



Appendix:

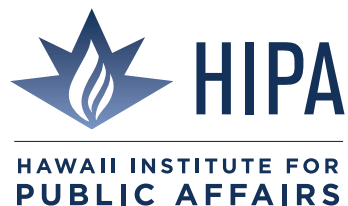
The Federal Agriculture Quarantine on Hawaii: Regulatory History, Impacts, and Opportunities for Change

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October 2026

Hawaii Institute for Public Affairs, Economic Series (October 2026)

Research Topics: Agriculture, Federal Regulations, Economy, Biosecurity.



Appendix I

Approved Fresh Fruits, Herbs, and Vegetables from Hawaii ⁷⁸

Reference
Fresh Fruits, Herbs, and Vegetables

List 3-1 Approved Fresh Fruits, Herbs, and Vegetables from Hawaii (Authority 7 CFR 318.13-4)

• Abiu T105-a-1¹ • <i>Aechmea bracteata</i> (fruit bearing panicle) • <i>Allium</i> spp. (bulb) • <i>Allium</i> spp. (leafy green tops; commercial consignments only; continental US only)² • Aloe vera (above ground parts) • Alokon (inflorescence) • Anise (leaf, stem, seed) • Arrowhead³ • Arrowroot • Artichoke, globe • Artichoke, Jerusalem • Asiatic pennywort (leaf, stem) • Asparagus • Atemoya T105-a-1¹ • Avocado T101-c-1 or T108-a (Exception: refer to Avocado Entering Alaska)	• Avocado, Sharwil T101-c-1 or T108-a (refer to Sharwil Avocado Entry Conditions) • Bael leaf (<i>Aegle marmelos</i>) D301.76(a-2)¹, or D301.76(a-3)⁴ • Bamboo shoots • Banana (fruit) T105-a-1¹ or T105-a-2¹ (refer to Bananas) • Basil (leaf, stem) • Bay laurel (leaf, stem) • Bean sprout, mung and soy Beet • Beremi (leaf, stem) (<i>Limnophila chinensis</i> ssp. <i>aromatica</i>) • Borage (leaf, stem) • Breadfruit (fruit) T105-a-1¹ ⁵ ⁶ or T105-a-2⁶ ⁷ • Broccoli • Brussels sprouts	• Burdock • Burnet (leaf, stem) • Butterbur • Cabbage • Cannonball fruit • Carambola T105-a-1¹ • Carrot • Cassava • Cauliflower • Celery (root, top) • Chervil (leaf, stem) • Chinese amaranth • Chinese cabbage • Chinese chives (leaf, stem) Chinese water chestnut • Cilantro (leaf coriander) • Citrus T103-b-1 or T105-a-1¹ ⁸ • Coconut (unrestricted) • Corn • Corn-on-the-cob	• Corn smut galls • Cowpea (pod) T105-a-2⁷ ⁹ • <i>Cucurbita</i> spp. T105-a-1¹ • Curry leaf (<i>Bergera koenigii</i>) D301.76(a-1), D301.76(a-2)¹, or D301.76(a-3)⁴ • Cyperus corm • Dandelion • Dill (leaf, stem, seed) • Dragon fruit (fruit) T105-a-1¹ ¹⁰ or T105-a-2⁷ ¹¹ • Dropwort, water • Drumstick (leaf, inflorescence) • Durian • Edible flowers¹² (inflorescences only) • Eggplant T105-a-1¹ • Eryngo (leaf) • Fennel (leaf, stem) • Galanga (rhizome)
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¹ Must be irradiated at an approved facility in Hawaii. Refer to the appropriate [treatment schedule](#) for details.

² A biometric sample **must** be inspected by APHIS following post-harvest processing. Inspect for chili thrips (*Scirtothrips dorsalis*), Asiatic onion leafminer (*Acrolepiopsis sapporensis*), and Oriental leafworm moth (*Spodoptera litura*). If quarantine pests are found, PROHIBIT movement and REQUIRE treatment in accordance with 7 CFR 305.

³ *Sagittaria sagittifolia* — PROHIBIT movement unless the importer has a valid PPQ Form 526 Permit. 7 CFR 360-Noxious Weed Regulations prohibit this noxious weed.

⁴ D301.76(a-3) is a processing protocol conducted under the authority of Federal Order DA-2022-07. Refer to the [Protocol for the Interstate Movement of Fresh, Mature Rutaceous Leaves for Consumption](#) for detailed instructions.

⁵ Fruit **must** be free from stems and leaves and **must** originate from an orchard previously treated with a fungicide appropriate for the fungus *Phytophthora tropicalis* or after irradiation, a post-harvest fungal dip may be used.

