STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESOURCE MANAGEMENT DIVISION
HONOLULU, HAWAII

January 26, 2021

Board of Agriculture
Honolulu, Hawaii

Subject:	REQUEST FOR CONSENT TO WAIVE PERFORMANCE BOND REQUIREMENT FOR GENERAL LEASE NO. S-4636; GREEN POINT NURSERIES, INC., LOT NO. 8, TMK: 3rd DIV/2-4-049:022; WAIAKEA, SOUTH HILO, ISLAND OF HAWAII
Authority:	Section 166E-6, Hawaii Revised Statutes (HRS), and Section 4-158-20(b)(2), Hawaii Administrative Rules (HAR)
Lessee:	Green Point Nurseries, Inc.
Land Area:	10.243 acres
Tax Map Key:	3rd DIV/ 2-4-049:022 (see Exhibit "A")
Land Status:	Encumbered by Governor's Executive Order No. 4300 to the Department of Agriculture for non-agricultural park land purposes in 2009
Lease Term:	50 years, 5/1/1980 through 4/30/2030
Annual Base Rent:	$4,480.00 per year, until May 1, 2025
Additional Rent:	1.5% of the gross proceeds from the sale of commodities produced on the demised premises which exceed the base annual rental
Performance Bond:	Two years of annual base rental
Character of Use:	Diversified agriculture purposes

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A1

A2

BACKGROUND:

General Lease No. S-4636 was originally awarded to Jean Higaki by the Board of Land and Natural Resources. In 1991 the lease was assigned to Ronald T. Okazaki. At its June 30, 2015 meeting, the Board of Agriculture extended General Lease No. S-4636 for fifteen years to expire on April 30, 2030. Mr. Okazaki passed away on February 17, 2020, and his son, Lloyd Okazaki, Personal Representative to his father's estate, requested that General Lease No. S-4636 be assigned to Green Point Nurseries, Inc. (GPN). At its September 22, 2020 meeting, the Board of Agriculture approved the assignment.

GPN currently holds two leases with the Department of Agriculture: General Lease No. S-5905 and General Lease No. S-4445. Both leases are in the Panaewa Farm Lots Subdivision and are operated by the Tanouye family who owns GPN. They cultivate a variety of tropical flowers, orchids and anthuriums. The Lessee is the original lessee on both leases and has made timely rental payments and is in compliance with the terms and conditions of the subject leases.

GPN is requesting that the performance bond requirement for General Lease No. S-4636 be waived as they have consistently made timely rental payments and are in compliance with lease provisions and 4-158-20(b)(2), HAR.

RECOMMENDATION:

That the Board of Agriculture approve lessee's request to waive the performance bond requirement for General Lease No. S-4636, subject to the provision that the Lessor reserves the right to reinstate the waived requirements at any time throughout the term of the lease.

Respectfully submitted,

BRIAN KAU, P.E.
Administrator and Chief Engineer
Agricultural Resource Management Division

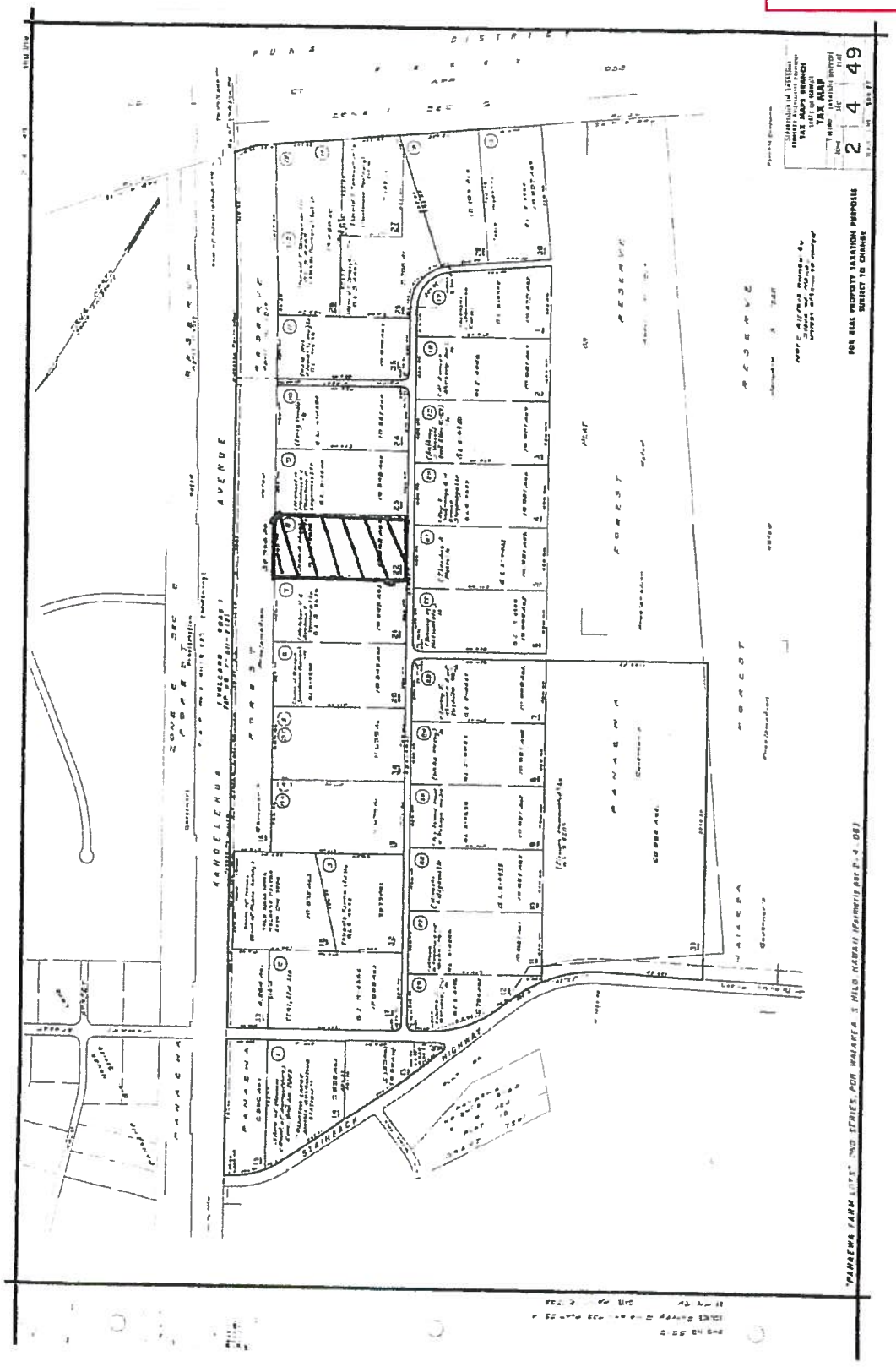
Attachments – Exhibit "A"

APPROVED FOR SUBMISSION:

Phyllis Shimabukuro-Geiser

PHYLLIS SHIMABUKURO-GEISER
Chairperson, Board of Agriculture

EXHIBIT "A"


PUNA DISTRICT
TAX MAP
2 4 49
FOR REAL PROPERTY TAXATION PURPOSES
SUBJECT TO CHANGE
KANOELEHUA AVENUE
FOREST RESERVE
PANAEWA
PANAEWA FOREST
PANAEWA FOREST RESERVE
HIGHWAY
STAINBACK
"PANAEWA FARM LOTS" 2ND SERIES, POR WAIAKEA 3 HILO HAWAII (Formerly por 2-4-08)

A3

State of Hawaii
Department of Agriculture
Plant Industry Division
Plant Quarantine Branch
Honolulu, Hawaii

January 26, 2021

Board of Agriculture
Honolulu, Hawaii

Subject: Request to Review the Petition from Mr. Darwin Inman, Kona Hills LLC, to Shorten and Exempt the Duration of Quarantine for Tissue Cultured Coffee Rust Resistant Coffee Plants, *Coffea* spp. subject to alternative propagation or import procedures.

I. Background:

A. Procedural Background

Mr. Inman's petition (Appendix A) for shortening and exempting the duration of quarantine is brought under Section 4-70-6, Hawaii Administrative Rules (HAR), which states: "Unless otherwise specified for specific plants in subsequent subchapters, the duration of quarantine shall be one year". However, section 4-70-6 also states that the Board of Agriculture (Board) may exempt or shorten the period of quarantine under certain conditions of importation or propagation procedure.

To be considered by the Board, a petition must contain certain substantive items, specifically: (1) the alternative propagation or import procedures that would justify the shortening or exemption of the one-year quarantine; (2) a statement of the petitioner's interest in the subject matter; and (3) a statement of the reasons in support of the proposed shortening or exemption of quarantine. Mr. Inman's petition appears to conform to these prerequisites for Board consideration.

B. Factual Background of the Petition

B1

Kona Hills LLC proposes to shorten the quarantine period for plants imported into Hawaii as follows (all plants originated from the same lot)[1]:

- The second shipment involved 301 plants under permit 21-06-O-P1842. These plants were imported in July 2020, have been in quarantine for a little over six months, and have not shown any issues of concern. (Attachment 3)

- The third shipment involved 300 plants under permit 21-10-O-P1911. These plants were imported in November 2020, have been in quarantine for about two months, and have not shown issues of concern. (Attachment 4)

- Kona Hills LLC has also been issued a permit in January 2021 for the remaining 500 tissue cultured plants from the original lot. These plants have not yet been imported.

II. Summary of Proposed Shortening and Exemption of Quarantine

For Kona Hills' second shipment, as listed above, they are requesting that the Board reduce the one-year quarantine by 6 months; thus allowing them to be released immediately.

For Kona Hills' third shipment, as listed above, they are requesting a 10-month quarantine reduction; thus allowing them to be released immediately.

For the final shipment, as listed above, Kona Hills is requesting a complete exemption of the one-year quarantine; thus allowing them to be released immediately.

III. Reasons that the Quarantine should be Shortened or Exempted

[1] The initial shipment involved 300 plants under permit 20-09-H-P1693. These plants were imported in October 2019, completed the full one-year quarantine and were released in October 2020. (Attachment 2)

Kona Hills contracted Micro Paradox to conduct micropropagation of all of the subject plants. Kona Hills believes that the propagation and importation procedures for these plants justify a shortening or exemption from the one-year quarantine: the plants are clones produced under standard in-vitro techniques; standard pest management and surveillance for pests and diseases of concern has been practiced throughout the process; the plants originate in California which does not have coffee diseases of concern; they used disease diagnostics through a U.S. Department of Agriculture approved lab, California Seed and Plant Lab, Inc.; they used California Department of Food and Agriculture certification prior to shipment to Hawaii; and because the initial portion of the plants already completed the standard one-year quarantine, all remaining plants should be eligible for either a shortening or exemption of quarantine as stated in section II above.

Please see Attachment 1 for additional details on the alternative propagation and importation procedures that have been maintained for these plants.

IV. Staff Recommendation

Normally, the Plant Quarantine Branch (PQB) would take no position on the substance of the proposed quarantine reduction and would recommend that the Board deny the petition as the one-year quarantine length is very important in order to keep diseases and pests out of Hawaii. However, the current situation is unique because the plants originate from a single lot, and a portion of them have already successfully completed the one-year quarantine period. Thus, PQB recommends approval of a quarantine reduction for the second lot of plants and immediate release, subject to the existing procedures that the petitioner has provided in Attachment 1.

For the third lot, and the plants that have yet to be imported, PQB recommends that the Board disapprove the petitioners' request for immediate release, but agree to shorten the quarantine period to three months. PQB understands the dire threat that coffee leaf rust (CLR) poses to Hawaii's coffee industry, and there is a need for additional rust resistant cultivars. However, a minimum of three months' quarantine is necessary to ensure that the plants are free of diseases and pests. There are other pests, diseases, and other strains of CLR that affect coffee plants and if introduced and released into Hawaii, the industry could be subjected to further devastation. Due to the unique circumstances of this petition and the potential crisis brewing in the coffee industry, PQB is proposing a minimum of at least three months in quarantine for the aforementioned plants to ensure that other diseases or pests do

not arrive with the remaining plants; and provided that the petitioner maintains the alternative propagation and importation procedures as provided in Attachment 1.

Respectfully Submitted,

Jonathan Ho
Acting Manager, Plant Quarantine Branch

CONCURRED:

Becky Azama
Acting Administrator, Plant Industry Division

APPROVED FOR SUBMISSION:

Phyllis Shimabukuro-Geiser, Chairperson
Board of Agriculture

December 14, 2020

PETITION REQUEST FOR EXEMPTION

To: Board of Agriculture

Petitioner: Mr. Darwin Inman, Manager
Kona Hills LLC
81-964 Haleki'i Street
Kealakekua, HI 96750
(808) 731-6498

Through: Hawaii Board of Agriculture
Attn. Phyllis Shimabukuro-Geiser, Chairperson
Hawaii Department of Agriculture

PETITION REQUEST:

Petition to immediately release coffee leaf rust resistant coffee plants from quarantine. The petition is a three-part request:
1) Permit 21-06-O-P1842 granted June 09, 2020: approximately 250 plants (current location: HDOA Plant Quarantine (Sand Island)
2) Permit 21-10-O-P1911 granted October 27, 2020: approximately 300 plants (current location: HDOA Plant Quarantine (Sand Island)
3) California based nursery: approximately 500 mother plants

DISCUSSION OF PETITION PROPOSAL:

Kona Hills would like to enhance and protect the future of our coffee farm along with the greater coffee industry in Hawaii. In late 2018 Kona Hills initiated a program to propagate rust resistant varieties in California for eventual export to Hawaii. Kona Hills appointed Micro Paradox/CSP Labs **(see description below)**, a California based plant specialist, to grow mother stock coffee plants in tissue culture for eventual export to Hawaii to serve the traditional one-year quarantine term. In July 2019, Kona Hills received its first PQ-7 permit (of three) and has completed the one-year period. Permit #1's total plants were a fraction of the available California mother stock due to the space limitations of the Plant Quarantine facility at Sand Island. The remaining propagated plants (Permits #2-4) needed to be staged in California due to the lack of room at Sand Island. Permits #s 2 and 3 (currently in Plant Quarantine in Honolulu) were initiated in July 2020 and November 2020 as the Sand Island facility rooms became available. Permit # 4 cannot initiate until Permit #2's room clears.

Kona Hills was willing to be patient with our program as there was no imminent danger of Coffee Leaf Rust in Hawaii. Our risk mitigation strategy became a necessity last month with the discovery of Coffee Leaf Rust in Maui and in the Kona district of the island of Hawaii. There is now an urgency to accelerate the importation program. The scope of Kona Hills and the industry's importation far outweighs the availability of space at Sand Island. Kona Hills would like to request the shortening of our existing permit timelines as our mother plants are from the same mother stock of completed Permit #1. The mother stock plants in question have been observed for 8 months in California and spent 12 months under observation for Permit 20-09-H-P1693. We feel it is reasonable and safe to request a full release of all related plants coming from that same stock. We would like to formally request an immediate exemption for Permits #2, #3 and the remaining mother stock (Permit #4) in California. We would like to request this exemption pending a final inspection by HDOA Plant Quarantine.

Coffee Leaf Rust Discussion: Coffee Leaf Rust (CLR) has decimated the economies of many countries in recent years, namely in Central America. The islands of Hawaii have few varieties, in scale, available to protect/replace against CLR infestation. An infestation of CLR, along with the existing conditions of Coffee Berry Borer and nematodes, can cripple the Hawaiian coffee market for many years to come including our project. With a demographic of under financed family farmers and a large amount of under treated feral ground, the Hawaii coffee industry could suffer between a 75% loss of economic value if the epidemic reaches its full potential.

USDA New Pest Guidelines describing Coffee Leaf Rust (December 2020)

- The first symptom of coffee leaf rust (CLR) is a pale-yellow spot on the upper leaf surface that appears 1–3 weeks after infection.
- Spores require 24 to 48 hours of continuous free moisture to germinate (high relative humidity alone is not enough).
- Spores can survive under dry conditions for 6 weeks.
- Time between infection and pustule development can range from 3 to 8 weeks in the field.
- Wind, rainfall and worker activity can disperse Hemileia vastatrix.
- Long-distance dispersal is typically attributed to both human-assisted spread and wind-assisted spread.
- The most effective method of managing CLR is through the use of resistant cultivars. Cultural management is also extremely important.
- Protective fungicides are recommended up to a disease threshold of 5 percent. Above that, systemic fungicides are needed to control the disease.

"The effect of coffee leaf rust on foliation and yield of coffee in Papua New Guinea "by J. S. Brown, *' J. H. Whan,* M. K. Kenny" and P. R. Merriman* *Department of Agriculture, Victorian Institute for Dryland Agriculture, *Department of Agriculture, Institute for Horticultural Development, and *Coffee Industry Corporation, Coffee Research Institute, PO Box 105, Kainantu, Eastern Highlands Province, Papua New Guinea

"Coffee leaf rust (CLR), caused by the pathogen Hemileia vastutrix Berk & Br., occupies a special position in the annals of plant pathology due to its devastating effects being documented by Large (1940). The disease devastated the coffee industry in Ceylon in the 1880s with average yields falling by over 50%. This resulted in that country changing from a coffee to a tea producer. The disease caused similar devastation to the arabica coffee plantings in Indonesia and that country's coffee production is now based on the more resistant robusta coffee. Losses as high as 70% have been estimated in India (Sreenivasas, 1989). The disease established in South America in the 1970s but it has not been as destructive as it was in Ceylon: losses of up to 30% in Brazil (Monaco, 1977), and 15-25% in Colombia (Castilo-Z, 1989) have been estimated. Colonisation of leaves by Hemifeia vastutrix reduces the photosynthetic efficiency of bushes; leaf cells are unable to function properly and diseased leaves fall prematurely. Significant reduction in photosynthetic rate can radically affect plant functions such as floral initiation and root and shoot growth. This can be followed by death of branches, or even of the whole plant (Cannell, 1973; Waller, 1982). Thus, yield loss is usually indirectly related to the severity of the disease. "

In a presentation to the Specialty Coffee Association 2017 it was cited by an industry expert the following statistics:

-CLR is the single biggest threat to the Latin America coffee industry.

-CLR affects 68% of coffee farms in Costa Rica (ICAFE)

-Last year, Mexico lost 46% of coffee production at an economic loss of $70M (ANICAFE).

- Starbucks and the "One Tree for Every Bag" program has distributed 10 million trees at a cost of $25M to El Salvador, Guatemala, and Mexico.

PETITIONERS RELATIONSHIP

Mr. Darwin Inman is a senior manager at Kona Hills Coffee. Kona Hills is a best-in-class coffee development converting an abandoned golf course and housing development of the former Hokukano Ranch Lot 1-A (1393 acres) and the Lower Kealakekua Heritage Reserve (500 acres) back to farming. The properties are located at 81-6580 Hawaii Belt Road, Kealakekua, Hawaii 96750. Both properties are located in the Kona District on the Big Island of Hawaii and are adjacent to each other.

