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MORRIS M. ATTA
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawaii 96814-2512
Phone: (808) 973-9600 FAX: (808) 973-9613

December 10, 2021

TO: Advisory Committee on Plants and Animals

FROM: Miaoying Tian, Ph.D.
Department of Plant and Environmental Protection Sciences
University of Hawaii at Manoa

THROUGH: Wil Leon Guerrero
Microorganism Specialist
Plant Quarantine Branch
Hawaii Department of Agriculture

SUBJECT: Request to:

(1) Allow the Importation of Avocado Root Rot, *Phytophthora cinnamomi*, a Fungus on the List of Restricted Microorganisms (Part A), for Laboratory Research Including Plant Inoculation, by the University of Hawaii, by Permit;

(2) Establish Permit Conditions for the Importation of Avocado Root Rot, *Phytophthora cinnamomi*, a Fungus on the List of Restricted Microorganisms (Part A), for Laboratory Research Including Plant Inoculation, by the University of Hawaii, by Permit;

(3) Determine Whether the Proposed Permit Conditions are Sufficient to Ensure that the Laboratory Research Including Plant Inoculation using Avocado Root Rot, *Phytophthora cinnamomi,* a Fungus on the List of Restricted Microorganisms (Part A), by the University of Hawaii, Presents Probably Minimal or No Significant Effects on the Environment; and

(4) Determine the Probable Impact to the Environment Should the Avocado Root Rot, *Phytophthora cinnamomi,* a Fungus on the List of Restricted Microorganisms (Part A), be Accidentally Released.

Advisory Committee
Phytophthora cinnamomi
Miaoying Tian
December 10, 2021

I. Summary Description of the Request

PQB NOTES: *The Plant Quarantine Branch (PQB) submittal for requests for import or possessions permits, as revised, distinguishes information provided by the applicant from procedural information and advisory comment and evaluation presented by PQB. With the exception of PQB notes, hereafter "PQB NOTES," the text shown below in Section II from page 2 through page 5 of the submittal was taken directly from Dr. Tian's application and subsequent written communications provided by the applicant. For instance, the statements on page 5 regarding effects on the environment are the applicant's statements and not PQB's. This approach for PQB submittals aims for greater applicant participation in presenting import requests in order to move these requests to the Board of Agriculture (Board) more quickly, while distinguishing applicant provided information from PQB information. The portion of the submittal prepared by PQB, including Environmental Assessment, Advisory Subcommittee Review, and Proposed Permit Conditions are identified as Sections III, IV, and V of the submittal, which starts at pages 6, 8, and 11 respectively.*

We have a request to review the following:

COMMODITY: A single shipment of up to three pure cultures of *Phytophthora cinnamomi*.

SHIPPER: Patricia Manosalva, University of California-Riverside, 3401 Watkins Dr., Boyce Hall 3485, Riverside, CA 92521

IMPORTER: Miaoying Tian, Ph.D., Department of Plant and Environmental Protection Sciences, University of Hawaii at Manoa, 3190 Maile Way, St. John 317, Honolulu, HI 96822 (See Appendix A).

CATEGORY: All species in the genus *Phytophthora*, are on the List of Restricted Microorganisms (Part A). This includes Avocado Root Rot, *Phytophthora cinnamomi.* Pursuant to Chapter 4-71A, Hawaii Administrative Rules (HAR), microorganism species on the List of Restricted Microorganisms (Part A) are categorized as high-risk microorganisms, which may be allowed import into the State under a permit approved by the Board.

PQB NOTES: *Phytophthora species are plant pathogens, of which are potentially destructive, and can cause economic loss on crops worldwide. The name Phytophthora originates from Greek meaning "the plant destroyer". Many species of Phytophthora are host-specific and are difficult to control chemically which is why resistant varieties of*

crops are selected to produce. Phytophthora cinnamomi has a wide range of plant hosts. There are thousands of plant species that Phytophthora cinnamomi can infect.

II. Information Provided by the Applicant in Support of the Application

PROJECT: This is a part of a project titled "Reducing Avocado Losses To Major Challenges By Improving Resistance Selection And Disease Management Using Next Generation Technologies" sponsored by U.S. Department of Agriculture (USDA) [and] National Institute of Food and Agriculture (NIFA) Specialty Crops Research Initiative (SCRI) grant program, led by University of California Riverside with University of Hawaii at Manoa (UHM) as one of the sub-awardees.

PURPOSE: We will use the well-characterized *Phytophthora cinnamomi* cultures from California as a control to study the diversity of *P. cinnamomi* isolated from avocado plants in Hawaii.

OBJECTIVE: The objectives are to determine the diversity of the avocado *P. cinnamomi* isolates from Hawaii and whether there is [any] difference between the Hawaii isolates and California isolates. Tremendous efforts have been and are currently being made to develop novel fungicides, disease resistance rootstocks and other novel control measures in California. To be able to determine whether these control measures/resources are applicable in Hawaii, a comparison between the isolates is essential. The results will provide valuable knowledge to guide the avocado root disease control in Hawaii and therefore benefit the state. The import of the microorganisms is also essential for Miaoying Tian and her collaborators at University of Hawaii (UH) to be able to complete the federally funded project. Without it, continued funding through University of California Riverside may be subject[ ] to termination. This funding has created job opportunities for a technician, an undergraduate student, and graduate student at UH.

PROCEDURE: We will use the imported isolates as the controls to perform *In vitro* fungicide sensitivity assay of the Hawaii isolates. This assay will be performed in petri dish[es] in the lab. The mycelia will be inoculated on the 10% V8 agar containing fungicides and the daily growth rate will be measured. We will also perform virulence variability assays. For this, we will first inoculate the detached avocado leaves placed in a plastic tray covered with a plastic dome, which will be performed in the lab. If this detached leaf assay is successful, we will only use the imported

organisms in the lab. Otherwise, we will need [to] inoculate the avocado seedlings in [the] lab. The seedlings grown in the pots will be placed in a sturdy plastic tray and inoculated by burying mycelia grown on millet seeds in the soil of the plants. The plants will be carefully watered using a beaker to avoid soil/water splash.

DISCUSSION:

1. Person Responsible:

Miaoying Tian, Ph.D., Department of Plant and Environmental Protection Sciences, University of Hawaii at Manoa, 3190 Maile Way, St. John 304, Honolulu, HI 96822. Phone: 808-956-5305 Fax: 808-956-2832.