⁶ Inspect for spiraling whitefly (*Aleurodicus dispersus*), inornate scale (*Aonidiella inornata*), red wax scale (*Ceroplastes rubens*), gray pineapple mealybug (*Dysmicoccus neobrevipes*), pink hibiscus mealybug (*Maconellicoccus hirsutus*), spherical mealybug (*Nipaecoccus viridis*), citrus mealybug (*Pseudococcus cryptus*), melon thrips (*Thrips palmi*), and signs of thrip damage. If any of these pests are found, prohibit entry or treat with 400 Gy (T105-a-2). Fruit receiving the 150 Gy treatment **must** also either receive a post-harvest dip in accordance with treatment schedule T102-c as provided in 7 CFR 305.42(b) or originate from an orchard or growing area previously treated with a broad-spectrum insecticide during the growing season, inspected and found free of any surface pests as prescribed in a compliance agreement. Post-treatment inspection in Hawaii is **not** required if the fruit undergoes irradiation at the 400 Gy dose. Refer to the appropriate [treatment schedule](#) for details.

⁷ **Must** be irradiated at an approved facility in Hawaii or in the mainland U.S. Refer to the appropriate [treatment schedule](#) for details. Certified facilities may be in any state except Alabama, Arizona, California, Florida, Georgia (except for Atlanta Hartsfield Airport), Kentucky, Louisiana, Mississippi (except for maritime port at Gulfport), Nevada, New Mexico, North Carolina (except for maritime port at Wilmington), South Carolina, Tennessee, Texas, and Virginia.

⁸ Inspect for freedom from the spherical mealybug (*Nipaecoccus viridis*) and a tuckerellid mite, (*Tuckerella ornata*).

⁹ Inspect for cassava red mite (*Oligonychus bharensis*) and adults and pupae of the order Lepidoptera before undergoing irradiation treatment. Refer to the appropriate [treatment schedule](#) for details. The pods **must** be free of stems and leaves. If infested with these pests or stems and leaves, REFUSE to certify.

¹⁰ For fruit presented for inspection, ensure that the sepals were removed and that the fruits are free from leaves and stems. If you find stems and leaves, REFUSE to certify. Also inspect for the gray pineapple mealybug (*Dysmicoccus neobrevipes*), pink hibiscus mealybug (*Maconellicoccus hirsutus*), and citrus mealybug (*Pseudococcus cryptus*) before undergoing irradiation treatment at the 150 Gy dose. Fruit receiving the 150 Gy dose **must** also either receive a post-harvest dip in accordance with treatment schedule T102-c or originate from an orchard or growing area that was previously treated with a broad-spectrum insecticide during the growing season and a pre-harvest inspection of the orchard or growing area found the fruit free of any surface pests as prescribed in a compliance agreement. If infested with these pests, REFUSE to certify or treat with 400 Gy (T105-a-2). Refer to the appropriate [treatment schedule](#) for details.

¹¹ Consignment **must** be free from stems and leaves. If you find stems and leaves, REFUSE to certify.

¹² Limited to *Calendula* spp. (pot marigold), *Tagetes* spp. (marigold), *Tropaeolum* spp. (nasturtium), and *Viola* spp. (johnny-jump-ups, pansies, and violets).