SHIPPER: Dr. Parm Randhawa, President, Micro Paradox, 3556 Sankey Road, Pleasant Grove CA 95668, Phone: 916-764-2214

IMPORTER: Mr. Darwin Inman, Manager, Kona Hills Coffee, 81-964 Haleki'i Street, Building # 3 Suite A, B Kealakekua, Hawaii, 96750(**Business Office of Kona Hills)**

CATEGORY: In Hawaii, the importation of coffee plants, *Coffea spp.*, is regulated under 4-70, Hawaii Administrative Rules (HAR), and in particular, sections 4-70-16 through 4-70-18, HAR. Under section 4-70-18, HAR, coffee plants or seeds for propagation may be imported under permit and must be held in a strictly enforced quarantine for a minimum of one year, or longer if necessary, in the judgment of the PQB Chief.

TESTING of PLANTS: A phytosanitary certificate is issued by Sutter County, California prior to shipments to Hawaii.

PLANT PATHOLOGIST: Dr. Parm Randhawa, Micro Paradox and CSP Labs (Founder)

Micro Paradox is a tissue culture laboratory located near Sacramento, California. Micro Paradox provide commercial-scale micropropagation production services to nurseries located in the United States and abroad.
Micro Paradox produce rootstock for a variety of crops, such as walnuts, almonds, pistachios, cherries, and more. Micro Paradox also conduct research and development projects to provide our customers with innovative products such as micrografted trees.Micro Paradox is a pioneer in commercial-scale tissue culture and micropropagation. Micro Paradox has a state-of-the-art facility that facilitates the production of a large number of plants to meet the demands of nurseries and cultivators.

CSP Labs is a leading private plant pathology and genetics testing laboratory. CSP customers are from around the world, and include seed companies, nurseries, growers, and other businesses. CSP services include pathogen identification in various tissue types, high throughput genotyping/screening services, GMO detection and characterization, soil nematode testing, variety genetic fingerprinting, resistance screening, and consulting. CSP are members of the International Seed Health Initiative (ISHI), an accredited entity under the National Seed Health System (NSHS), and many of our team are active in the American Phytopathological Society (APS). CSP team includes several experienced plant pathologists and biologists who are trained in, and have experience in, the latest molecular biology and microbiology

techniques as they apply to mycology, virology, bacteriology, and plant genetics.

SHIPPING and OBSERVATIONS

PROCEDURE: Coffee plants are sent directly to the HDOA quarantine facility after undergoing a phytosanitary inspection in California by Sutter County. The coffee plants are in the care of staff from CTHAR Plant Department under the supervision of the HDOA Plant Quarantine staff.

RUST RESISTANT VARIETIES:

Parents	Variety	Variety
Timor Hybrid/Villa Sarchi	Sarchimor	Victoria 1
Timor Hybrid/Villa Sarchi	Sarchimor	Victoria 2
Timor Hybrid/Villa Sarchi	Sarchimor	Victoria 4
Timor Hybrid/Villa Sarchi	Sarchimor	Victoria 14
Timor Hybrid/Villa Sarchi	Sarchimor	San Isidro 48

Please find attached Permits: 20-09-H-P1693, 21-06-O-P1842, and 21-10-O-P1911, and USDA New Pests Response Guidelines

Darwin Inman 1/18/21
Kona Hills LLC
209-988-5659
darwin@konahillsllc.com

COFFEE

Standard Operating Procedure (SOP) for Export from California to Hawaii

3560 Sankey Road, Pleasant Grove, CA 95668. (916) 655-1581

Table of Contents

1. Executive Summary

Kona Hills Coffee is developing best-in-class coffee plantations in Kealekekua, HI and intends to add new and improved coffee cultivars from abroad. Direct importation of coffee seeds as propagative material into HI is prohibited due to the risk of introduction of prohibited pests and diseases. This proposal is to offer an alternate pathway to introduce micro-propagated coffee plants from California following well-established clean stock and quality assurance processes at Micro Paradox propagation facility based on approval and inspection by USDA APHIS and CDFA permit conditions for export and pest free place of production certification.

In collaboration with Kona Hills Coffee, Micro Paradox will import propagative material for improved coffee cultivars from Costa Rica and establish candidate mother plants in bio-secure growing area that will be thoroughly tested for all known pathogens of coffee plants before initiating in clean tissue culture for micro-propagation. Micro Paradox will work with authorized representatives of USDA APHIS, CDFA and Sutter County Ag Department to conduct all diagnostic testing in an approved diagnostic laboratory and allow inspection of the mother plants on an ongoing basis by inspectors and establish clean mother stocks. Young tissue culture derived plants will be hardened off at the greenhouse, tested and inspected for all known coffee pests and diseases before plants are securely shipped to HI under the Hawaiian Department of Agriculture (HDOA) import permit for full release upon arrival in HI.

Kona Hills Coffee and Micro Paradox will work collaboratively with HDOA, allowing full review of the propagation, testing and plant maintenance process by the HDOA inspectors including the review of inspection reports completed by internal operations and external authorized representatives of the CDFA and County Ag Department during the entire process.

2. Purpose

The purpose of this document is to illustrate a clean plant program for coffee at Micro Paradox and seek qualification for a waiver of the Hawaiian Department of Agriculture (HDOA) post-entry quarantine requirements relating to the import of plant materials into Hawaii. In this pursuit, the process of plant production by tissue culture, preventative pesticide programs, phytosanitary inspections, and laboratory testing procedures are described herein.

3. About Micro Paradox

3.1 Facility

Micro Paradox was established in 2009 for micropropagation of fruit tree rootstocks. Today, the company produces rootstocks of walnuts, almonds, cherries, pistachios and pecans. The facilities are located in Sutter County, California, and include:

- 23,000 sq ft building containing laminar flow hood area and growth rooms
- 60,000 sq ft controlled environment greenhouse
- 20,000 sq ft 50-mesh insect-proof screenhouse with double doors to exclude insect entry
- 10,000 sq ft on-site pathology and genetic testing laboratory (CSP Labs).

HEPA filtered air is introduced into the laminar flow hood area and growth rooms. Positive pressure is maintained in the laminar hood area and growth rooms to prevent any airborne contamination entering the facility. All Micro Paradox workers adhere to good practices (uniformed, wash hands, wear booties, etc.,) when entering into the clean areas.

3.2 Accreditations

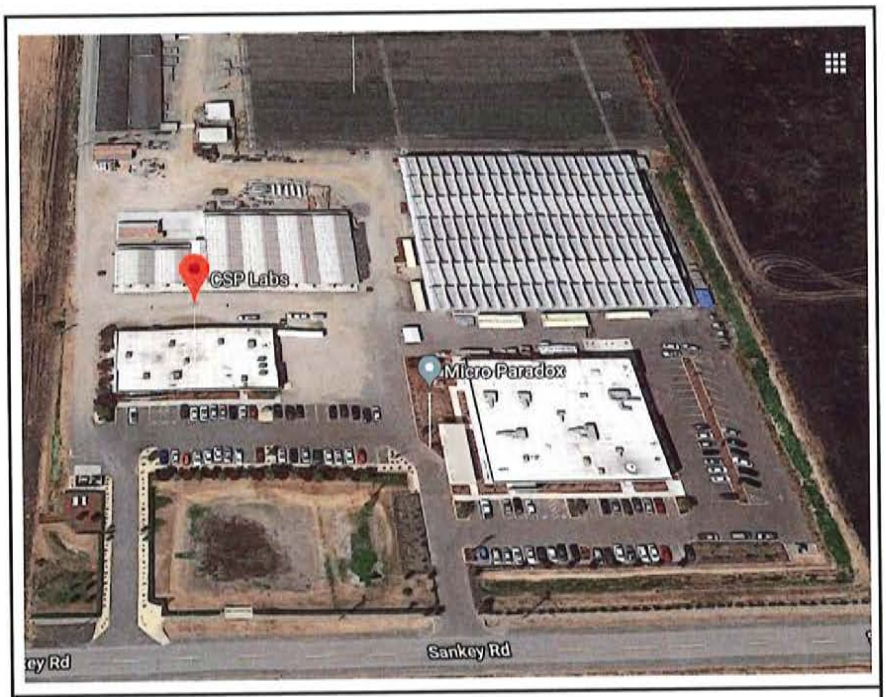
Micro Paradox is internationally recognized and approved by various countries for imports of nursery products.

The facility is approved by the United States Department of Agriculture (USDA) for international exports.

Chile. The Chilean Department of Agriculture has recognized Micro Paradox as an Approved Production Center for exporting walnut plants to Chile. The imported plants are not subject to any post-entry quarantine requirements. With this approval, Micro Paradox has exported more than 2 million plants to Chile since 2014.

Argentina. The Argentina Department of Agriculture has approved Micro Paradox to export walnut plants without requiring post-entry quarantine. Under this program, Micro Paradox exported 40,000 walnut plants to Argentina in 2018.

European Union (EU). The EU has approved Micro Paradox as a Pest Free Place of Production (PFPP), with particular reference to Xylella. Under this program, Micro Paradox has exported plants to Spain. Currently, Micro Paradox is listed as PFPP in European Union.



Google image of the Micro Paradox and CSP Labs campus

Micro Paradox (23,000 sq ft tissue culture lab)

4. Hawaii Requirements for Coffee Imports

An import permit from HDOA is required to import coffee propagation materials into Hawaii. Importation of a limited number of coffee plants or seeds for propagation is allowed. The plant materials will be held in quarantine under conditions outlined in the permit. Coffee seeds for roasting are prohibited except under permit. Each shipment is subject to approved treatment and conditions outlined in the permit. Used coffee bags are prohibited except under permit and approved treatment. Each shipment must be accompanied by a phytosanitary certificate or a certificate of treatment indicating the treatment procedure.

- HDOA EXTERIOR QUARANTINE for coffee requires the importer to obtain an import permit from HDOA.
- STATES REGULATED: All states
- COUNTRIES REGULATED: All countries
- MATERIALS REGULATED: All species of the genus Coffea.
- PESTS REGULATED: coffee berry borer (Stephanoderes hampei), coffee rust (Hemileia vastatrix), and other insects, pests, and diseases of coffee that are not now established in Hawaii.
- RESTRICTIONS: Any coffee plant, plant part, unroasted seed, or used coffee bag is prohibited except under permit.
- DURATION OF QUARANTINE: One year for coffee plants

5. Addressing Diseases of Concern

5.1 Pathogens, their spread and detection methods

Although Coffee rust (Hemileia vastatrix) is a main disease of concern, nursery plants for import to Hawaii should be free from several fungal, bacterial and viral pathogens. It is important to test mother plants for systemic pathogens that are difficult to culture (example - Xylella) and viruses (example - coffee ringspot virus). Other culturable fungi and bacteria are eliminated by sterilization procedures and sterility is maintained during in vitro multiplication and rooting stage. Acclimation in the greenhouse requires close monitoring of plants by qualified staff for any signs and symptoms of diseases. Any suspect samples are submitted for lab analysis.

Testing is provided by California Seed and Plant Lab (CSP Labs), which is located on the same campus as Micro Paradox. CSP Labs provides testing services to the seed industry and is accredited by the USDA-APHIS National Seed Health System (NSHS).

https://www.aphis.usda.gov/plant_health/acns/downloads/SeedHealthProgram/Entities/EntitiesAccredited.pdf

Class	Name	Spread by	Test
Fungi	Hemileia vastatrix (rust)	Air borne spores	Visual inspection
	Mycena citricolor (American leaf spot)	Spores	PDA Culture
	Cercospora coffeicola (leaf spot)	Spores	PDA Culture
	Rhizoctonia solani (root rot)	Soil movement	PDA Culture
	Ceratocystris fimbriata	Spores	PDA Culture
	Myrothecium roridum (stem canker)	spores	PDA Culture
	Pellicularia koleroga (Shred mold)	Spores	PDA Culture
Bacteria	Xylella fastidiosa	Glassy wing sharpshooter	PCR (multi-primer)
Viruses	Coffee ringspot virus	Brevipalpus phoenicis (false spider mite)	PCR

5.2 Inspections and sampling of plants during acclimation phase

Plants are routinely inspected (2-3X per week) by qualified personnel for any signs and symptoms of diseases as well as for insect pests and general cleanliness of greenhouse. Management includes pathologists and horticultists that hold Ph.D. degrees and provide training to inspectors. The inspectors report their findings of their visual observations of root rot, leaf spot, chlorosis, stunting etc to the management team. Samples, if any, are submitted to CSP Labs for diagnosis.

5.3 What if a common pathogen or insect pest detected

Preventative pesticide application program is followed. If an insect pest (aphid, mites, thrips etc) is detected, additional application of a suitable pesticide is made (spot treatment of whole house treatment) to eradicate the pest. For common fungal diseases (damping off, leaf spot etc), fungicides are applied. In addition, any suspect

plants are rouged out.

5.4 What if a quarantine pathogen (coffee rust) is detected

Coffee rust is a disease of high concern and has a zero tolerance. Rust infection results in chlorotic spots on leaves within 1-2 weeks of infection. Later these spots can start producing spores and infection spreads to other plants. https://www.apsnet.org/edcenter/disandpath/fungalbasidio/pdlessons/Pages/CoffeeRust.aspx

There are no coffee plants in Sutter County, therefore, the chances of infection is negligible. In spite of negligible possibility of infection, we routinely inspect for chlorotic spots. Any suspect plant is enclosed in a plastic bag and rogued out.

If a sporulating lesion is detected and infection is confirmed by lab analysis, the entire lot (whole house) is placed under quarantine and all plants destroyed by herbicide (such as paraquat) application. Since rust is an obligate parasite, killing of host plants will kill the rust.

5.5 Final inspection and certification

Before shipping to Hawaii, final inspection is conducted by Sutter County. This inspection covers all insect pests, mites and diseases. Micro Paradox maintains a California Nursery Stock Certificate. To meet quarantine requirements, a phytosanitary certificate from Sutter County will be included with each shipment to Hawaii.

CALIFORNIA NURSERY STOCK
CERTIFICATE FOR
INTERSTATE AND INTRASTATE SHIPMENTS

No.: D0756

This plant material or nursery or premises from which this shipment was made has been inspected and found free from especially injurious plant pests and disease symptoms

THIS SHIPMENT NEED NOT BE HELD FOR INSPECTION IN CALIFORNIA

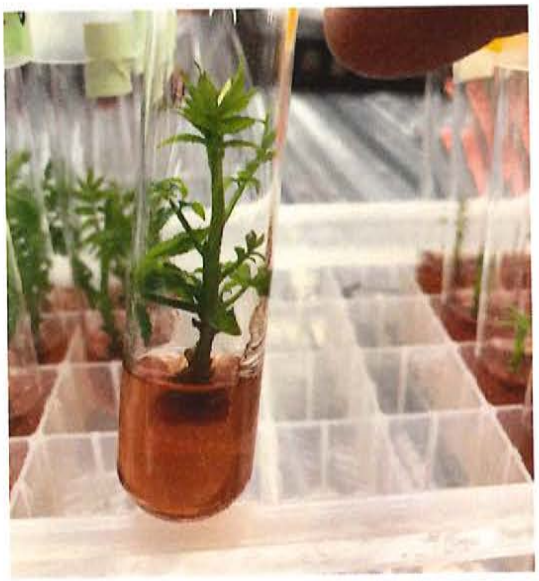
Issued by: Sutter County Agricultural Commissioner
and California Department of Food and agriculture
1220 N Street, Sacramento, CA 95814
66-119(2-12)

6. Production Process

6.1 Establishment of In Vitro Mother Plant

Coffee seeds are provided by the importer. Seeds are surface sterilized and planted on sterile tissue culture media in test tubes. Tubes with any visible bacterial and fungal growth are discarded. This assures elimination of any culturable pathogens. Nodal and tip sections of the plants are transferred to establishment media. Again, any contamination is discarded. Finally, one tube containing a clean and vigorous plant is selected as an **in vitro mother plant**. Derivatives of this mother plant, in the multiplication phase, are considered pure line. Samples

of the mother plant are tested for pathogens.



A representative in vitro mother plant.

A mother plant is maintained by regular transfers onto fresh nutrient media.

(This photo is not of a coffee plant. The photo is for illustration purposes only)

6.2 In Vitro Multiplication

Tissue from the in vitro mother plant is taken for the multiplication phase. In this phase, nodal and shoot tip sections of the mother plant are grown on multiplication media for 3-4 weeks. The resulting plant is cut and the cycle is repeated again. Several multiplication cycles are performed to increase the inventory of plant shoots.

Multiplication phase: Shoots are cut into nodal sections and transplanted onto fresh media.

A representative container showing full grown shoots for next cycle of multiplication.

6.3 Rooting in Growth Room

Shoots are subjected to root induction by exposure to rooting hormone. Shoots are then rooted in ellepots containing peat moss and perlite in a multi-cavity tray. The tray is covered with a plastic lid. The resulting unit (multi-cavity tray covered with lid) is called a dome. The domes are covered with breathable plastic bags and incubated under lights. In 3-4 weeks, roots are produced. The rooted plugs are then ready for shipment to Hawaii.

	
Growth room: Completely enclosed dome system to exclude introduction of any diseases and vectors	**Export-Ready plugs directly from growth room**

6.4 Acclimation in Insect-proof Greenhouse /Screenhouse

In the event the rooted plugs are not shipped directly to Hawaii, the plugs are transferred to our insect-proof screen house and/or greenhouse for acclimation. Our 50-mesh insect-proof screen excludes aphids, whiteflies, leafhoppers and mites. Considering mites as vectors for coffee ringspot virus and sharpshooters as vectors for Xylella fastidiosa, Micro Paradox's insect-proof screenhouse offers complete protection against the introduction of such pathogens from outside sources into our plantings.

	Insect-proof screen house for acclimating plants before export. **Export-ready plants**

6.5 Shipping

Micro Paradox

Plug trays are packed in cardboard boxes and shipped by air to Hawaii. Large shipments may be sent by sea.

7. Examples of Good Practices

7.1 Laboratory Practices

1. Only authorized people can work inside the clean rooms. The authorized people include workers who work at laminar flow hoods and in growth rooms, managers and janitorial.
2. All visitors must wear plastic booties, hairnets, etc. before entering the clean rooms. Visitors are always accompanied with a manager.
3. All workers are required to dress properly (scrubs, hairnet, etc.)
4. Floors are kept clean by daily mopping by janitorial staff. Mopping is generally done at the end of the shift and before the start of the next shift
5. No flying or crawling insects should be visible in the facility. All inside workers are trained to alert the managers if they see any insect. If any insect is found, pyrethrin based insecticides are sprayed after the shift.
6. No loose trash
7. Ensure all filters for laminar flow hoods are not expired (for sterility). Annual maintenance is performed.
8. Hand sanitizers are placed at various places throughout the facility. These include entry to clean area and at each laminar flow hood. Workers are alerted to use the sanitizers frequently.
9. Positive pressure in all clean areas (growth rooms and laminar flow hood area).
10. Sterility checks of HEPA filters by service providers on an annual basis.
11. Contamination is monitored daily. Technicians are assigned to growth rooms and they use flashlight to spot contamination.

Detecting contamination

A technician is using a flashlight to spot contamination in a multiplication container.