Dr. Tian will be responsible for safe storage and use of the imported microorganism. She is an associate professor in plant pathology with 20 years of experience working on various *Phytophthora spp*. since she was a graduate student at the Ohio State University. She has been a faculty [member] at UHM managing a research lab working on *Phytophthora spp.* at biosafety level 2 since 2014. Her latest General Biosafety Principles and Practices training and Transportation of Biological Substances Awareness training dates were completed on 02/09/2020 and 02/07/2020. The latest biosafety inspection of her lab was performed virtually by Todd Suda on 12/14/2020. A CV documenting her education, employments and research experience is attached (See attachment 1).

2. Safeguard Facility and Practices:

Contact person: Miaoying Tian, Ph.D., Department of Plant and Environmental Protection Sciences, University of Hawaii at Manoa, 3190 Maile Way, St. John 304, Honolulu, HI 96822 Phone: 808-956-5305 Fax: 808-956-2832

The labs used include St. John 304 and 301 at biosafety level 2. Only authorized personnel are allowed [ ] access to the labs. The imported culture will be stored in sterile water in 2-ml tubes, which will be placed in a locked drawer. St. John plant science building is locked after work hours and only authorized employees can enter the building. Autoclaves are in place on the 3rd floor of St. John. The map of the 3rd floor of St. John is attached (Appendix A, page 3).

Strict [pre]cautions will be taken to avoid the accidental release during the transport and experimentation. The samples will be transported according to DOT/IATA requirements by triple packaging with the label “UN3373, Biological Substance, Category B”, and may be opened for inspection. The routine handling

of the microorganisms will be performed in a Class II biosafety cabinet. Any spills will be decontaminated using 10% bleach. The growth of the microorganisms and lab-based detached leaf infection assays will be performed in a contained manner, either in petri dish[es] or covered plastic tray[s]. If infecting the seedlings in the lab is needed, the plants in pots will be placed in a plastic tray to contain any contaminated water. The plants will be watered carefully to avoid splash out of the plastic tray. When the experiment is done, all plants/soil and single-use pots will be autoclaved at 121° C for at least 45 minutes by using saturated steam under at least 15 psi of pressure. All the plastic trays will be soaked in 10% bleach for at least 1 hour before rinsing with clean water. All related waste will be autoclaved as above. Only the individuals with biosafety training are allowed to access and handle the imported microorganisms. The individuals are required to attend the initial biosafety training and regular refresher training.

3. Method of Disposition:

The microorganisms will be stored in locked drawers in the applicant's lab with the valid USDA and HDOA permits until the completion of the research project. After that, they will be autoclaved at 121° C for at least 45 minutes by using saturated steam under at least 15 psi of pressure. The live microorganisms will not have direct contact with the environment.

4. Abstract of Organism:

Phytophthora cinnamomi is an oomycete belonging to phylum Oomycota within the kingdom Straminipila. It has a wide host range. However, the host specificity is barely studied. For example, whether an isolate that infects avocado is able to infect other plant species is unclear. *P. cinnamomi* occurs worldwide, including Hawaii. It seems that it has been present in Hawaii since a long time ago. It could have come to Hawaii with some of the plant materials brought by the early Polynesian explorers and settlers (Zentmyer, G. A., California Avocado Society 1985 Yearbook 69: 89-96). Kliejunas and Ko (Phytopathology, 1976, 66: 116-121) identified *P. cinnamomi* in ohia forests and found that it was widely distributed throughout the island of Hawaii. *P. cinnamomi* was also found in many other plant species in Hawaii (http://www.extento.hawaii.edu/kbase/crop/Type/phyt_prim.htm). *P. cinnamomi* was first described from avocado roots in southern California in 1942 and was thought to be probably imported into California from tropical America, Hawaii, or Australia in the late 19th century with importations of avocado or other subtropical/tropical plants (Zentmyer, G. A., California Avocado Society 1985 Yearbook 69: 89-96).

P. cinnamomi grows best in mild temperate or subtropical regions. It does not grow or survive at low soil temperatures (below 6°C) or at high soil temperatures (above 34-36°C). Optimum temperatures are in the range of 21-27°C. The pathogen does not survive well or spread rapidly under low soil moisture conditions. *P. cinnamomi* produces sporangia, which release zoospores. Zoospores infect the hosts when swimming to the roots. Periods of abundant soil moisture promote production of sporangia, release of zoospores, and invasion of host roots. However, *P. cinnamomi* does not develop under conditions of continuously saturated soil with consequent low oxygen concentrations. It produces disease most rapidly under soil conditions of somewhat acid to neutral pH. *P. cinnamomi* does not produce toxins.

5. Effects on the Environment:

The to-be-imported microorganisms will be used entirely for research in contained labs. The research results are expected to contribute to avocado disease control and therefore benefit avocado industry in Hawaii. There will be no expected adverse impact on aquaculture and horticulture industries, forestry, environment (e.g., native fauna and flora, natural resources), economy, and society.

Strict cautions will be taken to avoid the accidental release during the transport and experimentation. If accidental release happens, the potential environmental, economic, and societal impacts are minimal if not none. There are a couple of reasons for that: 1) this pathogen is not air-borne, so it may never reach the hosts before it dies after the accidental release; 2) *P. cinnamomi* has been found in many plant species in Hawaii (http://www.extento.hawaii.edu/kbase/crop/Type/phyt_prim.htm), there is no evidence suggesting that the imported isolates are more aggressive than the ones in Hawaii. Perceived as a low risk to Hawaii, import of the same microorganism has been permitted by USDA APHIS (permit number: P526P-21-00350, (see USDA permit pdf, Attachment 2).

III. Environmental Assessment (EA)

Pursuant to a May 2008 Hawaii Intermediate Court of Appeals decision (Ohana Pale Ke Ao v. Board of Agriculture, 118 Haw. 247 (Haw. App. 2008), the Department of Agriculture's (Department's) import permit process is subject to the requirements of the Hawaii Environmental Protection Act, Chapter 343, Hawaii Revised Statutes (HRS). Under this decision, the requirement for an EA as a condition of the import permit or related authorization applies in those circumstances where the underlying permit activity for the importation initiates a "program or project" and where the use of state or county

funds or state or county lands is involved. When those circumstances are present, as they appear to be when a new organism is used at University of Hawaii (state lands), an EA is required to determine whether the proposed project or program is likely to have a significant impact on the environment. However, certain activities may be eligible for "exemption" from an EA under provisions established through the Environmental Advisory Council (EAC), provided that the project or program is determined to have little or no impact on the environment.