Appendix I

Approved Fresh Fruits, Herbs, and Vegetables from Hawaii ⁷⁸

Reference

Fresh Fruits, Herbs, and Vegetables

- Garden rocket (leaf, stem) Garland chrysanthemum
- Garlic chive
- Guava (fruit; commercial consignments **only**) T105-a-2⁷ ¹³
- Ginger bracts
- Ginger root¹⁴
- Gowkee
- Heckera umbellata (leaf, stem)
- Honewort
- Heartleaf (leaf stem) (Houttuynia cordata)
- Jackfruit (fruit) T105-a-1¹⁵ ¹⁴ or T105-a-2¹⁷
- Japanese honewort (Cryptotaenia japonica)
- Jicama
- Kaffir lime leaf (Citrus hystrix) D301.76(a-1), D301.76(a-2)¹, or D301.76(a-3)¹⁴
- Knotweed
- Kudzu
- Lamb's quarters (leaf, stem)
- Lemon balm (leaf)
- Lemon grass (leaf, stem)
- Lettuce
- Lily bulb (*Lilium* spp.)
- Litchi¹⁵ T102-d, T105-a-1¹, or T106-f
- Longan¹⁵ T102-d, T105-a-1¹, or T106-f
- Lotus root
- Maguery leaf
- Mahogany fruit
- Malabar spinach
- Mango T105-a-3
- Mangosteen (fruit) T105-a-1¹ ¹⁶ or T105-a-2⁷ ¹¹
- Marigold (flower head)
- Marjoram (leaf), Origanum spp. (leaf, inflorescence)
- Matsutake
- Melon (fruit) T105-a-1¹⁷ or T105-a-2⁷ ¹⁷
- Mint (leaf, stem)
- Moringa (pods) T105-a-1¹ ¹⁸ or T105-a-2⁷ ¹⁸
- Mountain papaya, Vasconcellea pubescens, T106-b-3
- Mugwort
- Mushroom
- Mustard greens
- Oregano (leaf, stem) Origanum vulgare
- Palm hearts (stem) peeled or trimmed (white to off-white)
- Papaya T103-d-2, T105-a-1¹, or T106-b-4, or T106-c
- Parsley
- Peanut
- Pepper (Capsicum spp.) T105-a-1¹
- Peppermint (leaf, stem)
- Perilla
- Pineapple T106-b-5 or T105-a-1¹
- Pineapple, smooth Cayenne and hybrids with 50% or more smooth Cayenne parentage
- Piper spp.
- Pohole fern (leaf, stem) Athyrium spp. and Diplazium spp.
- Pomegranate arils
- Poreleaf (leaf, stem)
- Potato
- Radish (Raphanus sativus)
- Rambutan T103-e, T105-a-1¹, T106-g
- Rhubarb
- Rosemary (leaf, stem)
- St. John's Bread
- Sage (leaf, stem)
- Saluyut jute (leaf, stem, inflorescence)
- Sapodilla T105-a-1¹
- Sausage fruit
- Savory (leaf, stem)
- Screwpine (leaf)
- Sea asparagus (tips) (Salicornia bigelovii) (commercial consignments into continental US **only**)
- Singhara nut (Trapa bispinosa)
- Sorrel (leaf, stem) Rumex spp.
- Spinach
- Sweet potato T101-b-3-1, T105-a-1¹, T105-a-2¹, or T106-h (refer to [Sweet Potatoes](#))
- Tamarind bean pod
- Taro
- Tarragon (leaf, stem)
- Thyme (leaf, stem)
- Tomato T101-c-3, T105-a-1¹
- Truffle
- Turmeric (rhizome)
- Turnip
- Water-chestnut
- Watercress
- Yams

¹³ Each consignment **must** be inspected in Hawaii and found free of the red spider mite (*Eutetranychus orientalis*) and the cassava red mite (*Oligonychus biharensis*).

¹⁴ If, after inspection, ginger maggot (*Eumerus figurans*) or banana moth (*Opogona sacchari*) are found, treatment with irradiation at 400 Gy (T105-a-2) is REQUIRED. Refer to the appropriate [treatment schedule](#) for details.

¹⁵ May **not** be moved interstate into Florida. All cartons in which litchi or longan are packed **must** be stamped, "Not for importation into or distribution in FL."

¹⁶ Fruit presented for inspection **must** have the sepals removed to conduct the inspection. Sepals are allowed for those fruit **not** being inspected. Consignment **must** be free from stems and leaves. If you find stems or leaves, REFUSE to certify. Inspect for the gray pineapple mealybug (*Dysmicoccus neobrevipes*), pink hibiscus mealybug (*Maconellicoccus hirsutus*), citrus mealybug (*Pseudococcus cryptus*), and *Thrips florum* before undergoing irradiation treatment in Hawaii at the 150 gray dose. If infested with these pests, REFUSE to certify or treat with 400 Gy (T105-a-2). Fruit receiving the 150 Gy dose also **must** either receive a post-harvest dip in accordance with treatment schedule T102-c as provided or originate from an orchard or growing area found free of any surface pests as prescribed in a compliance agreement. Post-treatment inspection in Hawaii is **not** required if the fruit undergoes irradiation treatment at the 400 Gy dose. Refer to the appropriate [treatment schedule](#) for details.

¹⁷ Melons **must** be washed to remove dirt and free from leaves and stems. If the melons receive the 150 Gy dose, inspect the consignment for spiraling whitefly (*Aleurodicus dispersus*) before undergoing irradiation treatment at the 150 Gy dose. If infested with spiraling whitefly, REFUSE to certify or treat with 400 Gy (T105-a-2). Fruit receiving the 150 Gy dose also **must** either receive a post-harvest dip in accordance with treatment schedule T102-c or originate from an orchard or growing area that was previously treated with a broad-spectrum insecticide during the growing season and a pre-harvest inspection of the orchard or growing area found the fruit free of any surface pests as prescribed in a compliance agreement. Post-treatment inspection in Hawaii is **not** required if the fruit undergoes irradiation treatment at the 400 Gy dose. Refer to the appropriate [treatment schedule](#) for details. Regardless of irradiation dose, melons **must** be washed to remove dirt and free of stems and leaves.

¹⁸ Inspect the consignment for spiraling whitefly (*Aleurodicus dispersus*), inonate scale (*Aonidiella inonata*), and citrus mealybug (*Pseudococcus cryptus*) before undergoing irradiation at the 150 Gy dose. If any of these pests are found, PROHIBIT ENTRY or treat with 400 Gy (T105-a-2). Fruit receiving the 150 Gy treatment **must** also either receive a post-harvest dip in accordance with treatment schedule T102-c as provided in § 7.CFR.305.42(b) or originate from an orchard or growing area that was previously treated with a broad-spectrum insecticide during the growing season and a pre-harvest inspection of the orchard or growing area found the fruit free of any surface pests as prescribed in a compliance agreement. Post-treatment inspection in Hawaii is **not** required if the fruit undergoes irradiation treatment at the 400 Gy dose. Refer to the appropriate [treatment schedule](#) for details.