Any invisible bacterial contamination can be seen with flashlight directed to the base of the container.

7.2 Greenhouse/Screenhouse Good Practices

1. Weeds control maintained. This includes the use of peat-perlite based potting mix free of any weed seeds. Pre-emergent weedicides are applied on an annual basis to control weeds. Any emerged weeds are removed by had.
2. All plants are on raised benches. The benches are made of aluminum mesh. Benches are movable on metal rails and can check out of the house at the end of each growing. The benches are thoroughly cleaned by pressure hose before using them again..
3. No loose trash in greenhouse
4. No algae on walkways. Physan 20 is used on walkways
5. All equipment is daily checked (exhaust fans, heaters, cooling pads, irrigation) and quickly repaired if needed.
6. Logging of preventative pesticide applications for insect and disease control. List of preventative pesticides is included in a later chapter.
7. Logging of weekly scouting for weeds, insects and diseases.
8. Phytosanitary visual inspections for insects and mites at 2-3X per week. This is done by our in-house staff, trained to detect certain pests and diseases.
9. Official inspections and sampling. This is done by Sutter County. Sutter County provides general inspection of our entire nursery. For meeting any quarantine requirements, special inspection is done before shipments.

Greenhouse automation: Light, RH and temperature are computer controlled

8. On-site Lab Support by CSP Labs

Samples of any suspect disease or pest are submitted to our on-site lab, California Seed and Plant Lab (CSP Labs).

CSP Labs performs pathology and genetic analysis of plants. CSP Labs is accredited by USDA-APHIS.

9. Preventative Pesticide Program

Micro Paradox has a preventative pesticide program in place to manage pests, weeds and diseases. If pests are found, corrective applications of pesticides are made.

Preventative Applications

Manager can add, delete or substitute certain pesticides

	Per gallon (tank mix)	Re-entry	Effectiveness
Week 1	Avid 1 ml Equus 20 ml Avoid hot days	12 hours	Mites, aphids, thrips, white flies, leaf miners Anthracnose, rust, Cercospora, downy mildew, Botrytis, Alternaria, Rhizoctonia, powdery mildew, Septoria, Didymella, Scab, Shot hole, Brown rot

Week 2	Admire 1 ml Rovral 5 ml Avoid hot days	12 hours	White flies, aphids, leafhoppers Beetles, psyllids, mole crickets, wireworms. Suppresses thrips also Rhizoctonia, Sclerotinia, Bipolaris, shot hole, Botrytis, Alternaria, Cladosporium, Colletotrichum, Phomopsis, Mycosphaerella, Phoma.

Weed Control

	Per gallon (One gallon covers 2000 ft)	Re-entry	Target
Matrix	6 gm	24 hours	Pre-emergent
GoalTender (not for greenhouse)	30 ml	24 hours	Pre-emergent. Has vapor phase
Round up	25 ml	24 hours	Post emergent
Spike (apply where no plants will be raised ever)	0.8 lb.	4 hours	All

Corrective Applications by Pest

Pest	Pesticide	Dose per gallon	Notes
Aphid	Admire	1 ml	
Bacteria	Kocide 2000	5 gm	
Fungi	Equus	20 ml	
Fungi	Cabrio	3 gm	
Leaf roller	Delegate	2 gm	
Mites	Avid	1 ml	
Mites (Avid resistant)	Envidor	6 ml	
Powdery mildew	Topsin M	5 gm	
Thrips	Entrust	1 gm	
Thrips	Delegate	2 gm	Suppression only
Weeds	Round up	25 ml	
Weeds (Roundup resistant)	Reckon	50 ml	
White fly	Admire	1 ml	
Worms	Delegate	2 gm	

Micro Paradox

10. Phytosanitary Inspections & Certification

Sutter County performs inspections of growth rooms, greenhouses and insect-proof screenhouses. Samples are drawn, as needed, for testing by the California Department of Food and Agriculture (CDFA).

The following diseases and insects/pests may be included:

1. Hemileia vastatrix (rust)
2. Mycena citricolor (American leaf spot
3. Cercospora coffeicola (leaf spot)
4. Rhizoctonia solani (root rot)
5. Ceratocystis fimbriata
6. Myrothecium roridum (stem canker)
7. Pellicularia koleroga (Shred mold)
8. Xylella fastidiosa
9. Coffee ringspot virus
10. Coffee berry borer
11. Any other pathogens
12. Any other insect pests
13. Mites

11. Illustrations and Records

Several photographs are presented below to show Micro Paradox growing facilities and processes.

11.1 Growth Room for Multiplication

11.2 Sticking Cuttings in Peat-perlite Based Media for Rooting

11.3 Manufacturing of Ellepots

11.4 Greenhouse Acclimation

11.5 Screenhouse Acclimation

11.6 Water Source (Deep Well 300 ft, No Pathogens)

11.7 Weekly Scouting

The following is an example of Micro Paradox's weekly scouting report which is emailed to all managers.

CSPLabs

Parm Randhawa <randhawa@calspl.com>

Scouting 09/15/2017
1 message

David Leaphart <david.leaphart@calspl.com> Sat, Sep 16, 2017 at 8:17 AM
To: Parm Randhawa <parm.randhawa@csplabs.com>, Sandeep Randhawa <srandhawa@calspl.com>, Hsien Easlon <hsien.easlon@calspl.com>, Harry Sohi <hsohi@calspl.com>, Caleb Iversen <caleb.iversen@calspl.com>, Jose Cobarrubia <jcobarrubia@calspl.com>

Hello,

Sankey

1. Mites have been spotted in GH3 and GH4. Both of these locations are on Viking Cuttings. Caleb is going to be applying a spot treatment along with the scheduled routine pesticide sprays.
2. Mother block Pistachio - Peter, Kerman and Randy are all looking to have signs of pesticide damage. Residue left on leaves is causing damage to new and old growth. Dr.Harry - please advise Jaswant to avoid spraying those plants in particular until the problem can be discovered.
3. Gravel is being purchased to reduce standing water in the aisle ways of the greenhouse. This will help alleviate algal growth and floor fungal gnats.

Thank you,

David Leaphart
Micro Paradox
3560 Sankey Road
Pleasant Grove, CA 95668
916-655-1019

11.8 Example of Pesticide Report Submitted to County

	A	B	C	D	E	F
1	**Pesticide applications: August 2017**					
2	**Date**	By	Location	Pesticide	Qty	Unit
3	8/6/2017	Caleb	Sankey	Vintre	1500	ml
4	8/6/2017	Caleb	Sankey	Equus	2580	ml
5	8/6/2017	Caleb	Sankey	Success	132	ml
6	8/6/2017	Caleb	Sankey	Safari	174	gm
7	8/13/2017	Caleb	Sankey	Vintre	1250	ml
8	8/13/2017	Caleb	Sankey	Admire	110	ml
9	8/13/2017	Caleb	Sankey	Avid	110	ml
10	8/13/2017	Caleb	Sankey	Rovral	550	ml
11	8/18/2017	Caleb	Sankey	Vintre	1500	ml
12	8/18/2017	Caleb	Sankey	Equus	2580	ml
13	8/18/2017	Caleb	Sankey	Safari	174	gm
14	8/18/2017	Caleb	Sankey	Success	132	ml
15	8/23/2017	Caleb	Sankey	Acramite	0.5	lb
16	8/27/2017	Caleb	Sankey	Vintre	1500	ml
17	8/27/2017	Caleb	Sankey	Admire	132	ml
18	8/27/2017	Caleb	Sankey	Avid	132	ml
19	8/27/2017	Caleb	Sankey	Rovral	660	ml
20	9/3/2017	Caleb	Sankey	Vintre	1500	ml
21	9/3/2017	Caleb	Sankey	Success	132	ml
22	9/3/2017	Caleb	Sankey	Equus	2580	ml
23	9/3/2017	Caleb	Sankey	Safari	174	gm

11.9 On-site Testing Laboratory (CSP Labs)

CSP Labs

Micro Paradox

11.10 Example: CSP Labs report

Lab ID: 2228317-114538

Results

Micro Paradox
3556 Sankey Road
Pleasant Grove, CA 95668
USA
Phone: 916-655-1581
Fax: 916-655-1582

Date received: 10/06/2017
Date reported: 10/14/2017

Received as: Walnut
Quantity received: 10 sample(s)
Lot(s): Screenhouse, Vlach 1-10

Assay ID	Target	Quantity Tested	Completed
13571	**MultiScan**	10 sample(s)	10/14/2017
Method:	PCR		
Results:	See Report		
Reviewed By:	Kiran Mani		

Tests performed

1. *Xylella fastidiosa* ITS PCR (Schaad 2002)
2. *Xylella fastidiosa* 16SrRNA PCR (Wenbin et al 2013)
3. *Xylella fastidiosa* HL5/6 PCR (Francis et al 2006)
4. *Xylella fastidiosa* 16S PCR (Harper 2010)
5. *Brenneria rubrifaciens* (PCR confirmation of cultures)
6. *Phytophthora cambivora* (Universal PCR followed by specific PCR)
7. Cherry leaf roll virus (PCR)

A representative set of samples.

Method

For *Xylella* and *Phytophthora*, 0.1 gm of root and petiole tissue was used for DNA/RNA isolation. For *Brenneria*, stem tissue was cultured on KB media and any suspect isolates tested by PCR. For Cherry leaf roll virus, leaf tissue was tested by PCR.

Results

#	Sample	1	2	3	4	5	6	7
1	Screenhouse, Vlach 1	-	-	-	-	-	-	-
2	Screenhouse, Vlach 2	-	-	-	-	-	-	-
3	Screenhouse, Vlach 3	-	-	-	-	-	-	-
4	Screenhouse, Vlach 4	-	-	-	-	-	-	-
5	Screenhouse, Vlach 5	-	-	-	-	-	-	-
6	Screenhouse, Vlach 6	-	-	-	-	-	-	-
7	Screenhouse, Vlach 7	-	-	-	-	-	-	-
8	Screenhouse, Vlach 8	-	-	-	-	-	-	-
9	Screenhouse, Vlach 9	-	-	-	-	-	-	-
10	Screenhouse, Vlach 10	-	-	-	-	-	-	-

"-" indicates negative.

Nilesh Maharaj

Approved by: Nilesh Maharaj, Ph.D.
Laboratory Director

Reviewed by:
X Kirandeep K Mani
Plant Pathologist

CSPLabs
California Seed and Plant Labs 3556 Sankey Rd, Pleasant Grove, CA 95668 Phone: (916) 655-1581 Fax: (916) 655-1582 www.csplabs.com

11.11 Phytosanitary Inspections (Example of Visual Inspection Report)

NIPM Item 4.3

STATE OF CALIFORNIA
DEPARTMENT OF FOOD AND AGRICULTURE
NURSERY, SEED, AND COTTON PROGRAM
64-084 (Rev. 07/01)

CDFA™

REPORT OF NURSERY INSPECTION

COUNTY: Sutter DATE: October 20, 2015

NURSERY NAME: Micro Paradox	LICENSE NO.: D0756-01	PHONE NO.: (916) 655-1581	REVIEWED BY: [signature]
NURSERY LOCATION: Sanky Road main Shadehouse - Chile section	MAILING ADDRESS: 3556 Sankey Road Pleasant Grove, CA 95668		NURSERY ACREAGE TYPE: ☒ TYPE 1 (any plant for planting, including ornamentals and potted plants) ☐ TYPE 2 (cut flowers & sod)
TOTAL ACRES: Approximately 500 feet²	INSPECTION DATE: October 20, 2015	HOURS: 1.0	

KIND OF NURSERY STOCK	NO./SIZE	LOCATION (in the nursery)	DEFECT OR PEST	LEVEL* [T] [L] [M] [H]	PDR NUMBER	HOLD	RELEASE DATE
Walnut rootstock 'Vlach'	3x4inch sleeves	Sankey Shadehouse - Chile	No live insect pest species				
60,000			or snails observed. Weed				
			control measures are in place.				
			Vinegar flies (Drosophila spp) and				
			fungus gnats (Sciaridae) observed				
			in moist areas. Shadehouse treated				
			for aphids and whiteflies 10/14/2015.				
90 plants sampled for plant parasitic nematodes:					510P06058770		October 19, 2015

NOTICE OF NONCOMPLIANCE

SECTIONS VIOLATED:

☐ SECTION 6902 FAC & SECTION 3060.2 CCR: NURSERY STOCK NOT IN COMPLIANCE WITH MINIMUM STANDARDS OF CLEANLINESS.
☐ SECTION 53451 FAC: NURSERY STOCK DEAD OR DYING CONDITION, SERIOUSLY BROKEN, FROZEN OR SERIOUSLY DAMAGED, ABNORMALLY POTBOUND.
☐ SECTION 53542 FAC: DECIDUOUS FRUIT AND NUT TREES WITH DEFECTIVE ROOTS, BROKEN GRAFTS.
☐ SECTION 53511 FAC: NURSERY STOCK NOT CORRECTLY LABELED.

AUTHORITY FOR HOLDING: FOOD & AGRICULTURAL CODE: ☐ SEC. 5701 PESTS ☐ SEC. 53421 GRADES & STANDARDS
NONCOMPLIANCE WARNING TAG ISSUED: ☐ YES ☐ NO
LOCATION OF STOCK HELD: ____

DISPOSITION: YOU ARE HEREBY NOTIFIED THAT THE NURSERY STOCK DESCRIBED HEREON SHALL NOT BE SOLD OR TRANSPORTED WITHOUT FIRST OBTAINING PERMISSION FROM THE PROPER ENFORCING OFFICER AND THAT YOU ARE REQUIRED TO:

☐ REDUCE PEST INFESTATION TO COMPLY WITH THE PRESCRIBED MINIMUM STANDARDS OF CLEANLINESS WITHIN ____ DAYS
☐ RECONDITION OR LABEL NURSERY STOCK WITHIN ____ DAYS
☐ OTHER: ____

AGRICULTURAL COMMISSIONER: Mark P. Quisenberry	ENFORCING OFFICER: [signature] Margaret Stelmak	
ADDRESS: 142 Garden Highway Yuba City CA 95991	TELEPHONE: (530) 822-7500	CC: ☒ NURSERY ☒ NURSERY & SEED PROGRAM ☐ ORIGIN COUNTY COMMISSIONER

* KEY: T - TRACE L - LIGHT M - MEDIUM H - HEAVY

11.12 An Example of Phytosanitary Sampling by County

CDFA Plant Health and Pest Prevention Services

STATE OF CALIFORNIA
DEPARTMENT OF FOOD AND AGRICULTURE
PLANT HEALTH AND
PEST PREVENTION SERVICES

PEST AND DAMAGE RECORD

PDR NUMBER **510P06088770** | Date collected **10/9/2015**

Lab: ENTO | PLANT PATH | NEMA | SEED | BOTANY | VERT | Time Collected

NOR Number:

Number of samples:

Location: **51**
Activity: **09**
Situation: **22**
Section:
Township:
Range:
Base and meridian:

Owner/receiver
Owner: **MicroParadox**
Address/physical description: **3556 Sankey Road**
City: **Pleasant Grove** | State: **CA** | Zip code: **95668**
County: **Sutter**
Phone | Fax | Latitude
E-mail | Longitude
Cross street: **Pleasant Grove Road**

Collector **Margaret Stelmok**
Affil. F S C E U O Describe Other

Quarantine shipper/broker
Name
Address
City | Zip code
State/Country
Phone | Fax | Latitude
E-mail | Longitude

Quarantine destination: **Chile**

Quarantine origin (where host grown)

City	County	State/Country	Zip
Pleasant Grove	**Sutter**	**CA US**	**95668**

Carrier (ground/air/maritime)

Business name	Flight number

Shipment size / units: **/**

Program: **QPHYT - Phytosanitary certification**

License plate	License state	Tail/ship number

Submitter remarks
Please test for Xiphenema Americana sensu stricto, Xiphenema Americana sensu lato, and other plant parasitic nematodes.

Suspect

Send report to:
Name: **Margaret Stelmok**
Phone:
Fax:
Email:

Entomology

Trap number	Grid number	Last service date	Latitude
Trap type		Trap density **per**	Longitude
Survey method			

General or Plant Pathology
Number of involved:
of plants affected:
Plant distribution:

Plant parts affected

Bark	Bulbs or Corms	Leaves, upper surface	
Blossoms	Fruit or nuts	Petiole	Stem
Branches, large	Growing tips	Rootlets	Trunk
Branches, terminal	Roots, large	Seeds	Tubers
Buds	Leaves, lower surface		

Plant symptoms

Canker	Gumming	Malformation	Slow Decline
Die back	Internal discoloration	Marginal burn	Stunting
Fruit rot	Leaf fall	Root rot	Sudden collapse

11.13 Example of Phytosanitary Certificate

Based on visual inspections and lab results, phytosanitary certificate is issued with applicable declarations.

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
PLANT PROTECTION AND QUARANTINE

PHYTOSANITARY CERTIFICATE

FOR OFFICIAL USE ONLY

PLACE OF ISSUE: Yuba City, California

NO. **F-C-06101-05352046-7-N**

TO: THE PLANT PROTECTION ORGANIZATION(S) OF: Chile

DATE INSPECTED: January 20, 2016

CERTIFICATION

This is to certify that the plants, plant product or other regulated articles described herein have been inspected and/or tested according to appropriate official procedures and are considered to be free from the quarantine pests, specified by the importing contracting party and to conform with the current phytosanitary requirements of the importing contracting party including those for regulated non-quarantine pests.

DISINFESTATION AND/OR DISINFECTION TREATMENT

1. DATE	2. TREATMENT
(1) January 11, 2016	Spray
3. CHEMICAL (active ingredient)	4. DURATION AND TEMPERATURE
Abamectin miticide/insecticide	**********
5. CONCENTRATION	6. ADDITIONAL INFORMATION
1 mL / 1 gal	100 gallons/acre

DESCRIPTION OF THE CONSIGNMENT

7. NAME AND ADDRESS OF THE EXPORTER	8. DECLARED NAME AND ADDRESS OF THE CONSIGNEE
Micro Paradox 3656 Sankey Road Pleasant Grove, California 95668	Agricola Natividad Limitada Raul Nilo s/n Lote a de el padre, panquehue Mallos, VI Region, Chile
9. NAME OF PRODUCE AND QUANTITY DECLARED	10. BOTANICAL NAME OF PLANTS
(1) 20400 Each Walnut (Rooted Plants)	(1) Juglans hindsii x Juglans regia
11. NUMBER AND DESCRIPTION OF PACKAGES	12. DISTINGUISHING MARKS
(1) 1 pallet	(1) Agricola Natividad Limitada Raul Nilo s/n lote a de el padre, panquehue Mallos, VI Region, Chile
13. PLACE OF ORIGIN	14. DECLARED MEANS OF CONVEYANCE
(1) Sutter County, California, USA	Air Freight
	15. DECLARED POINT OF ENTRY
	Santiago

WARNING: Any alteration, forgery, or unauthorized use of this phytosanitary certificate is subject to civil penalties of up to $250,000 (7 U.S.C. Section 7734(b)) or punishable by a fine of not more than $10,000, or imprisonment of not more than 5 years, or both (18 U.S.C. Section 1001).