Exemption from EA: In September 2008, the Department obtained the concurrence of EAC's Environmental Council for exemption from EA for those Plant Quarantine Branch import permits and related authorizations that satisfy certain criteria, including conditions to minimize risk to agriculture, horticulture, the environment, or animal or public health. The exemption from EA for microorganisms applies to the import of microorganisms for various purposes according to their placement on lists maintained by the Board of Agriculture (Board) and subject to permit conditions appropriate to eliminate or minimize risks associated with the microorganisms and their use. (See Exemption Class #10., item 3.a of the Department's exemptions, under the links for exemption lists for state agencies at: http://hawaii.gov/health/environmental/oeqc/index.html/). Permit conditions address matters such as health requirements, special precautions, and safeguarding from escape, theft, or release. Under the exemption, purposes for importation of microorganisms include, but are not limited to, food and beverage processing; clinical laboratory diagnostics or quality control testing; medical or scientific research by qualified entities and universities in standard research settings; classroom instruction at universities or high schools; microbial products; algae research or algae cultivation and production for food, feed, or export for processing for uses such as cosmetics, food supplements, and pharmaceuticals. The exemptions from EA are only applicable when a project or program will probably have minimal or no significant effect on the environment. Under EAC's rules and the Department's exemption list, exemptions are inapplicable when the cumulative impact of planned successive actions in the same place, over time, is significant, or when an action that is normally insignificant in its impact on the environment may be significant in a particularly sensitive environment.

PQB Process for Exemption from EA: When seeking an exemption from EA for an import request that requires the full Board review process, the Department must obtain the advice of other outside agencies or individuals having jurisdiction or expertise as to the propriety of the exemption. (Section 11-200-8(a), HAR.) The Board review process already includes recommendations and comments from the technical consultants (Advisory Subcommittee members) and the Advisory Committee on Plants and Animals (Advisory Committee). The representation of outside agencies such as the Hawaii Department of Land and Natural Resources, University of Hawaii, and Hawaii Department of Health, and the EAC, on the Advisory Committee provide opportunity for

these agencies input on the public health and environmental aspects of the import and appears to meet the consultation requirement of the EAC's rule. In addition, the input received from the Department's technical consultants on the Advisory Subcommittees, as individuals with expertise on the subject matter and the presence of additional individuals from the Hawaii Department of Health and University of Hawaii, appears to meet the consultation requirement. Where the recommendations from the technical consultants and Advisory Committee support exemption from an EA, the Department may prepare a declaration of exemption, which includes a description of the import request, lists of consultants, consultants' recommendation and comments, and the basis for the Department's determination of "probably minimal or no significant effect on the environment." The declaration of exemption from EA is submitted to the Board together with the import request. Where the recommendations from the technical consultants and Advisory Committee support an EA, the Department may require an EA as a prerequisite for Board review.

IV. Advisory Subcommittee Review

This request was submitted to the Advisory Subcommittee on Fungi for their review. Their recommendations and comments are as follows:

1. I recommend approval__/__disapproval to allow the importation of the Avocado Root Rot, *Phytophthora cinnamomi,* a Fungus on the List of Restricted Microorganisms (Part A), for Laboratory Research Including Plant Inoculation, by the University of Hawaii, by Permit.

Dr. Edward Desmond: Recommends approval.

Comments: "Provided mitigation measures are properly followed."

Mr. David Clements: Recommends approval.

Comments: None.

Dr. Susan Schenck: Recommends approval.

Comments: None.

Dr. A. Christian Whelen: Recommends approval.

Comments: None.

Dr. Stephen Ferreira: Recommends approval.

Comments: None.

Dr. Raquel Wong: Recommends approval.

Comments: None

Dr. George Wong: Recommends approval.

Comments: None.

2. I recommend approval__/__disapproval to Establish Permit Conditions for the Importation of Avocado Root Rot, *Phytophthora cinnamomi,* a Fungus on the List of Restricted Microorganisms (Part A), for Laboratory Research Including Plant Inoculation, by the University of Hawaii.

Dr. Edward Desmond: I recommend approval.

Comments: None.

Mr. David Clements: Recommends approval.

Comments: None.

Dr. Susan Schenck: Recommends approval.

Comments: None.

Dr. A. Christian Whelen: Recommends approval.

Comments: None.

Dr. Stephen Ferreira: Recommends approval.

Comments: None.

Dr. Raquel Wong: Recommends approval.

Comments: None

Dr. George Wong: Recommends approval.

Comments: None.

3. Are the Proposed Permit Conditions sufficient to assure that the Laboratory Research Including Plant Inoculation using Avocado Root Rot, *Phytophthora cinnamomi,* a Fungus on the List of Restricted Microorganisms (Part A), by the University of Hawaii, Presents Probably Minimal or No Significant Effects on the Environment?

Dr. Edward Desmond: Probably minimal or no significant effects on the environment.

Comments: None.

Mr. David Clements: Probably minimal or no significant effects on the environment.

Comments: None.

Dr. Susan Schenck: Probably minimal or no significant effects on the environment.

Comments: None.

Dr. A. Christian Whelen: Probably minimal or no significant effects on the environment.

Comments: None.

Dr. Stephen Ferreira: Probably minimal or no significant effects on the environment.

Comments: None.

Dr. Raquel Wong: Probably minimal or no significant effects on the environment.

Comments: None

Dr. George Wong: Probably minimal or no significant effects on the environment.

Comments: None.

4. Are the Proposed Permit Conditions sufficient to assure that the item requested for import presents probably minimal or no significant effects on the environment should it be accidentally released?

Dr. Edward Desmond: Yes.

Comments: None.

Mr. David Clements: Yes.

Comments: None.

Dr. Susan Schenck: No.

Comments: "I recommend allowing the import of the *P. cinnamomi* isolates because containment conditions appear adequate. If released, however, it might prove very damaging."

Dr. A. Christian Whelen: Yes.

Comments: "Provided they are properly followed."

Dr. Stephen Ferreira: Yes.

Comments: "While it is an important pathogen, it is really not prevalent in Hawaii. It certainly is important in avocados, and in forested areas, was and, I suspect[,] still is [an] important pathogen of Ohia. Otherwise, it is really not that important of a pathogen in Hawaii. As long as protocols for proper disposal of laboratory items and greenhouse plants, which basically involves autoclaving, there is no risk of escaping from the lab or greenhouse. Zoospore escape is greatly exaggerated, and would occur with water movement over short distances. In addition, a susceptible host would need to be found within a short period of time…probably within a few hours. Zoospores are not long-lived. This pathogen can spread locally in-field along irrigation furrows. Zoospores are not involved with long distant movement. Long distance spread is most likely via sporangial being rain or wind-blown wind. *P. cinnamomi* is mainly a soil-borne pathogen, so dispersal is, for the most part, by man moving infected plants or infested soil from one location to another. In my opinion, laboratory and greenhouse trials are relatively low risk if protocols are followed. There is no need to be overly concern[ed] about this pathogen escaping the lab easily. Moreover, *P. cinnamomi* is distributed widely in most forest environments and is most important in avocado. Concerns about strain differences and types are

theoretical, with almost no literature about important strain differences occurring with the *P. cinnamomi* populations."