Appendix IIa

Commodity Risk Assessment Request (Volcano Wasabi to HDOA)

Commodity Risk Assessment Request May 27, 2022

Contact Information

Jonathan B. Kindred
KR Farms LLC
129 Pahiki Place
Lahaina, Hawaii 96761
808-419-8228
Jon.kindred@icloud.com

Commodity Information

The commodity will be greenhouse grown on a single, 15.289 acre farm property located at 18-4040 Lehuanani Street, Volcano, Hawaii 96785. TMK (3)-1-8-007-097. Please refer to Appendix A for a map of the property location.

The scientific name of the commodity is *Wasabia japonica* or *Eutrema japonicum* (Miq.) Koidz. Familia: Brassicaceae. Tribus: Eutremeae. Genus: Eutrema.

We are now in the early stage of developing our wasabi farm and we envision experimenting with several different cultivars of the plant. We will be starting with Daruma, Mazuma and/or Misho. We expect that we will harvest rhizomes (stems) at approximately 18-24 months after planting. All harvesting will be done by hand. We envision initial planting to occur in Q4 2022. We will likely be growing from both seed and nursery stock which we will be importing to Hawaii from approved sources. Colored photographs of the wasabi plant can be found in the academic research piece published by Pacific Northwest Extension and attached as Appendix B.

We intend to harvest both rhizomes and leaves. Our request is for the addition of wasabi rhizomes and leaves to be added to Table 3-1 pursuant to 7 CFR 318.13 as approved for interstate movement to other parts of the United States.

The proposed end use of the imported commodity (wasabi rhizomes and leaves) is for consumption by our customers who we envision to be a mix of direct consumers and restaurants.

Our plan is to harvest and ship throughout the calendar year. We plan to harvest once per week according to orders received during the previous week.

Shipping Information

Although initial shipment volumes are expected to be lower we envision ramping up to shipping approximately 30 pounds of rhizomes and/or leaves each week (approximately 180 rhizomes).

Appendix IIa

Commodity Risk Assessment Request (Volcano Wasabi to HDOA)

We anticipate individual shipments ranging in size from 0.25 – 3 pounds if our demand estimations materialize. If successful we would plan to add additional capacity in future beyond the initial two greenhouse growing structures.

All shipments will be done via FedEx from their facility at Hilo airport. We intend to use FedEx medium size boxes (13.25"x11.5"x2.38") with reusable freezer gel packs included in each box with the wasabi product. All shipments to mainland USA will be 2 day delivery from Hilo direct to the address location of the end customer.

All wasabi rhizomes and leaves will be hand-picked onsite in the greenhouses and manually carried into an immediately adjacent packing building where the rhizomes and leaves will be washed, cleaned and packed into the FedEx boxes. After all orders have been boxed they will be driven to the FedEx facility at Hilo airport and turned over to FedEx for shipment.

Pest and Disease Information

We have yet to begin cultivation of the wasabi crop on our property so we have no direct experience with potential pest, bacterial or fungal diseases which may impact us in our specific growing environment. However, based on research and previous experience with Brassicaceae family plants in other locations we believe we need to manage exposure to the following risks which may negatively impact the plant stem and leaf quality.

The cabbage whitefly (*Aleyrodes proletella*; Linnaeus) is known to attack leaves of cabbage and other brassicas.

The brassica leaf miner (*Liriomyza brassicae*; Riley) hatches larvae known to attack leaves of brassicas.

The green peach aphid (*Myzus persicae*; Sulzer), the turnip aphid (*Lipaphis pseudobrassicae*; Davis) are known to attack wasabi leaves. The poplar petiole gall aphid (*Pemphigus populitransversus*; Riley) has been found on wasabi roots.

Cabbage and alfalfa loopers (*Trichoplusia ni*; Hubner and *Autographa californica*; Speyer), cabbageworm (*Pieris rapae*; Linnaeus), diamond black moth (*Plutella xylostella*; Linnaeus), Adult European crane fly (*Tripula paludosa*) and common crane fly (*Tripula oleraceae*; Alexander), and slugs (*Derocerus reticulatum*) are all pests which we will monitor and mitigate.

The most common bacterial disease affecting wasabi is internal black rot caused by *Pectobacterium*; Hauben and *Pseudomonas*; Migula in combination with the fungal pathogen *Phoma*. *Pectobacterium aroideae* and *P. carotovorum* infect wasabi plants through wounds.