ADDITIONAL DECLARATION

The dormant plants that come from the company Micro Paradox Inc., officially recognized by SAG Chile (resolucion number 10.162/2015), found free of Brevipalpus lewisi, Tetranychus pacificus, Euzophera semituneralis, Hyphantria cunea, Chrysobothris mali, Quadraspidiotus juglansregiae, Parlatoria oleae, Parthenolecanium pruinosum, Postvittana Epiphyas, Brenneria rubrifaciens, Xylella fastidiosa, Cherry leaf roll virus, Phytophthora cambivora, Xiphinema americanum sensu stricto and Xiphinema americanum sensu lato (except Chilean populations), in addition to

(see attached additional declaration)

Page 1 of 2

16. DATE ISSUED	17. NAME OF AUTHORIZED OFFICER (Type or Print)	18. SIGNATURE OF AUTHORIZED OFFICER
January 21, 2016	Nicolas A. Oliver	

No liability shall attach to the USDA or to any officer or representative of the USDA with respect to this certificate.

PPQ Form 577 FEB 2001 Previous editions are obsolete after 6/30/01

11.14 Pest Free Production Place (PFPP)

Micro Paradox listed as a PFPP by the European Union (EU).

European Union Approved, U.S Pest Free Areas, and Pest Free Places of Production for *Xylella fastidiosa*

Pest Free Areas

U.S. State	County		
Oregon	Benton	Jackson	Marion
	Clackamas	Josephine	Multnomah
	Columbia	Klamath	Polk
	Douglas	Lane	
Washington	Benton	Jefferson	Snohomish
	Clallam	King	Thurston
	Cowlitz	Lewis	Walla Walla
	Franklin	Pierce	Whatcom
	Grays Harbor	Skagit	Yakima

Pest Free Places of Production

Company Name	State	City	Zip Code
Monsanto Vegetable Seeds	California	Woodland	95695
Foundation Plant Services	California	Davis	95616
Driscoll's, Inc.	California	Watsonville	95077
Plant Sciences, Inc.	California	Watsonville	95076
Micro Paradox	California	Pleasant Grove	95668
Driscoll's, Inc.	California	Red Bluff	96080
Michigan State University Department of Horticulture Patrick Edger Laboratory	Michigan	East Lansing	48824
Vista Farms	Puerto Rico	Juana Diaz	00795

02/26/2019

12. Summary of Micro Paradox

Established

Micro Paradox was established in 2009 to provide tissue-culture services and micropropagated rootstocks to fruit tree nurseries in California. The company was incorporated in 2011.

Facilities

Micro Paradox is located on a 40-acre parcel and contains the following:

- 23,000 square feet concrete building containings media preparation rooms, laminar flow hood areas, growth rooms and a warehouse for transplanting.
- 60,000 square feet fully-automated greenhouse for acclimation of plants
- 20,000 square feet insect-proof screen house for growing "Export Grade" plants free of insect pests.
- 120,000 square feet shade house for growing plants for domestic sales.
- 160,000 square feet solar panels to provide 100% energy.
- Future expansion includes another 60,000 sq ft greenhouse, 25,000 sq ft warehouse and 40,000 sq ft insect-proof screenhouse.
- The parcel is shared with CSP Labs, which provides disease and DNA diagnostic services

Accreditations

Micro Paradox, a USDA inspected facility, is an Approved Production Center by other countries. These approvals allow Micro Paradox to export plants without any post-entry quarantine requirements. Micro Paradox currently has such approvals for the following:

- Chile: 2 million+ walnut plants exported during the last 4 years
- Argentina: 40,000 walnut plants exported in 2018
- European Union: Micro Paradox is listed as PFPP (Pest Free Production Place) for Xylella-free exports.

Products and services

Micro Paradox has expanded its products and services during the last 5 years. The following is a partial list.

- Walnut, pistachio, pecan, almond, cherry rootstocks
- Embryo rescue of grapes and stone fruits
- In vitro germplasm maintenance for clients

Customers

Our customers include:

- Commercial fruit tree nurseries who receive starter plants from us for further growing and grafting with varieties.
- Breeders needing embryo rescue services.
- Importers who need varieties from other countries to be quarantined at our facility.

Staff

Following staff is in place to meet needs:

- 4 people in administration and sales
- 6 people for R and D (include 3 Ph.D.)
- 70 people for laminar hood and transplanting for growth rooms.
- 20 people for greenhouse work (growing, sorting and shipping)

13. Summary of California Seed and Plant Lab, Inc. (CSP Labs)

Established

CSP Labs was established in 1995 to provide diagnostic services (pathology and genetics) to seed companies and nurseries. The company was incorporated in 1998

Facilities

CSP Labs is located on a 40-acre parcel. The parcel is shared with Micro Paradox. Facilities include:

- 10,000 sq ft containing labs (Seed health lab, Plant health lab, Molecular lab).
- 14,000 sq ft greenhouses for grow out tests, disease resistance screening and pathogenicity tests.
- Modern equipment includes automated DNA/RNA extractions, hydrocycler for high throughput PCR, robotics for liquid handling.

Accreditations

CSP Labs is a USDA and CDFA inspected facility and accredited as follows:

- CDFA approved lab to receive samples
- USDA approved lab to receive samples from all countries.
- NSHS (National Seed Health System) accredited to conduct seed testing for phytosanitary certificate issuance.
- ISHI (International Seed Health Initiative) participant
-

Products and services

CSP Labs provides the following services.

- Seed health testing by Selective media, ELISA, PCR methods
- Plant disease diagnosis by microscopy, culture, PCR and DNA sequencing.
- Genetic purity of seed lots by PCR markers
- Genetic ID of seeds by PCR markers (KASP, SNP etc)
- Genetic ID of vegetatively grown crops such as strawberries, grapevines by SSR markers

Customers

Our customers include:

- Seed companies who need pathology testing for quality assurance and phytosanitary testing. Seed lots are also routinely tested for genetic purity and identity.
- Nurseries needing diagnostics of any diseases and DNA ID to confirm varietal identity in their production system.
- Breeders needing marker assisted selection.

Staff

Following staff is in place to meet needs:

- 4 people in administration and sales
- 4 people (including 2 Ph.D.) for managing labs and conducting R and D
- 6 technicians for seed health lab
- 4 technicians in Plant Health Lab
- 13 technicians in Molecular lab.

ATTACHMENT 2

722

Permit No.: 20-09-H-P1693-

Date: September 26, 2019

State of Hawaii
DEPARTMENT OF AGRICULTURE
Plant Quarantine Branch
1849 Auiki Street
Honolulu, Hawaii 96819

IMPORT PERMIT

(Valid for one shipment within one year)

Permission is hereby granted to introduce the following commodity(s), in accordance with Chapter 4-70, Hawaii Administrative Rules of the Division of Plant Industry, Department of Agriculture, and the conditions listed below. (Each commodity must be inspected by a Plant Quarantine Inspector upon arrival before release.)

Quantity	Unit	Commodity	Scientific Name
5000	each	Tissue-culture coffee plants (NO SUBSTITUTIONS ALLOWED)	*coffea sp.*

INSTRUCTION To Shipper: One copy of permit to accompany shipment to Hawaii.

Object of Importation: Tissue culture coffee plants-one year quarantine at PIO.

Name and Address of Shipper: Micro Paradox, 3556 Sankey Road Pleasant Grove, CA 95668

Phone: 918-655-1581

Name and Address of Importer: Kona Hills LLC.,, Darwin Inman, 81-964 Halekl'i Street Ste. A Kealakekua, HI 96750

Phone: 808-731-6498

CHIEF PLANT INSPECTOR

Phyllis Shimabukuro-Geiser
CHAIRPERSON, BOARD OF AGRICULTURE

FOR OFFICIAL USE ONLY

STATION_____ ARRIVAL DATE _____ FLIGHT/SHIP _____

WAYBILL NO. _____ INSPECTION DATE/TIME _____ INSPECTOR _____

REMARK _____

Permit No.: 20-09-H-P1693-

Date: September 26, 2019

PLANT QUARANTINE BRANCH
Permit Conditions

Condition

Coffee; Tissue culture coffee plants for one-year quarantine at PIO

ATTACHMENT 3

Permit No.: 21-06-O-P1842

Date: June 09, 2020

State of Hawaii
DEPARTMENT OF AGRICULTURE
Plant Quarantine Branch
1849 Auiki Street
Honolulu, Hawaii 96819

IMPORT PERMIT

(Valid for one shipment within one year)

Permission is hereby granted to introduce the following commodity(s), in accordance with Chapter 4-70. Hawaii Administrative Rules of the Division of Plant Industry, Department of Agriculture, and the conditions listed below. (Each commodity must be inspected by a Plant Quarantine Inspector upon arrival before release.)

Quantity	Unit	Commodity	Scientific Name
Multiple		Tissue-culture coffee plants (NO SUBSTITUTIONS ALLOWED)	*coffea sp.*

INSTRUCTION To Shipper: One copy of permit to accompany shipment to Hawaii.

Object of Importation: Coffee; Tissue-Culture coffee plants for one year QU.

Name and Address of Shipper: Micro Paradox, 3556 Sankey Road Pleasant Grove, CA 95668

Phone: 916-655-1581

Name and Address of Importer: Kona Hills LLC.,, Darwin Inman, 81-964 Haleki'i Street Ste. A Kealakekua, HI 96750

Phone: 808-731-6498

CHIEF PLANT INSPECTOR

Phyllis Shimabukuro-Geiser
CHAIRPERSON, BOARD OF AGRICULTURE

FOR OFFICIAL USE ONLY

STATION _____ ARRIVAL DATE _____ FLIGHT/SHIP _____

WAYBILL NO. _____ INSPECTION DATE/TIME _____ INSPECTOR _____

REMARK _____

Permit No.: 21-06-O-P1842

Date: June 09, 2020

PLANT QUARANTINE BRANCH
Permit Conditions

Condition

Coffee; TC coffee plants for one-year quarantine

ATTACHMENT 4

Permit No.: 21-10-O-P1911

Date: October 27, 2020

State of Hawaii
DEPARTMENT OF AGRICULTURE
Plant Quarantine Branch
1849 Auiki Street
Honolulu, Hawaii 96819

IMPORT PERMIT

(Valid for one shipment within one year)

Permission is hereby granted to introduce the following commodity(s), in accordance with Chapter 4-70. Hawaii Administrative Rules of the Division of Plant Industry, Department of Agriculture, and the conditions listed below. (Each commodity must be inspected by a Plant Quarantine Inspector upon arrival before release.)

Quantity	Unit	Commodity	Scientific Name
300		Tissue-culture coffee plants (NO SUBSTITUTIONS ALLOWED)	*coffea sp.*

INSTRUCTION To Shipper: One copy of permit to accompany shipment to Hawaii.

Object of Importation: Tissue culture coffee plants-one year quarantine at PIO.

Name and Address of Shipper: Micro Paradox, 3556 Sankey Road Pleasant Grove, CA 95668

Phone: 916-655-1581

Name and Address of Importer: Kona Hills LLC.,, Darwin Inman, 81-964 Haleki'i Street Ste. A Kealakekua, HI 96750

Phone: 808-731-6498

CHIEF PLANT INSPECTOR

Phyllis Shimabukuro-Geiger
CHAIRPERSON, BOARD OF AGRICULTURE

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STATION _____ ARRIVAL DATE _____ FLIGHT/SHIP _____

WAYBILL NO. _____ INSPECTION DATE/TIME _____ INSPECTOR _____

REMARK _____

Permit No.: 21-10-O-P1911

Date: October 27, 2020

PLANT QUARANTINE BRANCH
Permit Conditions

Condition

Coffee; tissue-culture plant for One-year Quarantine

United States Department of Agriculture

Animal and Plant Health Inspection Service

Plant Protection and Quarantine

New Pest Response Guidelines

Hemileia vastatrix, Berk. & Broome

Coffee leaf rust

H. vastatrix

Contents

Figures and Tables

H. vastatrix

Figures

Tables

Chapter 1

Introduction

Plant Protection and Quarantine (PPQ) develops New Pest Response Guidelines (NPRGs) in preparation for potential future pest introductions. This document is based on the best information available at the time of development and may not reflect the latest state of knowledge at the time the pest is detected. In addition, the PPQ response must be tailored to the specific circumstances of each pest introduction event, which cannot be predicted. Therefore, this document provides general guidelines that can be used as a basis for developing a situation-specific response plan at the time a new pest is detected.

Program managers of Federal emergency response or domestic pest control programs must ensure that their programs comply with all Federal Acts and Executive Orders pertaining to the environment, as applicable. Refer to the Environmental Compliance section in Appendix A for details.

Chapter 2

Pest Overview

Key Information

- The first symptom of coffee leaf rust (CLR) is a pale-yellow spot on the upper leaf surface that appears 1–3 weeks after infection.
- Spores require 24 to 48 hours of continuous free moisture to germinate (high relative humidity alone is not enough).
- Spores can survive under dry conditions for 6 weeks.
- Time between infection and pustule development can range from 3 to 8 weeks in the field.
- Wind, rainfall and worker activity can disperse *Hemileia vastatrix*.
- Long-distance dispersal is typically attributed to both human-assisted spread and wind-assisted spread.
- The most effective method of managing CLR is through the use of resistant cultivars. Cultural management is also extremely important.
- Protective fungicides are recommended up to a disease threshold of 5 percent. Above that, systemic fungicides are needed to control the disease.

Taxonomy

Scientific Name

- *Hemileia vastatrix* Berk. & Broome

Taxonomic Position

- Fungi : Basidiomycota : Pucciniomycetes : Pucciniales : Not assigned

Common Name(s)

- **Coffee leaf rust (CLR)**

Biology and Ecology

Hemileia vastatrix, causal agent of CLR, is genetically diverse, with more than 50 physiologic races (Zambolim, 2016). This fungus requires a live host to survive (Vieira et al., 2012). Although CLR affects coffee leaves of all ages, younger leaves seem to be more resistant. Infection typically starts on the older leaves at the bottom of the tree and moves up to the higher, younger leaves (Coutinho et al., 1994; Waller, 1982). However, the physiologic races can have varying effects on leaves of different ages (Eskes and Toma-Braghini, 1982).

Hemileia vastatrix requires only coffee as a host to complete its life cycle (Koutouleas et al., 2019). It produces three spore types: urediniospores, teliospores, and basidiospores (Coutinho et al., 1995). Reproduction and spread occurs primarily through urediniospores (Arneson, 2005). Teliospores, which germinate to produce basidia and basidiospores, rarely occur (Coutinho et al., 1995; Kolmer et al., 2018). The role basidiospores play in the fungus' life cycle is undetermined (Coutinho et al., 1995; Koutouleas et al., 2019).

Urediniospores require 6 to 28 hours of continuous free moisture to germinate (Arneson, 2005; Kushalappa et al., 1983). Reported optimum, minimum, and maximum temperatures for germination are 22 °C (72 °F), 13 to 15.5 °C (60 °F), and 28.5 °C (83 °F), respectively (de Jong et al., 1987; Nutman et al., 1963). Shade may provide a better microclimate for germination and colonization (López-Bravo et al., 2012).

Fungal spores germinate and infect stomata on the lower side of the leaf (Rayner, 1961a, 1962), completing the infection process within 24–48 hours (Arneson, 2005). The first symptom to develop is a pale-yellow spot or lesion that can appear on the upper leaf surface 1–3 weeks after infection (Waller, 1982). However, the time between infection and pustule development can range from 3 to 8 weeks in the field (de Moraes et al., 1976); temperatures lower than 15.5 °C (60 °F) or higher than 28 °C (82 °F) can extend this period (Brown et al., 1995; Zambolim, 2016).

A single rust pustule has 150,000 urediniospores and can mature in 2–3 weeks (Schieber and Zentmyer, 1984). Spores can survive under dry conditions for 6 weeks (Schieber and Zentmyer, 1984) and secondary cycles of infection occur continuously during favorable conditions (Arneson, 2005).

Although CLR does not usually kill the tree, it progressively weakens it (Vieira, 2010). Severe infection can cause twig and branch dieback (Arneson, 2005; Waller, 1982), which reduces yield after a year of heavy infection because berries grow on the previous season's branches (Arneson, 2005).

Hosts

Table 2-1 lists the reported hosts of *H. vastatrix*.

Table 2-1 Reported host plants of *H. vastatrix*

Scientific name	Common name	References
Coffea arabica L.	arabica coffee	Fernandez et al., 2012
Coffea benghalensis B. Heyne ex Schult.	Bengal coffee	Thirumalachar and Narasimhan, 1947
Coffea canephora Pierre ex A. Froehner	robusta coffee	Capucho et al., 2013
Coffea spp.	coffee	Silva et al., 2018
Coffea congensis A. Froehner	Congo coffee	Thirumalachar and Narasimhan, 1947
Coffea eugenioides S. Moore	nandi coffee	Thirumalachar and Narasimhan, 1947
Coffea liberica W. Bull ex Hiern	Liberian coffee	Thirumalachar and Narasimhan, 1947
Coffea liberica W. Bull ex Hiern var. *dewevrei* (De Wild. & T. Durand) Lebrun (=*Coffea excelsa* A. Chev.)	excelsa coffee	Thirumalachar and Narasimhan, 1947

Abandoned coffee farms inhabit most of the Hawaiian islands, and wild coffee is continuously being sown from bird and pig droppings (Bittenbender and Smith, 2008). A survey conducted by Goto and Fukunaga (1986) on the Island of Hawaii found more than three million wild coffee trees on ~2,170 ha (~5,361 ac); these sites included younger trees from volunteer seedlings and older trees that were planted and abandoned (Johnson and Manoukis, 2020). Such plants could serve as reservoirs of CLR.

Dispersal

Human-Assisted Spread

Humans moving through or handling infected coffee plants and the movement of infected plant materials can carry urediniospores to new locations (Arneson, 2005; Kushalappa and Eskes, 1989). Irrigation may affect disease incidence (de Paiva Custódio et al., 2014), but spore dispersal via irrigation has not been reported in the literature, and drip irrigation systems common in coffee cultivation are unlikely to spread spores to leaves. In most cases, the specific pathway responsible for the movement of this rust to new areas has not been found, but long-distance dispersal is typically attributed to both human-assisted and wind-assisted spread.

Natural Dispersal

Both wind and rainfall play important roles in the dispersal of *H. vastatrix*. Rainfall facilitates short distance dispersal when the splashing of raindrops physically releases urediniospores from leaves (Rayner, 1961b). Dislodged urediniospores settle out of the air or are carried in water droplets to uninfected leaves within or between plants (Yirga, 2020). This dispersal primarily happens underneath the coffee canopy, within a coffee plantation.