Dr. Raquel Wong: Yes.

Comments: None

Dr. George Wong: Yes.

Comments: "…concerning that this species is the **"world's most devastating plant pathogen!"** This is a comment made on the abstract of a paper and is an opinion not based on any evidence. I saw it as an overblown, exaggeration by the author and nothing else."

V. Proposed Permit Conditions

1. The restricted article(s), Avocado Root Rot, *Phytophthora cinnamomi*, shall be used for laboratory research including plant inoculation, a purpose approved by the Board of Agriculture (Board), and shall not be sold, given, or transferred in Hawaii, except as approved by the Board. Release of the restricted article(s) into the environment is prohibited.

2. The permittee, Miaoying Tian, Ph.D., University of Hawaii at Manoa, Department of Plant and Environmental Protection Sciences, 3190 Maile Way, St. John 304, Honolulu, Hawaii 96822, shall be responsible and accountable for all restricted article(s) imported, from the time of their arrival to their final disposition.

3. The restricted article(s) are subject to the pre-entry requirements of section 4-71A-8, Hawaii Administrative Rules (HAR), and the inspection requirements of section 4-71A-9, HAR.

4. Each shipment shall be accompanied by a copy of the Plant Quarantine Branch (PQB) permit for the restricted article(s) and an invoice, packing list, or other similar PQB approved document listing the scientific and common names of the restricted article(s), the quantity of the restricted article(s), the shipper, and the permittee for the restricted article(s).

5. The restricted article(s), shall be safeguarded at University of Hawaii at Manoa, 3190 Maile Way, St John 304 and 301, Honolulu, Hawaii 96819, sites inspected and approved by the PQB prior to importation. Removal of

the restricted article(s) to another site or room shall require site inspection and approval by the PQB chief prior to movement.

6. The restricted article(s) shall be maintained by the responsible person, Miaoying Tiang, Ph.D., University of Hawaii at Manoa, Department of Plant and Environmental Protection Sciences, 3190 Maile Way, St. John 317, Honolulu, Hawaii 96822, or by trained or certified personnel designated by the permittee.

7. The permittee shall adhere to the use, facility, equipment, procedures, and safeguards proposed and described in the permit application, as approved by the PQB Chief and Board.

8. The approved site(s), restricted article(s), and records pertaining to the restricted article(s) under permit shall be subject to post-entry inspections pursuant to section 4-71A-16, HAR. The permittee shall make the site(s), restricted article(s) and records pertaining to the restricted article(s) available for inspection upon request by a PQB inspector.

9. The permittee shall submit an annual report of all the restricted article(s) imported or possessed for the calendar year by January 31st of the following year. The report shall include:

    a. The permit number, scientific name, and quantity of the restricted article(s) imported or possessed;

    b. The status of use and possession of the restricted article(s);

    c. A summary of any significant changes to the permittee's operation, personnel, and/or procedures; and

    d. Any significant events that occurred at the permittee's site.

10. The permittee shall have available a procedural or biosafety manual for review and approval by the PQB at the time of initial site inspection and any subsequent post-entry inspection(s), which identifies the hazards that will or may be encountered, and which specifies practices and procedures designed to minimize or eliminate risks of theft, exposure, or contamination, and/or accidental release of the restricted article(s), including the risk of introduction and spread of pests that may be associated with the restricted article(s) into the environment. The

permittee shall adhere to all practices and procedures as stated in this biosecurity manual.

11. It is the responsibility of the permittee to comply with any applicable requirements of municipal, state, or federal law pertaining to the restricted article(s). The permittee shall also comply with University of Hawaii Institutional Biosafety Committee instructions.
12. The permittee shall submit to the PQB Chief a copy of all valid licenses, permits, certificates or other similar documents required by other agencies for the restricted article(s) and operation of the facility where the restricted article(s) are safeguarded. The permittee shall immediately notify the PQB Chief in writing when any of the required documents are suspended, revoked, or terminated. This permit may be amended, suspended, or cancelled by the PQB Chief upon suspension, revocation, or termination of any license, permit, certificate, or other similar document required for the restricted article(s) or operation of the facility safeguarding the restricted article(s).

13. Upon completion or termination of the use of the restricted article(s), the restricted article(s) shall be destroyed by autoclaving. In the event autoclaving is not possible, the permittee shall obtain written authorization from the PQB Chief for an appropriate alternate method of destruction.

14. The permittee shall immediately notify the PQB Chief verbally and in writing under the following circumstances:

    a. Any changes to the approved sites, facilities, procedures, or equipment used to contain the restricted article(s). Any such changes must be approved by the PQB and in compliance with permit conditions prior to implementation.

    b. If any theft, accidental release, disease outbreaks outside of containment, or other exposure and/or pest emergence involving or suspected to involve the restricted article(s) under this permit, occurs.

    c. If a shipment of the restricted article(s) is delivered to the permittee without a PQB “Passed” stamp, tag or label affixed to the article, container or delivery order that indicates that the shipment has passed inspection and is allowed entry into the State. Under this circumstance, the permittee shall not open or tamper with the shipment. Additionally, the permittee shall secure all restricted

article(s), shipping containers, shipping documents and packing materials for the PQB.

d. If the permittee will no longer import and/or possess the restricted article(s) authorized under this permit. Under this circumstance, the permittee shall inform the PQB Chief of the final disposition for the restricted article(s), submit a final report on the method of destruction of the restricted article(s) to the PQB chief within 30 days of completion or termination of the use of the restricted article(s), and the permit will be cancelled.

15. Any violation of the permit conditions may result in citation, permit cancellation, and enforcement of any or all of the penalties set forth in HRS §150A-14.

16. A cancelled permit is invalid and upon written notification from the PQB chief, all restricted article(s) listed on the permit shall not be imported. In the event of permit cancellation, any restricted article(s) imported may be moved, seized, treated, quarantined, destroyed, or sent out of state at the discretion of the PQB Chief. Any expense or loss in connection therewith shall be borne by the permittee.

17. The permit conditions are subject to cancellation or amendment at any time due to changes in statute or administrative rules restricting or disallowing import of the microorganisms or due to Board action disallowing a previously permitted use of the restricted article(s).

18. The permittee is responsible for costs, charges, or expenses incident to the inspection, treatment or destruction of the restricted article(s), as provided in Act 173, Session Laws of Hawaii 2010, Section 13, including, if applicable, charges for overtime wages, fixed charges for personnel services, and meals.