Fungal diseases include black leg caused by *Phoma wasabiae*, white blister rust caused by *Albugo wasabiae* Hara, downy mildew caused by *Peronospora alliariae*, damping off caused by

Appendix IIa

Commodity Risk Assessment Request (Volcano Wasabi to HDOA)

Pellicularia filamentosa, white mold caused by *Sclerotinia sclerotiorum*, and club root caused by *Plasmodiophora brassicae*.

Most of the general pest and disease notations above are found in pages 9-12 in the aforementioned research piece (including references) attached as Appendix B.

Strategies for Risk Mitigation or Risk Management

The ultimate responsible party for pest management and control will be Jonathan B. Kindred, Managing Member of KR Farms LLC. Mr. Kindred intends to retain a full-time farm manager within calendar 2022 to implement the risk management strategy. Additionally, KR Farms has retained the services of Craig Colamarino as a farming consultant via his company Maui Organic Solutions LLC.

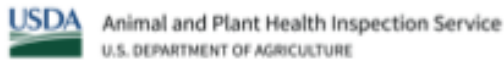
One critical element of our pest risk management strategy is the use of enclosed greenhouse structures for growing our wasabi. We believe that this containment feature will be an effective organic measure to mitigate pest risks.

Mr. Colamarino has preliminarily identified the additional following actions which are likely to be implemented to control pest and plant disease risks.

In order to mitigate fungal diseases and mold it will be important to give adequate spacing between plants so that in case of any mold or fungus, the individual plant can be separated and destroyed to reduce the spread or contamination. Close monitoring of the plants several times per day is essential to catch any early signs of mold or fungus. Also, keeping the water systems maintained properly is essential to ensure there will not be any bacteria or fungus that can be spread by way of watering. Proper drainage in the soil is imperative to make sure there will not be any rotting at the roots or any stagnant water leading to fungal/bacterial disease. Prevention is the best way to mitigate any contamination.

As far as pests are concerned success has been achieved in the past by companion-planting brassicas with harsh smelling plants such as onions and garlic. Other plants such as tobacco are sticky and will catch things like crane flies on the leaves. Also, strong concentrated Hawaiian chili pepper oil has been a great organic alternative to harsh pesticides for cabbage worms and white fly. Successful leaf miner mitigation is using neem oil before and during any leaf miner damage. Salting around the growing area and using ducks has worked very well for slug management in the past. Keeping the pH at proper levels and making sure the soil is rich with organic material will keep the plants immune system strong and reduce damage from most common pests. Similar to humans, when plants are healthy, bugs don't have a good chance at causing too much damage because the immune system is strong and will ward off weakness that allows the pests to cause damage.

USDA Pest Risk Assessment (Version 1), Interstate movement of wasabi (*Eutrema japonicum*) from Hawaii into the continental United States for consumption



Interstate movement of wasabi (*Eutrema japonicum*) from Hawaii into the continental United States for consumption

A Qualitative, Pathway Initiated Pest Risk Assessment

Version 1

January 22, 2024

Agency contact

Plant Pest Risk Analysis
Science and Technology
Plant Protection and Quarantine (PPQ)
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USDA Pest Risk Assessment (Version 1), Interstate movement of wasabi (*Eutrema japonicum*) from Hawaii into the continental United States for consumption

Pest Risk Assessment for wasabi from Hawaii

Executive Summary

The purpose of this report is to assess the pest risks associated with the domestic offshore interstate movement of commercially produced fresh leaves and rhizomes (stems above and below ground) of wasabi, *Eutrema japonicum* (Brassicaceae), from Hawaii into the continental United States for consumption.

The interstate movement of fruits and vegetables for consumption from the State of Hawaii into the United States is regulated and under this regulation the entry of wasabi from Hawaii into the continental United States is not authorized. A grower based in Hawaii is requesting market access. Based on the market access request, we considered the pathway to include the following processes and conditions: the washing of leaves and rhizomes. The pest risk ratings depend on the application of all conditions of the pathway as described in this document; fresh leaves and rhizomes 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 state of Hawaii to develop a list of pests with quarantine significance for the continental United States. These are pests that occur in Hawaii 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.

USDA Pest Risk Assessment (Version 1), Interstate movement of wasabi (Eutrema japonicum) from Hawaii into the continental United States for consumption

Pest Risk Assessment for wasabi from Hawaii

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Ver. 1

January 22, 2024

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USDA Pest Risk Assessment (Version 1), Interstate movement of wasabi (*Eutrema japonicum*) from Hawaii into the continental United States for consumption

Pest Risk Assessment for wasabi from Hawaii

1. Introduction

1.1. Background

The purpose of this report is to present PPQ's assessment of the pest risk associated with the domestic offshore interstate movement of commercially produced leaves and rhizomes (stems above and below ground) of wasabi, *Eutrema japonicum* (Miq.) Koidz, from Hawaii into the continental United States (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 interstate movement of fruits and vegetables for consumption from the State of Hawaii into 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 § 318, 2023) and as described in the [manuals for Hawaii, and Puerto Rico and the U.S. Virgin Islands](#). Under this regulation, the entry of wasabi from Hawaii into the PRA area is not authorized. This commodity risk assessment was initiated in response to an industry request to change the federal regulation to allow entry (PPQ, 2023).

