis</i> (Green)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Pseudaulacaspis cockerelli</i> (Cooley)	Trung, 2021	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Diaspididae ⁴ <i>Pseudaulacaspis pentagona</i> (Targioni Tozzetti)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	

Organism	In Viet Nam	In U.S.	Host Association	Notes
INSECT: Hemiptera: Diaspididae ⁴ <i>Unaspis citri</i> (Comstock)	Trung, 2021	CABI, 2022	CABI, 2022	
INSECT: Hemiptera: Margarodidae <i>Icerya purchasi</i> Maskell	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Pseudococcidae <i>Dysmicoccus brevipes</i> (Cockerell)	Trung, 2021	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Pseudococcidae <i>Ferrisia virgata</i> (Cockerell)	Trung, 2021	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Pseudococcidae <i>Nipaecoccus nipae</i> (Maskell)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Pseudococcidae <i>Planococcus citri</i> (Risso)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Pseudococcidae <i>Planococcus minor</i> (Maskell)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Pseudococcidae <i>Pseudococcus jackbeardsleyi</i> Gimpel & Miller	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Pseudococcidae <i>Pseudococcus longispinus</i> (Targioni Tozzetti)	Trung, 2021	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hemiptera: Pseudococcidae <i>Saccharicoccus sacchari</i> (Cockerell)	Garcia Morales et al., 2016	Garcia Morales et al., 2016	Garcia Morales et al., 2016	
INSECT: Hymenoptera: Formicidae <i>Tapinoma melanocephalum</i> (Fabricius)	CABI, 2022	CABI, 2022	CABI, 2022	
INSECT: Lepidoptera: Pyralidae <i>Cadra cautella</i> (Walker)	Trung, 2021	CABI, 2022	CABI, 2022	
INSECT: Lepidoptera: Pyralidae <i>Plodia interpunctella</i> (Hübner)	CABI, 2022	CABI, 2022	Williams, 1964	

Organism	In Viet Nam	In U.S.	Host Association	Notes
INSECT: Thysanoptera: Thripidae <i>Heliothrips haemorrhoidalis</i> (Bouche)	CABI, 2022	CABI, 2022	CABI, 2022	
FUNGUS <i>Ceratocystis paradoxa</i> (Dade) C. Moreau	CABI, 2022	CABI, 2022	CABI, 2022	
FUNGUS <i>Ceratocystis fimbriata</i> Ellis & Halst.	CABI, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS <i>Colletotrichum gloeosporioides</i> (Penz.) Penz. & Sacc., syn.: <i>Glomerella cingulata</i> (Stoneman) Spauld. & H. Schrenk	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS <i>Curvularia lunata</i> (Wakker) Boedijn, syn. <i>Cochliobolus lunatus</i> R.R. Nelson & Haasis	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS <i>Fusarium fujikuroi</i> Nirenberg	CABI, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
FUNGUS <i>Lasiodiplodia theobromae</i> (Pat.) Griffiths & Maubl.	CABI, 2022	CABI, 2022	CABI, 2022	
FUNGUS <i>Pseudopezalotiopsis theae</i> (Sawada) Maharachch., K.D. Hyde & Crous	Mordue and Holliday, 1971	Mordue and Holliday, 1971	Farr and Rossman, 2022	This pest is not listed in ARM. It is found in Hawaii.
FUNGUS <i>Rigidoporus microporus</i> (Sw.: Fr.) Overeem	Govaerts et al., 2014	Farr and Rossman, 2022	Stevenson, 1975	This pest is not listed in ARM.
FUNGUS <i>Thanatephorus cucumeris</i> (A.B. Frank) Donk, syn.: <i>Rhizoctonia solani</i> J.G. Kühn	CABI, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
CHROMISTA <i>Phytophthora cactorum</i> (Lebert & Cohn) J. Schröt.	CABI, 2022	CABI, 2022	CABI, 2022	
CHROMISTA <i>Phytophthora palmivora</i> (E.J. Butler) E.J. Butler	Farr and Rossman, 2022	Farr and Rossman, 2022	Farr and Rossman, 2022	
NEMATODE <i>Helicotylenchus dihystrera</i> (Cobb) Sher	CABI, 2022	CABI, 2022	CABI, 2022	
NEMATODE <i>Meloidogyne incognita</i> (Kofoid & White) Chitwood	CABI, 2022	CABI, 2022	CABI, 2022	

Organism	In Viet Nam	In U.S.	Host Association	Notes
NEMATODE <i>Pratylenchus brachyurus</i> (Godfrey) Filipev & Schuurmans Stekhoven	CABI, 2022	CABI, 2022	CABI, 2022	
NEMATODE <i>Pratylenchus coffeae</i> (Zimmermann) Filipev & Schuurmans Steckhoven	CABI, 2022	CABI, 2022	CABI, 2022	
NEMATODE <i>Pratylenchus zaeae</i> Graham	CABI, 2022	CABI, 2022	CABI, 2022	
NEMATODE <i>Rotylenchus reniformis</i> Linford & Oliveira	CABI, 2022	CABI, 2022	CABI, 2022	
NEMATODE <i>Xiphinema americanum</i> Cobb	CABI, 2022	CABI, 2022	CABI, 2022	