19. The permittee shall comply with the Centers for Disease Control and Prevention and National Institutes of Health Biosafety Level 2 guidelines for laboratory facility for safety equipment, standard microbiological practices and special practices as found in the current edition of the *Biosafety in Microbiological and Biomedical Laboratories.*

20. These permit conditions are subject to amendment by the PQB Chief to conform to more recent Board approved permit conditions for the

restricted article(s), as necessary to address scientifically validated risks associated with the restricted article(s).

21. The permittee shall agree in advance to defend and indemnify the State of Hawaii, its officers, agents, employees, and the Board of Agriculture members for any and all claims against the State of Hawaii, its officers, agents, employees or Board of Agriculture members that may arise from or be attributable to any of the restricted article(s) that are introduced under this permit. This permit condition shall not apply to a permittee that is a federal or State of Hawaii entity or employee, provided that the federal or state employee is a permittee in the employee's official capacity.

ADVISORY COMMITTEE REVIEW: May we request your recommendation and comments at the next meeting of the Advisory Committee on Plants and Animals.

Miaoying Tian
College of Tropical Agriculture and Human Resources
(Department of Plant and Environmental Protection Sciences)
FTE Distribution: 30% I; 70% R

Education

Degree	University	Major
Bachelors	Agricultural University of Hebei	Plant Protection
Masters	Chinese Academy of Agricultural Sciences	Plant Pathology
PhD	The Ohio State University	Plant Pathology

Lifetime and Fellow Achievement Awards (peer nominated and endorsed national and International-important for those without accreditation that is peer nominated and endorsed, recognized)

Professional Appointments

Title	Employer	Dates Employed
Associate Researcher	University of Hawaii at Manoa	08/01/2019
Assistant Researcher	University of Hawaii at Manoa	01/02/2014
(Senior) Research Associate	Boyce Thompson Institute	04/2009
Postdoctoral Associate	Michigan State University	04/2006
Postdoctoral Associate	Boyce Thompson Institute	04/2005

Courses Taught

Course Number and Title (credits)

- PEPS/TPSS 371 Genetics: Theory to Application, 3 credits (yearly, since 2014)
- PEPS/MBBE 652 Molecular Plant-Fungal Interactions, 3 credits (every 2 years, since 2015)
- PEPS 605 Biology of Plant Pathogens: Fungi and Nematodes (Fungi section, 2 credits) (yearly, since 2017)
- PEPS 600 Seminar in Plant Pathology (in rotation, 2014 and 2019)
- PEPS 499 and 699 Direct Research for Undergraduate and Graduate Students (all semesters)

Publications (reverse chronological order)

Books

Book Chapters

Tian M., Navet N., and Wu D. (2020) CRISPR/Cas9-mediated gene editing of the plant pathogenic oomycete *Phytophthora palmivora.* Book chapter in **CRISPR-Cas Methods.** Springer Protocols Handbooks https://link.springer.com/book/10.1007%2F978-1-0716-0616-2), Page 87-98.

Conference Proceedings (Since 2014)

Note: Graduate students or researchers under my direct supervision are underlined.

Standish J. R., Purayannur, S., Bowman M., Childs K. L., **Tian M.**, Quesada L. M. (2020) Predicting the *Peronospora belbahrii* secretome for in silico identification of effector proteins. (Abstr.) Phytopathology 110: S1.18. https://doi.org/10.1094/PHYTO-110-7-S1.1

Standish J. R., Bowman M. J., Childs K. L., **Tian M.**, Quesada-Ocampo L. M. (2020) Utilizing comparative genomics to develop species-specific diagnostic markers for basil downy mildew. APS annual meeting 2020 abstract.

Johnson E. T., Quesada-Ocampo L., Bowman M., Childs K., **Tian M.** (2020) Differential expression of genes encoding sugar transporters in the basil pathogen *Peronospora belbahrii.* APS annual meeting 2020 abstract.

Navet N., **Tian M.** (2019) Targeted mutagenesis of basil candidate susceptibility gene DMR1 using CRISPR/Cas9.

(Abstr.) Phytopathology 109: S2.22. https://doi.org/10.1094/PHYTO-109-10-S2.1

Cai Z., Navet N., Uchida J., and **Tian M.** (2018) A host-specific RxLR effector of *Phytophthora palmivora* contributes to virulence on cacao. (Abstr.) Phytopathology 109: S2.58. https://doi.org/10.1094/PHYTO-108-12-S2.1

Tian M., Gumtow R., Navet N., Wu D., Schornack S. and Uchida J. (2017) Dissecting the pathogenicity mechanisms of *Phytophthora palmivora*. (Abstr.) Phytopathology 107: S5.25

Wu D., Win J., Shao D., and **Tian M.** (2015) Dissecting the molecular basis of basil *Peronospora belbahrii* interactions. (Abstr.) Phytopathology 105(Suppl. 4): S4.150

Refereed Journal Publications

Notes: Corresponding author suggests the project leadership of the study and contribution to all aspects, including concept development, supervision, manuscript writing and editing; Graduate students or researchers under M. Tian's direct supervision are underlined.

34. Navet N. and **Tian M.*** (2020) Efficient targeted mutagenesis in allotetraploid sweet basil by CRISPR/Cas9. *Plant Direct*, 4(6): e00233. **(*Corresponding author)**

33. Navet N. and **Tian M.*** (2020) *Agrobacterium*-mediated transformation of sweet basil (*Ocimum basilicum*) *Bio-protocol*, 10(22): e3828. **(*Corresponding author)**

32. Pettongkhao S., Navet N., Schornack S., **Tian M.***, Churngchow N* (2020). A secreted protein of 15 kDa plays an important role in *Phytophthora palmivora* development and pathogenicity. Scientific Reports, 10: 2319 **(*Corresponding author)**

31. Shao D. and **Tian M.*** (2018) A qPCR approach to quantify the growth of basil downy mildew pathogen *Peronospora belbahrii* during infection. *Current Plant Biology*, 15:2-7. **(*Corresponding author)**

30. Gumtow R., Wu D., Uchida J. and **Tian M.*** (2018) A *Phytophthora palmivora* extracellular cystatin-like protease inhibitor targets papain to contribute to virulence on papaya. *Molecular Plant-Microbe Interactions*, 31(3):363-373. **(*Corresponding author)** (Cover page article)

29. Mishra S., Wang K. H., Sipes B. S. and **Tian M.** (2018) Induction of host-plant resistance in cucumber by vermicompost tea against root-knot nematode. *Nematropica*, 48(2):164-171.