1.3. Potential weediness of the commodity

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

A weed risk analysis is not required when (a) the commodity is already enterable into the PRA area from other countries, (b) the commodity plant species is widely established (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 wasabi does not need to be analyzed because this commodity is already enterable from other countries (7 CFR §319.56-3, 2023; 7 CFR §319.56-10, 2023).

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.

USDA Pest Risk Assessment (Version 1), Interstate movement of wasabi (*Eutrema japonicum*) from Hawaii into the continental United States for consumption

Pest Risk Assessment for wasabi from Hawaii

1.4.1. Description of the commodity

The specific pathway of concern is the interstate movement of fresh leaves and rhizomes (stems above and below ground) of wasabi for consumption.

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

The leaves and rhizomes will be washed prior to being packed for shipment. Additional pest exclusion or mitigation measures, or shipping and storage conditions in Hawaii 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 continental United States. This list includes pests that are present in Hawaii on any host and are known to be associated with *Eutrema japonicum* 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 consulted scientific literature, port-of-entry pest interception data, and information provided by Hawaii to identify possible quarantine pests associated with wasabi. We found no pests that are of quarantine significance to the PRA area. Therefore, we did not include a pest list.

2.2. Pests considered

2.2.1. Organisms with non-quarantine status

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

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

***Chrysodeixis eriosoma* Doubleday (Lepidoptera: Noctuidae).** *Chrysodeixis eriosoma* is a polyphagous species that feeds on leaves, flowers, and sometimes fruit of host plants (Roberts, 1979). Early-instar larvae feed on the underside of leaves, while later instar larvae feed from leaf margins and chew holes through leaves (Dugdale, 1998; Mau and Kessing, 1991). This pest is of quarantine significance for the continental United States (ARM, 2023) and present in Hawaii (Heu, 2007; Mau and Kessing, 1991; McQuate and Sylva, 2018). We found only one report that weakly associated this insect with wasabi (Craigie, 2002). Because we could not find evidence that wasabi is a host of *C. eriosoma*, we did not consider it further.

***Fusarium oxysporum* Schldl.: Fr.** We found a report indicating that *Fusarium oxysporum* had been isolated from wasabi plants showing root rot and wilt in British Columbia, Canada

USDA Pest Risk Assessment (Version 1), Interstate movement of wasabi (*Eutrema japonicum*) from Hawaii into the continental United States for consumption

Pest Risk Assessment for wasabi from Hawaii

greenhouses in 2017 and 2018 (from only one sample each year) (CPDS, 2019). Koch's postulates were not fulfilled, and the report categorized *F. oxysporum* as a potential but not confirmed pathogen of wasabi. We did not find separate reports of *F. oxysporum* causing disease of wasabi. *Fusarium oxysporum* is listed as a quarantine pest for the continental United States and is listed as uncategorized for Hawaii and Puerto Rico (ARM, 2023). *Fusarium oxysporum* is widespread in the United States (Farr et al., 1989) and has also been reported from Hawaii (Raabe et al., 1981). Because the pathogen is widespread in the United States and is not a confirmed pathogen of wasabi, it was not evaluated further.

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 will be addressed in a separate document.

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5. Appendix: Pests with non-quarantine status

We found evidence that the organisms listed below are associated with wasabi and are present in Hawaii; however, none are of quarantine significance for the continental United States (ARM, 2023, 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 Hawaii, presence in the continental United States (if applicable), and association with wasabi. If any of the organisms are not present in the continental 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, 2023).