Long distance dispersal is achieved through urediniospores carried on the wind. Urediniospores have been found up to 1 km (0.6 mi) in the atmosphere and are suspected to be capable of moving thousands of miles (Ferreira and Boley, 1991; Kushalappa and Eskes, 1989). Genetic analyses of CLR in South America and a similar pathogen, wheat stem rust, in Australia and Africa further support intercontinental migration on the wind as a rare, but viable pathway responsible for bringing rusts to new areas (Cabral et al., 2016; Visser et al., 2019). While no short-term urediniospore dispersal studies were found for *H. vastatrix*, a study of banana black leaf streak found that significant numbers of similar spores traveled 1 km (0.6 mi) in 30 days (Rieux et al., 2014). Additionally, agricultural landscape changes (specifically creating livestock pastures or open spaces near coffee cultivation) can change wind patterns and increase the likelihood of wind-borne urediniospore dispersal (Avelino et al., 2012).

Chapter 3

Pest Identification

Species ID/Diagnostic

Morphological

Identification of *H. vastatrix* is through morphological structures and symptoms on coffee.

Uredinia

Uredinia (Fig. 3-1), the fruiting body that produces urediniospores, are 0.1 mm wide and located on the underside of the leaf. They appear as orange-yellow to red-orange colored powdery pustules (Fig. 3-2) that are densely scattered or in rounded spots ranging in size from a few millimeters in early infections to several centimeters in older infections. Centers of older pustules may die (Hernández, 2005; USDA-APHIS-PPQ, 2015).

Urediniospore

Urediniospores are kidney-shaped (Fig. 3-3), 26–40 µm long × 18–28 µm wide; the wall is colorless to pale yellow, 1–2 µm thick; smooth on the straight side, warted on the convex side with warts regularly longer (3–7 µm) on the spore edges (Hernández, 2005). This is the most commonly observed spore type.

Teliospore

Teliospores may be produced in uredinia; spherical to lemon-shaped, 26–40 µm long × 20–30 µm wide; wall is colorless to yellow, 1 µm thick; smooth, thicker at the apex, pedicel colorless (Coutinho et al., 1995; Hernández, 2005). This spore type is rare.

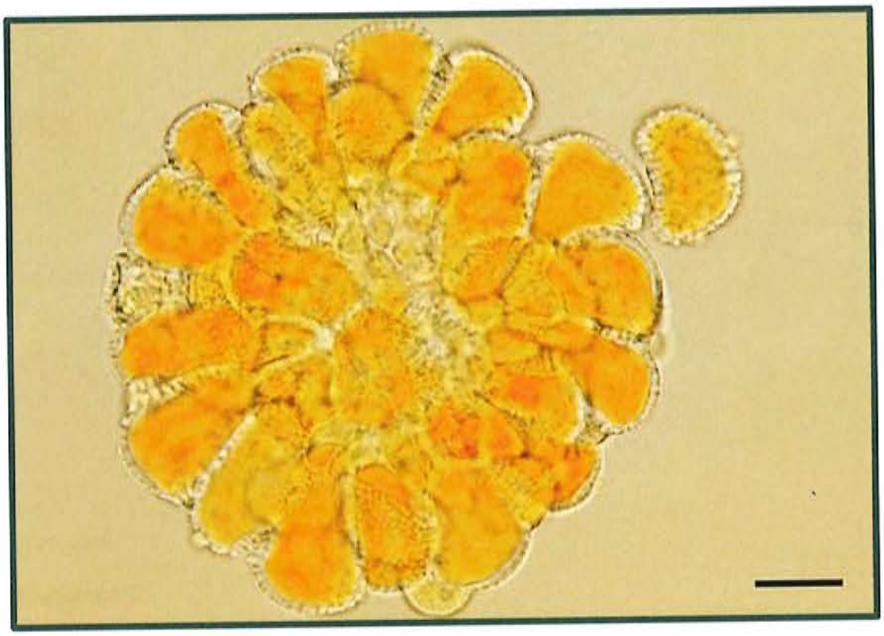

Figure 3-1 Arrangement of urediniospores in a uredinium (bar = 20 µm) (image courtesy of Carvalho et al., 2011)

Figure 3-2 Closeup of uredinial pustules on lower leaf surface (bar = 0.5 cm) (image courtesy of Carvalho et al., 2011)

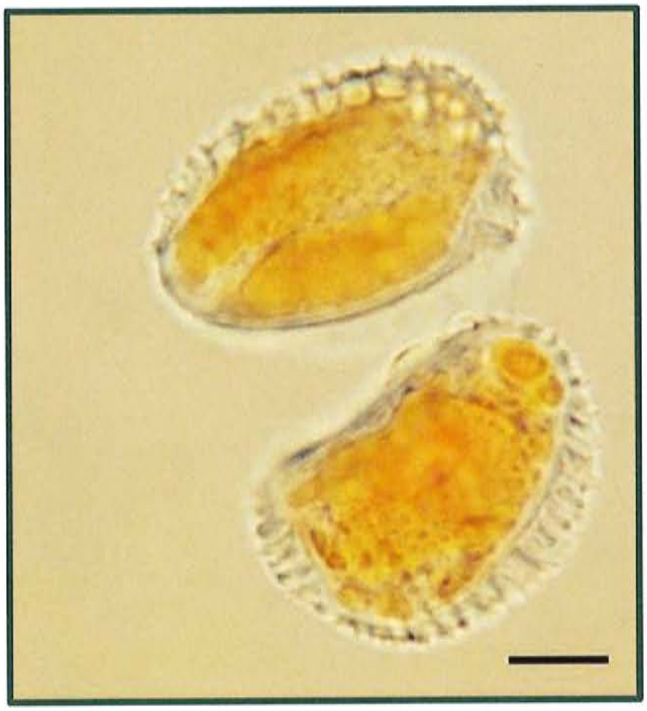

Figure 3-3 Urediniospores with a thickened upper wall containing carotenoid lipid vesicles imparting the yellow-orange color (bar = 10 µm) (image courtesy of Carvalho et al., 2011)

Molecular

- James et al. (2016) confirmed the presence or absence of *H. vastatrix* on leaf discs by using rRNA gene primers specific to the rust internal transcribed spacer (ITS) region.

Signs and Symptoms

The first symptoms observed on the upper surface of leaves are pale-yellow irregular spots approximately 1–3 mm (0.04–0.12 inches) in diameter (Fig. 3-4) (Schieber and Zentmyer, 1984). These spots expand and overlap to form irregular lesions; on the lower leaf surface, masses of urediniospores expand and appear like orange powder (Fig. 3-5) (Arneson, 2005). Lesions can develop anywhere on the leaf but are often prominent along leaf margins (Arneson, 2005). The centers of the spots will dry out and turn brown, but the lesions will continue to expand and produce spores (Arneson, 2005; Schieber and Zentmyer, 1984).

Coffee leaf rust infections appear on the lower branches first and move up the tree (Arneson, 2005; Schieber and Zentmyer, 1984). The rust sometimes infects berries (Schieber and Zentmyer, 1984). Premature defoliation occurs in infected

trees (Figure 3-6). Severe infections can cause twig and branch dieback (Arneson, 2005; Waller, 1982).

Figure 3-4 Pale yellow spots are the first symptoms that appear on upper surface of leaf (image courtesy of a Hawaii coffee farmer)

Figure 3-5 Orange rust pustules of CLR on lower leaf surface (bar = 0.5 cm) (image courtesy of Carvalho et al., 2011)

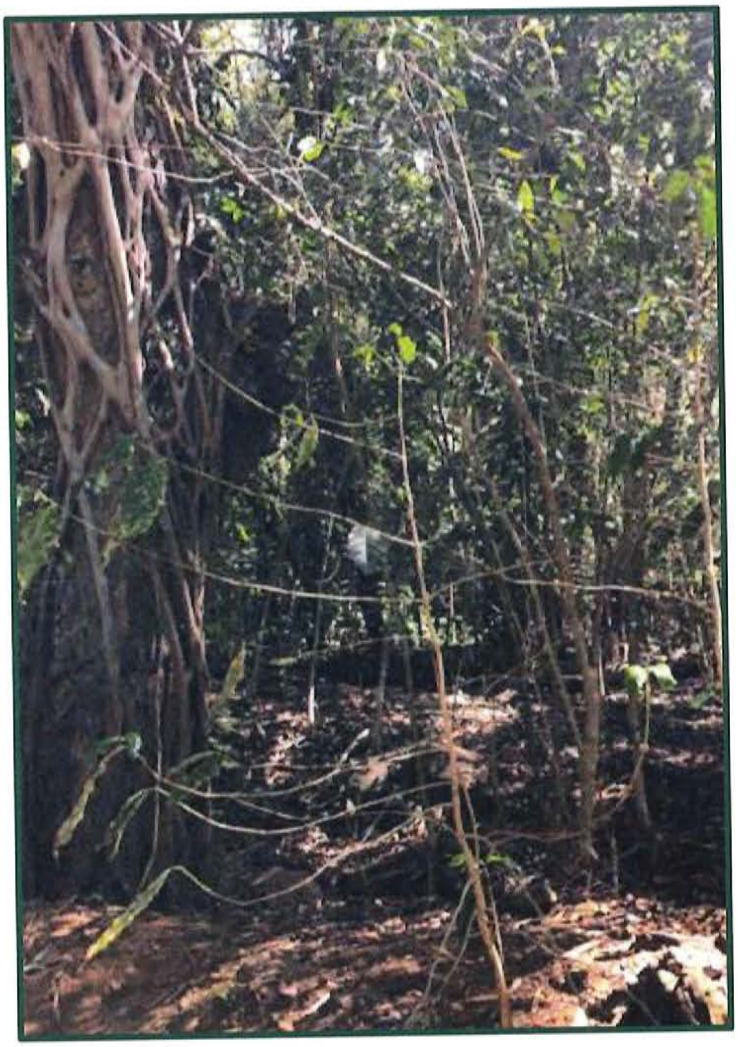

Figure 3-6 Premature defoliation in a coffee tree (image courtesy of Hawaii Department of Agriculture).

Chapter 4

Surveys

Survey Area

Detection surveys are conducted in an area to determine if pests are present. Surveys should cover all habitable areas for the pest and focus on at-risk areas that are predicted to suffer the most impact.

Delimitation surveys determine the extent of the infected area after an infection has been confirmed.

Several factors can influence the survey area, including host plant density and distribution, wind direction, and agency resources. If specific pathways are suspected, this information may also inform the selection of a survey area.

Timing of Surveys

Surveys are most likely to find infections while warm and wet conditions persist; therefore, all surveys should attempt to match this environmental suitability. CLR spreads and develops during rainy seasons, when conditions are favorable for the successful colonization of hosts (Ferreira and Boley, 1991) and declines during dry seasons when coffee plants often drop leaves (Waller, 1982). In Brazil, CLR first appears in early summer during the wet season and increases in severity in the following warm, wet months until it reaches peak intensity as drier, cooler weather arrives (Kushalappa and Eskes, 1989).

For Detection

Detection surveys for this pathogen should take place during warm, wet seasons and should continue throughout the coffee growing season, ending when coffee plants begin to drop leaves and resuming when new leaves are flushing.

The detection survey design provided in this document is meant to act as an early warning system after which specialists can conduct delimitation surveys, and growers can implement preventative measures to limit the spread of the disease.

For Delimitation

Delimitation surveys for this pathogen should take place immediately after an infected coffee plant has been discovered.

The delimitation survey design provided in this document is meant to determine the size and shape of a novel *H. vastatrix* infection within a specified area after an initial detection, but may not be suitable for long term monitoring. After initial surveys are completed, the need for future detection surveys, scouting, and/or monitoring for CLR should be discussed with PPQ staff and extension specialists in the affected area. Any continuing surveys should take place in conjunction with local outreach.

Survey Techniques

Visual Inspection

Inspectors can effectively survey for CLR by visually inspecting coffee plant leaves for lesions or orange colored uredia and urediospores (see Signs and Symptoms). We recommend surveying leaves from the lower third of the tree and the older leaves in the middle of the branches (third or fourth pair of leaves) (Macchiavelli and Rodríguez, 2000; Zambolim, 2016).

Survey Preparation, Sanitization and Clean-Up

1. When taking samples, take strict measures to prevent contamination by CLR between properties during inspections.
   a. Designate a clean area where transport vehicles can park. Make sure this area is not located near infected fields.
   b. Use disposable protective clothing, gloves and footwear, and change them before entering each site.
   c. Disinfect used tool(s) with 10% bleach solution, 1 part bleach (any commercial bleach) to 9 parts water or 70% alcohol.
   d. Thoroughly spray tools with or immerse the cutting portion of the tool(s) in bleach and allow to air-dry to prevent the spread of pathogens.
   e. Change gloves after touching an infected or suspected infected plant.
   f. Disinfect vehicles and large equipment (e.g., storage areas and bins).

Detection Survey

Outreach campaign to coffee growers

Developing an outreach campaign as a stand-in for traditional surveys will more effectively detect CLR over a larger area. This campaign should spread awareness

of the disease and its impacts on coffee and engage coffee growers in at-risk areas to pro-actively inspect their crops and report signs and symptoms (see Signs and Symptoms) to the proper authorities. Photographs of symptomatic leaves submitted to local extension agents or PPQ surveyors would help map new detections and/or areas for further investigation.

This outreach should operate side by side with traditional detection surveys by PPQ surveyors or local extension services to communicate to growers when the risk for CLR infection is greatest for their coffee plants and to investigate detections found by local growers.

Some resources are already available in Hawaii for CLR (https://www.hawaiicoffeeed.com/clr.html) and can be adapted to help build an outreach campaign. Additionally, extension specialists and local universities should be involved in the planning stages of any outreach program to best design a program/survey to cater to the needs of local stakeholders.

Beyond coffee growers, we also recommend developing outreach materials for the general public and for school aged children to help detect CLR in coffee plants grown in the wild or in residential areas. A central website to disseminate this information, along with presentations to community groups, schools, and other interested parties, will help spread awareness about CLR. E-mail or educational mailers, billboards, radio spots, and television public service announcements could also be used to inform the public.

All communications should include the typical signs and symptoms of *H. vastatrix* infection, its potential consequences, and instructions and contact information to report a suspected *H. vastatrix* detection.

Assigning a dedicated outreach coordinator may be the most effective way to engage the community and ensure that the proper information is brought to the public. This person could develop outreach materials and manage their dispersal, make presentations to the community, and facilitate interactions between property owners and official surveyors.

Field Survey

While outreach and extension to coffee growers should be the primary focus of the detection survey, we are also providing a protocol to monitor and detect novel *H. vastatrix* infections in cultivated coffee fields or nurseries. These protocols can be used by PPQ surveyors, extension specialists, or communicated to coffee growers to be integrated into existing disease and pest scouting procedures. Feasibility and cost effectiveness of CLR surveys may be enhanced by bundling with surveys for other pests of coffee.

We recommend mapping all coffee plantations in potentially affected regions and dividing surveys efforts evenly throughout the area. A combination of local growers taking part in the outreach program and targeted surveys of coffee fields will help to monitor the largest possible area.

The survey will consist of visual inspections in coffee fields to look for lesions and/or spores on coffee leaves, followed by collection of symptomatic leaves using sanitary protocols and confirmation of *H. vastatrix* detections by USDA experts.

We do not recommend that detection surveys inspect wild or residential areas, as coffee plants are sporadic in these areas and may be difficult to locate.

Detection Survey Protocol for Coffee Nurseries and Plantations

1. Determine potential survey sites by mapping all coffee nurseries and plantations and schedule surveys for seasons when CLR will be apparent (See Timing of Surveys).
2. In the absence of any information pertaining to the whereabouts of possible CLR infections, choose fields to be surveyed that are distributed evenly across the area according to the map of coffee cultivation and available resources (Figure 4-1).
    a. If available, use pertinent information such as previous CLR infections or the suspected pathway of introduction to focus survey efforts in the areas most likely to be infected.

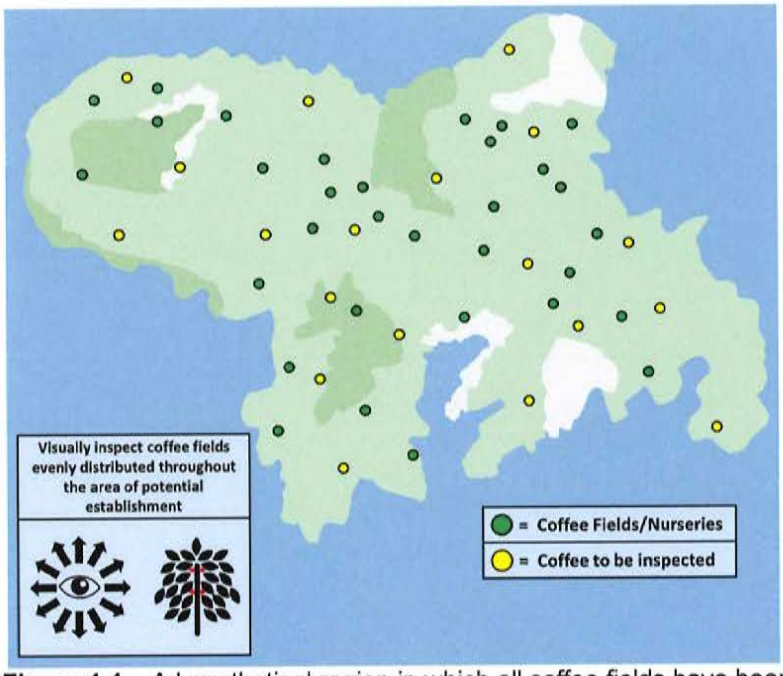

Figure 4-1 A hypothetical region in which all coffee fields have been mapped and detection surveys will be carried out in fields evenly spaced throughout the area.

3. Carry out surveys after mapping and selecting target coffee fields, following the Surveying in Coffee Plantations and Nurseries instructions below.
    a. Detection surveys should be carried out every 3 to 8 weeks, as resources allow, to detect newly emerging CLR infections during wet seasons.
    b. If a suspected positive detection is made, collect samples for confirmation following the Sampling Plant Part instructions. Upon confirmation of positive detection, plan and carry out a delimitation survey.
4. If resources are limited, consider developing smaller sentinel sites for surveys.
    a. A sentinel site, in this case, would be a small portion of a coffee field that is regularly inspected along a surveyor's normal route.
    b. We recommend mapping the sentinel site locations to promote even coverage and focus on any high-risk areas.
    c. If sentinel sites are established for CLR, use GPS to record the perimeter of each sentinel site and draw a map of the immediate area that includes reference points to aid others in finding the areas if necessary.
    d. Once a sentinel site is established, the surveyor should re-inspect it on a regular basis (every 3 to 8 weeks) as permitted by resources and their regular survey schedule.

Surveying in Coffee Plantations and Nurseries

1. Determine the size of each plantation or nursery to be inspected to calculate the number of transects needed to effectively inspect the entire area.
    - Farm size can be acquired from satellite imagery or by asking growers or landowners.
    - Refer to Table 4-1 to determine the number of transects needed to comprehensively survey the nursery/plantation on foot.
    - Adhering to this method ensures 95% confidence to detect a 0.1% disease incidence (NSHS, 2019).
2. Map the survey route by placing transects equidistantly throughout the field with 10-foot buffers on either side (Fig. 4-3). Transects should follow the rows of coffee plants and cover the entire field.
3. Walk along the pre-determined transects for each field, visually inspecting all plants along the transect for symptoms.
4. If symptoms are observed, record the location and collect up to 10 symptomatic leaves from the affected plant (See Sampling Plant Parts).

a. Collect samples from 50 plants that are representative of the entire field to be confirmed by USDA experts.
b. Do not collect samples if plants are asymptomatic.
c. Once the surveyor can determine that the field is heavily infected, stop all inspection to prevent further spread of the pathogen and start control measures.