28. Ekchaweng K., Evangelisti E., Schornack S., **Tian M.*** and Churngchow N*. (2017) The plant defense and pathogen counterdefense mediated by *Hevea brasiliensis* serine protease HbSPA and *Phytophthora palmivora* extracellular protease inhibitor PpEPI10. *PLoS One*, 12(5):e0175795. **(*Corresponding author)**

27. Mishra S., Wang K. H., Sipes B. S. and **Tian M.** (2017) Suppression of root-knot nematode by vermicompost tea prepared from different curing ages of vermicompost. *Plant Disease*, 101(5): 734-737.

26. Wu D., Navet N., Liu Y., Uchida J. and **Tian M***. (2016) Establishment of a simple and efficient *Agrobacterium*-mediated transformation system for *Phytophthora palmivora. BMC Microbiology,* 16:204 **(*Corresponding author)**

25. Khunjan U., Ekchaweng K., Panrat T., **Tian M.**, and Churngchow N. (2016) Molecular cloning of HbPR-1 gene from rubber tree, expression of HbPR-1 gene in *Nicotiana benthamiana* and its inhibition of *Phytophthora palmivora*. *PLoS One*, 11(6): e0157591.

24. Klessig D. F., **Tian M.,** and Choi H. W. (2016) Multiple targets of salicylic acid and its derivatives in plants and animals. *Front Immunol.* 7:206.

23. Choi H. W., Manohar M., Manosalva P., **Tian M.**, Moreau M., and Klessig D. F. (2016) Activation of plant innate immunity by extracellular high mobility group box 3 and its inhibition by salicylic acid. *PLoS Pathogens*, 12(3): e1005518.

22. Choi H. W.*, **Tian M.***, Manohar M., Harraz M. M., Park S. W., Schroeder F. C., Snyder S. H., and Klessig D. F. (2015) Human GAPDH is a target of aspirin's primary metabolite salicylic acid and its derivatives. *PLoS One*, 10(11): e0143447. **(*Co-first author)**

21. Choi H. W., **Tian M.**, Song F., Venereau E., Preti A., Park S. W., Hamilton K., Swapna G. V., Manohar M., Moreau M., Agresti A., Gorzanelli A., De Marchis F., Wang H., Antonyak M., Micikas R. J., Gentile D. R., Cerione R. A., Schroeder F. C., Montelione G. T., Bianchi M. E., and Klessig D. F. (2015) Aspirin's active metabolite salicylic

acid targets high mobility group box 1 to modulate inflammatory responses. *Mol. Med.* 18(21):526-35.

20. Manohar M.*, **Tian M.***, Moreau M.*, Park, S. W., Choi H. W., Fei Z., Friso G., Asif M., Manosalva P., von Dahl C. C., Shi K., Ma S., Dinesh-Kumar S. P., O'Doherty I., Schroeder F. C., van Wijk K. J. and Klessig D. F. (2015) Identification of multiple salicylic acid-binding proteins using two high throughout screens. *Frontiers in Plant Science*, 5:777. (***Co-first author**)

19. **Tian M.**, Sasvari Z., Gonzalez P., Friso G., Rowland E., Liu X., van Wijk K. J., Nagy P. D. and Klessig D. F. (2015) Salicylic acid inhibits the replication of Tomato Bushy Stunt Virus by directly targeting a host component in the replication complex. *Molecular Plant-Microbe Interactions*, 28(4):379-86. (Highlighted in MPMI as *MPMI* Editor's Pick, April 2015)

18. Liao Y., **Tian M.**, Zhang H., Li X., Wang Y., Xia X., Zhou J., Zhou Y., Yu J., Shi K., and Klessig D. F. (2015) Salicylic acid binding of mitochondrial alpha-ketoglutarate dehydrogenase E2 affects mitochondrial oxidative phosphorylation and electron transport chain components and plays a role in basal defense against tobacco mosaic virus in tomato. *New Phytologist*, 205(3):1296-1307.

17. Dong S., Stam R., Cano L. M., Song J., Sklenar J., Yoshida K., Bozkurt T. O., Oliva R., Liu Z., **Tian M.,** Win J., Banfield M. J., Jones A. M. E., van der Hoorn R. A. L. and Kamoun S. (2014) Effector specialization in a lineage of the Irish potato famine pathogen. *Science*, 343(6170):552-5.

16. Moreau M., Westlake T., Zampogna G., Popescu G., **Tian M.**, Noutsos C., and Popescu S. (2013) The Arabidopsis oligopeptidases TOP1 and TOP2 are salicylic acid targets that modulate SA-mediated signaling and the immune response. *Plant Journal*, 76(4):603-614.

15. **Tian M.,** von Dahl C. C., Liu P. P., Friso G., van Wijk K. J., and Klessig D. F. (2012) The combined use of photoaffinity labeling and surface plasmon resonance-based technology identifies multiple salicylic acid-binding proteins. *Plant Journal*, 72(6):1027-1038.

14. Porter K., Shimono M., **Tian M.**, and Day B. (2012) Arabidopsis actin-depolymerizing factor-4 links pathogen perception, defense activation and transcription to cytoskeletal dynamics. *PLoS Pathogens*, 8(11):e1003006.

13. Moreau M.*, **Tian M.***, and Klessig D. F. (2012) Salicylic acid binds NPR3 and NPR4 to regulate NPR1-dependent defense responses. *Cell Research*, 22(12):1631-1633. (***Co-first author**)

12. **Tian M.**, Win J., Savory E., Burkhardt A., Held M., Brandizzi F., and Day B. (2011) 454 genome sequencing of *Pseudoperonospora cubensis* reveals effector proteins with a QXLR translocation motif. *Molecular Plant-Microbe Interactions*, 24(5):543-553. (Top 10 paper of MPMI in 2011)

11. Chinnapun D., **Tian M.**, Day B., and Churngchow N. (2009) Inhibition of a *Hevea brasilensis* protease by a Kazal-like serine protease inhibitor from *Phytophthora palmivora. Physiological and Molecular Plant Pathology*, 74:27-33.

10. **Tian M.**, Chaudhry F., Ruzicka D. R., Meagher R. B., Staiger C. J., and Day B. (2009) *Arabidopsis* actin depolymerizing factor AtADF4 mediates defense signal transduction triggered by the *Pseudomonas syringae* effector AvrPphB. *Plant Physiology*, 150(2):815-824.

9. Song J., Win J., **Tian M.**, Schornack S., Kaschani F., Ilyas M., van der Hoorn R., and Kamoun S. (2009) Apoplastic effectors secreted by two unrelated eukaryotic plant pathogens target the tomato defense protease Rcr3. *Proc. Natl. Acad. Sci. U.S.A*, 106(5):1654-1659.