Organism	In Hawaii	In U.S.	Host Association	Notes
INSECT Hemiptera: Aphididae <i>Lipaphis pseudobrassicae</i> Davis; syn. <i>Lipaphis erysimi</i> (Kaltenbach)	Heu, 2007; Wang and Messing, 2006	CABI, 2023	Chadwick et al., 1993; MacDonald et al., 2017	N/A
INSECT Hemiptera: Aphididae <i>Macrosiphum euphorbiae</i> (Thomas)	CABI, 2023; Heu, 2007	CABI, 2023	MacDonald et al., 2017	N/A
INSECT Hemiptera: Aphididae <i>Myzus persicae</i> (Sulzer)	Messing et al., 2007	CABI, 2023	CABI, 2023; MacDonald et al., 2017	N/A
INSECT Hemiptera: Aphididae <i>Pemphigus populitransversus</i> Riley	Footitt et al., 2012	CABI, 2023	Blackman and Eastop, 2000; MacDonald et al., 2017	N/A
INSECT Lepidoptera: Noctuidae <i>Trichoplusia ni</i> (Hübner)	CABI, 2023; Heu, 2007	CABI, 2023	Miles and Daniels, 2019	N/A
INSECT Lepidoptera: Pieridae <i>Pieris rapae</i> (L.)	Heu, 2007	CABI, 2023	Chadwick et al., 1993; Miles and Daniels, 2019	N/A
INSECT Lepidoptera: Plutellidae <i>Plutella xylostella</i> (L.)	CABI, 2023; Heu, 2007	CABI, 2023	MacDonald et al., 2017	N/A
MOLLUSK Stylommatophora: Agriolimacidae <i>Deroceras reticulatum</i> (Müller)	Hayes et al., 2012	CABI, 2023	Craigie, 2002; Miles and Daniels, 2019	N/A
NEMATODE <i>Aphelenchoides fragariae</i> (Ritzema - Bos) Christie	Raabe et al., 1981	CABI, 2023	NARO, 2023	N/A

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Pest Risk Assessment for wasabi from Hawaii

Organism	In Hawaii	In U.S.	Host Association	Notes
FUNGUS <i>Albugo candida</i> (Pers.: Fr.) Kuntze	Raabe et al., 1981	Farr et al., 1989	Choi et al., 2014	N/A
FUNGUS <i>Alternaria brassicae</i> (Berk.) Sacc.	Farr et al., 1989	Farr et al., 1989	CABI, 2023	N/A
FUNGUS <i>Botrytis cinerea</i> Pers.: Fr.	CABI, 2023	CABI, 2023	MacDonald and Punja, 2017	N/A
FUNGUS <i>Erysiphe cruciferarum</i> Opiz ex L. Junell	Amano (Hirata), 1986; Cunningham and Nelson, 2012	CABI, 2023	Park et al., 2016	This pest is established in the United States and is not under official control.
FUNGUS <i>Fusarium sambucinum</i> Fuckel syn.: <i>Gibberella pulicaris</i> (Fr.: Fr.) Sacc.	Stevens, 1925	Farr et al., 1989	Rodriguez and Punja, 2007	N/A
FUNGUS <i>Fusarium solani</i> (Mart.) Sacc.	Raabe et al., 1981	USDA ARS, 1960	CPDS, 2017	N/A
FUNGUS <i>Leptosphaeria maculans</i> (Desm.) Ces. & de Not.	CABI, 2023	CABI, 2023	Punja et al., 2017	This pest is established in the United States and is not under official control.
FUNGUS <i>Sclerotinia sclerotiorum</i> (Lib.) de Bary	Raabe et al., 1981	CABI, 2023	Chadwick et al., 1993	N/A
FUNGUS <i>Stemphylium vesicarium</i> (Wallr.) E.G. Simmons	CTAHR, 2015	CABI, 2023	CPDS, 2019	N/A
FUNGUS <i>Rhizoctonia solani</i> J.G. Kühn syn.: <i>Thanatephorus cucumeris</i> (A.B. Frank) Donk	Trujillo et al., 1988	CABI, 2023	Kim et al., 1994; Follett, 1986	N/A
CHROMISTAN <i>Phytophthora cryptogea</i> Pethybr. & Laff.	CABI, 2023	CABI, 2023	Granke et al., 2012	This pest is established in the United States and is not under official control.
CHROMISTAN <i>Phytophthora drechsleri</i> Tucker	Raabe et al., 1981	Farr et al., 1989	Minoshima et al., 2017	This pest is established in the United States and is not under official control.

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USDA Pest Risk Assessment (Version 1), Interstate movement of wasabi (*Eutrema japonicum*) from Hawaii into the continental United States for consumption