Table 4-1 Minimum number of transects surveyors should walk in coffee fields to effectively inspect fields for rust symptoms and spores based on the NSHS Phytosanitary Field Inspection Procedures (NSHS, 2019)

Field Size (Acres)	Minimum # transects
0-1	6
1-5	9
5-10	11
10-20	13
20-50	17
50-100	20
100-200	24
200-500	30
500-1000	36

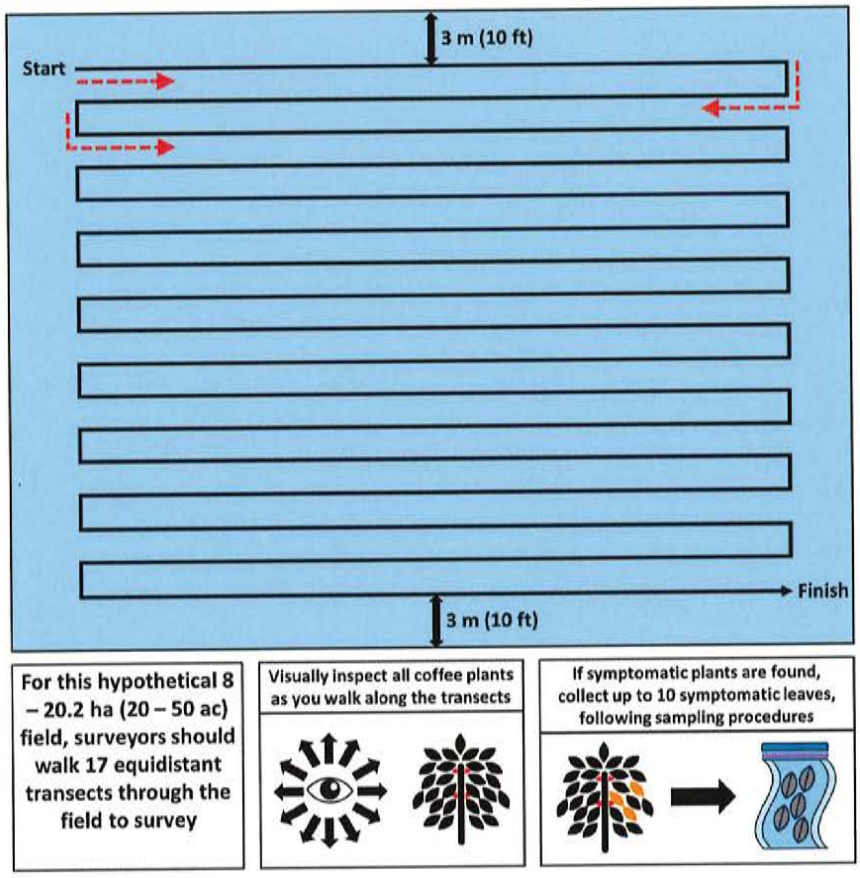

Figure 4-2 An example survey for a 8–20.2 ha (20–50 ac) coffee planting within the core infected area based on field inspection guidelines of NSHS (2019)

Delimitation Survey

This survey protocol describes how to determine the local extent of a *H. vastatrix* infected area after an infection has been confirmed. Because this disease can spread rapidly over great distances under the right conditions, we are also recommending an outreach component that will allow for the recognition and reporting of *H. vastatrix* occurrences in the buffer area outside the immediate survey area. This outreach will also supplement and improve continuing detection surveys after the delimitation survey is completed.

We recommend visual surveys for lesions and/or spores on coffee leaves, collection of symptomatic leaves, and confirmation of *H. vastatrix* detections by USDA experts to delimit this pathogen. Spore trapping is an alternative survey method for *H. vastatrix* spores in the environment but requires intensive monitoring, frequent maintenance, and time to process and identify collected spores. If resources allow, spore traps could be used to monitor the perimeter of a delimitation survey area. They may also be used as an early detection method in high-risk areas for CLR spores carried by the wind.

See below for separate sets of instructions for delimitation of this pathogen in coffee nurseries and plantations and in residential areas. The sampled area may expand beyond what is described here if infected plants are found near the survey periphery.

Field Delimitation Survey

Surveying in Coffee Nurseries and Plantations

Nurseries and plantations may differ in plant density, but the survey protocols are the same. Because coffee plantations may be small or have a low density of mature plants, surveyors may choose to inspect every coffee plant within the delimitation area.

1. First delineate the core infected area and the buffer area. Based on the reported wind dispersal of spores, the core infected area occurs within 2 km (1.2 mi) of the initial detection (Ferreira and Boley, 1991; Rieux et al., 2014) and should be intensively sampled (Fig. 4-3). The buffer area encompasses the wider region around the core infected area where host plants occur. For islands or smaller regions, this will include all high-risk areas (e.g., coffee plantations or nurseries) that are found across the entire region (Fig. 4-4).

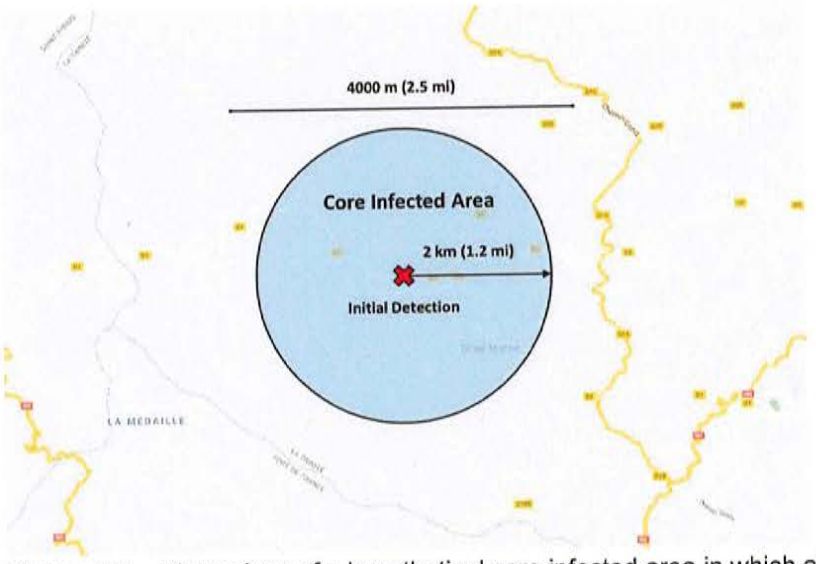

Figure 4-3 Dimensions of a hypothetical core infected area in which all residential areas, coffee plantations, and coffee nurseries would be surveyed

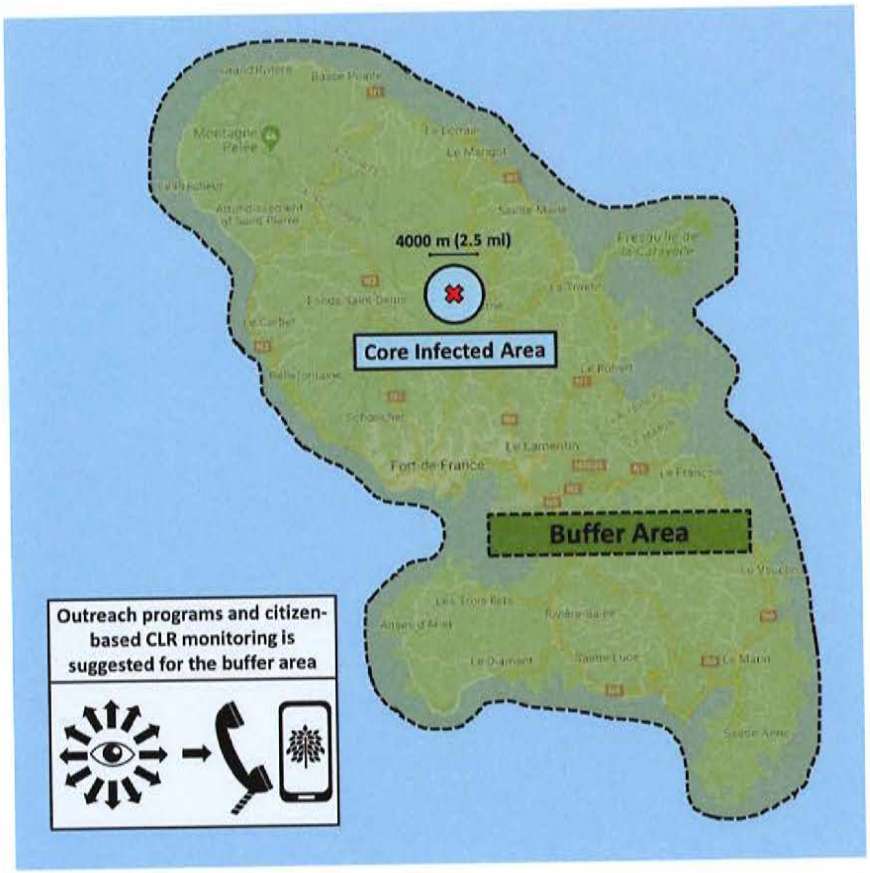

Figure 4-4 An illustration of a buffer area covering the entire island where outreach programs could be deployed to identify new *H. vastatrix* infections. This is a hypothetical illustration and does not depict actual infections or sampling plans.

2. Locate all coffee plantations and nurseries within the core infected area. Each of these areas will need to be surveyed for *H. vastatrix* following the Coffee Plantation and Nurseries survey instructions.
3. Locate residential areas within the core infected area to be surveyed. Use visual surveys while driving or walking in public areas to locate wild coffee plants or coffee plants in private gardens (See Surveying in Residential Areas).
4. Develop and launch an outreach program in the buffer area to inform coffee growers and the general public of the signs and symptoms of the disease, its impact on coffee cultivation, and the actions they can take when finding a suspected infection (See Sampling in the Buffer Area).
5. If any positive detections are made in nurseries or plantations, expand the survey, creating a new core infected area starting from the point of additional detection (Fig. 4-5). However, H. vastatrix can spread quickly and is unlikely to be eradicated after an initial detection. If surveys or other information indicates CLR is widespread in the region around the core infected area, consider ending the delimitation surveys and working with PPQ staff and/or local extension agents to limit the spread and impact of this disease by focusing remaining resources on high risk areas and outreach to the public.
6. If no additional detections are found within the core infected area, refer to the Eradication and Control Options chapter. Monitor high-risk areas within the buffer zone and survey residential areas. Work with PPQ staff and/or local extension agents on public outreach.

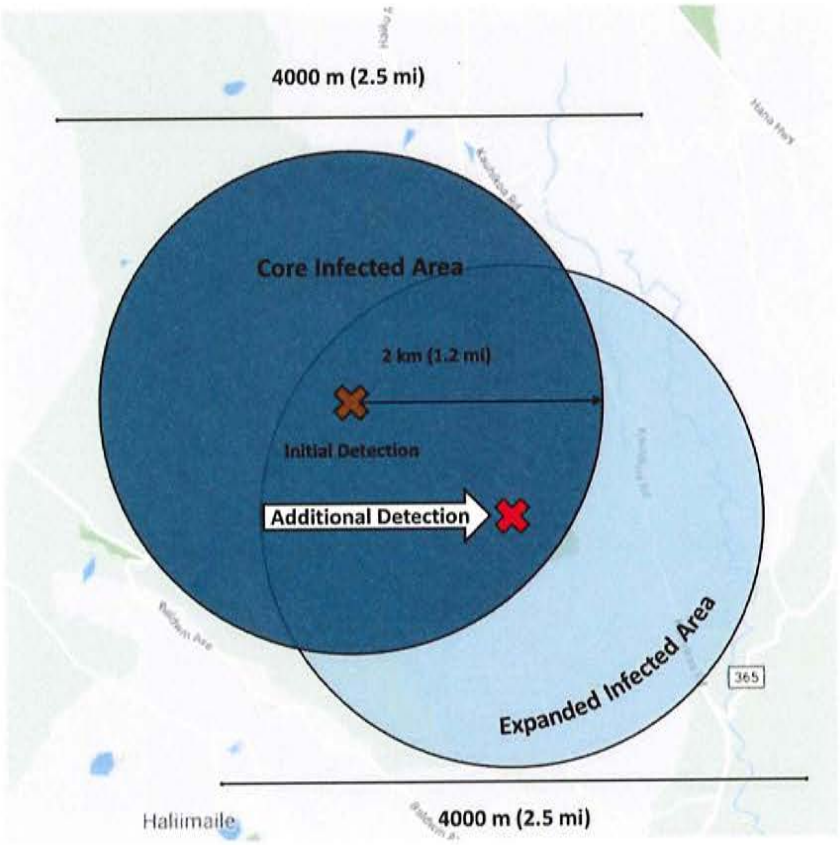

Figure 4-5 A hypothetical extension of the core infected area, adding an additional 2 km (1.2 mi) after a new detection

Surveying in Residential Areas

Infections found in residential areas can be more difficult to survey because of property lines, fences, and other potential barriers. Also, the distribution of coffee plants in these areas is not predictable. Therefore, we are providing generalized instructions that surveyors can modify to fit their situation.

- If walking linear transects is difficult, consider following roads or other natural barriers.
- Obtain permission to take samples from or walk across private property; if you cannot obtain permission, make note of the location.

To survey the residential area:

1. Locate all residential areas within 2 km (1.2 mi) of the initial detection that are accessible by driving or walking. Divide the residential areas into discrete and logical "neighborhoods".
2. Perform a visual survey in each neighborhood to locate all coffee plants located on residential properties. Ask property owners if they have coffee

plants and if they do, ask for access. Walking in public areas or driving is suggested.

3. Map all visually surveyed coffee plants (Fig. 4-6 presents a hypothetical survey). Collect samples from symptomatic coffee plants for laboratory confirmation.
    a. If more than 50 plants are found to be infected in a single neighborhood, stop collecting symptomatic leaves but continue inspecting the remainder of the area and recording the location of infected plants.
    b. Do not collect samples if plants are asymptomatic.
4. If any positive detections are made in a neighborhood, expand the survey, creating a new core infected area starting from the point of additional detection. Continue surveying and expanding the survey area until no infected plants are found (Fig. 4-5). If surveys or other information indicates CLR is widespread in the region around the core infected area, consider ending the survey and working with PPQ staff and/or local extension agents to focus remaining resources on high risk areas and outreach to the public.
5. If no additional detections are found within the core infected area, refer to the Eradication and Control Options chapter. Monitor high-risk areas within the buffer zone and work with PPQ staff and/or local extension agents on an educational outreach effort to the public.

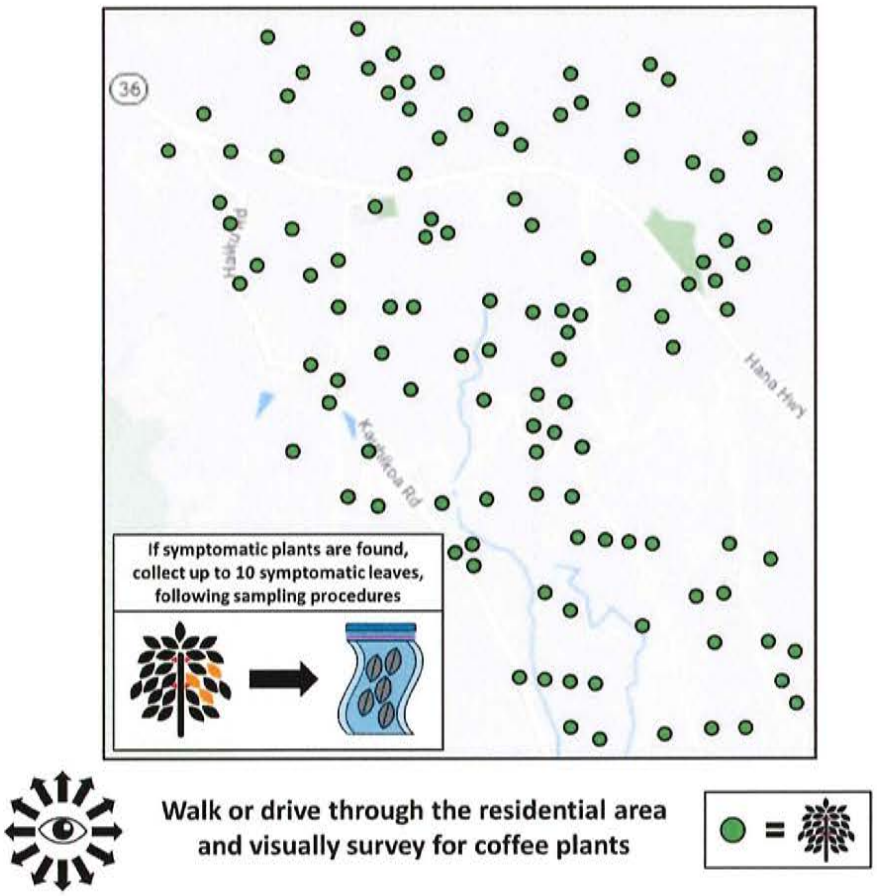

Figure 4-6 A possible outcome from the visual survey of a residential area, after which all plants would be inspected and symptomatic plant material would be collected and sent for confirmation

Surveying in the Buffer Area – an Outreach Campaign

Because we do not know the maximum dispersal range of *H. vastatrix* spores, the area endangered by this fungus after a detection is extremely difficult to identify and survey. For this reason, we suggest developing an outreach campaign for the buffer area surrounding the core infected area. This campaign should spread awareness of the disease and its impacts on coffee and engage the local population in reporting signs and symptoms (see Signs and Symptoms) to the proper authorities. It should also work in conjunction with long term monitoring by local extension services to communicate to growers when the risk for CLR infection is greatest for their coffee plants.

Similar to the active outreach program for coconut rhinoceros beetle (*Oryctes rhinoceros* (L.)) in Hawaii, this program should raise public awareness about CLR and generate support for the efforts to control the fungus after it is detected.

Follow the outreach guidelines provided in the detection survey section of this document.

Outreach efforts can also include a citizen-science program to expand the reach of the *H. vastatrix* survey. Photographs or symptomatic leaves submitted to local extension agents or PPQ surveyors would help detect new infections and/or areas for further investigation. Possible strategies for the project include enlisting community gardeners to monitor coffee plants and to give participants a mobile application to record photographic evidence of possible infected plants for review by the proper authorities.