8. Zhou F., Mosher S., **Tian M.**, Sassi G., Parker J., and Klessig D. F. (2008) The Arabidopsis gain-of-function mutant ssi4 requires RAR1 and SGT1b differently for defense activation and morphological alterations. *Molecular Plant-Microbe Interactions*, 21(1):40-49.

7. **Tian M**., Win J., Song J., van der Hoorn R., van der Knaap E., and Kamoun S. (2007) A *Phytophthora infestans* cystatin-like protein targets a novel tomato papain-like apoplastic protease. *Plant Physiology*, 143:364-377.

6. **Tian M**., and Day B. (2006) Domain switching and host recognition. *Molecular Microbiology*, 61(5):1091-1093.

5. **Tian M.** and Kamoun S. (2005) A two disulfide bridge Kazal domain from *Phytophthora* exhibits stable inhibitory activity against serine proteases of the subtilisin family. *BMC Biochemistry*, 6:15.

4. Torto-Alalibo T., **Tian M.,** Gajendran K., Waugh M. E., van West P., and Kamoun S. (2005) Expressed sequence tags from the oomycete fish pathogen *Saprolegnia parasitica* reveal putative virulence factors. *BMC Microbiology*,

5:46.

3. **Tian M.**, Benedetti B., and Kamoun S. (2005) A second Kazal-like protease inhibitor from *Phytophthora infestans* inhibits and interacts with the apoplastic pathogenesis-related protease P69B of tomato. *Plant Physiology*, 138:1785-1793.

2. **Tian M.**, Huitema E., da Cunha L., Torto T., and Kamoun S. (2004) A Kazal-like extracellular serine protease inhibitor from *Phytophthora infestans* targets the tomato pathogenesis-related protease P69B. *Journal of Biological Chemistry*, 279(25):26370-26377.

1. Huitema E., Bos J. I. B., **Tian M.**, Win J., Waugh M. E., and Kamoun S. (2004) Linking sequence to phenotype in *Phytophthora*-plant interactions. *Trends in Microbiology*, 12(4):193-200.

Extension Publications

Creative Works (i.e., Extension Videos, Websites, Blogs, Creative Designs and Exhibitions, etc.)

Leadership Roles (Committees, Boards, Advisory, etc.)

Committees in college and department:

a. PEPS departmental personnel committee (DPC) (2019-present)
b. College of Tropical Agricultural and Human Resources (CTAHR) faculty senate (2015-2019)
b. PEPS faculty search committee (2015-2016, Environmental Microbiologist; 2017, Pollinator biologist; 2019, Entomologist)
c. Curriculum committee for the joint undergraduate program of PEPS and TPSS (2016-2017, 2020-present)
d. Undergraduate student advisor for Invasive Species specialization of Tropical Agriculture and the Environment undergraduate program (2017-present)

Conference session chair/moderator:

a. "Pathogen Virulence and Effectors" session of American Phytopathological Society annual meeting at San Antonio, Texas (August 2017)
b. "Effectors" session of Oomycete Molecular Genetics Network annual meeting at Asilomar, California (March 2017)
c. "Oomycete Biology" session of Oomycete Molecular Genetics Network annual meeting at Asilomar, California (March 2015)

Committee member of national and international scientific communities:

a. Steering Committee of Oomycete Molecular Genetics Network (2018-)
b. Molecular and Cellular Phytopathology Committee the American Phytopathological Society (2014-2016)
c. Mycology Committee of the American Phytopathological Society (2014-2016).

Currently Active Grant Support

Tian M. and Christopher D. (08/01/2020-07/31/2022) Genome editing of papaya for functional analysis, metabolic engineering and crop improvement. USDA NIFA, $299,895.

Manosalva, P., Kim H., Cano L., Schafer B., Crane J., Karen G., **Tian M.** et al. (09/01/2020-08/31/2024) Reducing avocado losses to major challenges by improving resistance selection and disease management using next generation technologies. USDA SCRI, $4,401,036 (Portion to **Tian M.** and Wages S at UH: $356,754).

Tian M. (07/01/2020-06/30/2021) Statewide survey for *Fusarium oxysporum* f. sp. *cubense* tropical race 4. USDA APHIS, $42,385.

Tian M. 2019-2024, Pathogenicity mechanisms and control of economically important plant pathogenic oomycetes, NIFA HATCH project, project no HAW09049-H.

Presentations at Conferences (Since 2014)

Note: Graduate students or researchers under my direct supervision are underlined.

Title: Differential expression of genes encoding sugar transporters in the basil pathogen *Peronospora belbahrii*.
Authors (put an asterisk on the presenter): Johnson E. T.*, Quesada-Ocampo L., Bowman M., Childs K., **Tian M.**
Name of Conference: American Phytopathological Society Annual Meeting 2020
Location: on-line
Date of Presentation: Aug 10-14, 2020

Title: Utilizing comparative genomics to develop species-specific diagnostic markers for basil downy mildew.
Authors (put an asterisk on the presenter): Standish J. R.*, Bowman M. J., Childs K. L., **Tian M.**, Quesada-Ocampo L. M.
Name of Conference: American Phytopathological Society Annual Meeting 2020
Location: on-line
Date of Presentation: Aug 10-14, 2020

Title: Predicting the *Peronospora belbahrii* secretome for *in silico* identification of effector proteins.
Authors (put an asterisk on the presenter): Standish J. R.*, Purayannur S., Bowman M., Childs K., **Tian M**., and Quesada-Ocampo L. M.
Name of Conference: 97th Annual meeting of American Phytopathological Society Southern Division
Location: Charleston, South Carolina
Date of Presentation: Feb 9-12, 2020

Title: Targeted mutagenesis of basil candidate susceptibility gene DMR1 using CRISPR/Cas9.
Authors (put an asterisk on the presenter): Navet N.*, **Tian M.**
Name of Conference: American Phytopathological Society annual meeting
Location: Cleveland, Ohio
Date of Presentation: 08/06/2019

Title: Dissection of the pathogenicity mechanisms of *Phytophthora palmivora* using CRISPR/Cas9 gene editing
Authors (put an asterisk on the presenter): **Tian M.***
Name of Conference: The Third HOKU (Honolulu Office of Kobe University) Symposium
Location: Honolulu, Hawaii
Date of Presentation: 11/16/2018

Title: A host-specific RxLR effector of *Phytophthora palmivora* contributes to virulence on cacao
Authors (put an asterisk on the presenter): Cai Z., Navet N., Uchida J., and **Tian M.***
Name of Conference: Joint Meeting of the American Phytopathological Society Pacific Division and Conference on Soil-borne Plant Pathogens
Location: Portland, Oregon
Date of Presentation: 06/27/2018