Pest Risk Assessment for wasabi from Hawaii

Organism	In Hawaii	In U.S.	Host Association	Notes
CHROMISTAN <i>Plasmodiophora brassicae</i> Woronin	Raabe et al., 1981	CABI, 2023	Miles and Daniels, 2019	This pest is established in the United States and is not under official control.
CHROMISTAN <i>Globisporangium intermedium</i> (de Bary) Uzuhashi, Tojo & Kakishima syn.: <i>Pythium intermedium</i> de Bary	Raabe et al., 1981	Farr et al., 1989	Rodriguez and Punja, 2007	This pest is established in the United States and is not under official control.
BACTERIUM <i>Pectobacterium carotovorum</i> subsp. <i>brasilensis</i> (Duarte et al.) Nabhan et al.	CABI, 2023	McNally et al., 2017	El Tassa and Duarte, 2006	N/A
BACTERIUM <i>Pectobacterium carotovorum</i> subsp. <i>carotovorum</i> (Jones) Hauben et al., syn.: <i>Erwinia carotovora</i> (Jones) Bergey et al., <i>Erwinia aroideae</i> (Townsend) Bergey et al.	Raabe et al., 1981	CABI, 2023	Follett, 1986; CPDS, 2017	N/A
BACTERIUM <i>Pectobacterium wasabiae</i> (Goto and Matsumoto) Gardan et al., syn.: <i>Pectobacterium parmentieri</i> Khayi et al.	Arizala et al., 2020	CABI, 2023	Goto and Matsumoto, 1987	This pest is established in the United States and is not under official control.
BACTERIUM <i>Pseudomonas viridiflava</i> (Burkholder) Dowson	Raabe et al., 1981	CABI, 2023	CABI, 2023	This pest is established in the United States and is not under official control.
VIRUS <i>Cucumovirus Cucumber mosaic virus</i> (CMV)	Hu et al., 1995	CABI, 2023	Wilson, 1998	N/A
VIRUS <i>Tobamovirus Tobacco mosaic virus</i> (TMV)	Raabe et al., 1981	CABI, 2023	Kim and Lee, 1999	N/A
VIRUS <i>Tospovirus Tomato spotted wilt virus</i> (TSWV)	CABI, 2023	CABI, 2023	Bae and Park, 2023	N/A
VIRUS <i>Potyvirus Turnip mosaic virus</i> (TuMV)	Raabe et al., 1981	CABI, 2023	Chadwick et al., 1993	This pest is established in the United States and is not under official control.

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Appendix IIc

Risk Management Document, Interstate movement of wasabi (*Eutrema japonicum*) from Hawaii into the continental United States for consumption

United States Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine

Risk Management Document

**Interstate movement of wasabi (*Eutrema japonicum*) from
Hawaii into the
continental United States for consumption**

December 5, 2024

**Pest Exclusion and Import Programs
Imports, Regulations, and Manuals**

Risk Management Document, Interstate movement of wasabi (*Eutrema japonicum*) from Hawaii into the continental United States for consumption

Introduction

On May 27, 2022, a grower in Hawaii requested market access for fresh leaves and rhizomes (stems above and below ground) of wasabi, *Eutrema japonicum* (Miq.) Koidz. from Hawaii into the continental United States for consumption. The United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) prepared a pest risk assessment (PRA) (USDA, 2024) for wasabi using scientific literature, port-of-entry pest interception data, and information provided by the state of Hawaii following International Standards for Phytosanitary Measures No. 11 Pest risk analysis for quarantine pests (ISPM 11, 2013).

The PRA determined that there were no pests associated with wasabi from Hawaii that follow the pathway of fresh leaves and rhizomes of wasabi. All pests found to be associated with wasabi in Hawaii were determined to be non-quarantine status for the continental United States (USDA 2024).

This risk management document outlines the phytosanitary measures that APHIS will require if the proposed interstate movement of fresh leaves and rhizomes of wasabi from Hawaii into the continental United States is approved, and provides the evidence used by APHIS to conclude that these measures will effectively prevent the introduction of quarantine pests.

Risk Management Measures

APHIS proposes that fresh leaves and rhizomes of wasabi from Hawaii may be moved interstate into the continental United States under the following conditions:

1. Only commercially produced fresh leaves and rhizomes of wasabi may be moved interstate.
2. The wasabi must be washed prior to being packed for shipment.
3. Each shipment will be inspected by PPQ in Hawaii before moving to the continental United States.

Evidence for the Efficacy of Interstate Movement Requirements

Commercially produced fruits are grown and packed to meet quality levels that allow them to be marketed for sale. Visible pest infestations/plant disease infections are routinely culled during harvest and packing. Standard commercial practices often include cultural, chemical, or mechanical means (e.g., field sanitation, pre-harvest application of pesticides, resistant cultivars) to eliminate pests from fields or prevent pest infestation/infection. Washing of wasabi prior to packing will remove external pests. Pesticide applications and sanitation, such as removing and discarding infested/infected or damaged produce, are essential components of good agricultural practices, and are mainstays of commercial production (Kirk *et al.*, 2001). Commercially produced fruit is less likely than other fruit to have pests or other phytosanitary issues. Interceptions of pests in commercial fruit are far fewer than pest interceptions on fruit in passenger baggage, which is rarely commercially produced (ARM, 2024).

Risk Management Document, Interstate movement of wasabi (*Eutrema japonicum*) from Hawaii into the continental United States for consumption

Inspection ensures that various stages of any pest that are present will be detected. APHIS and CBP intercept 1.5 million prohibited plants and plant products and 40,000 to 50,000 plant pests per year by inspection (Cavey, 2003). Each consignment of fresh leaves and rhizomes of wasabi will be inspected by PPQ in Hawaii.

Conclusion

APHIS believes that the phytosanitary measures proposed in this document, including commercial production and inspection, will result in the phytosanitary movement of fresh leaves and rhizomes of wasabi from Hawaii into the continental United States.

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