Sampling Plant Parts

1. Wear gloves when collecting samples.
2. Collect up to ten leaves showing symptoms (Macchiavelli and Rodríguez, 2000) from the lower third of the tree and the older leaves in the middle of the branches (Zambolim, 2016) from the symptomatic plant.
    a. Remember to change gloves and disinfect any tools that may have touched the plant between samples (see Survey Preparation, Sanitization and Clean-Up).
    b. Use a new bag for each sample.
    c. Do not add any extra moisture into the bag, but leaves can be wrapped in paper towels.
    d. Label the sealed bag with the host cultivar, sample name/number, and GPS coordinates.
    e. Double bag the samples and seal.
    f. DO NOT freeze the samples. Instead, keep the samples cool by placing them in a hard cooler with lid and add freezer bags/cold packs. Tape the box shut and package it for shipment[GML-A1].
        - Fill out a PPQ Form 391 https://www.aphis.usda.gov/library/forms/pdf/PPQ_Form_391.pdf.
        - Before mailing specimens out of state, check with your state department of agriculture to see if permits are necessary.
        - When you mail the specimens, notify the Domestic Diagnostic Coordinator by email at PPQ.Domestic.Diagnostic.Coordinator@usda.gov and copy the appropriate National Pest Identification Specialist (see link below).
        - Include the following in the email:
            - A summary of what is in the package.
            - An explanation of why the specimens should be identified.
            - The tracking number.
            - PPQ Form 391.

- Send packages to the following address:
  Dr. Megan Romberg/Dr. Aaron Kennedy
  URGENT, USDA-APHIS-PPQ
  Bldg. 010A, Rm. 327, BARC-West
  10300 Baltimore Ave.
  Beltsville, MD 20705-2350

  Consult the following for more information:
  https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/request-official-confirmation-preliminary-pest-id

Chapter 5

Eradication and Control Options

Overview

This information can be used by PPQ decision-makers after a detection to assess the suitability of potential actions to eradicate, contain, or suppress *H. vastatrix*. The efficacy and feasibility of each control option should depend on the pest situation at the time of detection. Factors including detection location (e.g., natural or urban environment, agricultural crops, greenhouses, orchards), area of spread, the climatic region, the time of year, the phenology of the host, and current practices already in place contribute to determining whether a particular control option is appropriate.

Eradication Options

Because of the nature of *H. vastatrix*, eradication of CLR is not usually feasible. Rust diseases in general are difficult to eradicate because the spores are wind-borne and thus can be widely distributed over a short time period. The only example of an eradication attempt is in Shaw (1970), describing how growers in Papua, New Guinea, temporarily eradicated the disease in 1965 by destroying mature bushes, seedlings and regrowth suckers (Shaw, 1970). However, by 1985 it was widespread (Muthappa and Kokoa, 1989). Eradication is not otherwise described in the literature; most research on CLR discusses management options.

Host Resistance

The most effective method of managing CLR is through the use of resistant coffee cultivars (Zambolim, 2016). Resistant varieties have been imported by the College of Tropical Agriculture and Human Resources and the Hawaii Agriculture Research Center (HARC) (Bittenbender and Smith, 2008). In 1992 HARC imported two CLR-resistant varieties from Guatemala and has been crossing those varieties with 'Typica' and 'Cacuai' (HARC, 2020). In addition, HARC and USDA Agricultural Research Service Pacific Basin Agriculture Research Center are working together to develop and release coffee rust-resistant germplasm. Research (2016) lists 16 additional CLR-resistant varieties. However,

the ability of *H. vastatrix* to develop new races that can overcome resistance genes may render this method unsuitable as the sole control method (Várzea and Marques (2005), as cited in Zambolim, 2016).

Chemical Control

In other countries, chemical management of CLR is maintained with copper-based fungicides—including copper oxychloride, copper oxides, hydroxides, and the Bordeaux mixture, a combination of copper sulfate, lime, and water—as a preventative strategy before rust infection and up to a disease threshold of 5 percent (Zambolim, 2016). After plants have become infected, copper hydroxide is ineffective at reducing severity (da Costa et al., 2019). At that point, control consists of systemic fungicides including triazoles and strobilurins (QoI) (Zambolim, 2016). Because copper fungicides can reduce efficacy of these two fungicide groups, they should not be included together in a tank mix (da Costa et al., 2019).

When comparing the efficacy of preventive copper oxychloride treatments to systemic fungicides, de Souza et al. (2011) concluded that copper treatments were less effective than systemic fungicides. However, over a 6-year span, copper oxychloride-treated plants produced a yield of over 30 processed coffee bags (60 kg) per hectare (de Souza et al., 2011). Applications of triadimefon in field trials in Brazil had a curative effect, and alternating with copper fungicides was found to be effective (Schieber and Zentmyer, 1984). Sprays of chlorothalonil alone or mixed with azoxystrobin reduced CLR by 83 and 86 percent respectively (Kairu, 2008). Pyraclostrobin reduced CLR severity by approximately 91 percent in one trial (da Costa et al., 2019).

Table 5-1 includes protective fungicides registered in the United States for coffee. Currently no systemic fungicides are registered in Hawaii for use on coffee. Table 5-2 lists systemic fungicides used in other countries against CLR. These fungicides are registered in the United States for crops other than coffee.

Table 5-1 Fungicides registered for coffee in the United States (CDMS, 2020)

Fungicide	Fungicide type	Farming system
copper oxide	protective	conventional and organic*
copper hydroxide	protective	conventional and organic*
copper oxychloride	protective	conventional and organic*
copper oxychloride + copper hydroxide	protective	conventional and organic*
Bacillus subtilis QST 713	biological control	organic
Bacillus amyloliquefaciens D747	biological control	organic

* Some formulations are registered for organic use (CDMS, 2020)

Table 5-2 Systemic fungicides used in other countries for coffee leaf rust management (Virginio Filho and Domian, 2019; Kairu, 2008)***

Fungicide	Fungicide type	Farming system
chlorothalonil	protective	conventional
azoxystrobin	QoI (systemic)	conventional
trifloxystrobin	QoI (systemic)	conventional
pyraclostrobin	QoI (systemic)	conventional
cyproconazole**	triazole (systemic)	conventional
triadimefon	triazole (systemic)	conventional
propiconazole	triazole (systemic)	conventional
triadimenol	triazole (systemic)	conventional
cyproconazol + pyraclostrobin	triazole + strobilurin (systemic)	conventional
cyproconazol + trifloxystrobin	triazole + strobilurin (systemic)	conventional

**Not registered in California
***These fungicides have not been approved for use on coffee in the United States but are registered for use on other crops

Although fungicides are an effective way to manage the disease, they should be integrated with other management strategies, such as resistant cultivars and cultural controls. Copper and systemic fungicides can either increase copper in the soil or damage the ecosystem that keeps other pests and pathogens in check (Arroyo-Esquivel et al., 2019; Vandermeer et al., 2014).

The following are recommendations for application of fungicides for management of CLR (Virginio Filho and Domian, 2019):

1. Use a backpack or manual sprayer and reduce sprayer pressure or change the nozzle to create larger droplets.
    a. According to experts at the French Agricultural Research Centre for International Development (CIRAD), motorized sprayers should not be used for initial CLR treatments to contain spores (Keith, 2020).
2. Calibrate your sprayer based on publications for sprayer calibration.
3. Take care not to touch the leaves, as you may move spores around the field.
4. Spray the entire coffee tree, focusing on both sides of the leaves. *Hemileia vastitrix* spores enter via the stomata on the undersides of leaves.
5. Spray all producing, non-producing, and seedling coffee plants. Spray slowly and deliberately to completely cover tree foliage and leaf surfaces.
6. If using systemic fungicides that require a soil application, apply when the soil is moist to ensure that the active ingredients can be absorbed by the plant roots (Zambolim, 2016).
7. Rotate the use of fungicides based on mode of action to prevent resistance.
8. Add spreaders and adjuvants to improve spray coverage and help the product adhere to the leaf surface, especially during rain.

Timing of fungicide applications

Several factors should be considered when deciding to begin fungicide applications, including weather, plant growth patterns, and disease monitoring (Zambolim, 2016). CLR is active during rainy seasons in temperatures between 12.5 °C and 32.5 °C (54.5-90.5 °F) (Ferreira and Boley, 1991). Protective fungicides should be applied just before the rainy season begins (see Table 5.1) (Schieber and Zentmyer, 1984). During years of high berry load, four to five sprays of copper fungicides may be needed at 30-day intervals, followed by additional sprays of systemic fungicides based on the 5 percent threshold (Zambolim, 2016).

Alternative Control Techniques

Cultural Control and Sanitary Measures

In addition to weather, cropping practices such as shading, plant density, fertilization, and pruning affect the infection cycle of *H. vastatrix* (Avelino et al., 2004). Studies of disease incidence when growing coffee under shade trees have recorded both positive and negative effects (Avelino et al., 2004). Shade coverage of 30 to 50 is recommended (Elevitch et al., 2009), while high coffee plant density favors disease development (Avelino et al., 2004).

The susceptibility of coffee to *H. vastatrix* is affected by the host's nutritional status. Fertilization with nitrogen and phosphorus can reduce susceptibility to rust, but an excess of potassium can increase susceptibility (Arneson, 2011). High yields in one season can deplete nutrients and increase the severity of rust during that season and for subsequent years unless proper modifications are made to the fertilizer applications (Arneson, 2011). Excess minerals can weaken coffee plants and thereby increase susceptibility to diseases (Torres Castillo et al., 2020). Contact your local extension service for fertilizer recommendations.

Weed control is important for rust management. Eliminating weeds decreases competition for soil nutrients and moisture (Avelino et al., 2004; Zambolim, 2016). Volunteer or feral coffee plants in fields or natural areas should be eliminated because they can serve as a host to *H. vastatrix*.

Pruning non-productive old stems of coffee plants to stimulate new growth (Avelino et al., 2004) can also be used to prevent excessively high yields, thus decreasing the plants susceptibility to CLR (Arneson, 2011). Pruning also increases aeration in the canopy and allows for easier coverage of leaves when applying chemical controls (Avelino et al., 2004).

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Appendix

A

Environmental Compliance

Introduction

Use Appendix A as a guide to environmental regulations pertinent to *H. vastatrix*.

Overview

Program managers of Federal emergency response or domestic pest control programs must ensure that their programs comply with all Federal Acts and Executive Orders pertaining to the environment, as applicable. Two primary Federal Acts, the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA), often require the development of significant documentation before program actions may begin. APHIS' Policy and Program Development Staff (PPD), Environmental and Risk Analysis Services (ERAS) is available to provide guidance and advice to program managers and prepare drafts of applicable environmental documentation. In preparing draft NEPA documentation, PPD ERAS may also perform and incorporate assessments that pertain to other Acts and Executive Orders, described below, as part of the NEPA process. The Environmental Compliance Team (ECT), a part of PPQ's Plant Health Programs, sometimes assists ERAS in development of documents and implements environmental monitoring. Program leadership is strongly advised to consult with PPD ERAS and/or ECT early in the development of a program in order to conduct a preliminary review of applicable environmental statutes and to ensure timely compliance.

Environmental monitoring of APHIS pest control activities may be required as part of compliance with environmental statutes, as requested by program managers, or as suggested to address concerns with controversial activities. Monitoring may be conducted with regards to worker exposure, pesticide quality assurance and control, off-site chemical deposition, or program efficacy. Different tools and techniques are used depending on the monitoring goals and control techniques used in the program. Staff from ECT will work with the program manager to develop an environmental monitoring plan, conduct training to implement the plan, provide day-to-day guidance on monitoring, and provide an interpretive report of monitoring activities.

The following is list of pertinent laws and Executive Orders:

National Environmental Policy Act (NEPA) – NEPA requires all Federal agencies to examine whether their actions may significantly affect the quality of the human environment. The purpose of NEPA is to inform the decision-maker prior to taking action and to inform the public of the decision. Actions that are excluded from this examination, actions that normally require an Environmental Assessment, and actions that normally require Environmental Impact Statements are codified in APHIS' NEPA Implementing Procedures located in 7 CFR 372.5.

The three types of NEPA documentation are:

1. **Categorical Exclusion**

   Categorical exclusions are classes of actions that do not have a significant effect on the quality of the human environment and for which neither an environmental assessment (EA) nor an environmental impact statement (EIS) is required. Generally, the means through which adverse environmental impacts may be avoided or minimized have actually been built into the actions themselves (see 7 CFR 372.5(c)).

2. **Environmental Assessment (EA)**

   An EA is a public document that succinctly presents information and analysis for the decision-maker of the proposed action. An EA can lead to the preparation of an environmental impact statement (EIS), a finding of no significant impact (FONSI), or the abandonment of a proposed action.

3. **Environmental Impact Statement (EIS)**

   In the event that a major Federal action may significantly affect the quality of the human environment (adverse or beneficial), or, the proposed action may result in public controversy, an EIS is prepared.

Endangered Species Act (ESA) – This statute requires that programs consider their potential effects on federally protected species. The ESA requires programs to identify protected species and their habitat in or near program areas and documentation of how adverse effects to these species will be avoided. The documentation may require review and approval by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service before program activities can begin. Knowingly violating this law can lead to criminal charges against individual staff members and program managers.

Migratory Bird Treaty Act – This statute requires that programs avoid harm to migratory bird species, eggs, and their nests. In some cases, permits may be available to capture birds, which require coordination with the U.S. Fish and

Wildlife Service.

Clean Water Act – This statute requires various permits for work in wetlands and for potential discharges of program chemicals into water. This may require coordination with the Environmental Protection Agency, individual states, and the Army Corps of Engineers. Such permits would be required even if the pesticide label allows for direct application to water.

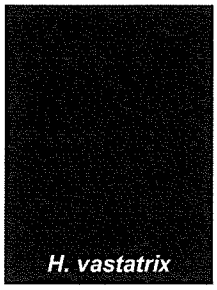
Tribal Consultation – This Executive Order requires formal government to government communication and interaction if a program might have substantial direct effects on any federally-recognized Indian Nation. This process is often incorrectly included as part of the NEPA process, but must be completed prior to general public involvement under NEPA. Staff should be cognizant of the conflict that could arise when proposed federal actions intersect with tribal sovereignty. Tribal consultation is designed to identify and avoid such potential conflict.

National Historic Preservation Act – This statute requires programs to consider potential impacts on historic properties (such as buildings and archaeological sites) and requires coordination with local State Historic Preservation Offices. Documentation under this Act involves inventorying the project area for historic properties and determining what effects, if any, the project may have on historic properties. This process may require public involvement and comment prior to the start of program activities.

Coastal Zone Management Act – This statute requires coordination with states where programs may impact Coastal Zone Management Plans. Federal activities that may affect coastal resources are evaluated through a process called "federal consistency". This process allows the public, local governments, Tribes, and state agencies an opportunity to review the federal action. The federal consistency process is administered individually by states with Coastal Zone Management Plans.

Environmental Justice – This Executive Order requires consideration of program impacts on minority and economically disadvantaged populations. Compliance is usually achieved within the NEPA documentation for a project. Programs are required to consider if the actions might disproportionally impact minority or economically disadvantaged populations, and if so, how such impact will be avoided.

Protection of Children –This Executive Order requires federal agencies to identify, assess, and address environmental health risks and safety risks that may disproportionately affect children. If such a risk is identified, then measures must be described and implemented to minimize such risks.



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Cover Image

Orange irregular spots on the underside of coffee leaves with brown dying centers and defoliation of coffee tree due to CLR (images courtesy of a Hawaii coffee farmer and Carvalho et al. (2011)

STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
QUALITY ASSURANCE DIVISION
1851 AUIKI STREET
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January 26, 2021

Board of Agriculture
Honolulu, Hawaii

Subject: South Maui Gardens Hemp Producer Update: Mediation

I. BACKGROUND

The board of agriculture at its December 15, 2020 meeting asked South Maui Gardens ("SMG") and their surrounding neighbors ("Maui Neighbors") to participate in voluntary mediation through Hawaii Agricultural Mediation Program ("HIAMP") to resolve ongoing issues between the two parties. Staff verified that farmer-neighbor disputes are one of the issues mediated for free by HIAMP.

II. CURRENT STATUS:

On January 13, 2021 SMG submitted HIAMP's Request for Mediation Form. On January 15, 2020 Matt Strassberg of HIAMP informed the department that HIAMP accepted the mediation case, and assigned it a mediator. Mediation is confidential so further details are unavailable without the consent of both parties.

Respectfully submitted:

Shelley Choy, Hemp Program Coordinator

CONCURRED:

Leonard G. Obaldo. Acting Administrator
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APPROVED FOR SUBMISSION:

Phyllis Shimabukuro-Geiser
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January 26, 2021

Board of Agriculture
Honolulu, Hawaii

Subject: Report on Requested Recommendations re: Hemp Interim Rules

I. BACKGROUND

Act 014, Session Laws of Hawaii 2020 ("Act 14"), allows individuals in Hawaii to apply directly to the United States Department of Agriculture ("USDA") for a license to grow hemp. The Act also allows transportation of hemp in the state with the approval of the Department of Agriculture ("department"). Finally, Act 14 creates state restrictions on growing hemp, including prohibitions for growing hemp within 500 feet of a school or residence ("Buffer Zones"). Farmers that were previously engaged in growing hemp under the Hawaii industrial hemp pilot program, however, are exempt from the Buffer Zones.

Act 14 directs the Department to adopt rules to effectuate the purposes of the Act, including any rules necessary to address any nuisance issues arising out of activities of a hemp grower exempted from the Buffer Zones. The department drafted interim rules and the board of agriculture ("board") accepted the interim rules at its September 15, 2020 meeting. At that meeting, the board requested that the department further research the regulation of noise, smell, and light, including how Hawaii and other states regulate such nuisances and the best science available to analyze them.

II. RESEARCH:

As instructed by the board, the department researched the complex issues of lights, noise, and odor, contacting relevant agencies and analyzing the practices and policies regarding regulation of lights, noise, and odor in other states both generally, and specifically pertaining to hemp production. The department provided much of its findings in its December 15, 2020 submittal to the board, which is provided for reference as attachment A. Some key findings are as follows:

1. **Noise - State Level:** Across the nation, noise is regulated for health reasons by health agencies. In Hawaii, sound for health regulatory purposes is measured by dBa, according to standards set in Title 11 Chapter 46

Community Noise Control and enforced by the Department of Health Noise Control Branch. The state's noise limits for residential zoned areas are 55 dBa during the day, and 45 dBa at night, while operations in agriculturally zoned areas are allowed to operate at 70 dBa, 24/7. The state does not regulate low frequency noise, which is sound that is generally below audible levels and measured in dBc. Proposed rules[1] suggested to the board by people who are not part of the hemp industry seek to have hemp farmers in agriculturally zoned areas regulated by residential level dBa limits, *and* subjected to the additional measurement of dBc regulations for low frequency noise reasons. The science behind low frequency noise on health effects appears to be highly controversial, and beyond the ability of staff to adequately analyze.

2. **Noise - County Level:** A few cities and counties in the nation have codified dBc as a regulatory measurement for sound, but the application of dBc limits even within those few jurisdictions is usually narrow, applied to sound amplifying devices such as speakers whose primary function is to amplify sound.[2] Even in the broadest applications of dBc as a sound limit, where both dBa and dBc limits are set according to zoning (residential, industrial, agricultural),[3] the lowest limits for nighttime dBc generation (60 dBc) in residentially zoned areas ***are double*** the amount (30 dBc) which have been suggested be applied to hemp farms operating within buffer zones in Hawaii.[1]
3. **Odor:** Few states regulate odor at all, as odor is even more difficult to measure than sound[4], and much more subjective in experience and effect.
4. **Lighting:** Nationwide the only instance of agricultural lighting regulations staff could find was a California regulation requiring nighttime lighting for worker safety. Hawaii at a state level regulates lighting for government buildings, but *not* for private property or private operations on public lands. Counties may adopt more specific lighting ordinances as necessary affecting private land and private operations according to the established methods for adopting such ordinances. These ordinances are tailored to the needs of the county rather than applied statewide.
5. **Enforcement Issues:** Enforcing sound and odor related regulations requires expertise, specialized training, and specialized equipment. The department simply does not have the equipment or expertise to measure sound or odor, and its interim rules do not govern the department of health's personnel.

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[1] Proposed Rules
2) Greenhouse (or similar structures) fans that generate 30 dB C of Low Frequency Noise measured at the property border are prohibited.
3) Hemp farm noise between 10 pm and 7 am is limited to 50 dB A.

[2] Panama City Beach, Florida Code of Ordinances Section 18-86.C "Additional limit for Sound Production Deices measured under the C scale."
Putnam County, Florida Code of Ordinances Section 18-200 "Maximum permissible amplified sound levels"

[3] Palmetto Bay, Florida Code of Ordinances Section 30-60.29(d)(1) "Continuous Sound."
New Port Richey, Florida Code of Ordinances Section 14-23 "Maximum permissible sound."

III. RECCOMMENDATIONS:

Following months of research both in drafting the rules and since the initial promulgation and adoption of the interim rules at issue, the **department recommends a continued retention of the rules as currently accepted.**

A. **Re: Light, sound, and smell issues**: Pre-existing regulations and authority under the Department of Health and County land use ordinances address and are the appropriate method of addressing the areas of nuisance referenced. The department firmly reiterates that where preexisting regulatory oversight of nuisance and other issues are present, a deferral to and reliance on those regulatory frameworks is the proper and preferred means to avoid any ambiguity that may arise from multi-jurisdictional enforcement authority that may conflict. That is especially true when those conflicting standards are imposed by an agency (the department of agriculture) that lacks scientific expertise in those areas of concern (health issues) and the resources and skillset to even enforce the type of standard envisioned. As such, the department did not find it necessary or appropriate to create additional regulations and promulgated rules which rely on those existing nuisance and land usage regulations at both state and county levels.

B. **Re: fees**: The department was given duties by Act 14 which it is required to accomplish, and no additional resources to accomplish those duties. The department recommends the retention of the $50/hour fee which can be assessed if inspections need to be performed which cannot be covered within the department's operational capacities and budget. The fee is in keeping with the rate charged by the department for other inspections which fall outside of normal work hours or budgeted operational costs. The department notes it did not charge fees for inspections performed by staff during normal work hours for the duration of the Hawaii Industrial Hemp Pilot Program, and intends to continue this practice to the degree possible, understanding the need to keep such charges to a minimum.

IV. CONCLUSION

Act 14 instructed the department to create any rules *necessary* to address any nuisance issues; the department in research done in the weeks it was given to craft interim rules, and in the months following, found and continues to find that further rules related to light, sound, and odor for nuisance purposes are *not necessary*.

While it may be insisted that as long as anyone is bothered by lights, sounds, or odor from hemp production then further rules are necessary to address it, the department utterly disagrees with and rejects this notion. The mere fact that existing regulations do not generate the outcome desired by some does not mean that there are no relevant pre-existing regulations, or that further regulations are necessary or appropriate.

Rule changes proposed to the department have been painted as small, reasonable, and limited, when in reality they place unheard of restrictions on agriculture and private operations: residential noise restrictions in agriculturally zoned areas, dBc noise limits twice as restrictive as those used in one of the few counties which even uses it as a measure of sound for regulatory purposes, lighting requirements that are usually only applied to government buildings, and regulations for the extraordinarily subjective experience of odor. The proposed changes proffered as small and limited are actually unreasonable and extreme.

The issue at hand should treated as a typical farmer neighbor dispute, and resolved between the parties privately. This is not the first farmer-neighbor dispute to arise in the state, nor even the first hemp farmer-neighbor dispute. Other farmers and neighbors have solved disputes amicably, and mediation is available for farmers and neighbors who cannot resolve disputes themselves. These types of disputes are so common that programs such as the Hawaii Agricultural Mediation Program mediates farmer-neighbor disputes for free.

The department holds it has met the requirements of Act 14 with its rules as written in the most appropriate manner, and urges the board to firmly accept the rules as stated without making further changes. If it is believed that for health reasons changes to the levels of sound allowed in agriculturally zoned areas and how sound is even measured for regulatory purposes is necessary, those changes should be sought in the proper forums: health related statutes, health agency rules regarding sound, and county ordinances regarding light usage, noise, and land usage. The legislature is now in session, and stakeholders may take this opportunity to address their concerns in the appropriate forum. If the lawful operational noise limits of agricultural operations on agriculturally zoned land change statutorily, those limits would also be acknowledged by the department according to its rules as written.

Respectfully submitted:

Shelley Choy, Hemp Program Coordinator

CONCURRED:

Leonard G. Obaldo, Acting Administrator
Quality Assurance Division

APPROVED FOR SUBMISSION:

Phyllis Shimabukuro-Geiser
Chairperson, Board of Agriculture

STATE OF HAWAII
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1851 AUIKI STREET
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December 15, 2020

Board of Agriculture
Honolulu, Hawaii

Subject: South Maui Gardens Hemp Producer Update

I. BACKGROUND

Act 014 directed the Department of Agriculture ("department") to adopt rules to effectuate the purposes of Act 014, including any rules necessary to address any nuisance issues by September 30, 2020. To meet the requirements of the Act, the department promulgated rules for the board's approval, and the board at its September 22, 2020 meeting accepted the interim rules as stated, while directing South Maui Gardens ("SMG") to work with the neighboring community ("Maui neighbors") to address issues, and the department to work with other agencies to further research noise, smell, and light issues according to the best science available.

II. ACTIVITY SINCE LAST BOARD MEETING:

Summary of events and testimony received after September 22 board meeting until present:

1. 9/29/2020- Peter Fay ("Fay") sent a letter from Dr. Geoff Leventhal, a sound consultant, stating that for health reasons daytime noise should not be above 50 dBa, and night time noise should not be above 45 dBa, while speculating that the noise experienced by the Maui neighbors is likely above 60 dBa externally.
2. 10/12/2020 Fay sent attachment with sound measurements taken by Maui neighbor's consultant, as requested by Dr. Nick Comerford at the 9/22/2020 board meeting. Measurements were taken at various places on the properties surrounding SMG's property, with a range of 34-92 dBa reported.
3. 11/12/2020 Elisabeth Bluml ('Bluml") submits letter from an M McBride DO claiming that low frequency noise and hemp odor is the root cause of Bluml's mis-aligned neck, spine, and hips. Note: staff was unable to further determine M McBride's profession, licensure, or identity.
4. 11/12/2020= Bluml submits letter from Naturopathic Doctor Bonnie Marsh, stating that various health issues Bluml is experiencing are being caused by noise from SMG's operations.

5. 11/17/2020 Fay states that SMG sent an email describing various mitigatory efforts taken to reduce the possible effects of their operation on the public, but that nothing has changed for the neighbors surrounding SMG's operation on the ground. Fay attached previously submitted attachments on sound assessment and proposed rules.
6. 11/23/2020 SMG submits letter to the department and board listing the efforts they have made to work with their neighboring community as directed by board at the September 22, 2020 board meeting:
    a. Erected cooling walls and sensors/controls around the perimeter of its cooling fan.
    b. Reduced usage of fans between 5pm and 8am.
    c. Turned off the fans for a few days a month.
    d. Reduced light usage by 50% with plans to further reduce it to 80%.
7. 11/24/2020 Jutta Mueller screenshot of the dBa at her property border showing a dBa of 63.
8. 11/24/2020 Department of Health ("DOH") Noise Section sends noise inspectors to take official measurements to determine compliance with the allowable limits for agricultural operation noise; they find that the operation is operating within allowable limits for agricultural operations. James Toma, Supervisor of Noise Section notes agricultural operations are explicitly allowed to operate 24/7 under state law, and that DOH has specific regulations for noise in many contexts.
9. 11/29/2020 Fay comments on SMG's 11/23/2020 letter to the department and board, stating that SMG's mitigatory efforts have no on the ground effect, and that only 15 foot thick walls can effectively block low frequency noise. Includes previous Dr. Leveanthal report as attachment again.
10. 12/12/2020 Fay provides an email with:
    a. Previous Dr. Leveanthal attachment on low frequency noise, notes that low frequency noise is measured in dB-C, not dBa.
    b. Acknowledges that DOH officials only measure noise in dBa. Claims that DOH unofficial measurements on a frequency they do not measure or regulate match the measurements taken by/for Maui neighbors.
    c. Letter from a Dr. Mariana Alves-Perreira instructing Juetta Mueller to take certain actions to mitigate the health effects she is experiencing. Perreira notes that sound is regulated and measured according to dBa, but that she believes the health issues are being caused by dB-C measured sound.
    d. Attachment on "vibroacoustic disease" by Dr. Mariana Alves-Perreira, asserting that low frequency noise causes various health outcomes.
    e. Letters from doctors of two Maui Neighbors regarding their health conditions and the noise from SMG's operations.
    f. Desired outcome: accept dB-C noise as a measurement level and low frequency noise health issues as established fact.

11. 12/12/2020 Jutta Mueller sends two doctor's letters which were attached in Fay's previous email.
12. 12/13/2020 SMG submits testimony and updates:
    a. Scooter Walsh, President of SMG details actions taken to mitigate effects of SMGs operations, states that any usage of the greenhouses for crops would necessitate, fans, not just hemp growth. States Fay's proposed would eliminate not just SMGs hemp operations, but some of its other nursery greenhouse operations as well, and many associated jobs.
    b. James Tallman, a Director of SMG hemp division: disputes Fay's claim that 32 small fans would be quieter than 2 large fans. States residential codes are not as stringent as the noise requirements proposed by Fay. Provides information on the practical effects which Fay's proposed regulation would have on SMG, and the impossibility for any agricultural operation to comply with them.
    c. Heather Manalii, SMG Hemp employee: asks board to consider effects on all SMG and agricultural employees if regulations force SMG out of business.
13. 12/14/2020 Letter from Dr. Caroline Sakai, stating that Bluml's health conditions are being caused by the SMG noise, and that her physical and mental health is deteriorating into vibroacoustic disease.

III. UPDATE: STAFF RESEARCH ON LIGHTS SOUND NOISE

Noise

1. **In Hawaii:** Noise is regulated by the Department of Health Indoor and Radiological Health Branch, Noise Control Section. Hawaii Administrative Regulations Chapter 46 contains detailed noise regulations for many activities, including agricultural activities. One of the explicitly stated objectives of the branch is to ensure that noise emissions from permitted activities, including agricultural operations, comply with specified conditions, standards, and rules.
2. **Nationally:** Noise is generally regulated by departments of health, or departments of environmental quality. At times it is regulated at a state level, but in many states noise ordinances are county specific.
3. Noise is not regulated by the department of agriculture in any state.
4. **Low Frequency Noise ("LFN"):** No state in the entire nation has adopted regulations on low frequency noise/ultrasound. Internationally some European countries appear to have adopted guidelines for low frequency noise, but actual regulations regarding LFNs do not seem to have uniformly adopted by other countries.
5. **Complexity:** The science behind noise regulation is complex. Proper measurement of noise requires specific training and expertise to measures sound to determine compliance with regulatory standards. The department of

health has a team of investigators specifically trained to deal with noise issues. The department of agriculture does not have the personnel, equipment, or expertise to measure much less create regulations regarding noise.

Odor

1. **Odor** – Odor is far more subjective and difficult to measure than noise.
2. **In Hawaii:** Odor does not appear to be comprehensively regulated by a specific branch like noise is, however, DOH has some references to noxious odor in HRS 322, and several branches within DOH address odor in specific contexts.
3. **Nationally:** Odor alone is not generally regulated, but when regulated it is regulated by "departments of environmental quality," "clean air branches," "departments of health," or in some circumstances by "departments of environmental resources," as odor issues tend to be health and environmental issues.
4. **Agricultural Odor:** In some limited instances dealing with livestock operations, departments of agricultures in tandem with departments of health/departments of environmental quality are involved with special CAFO (concentrated animal feeding operations)/AFO (animal feeding operations) federal regulations. These regulations are complex, targeted at the environmental and health impacts of concentrated animal operations, and developed at the federal level.
5. Only one state, Idaho, places its department of agriculture in charge of being the primary regulator of certain agricultural odors (compost, manure, onions). The nature of Idaho department of agriculture's odor regulatory duties are very narrow, however, and do not require any measurement type activities, only review of mitigation plans and best management practices for the activity.

Lighting

1. **Hawaii:** no statewide lighting laws for private property. Act 287 SLH 287 referenced by Peter Fay applies to government/public light fixtures, *not* private property or private operations on public lands.
2. **Nationally:** Most state laws pertaining to lighting are limited to outdoor lighting fixtures installed on the grounds of a state building or facility or on a public roadway.
3. **Community light usage** if regulated is regulated at a county level by county lighting ordinances. Only Hawaii County has adopted a lighting ordinance.

Hemp Specific Practices regarding: lights, sounds, odor:

1. **Hawaii** is the only state in the nation which has adopted statewide hemp specific buffer zones for reasons unrelated to cross pollination concerns in states with both hemp/marijuana production legalized.
2. **Nationally:** Staff raised the issue of odor light and sound issues related to hemp at a national regulator's meeting. Only Mississippi expressed awareness of such

issues, but has no regulations regarding it. Maryland and several individual counties in California have some individual farms in upscale agricultural communities dealing with the issue, but no statewide regulations have been adopted in response.

3. **County Specific:** California's state law allows regulation hemp production by county, leaving items such as decisions on buffer zones up to each of its 58 counties rather than enacting a statewide mandate. Of CA's 58 counties, only one, Ventura County, to date has temporarily adopted hemp specific setbacks for odor related issues. The setbacks do not apply to indoor greenhouse growth with odor filtration systems in place.

Maui County Agricultural District

1. The SMG operation is in the Agricultural District.
2. **Maui County Code 19.30A.010(B)(6) -** Agricultural District states the following: "It is the intent of this chapter to . . . [n]otify the public that lands within the agricultural district are used for agricultural purposes. Owners, residents, and other users of such property or neighboring properties may be subjected to inconvenience, discomfort, and the possibility of injury to property and health arising from normal and accepted agricultural practices and operations. Such normal and accepted agricultural practices and operations include but are not limited to noise, odors, dust, smoke, the operation of machinery of any kind, including aircraft, and the storage and disposal of manure. Owners, occupants, and users of such property or neighboring properties shall be prepared to accept such inconveniences, discomfort, and possibility of injury from normal agricultural operations."
3. The SMG operation is not in a residentially zoned neighborhood, they are in an agriculturally zoned neighborhood and compliant with requirements for agricultural zoning. The Maui neighbors decided to live in an Agricultural District, and as such Maui County Code 19.30A.010(B)(6) provides notice regarding the possibility of inconveniences, discomfort, and possible injury to health that come from living by a normal agricultural operation. According to all existing requirements, SMG is operating as a normal agricultural operation and is not in violation of any noise, light, or odor limits established by law.

III. CONCLUSION

1. **Health Issues:** Noise, odor, and lighting in the manner referenced in the SMG situation are decidedly health issues. The research outcomes over the past two months by *both* the department and the Maui neighbor group simply affirm the health centric nature of the issues at hand. Given the complexity of noise, odor, and lighting regulations, the health centric nature of issues presented, and the department of agriculture's lack of

expertise, equipment, and personnel for appropriately regulating complex and controversial health issues, the department recommends a continued retention of the rules as currently stated. The department is keenly aware that this course of action does not provide the relief sought by the Maui group, however, the relief sought by the Maui group: which as an underlying basis requires the department to adopt dB-C noise standards and the science behind low frequency noise effects on health as established fact, and make regulations in light of it, is entirely a health issue. The department notes (1) no state in the entire nation has adopted dB-C as a sound measurement for regulatory purposes or low frequency noise standards (2) no agricultural agency in the nation regulates noise, and (3) there is a state agency, the department of health's noise control branch, with its specific regulations on noise, that does have the expertise necessary to assess the validity of the science being asserted by the Maui neighbors. If it is believed long-standing standards for *health* issues related to noise, odor, and lighting should be adjusted, changes to those standards and discussion on topics such as low frequency noise and *how* sound should even be measured for regulatory health purposes should be made legislatively– in the areas of law already dedicated to regulating noise, and health generally, with the input of all appropriate agencies, authorities, and stakeholders.

2. **Policy Implications:** The Maui neighbors claim the acceptance of the low frequency noise science and regulations made on less than 50 hemp farmers in light of it will only have a narrow effect. The department, however, finds the opposite to be true: the acceptance of low frequency noise health science, which appears highly controversial, applied at the cost of an agricultural producer, is not a matter which is limited or light, and should not be addressed through the process of an agricultural interim rule. Accepting the Maui neighbor's claims encourages attempts to establish and apply controversial health science regulations to farmers through the circumvention of the normal rules and authorities regarding health, to the detriment of farmers operating in an agricultural zone who are in compliance with all existing authority.
3. **Appropriateness of current interim rules:** The department and its board exist to support agriculture. The issues in question are indisputably health issues. The department's research into the issues of noise, odor, and lights further affirms that the appropriate place to further explore, contest, and update odor, noise, and community lighting regulations is in statutes and administrative regulations specific to health, and county lighting ordinances. Despite claims that the rules as currently stated do not meet the requirements of Act 014, the department holds that the rules as currently promulgated and accepted meet the requirements of Act 014 to address nuisance issues as necessary in the manner most appropriate. Act 014 directs the department to adopt rules to effectuate the purposes of Act 014, including any rules **necessary to address any nuisance issues** (emphasis added). Regulations specifically addressing the nuisances

identified at hand already exist under the purview of the Department of Health and Maui County's land use ordinances. Where preexisting regulatory oversight of nuisance and other issues are present, a deferral to and reliance on those regulatory frameworks is the proper and preferred means to avoid any ambiguity that may arise from multi-jurisdictional enforcement authority that may conflict. That is especially true when those conflicting standards are imposed by an agency that lacks scientific expertise in those areas of concern. As such, the department did not find it necessary or appropriate to create additional regulatory burdens on farmers in an area which is the authority of other agencies, and promulgated rules which rely on those existing nuisance and land usage regulations at both state and county levels. The department has met the mandate of Act 014 in a manner appropriate to the requirements of the Act and the department's purpose, which is to support agriculture, and requests the board continue to accept the interim rules as currently stated, without making further changes. If changes to the way sound is measured, regulated, and applied are necessary for health purposes, those changes should be made through the normal legislative process, allowing for proper input from the appropriate agencies, stakeholders, and the public.