Title: Dissecting the pathogenicity mechanisms of *Phytophthora palmivora*.
Authors (put an asterisk on the presenter): **Tian M.***, Gumtow R., Navet N., Wu D., Schornack S. and Uchida J.
Name of Conference: American Phytopathological Society annual meeting
Location: San Antonio, Texas
Date of Presentation: 08/08/2017

Title: A *Phytophthora palmivora* cystatin-like protease inhibitor targets papain to contribute to virulence on papaya.
Authors (put an asterisk on the presenter): Gumtow R., Wu D., Schornack S., Uchida J., and **Tian M.***
Name of Conference: Oomycete Molecular Genetics Network annual meeting
Location: Asilomar, California
Date of Presentation: 03/12/2017

Title: Functional characterization of a cytoplasmic effector gene highly conserved in plant pathogenic oomycetes.
Authors (put an asterisk on the presenter): Navet N*., Wu D., Shao D. and **Tian M.**
Name of Conference: Oomycete Molecular Genetics Network annual meeting
Location: Asilomar, California
Date of Presentation: 03/12/2017

Title: Vermicompost tea mediated host plant resistance against root-knot nematodes, *Meloidogyne spp.*
Authors (put an asterisk on the presenter): Mishra S.*, Sipes B. S., **Tian M.** and Wang K. H.
Name of Conference: Society of Namatologists / The Organization of Nematologists of Tropical America annual meeting
Location: Montreal, Canada
Date of Presentation: 2016

Title: Functional characterization of putative effector genes of basil downy mildew pathogen *Peronospora belbahrii*
Authors (put an asterisk on the presenter): Shao D.* and **Tian M.**
Name of Conference: International Society for Molecular Plant-Microbe Interactions XVII Congress
Location: Portland, Oregon
Date of Presentation: 07/20/2016

Title: Establishment of a simple and efficient Agrobacterium-mediated transformation system for *Phytophthora palmivora*
Authors (put an asterisk on the presenter): Wu D., Navet N. and **Tian M.***
Name of Conference: International Society for Molecular Plant-Microbe Interactions XVII Congress
Location: Portland, Oregon
Date of Presentation: 07/20/2016

Title: *De novo* assembly and analysis of transcriptome of *Peronospora belbahrii*
Authors (put an asterisk on the presenter): **Tian M.***, Wu D., and Shao D.
Name of Conference: Oomycete Molecular Genetics Network annual meeting
Location: Asilomar, California.
Date of Presentation: 03/16/2015

Title: Functional characterization of putative extracellular cystatins in *Phytophthora palmivora* pathogenicity on papaya.
Authors (put an asterisk on the presenter): Gumtow R.*, Dragich M., Uchida J., Schornack S., **Tian M.**
Name of Conference: Oomycete Molecular Genetics Network annual meeting
Location: Asilomar, California
Date of Presentation: 03/16/2015

Title: Dissecting the molecular basis of basil *Peronospora belbahrii* interactions.
Authors (put an asterisk on the presenter): Wu D., Win J., Shao D., and **Tian M.***
Name of Conference: American Phytopathological Society annual meeting
Location: Pasadena, California
Date of Presentation: 08/02/2015

Title: Toward understanding the molecular basis of basil-*Peronospora belbahrii* interactions
Authors (put an asterisk on the presenter): **Tian M.***
Name of Conference: CTAHR/Tokyo University of Agriculture and Technology (TUAT) meeting
Location: Honolulu, HI.
Date of Presentation: 05/15/2015

USDA United States Department of Agriculture

United States Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection & Quarantine
4700 River Road
Riverdale, MD 20737

Permit to Move Live Plant Pests, Noxious Weeds, and Soil

Interstate Movement

Regulated by 7 CFR 330

This permit was generated electronically via the ePermits system

PERMITTEE NAME:	Dr. Miaoying Tian	**PERMIT NUMBER:**	P526P-21-00350
ORGANIZATION:	University of Hawaii at Manoa	**APPLICATION NUMBER:**	P526-201216-006
ADDRESS:	3190 Maile Way, St. John 317 Honolulu, HI 96822	**DATE ISSUED:**	01/25/2021
		EXPIRES:	01/25/2024
MAILING ADDRESS:	3190 Maile Way, St. John 317 Honolulu, HI 96822	**FACILITY NUMBER:**	N/A
		HAND CARRY:	Yes
PHONE:	808-956-5305		
ALT. PHONE:	330-317-5390		
EMAIL:	mtian@hawaii.edu		
FAX:			

DESTINATION: 3190 Maile Way, St. John 317, Honolulu, HI 96822
RELEASE: No

Under the conditions specified, this permit authorizes the following:

Regulated Article	Life Stage(s)	Intended Use	Shipment Origins	Originally Collected	Culture Designation
Phytophthora cinnamomi	Mycelia	Research - Greenhouse (growth chamber and lab included)	CA	Originally Collected from Within the Continental U.S.	

PERMIT GUIDANCE

1) Importation, interstate movement, and environmental release of the listed regulated organisms that have been genetically engineered may require a different permit issued under regulations at 7 CFR part 340. Any unauthorized importation, interstate movement, or environmental release (including accidental release) of a regulated GE organism would be a violation of those regulations. Before moving genetically engineered organisms, contact APHIS Biotechnology Regulatory Services (BRS) at: https://www.aphis.usda.gov/aphis/ourfocus/biotechnology. If BRS does not require a permit, contact the Pest, Pathogen, and Biocontrol permit unit for further guidance at: pest.permits@usda.gov
2) If an animal pathogen is identified in your shipment, to ensure appropriate safeguarding, please refer to http://www.aphis.usda.gov/import_export/animals/animal_import/animal_imports_an products.shtml
3) If a human pathogen is identified, please refer to the CDC Etiologic Agent Import Permit Program at http://www.cdc.gov/od/eaipp/
4) This permit DOES NOT fulfill the requirements of other federal or state regulatory authorities. Please contact the appropriate agencies, such as the U.S. Environmental Protection Agency, the U.S.

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS.	DATE
Vickie Brewster Vickie Brewster	01/25/2021

Fish and Wildlife Service, the U.S. Food and Drug Administration, the Centers for Disease Control and Prevention, the APHIS Veterinary Services unit, the APHIS Biotechnology Regulatory Services, or your State's Department of Agriculture to ensure proper permitting.
5) If you are considering renewal of this permit, an application should be submitted at least 90 days prior to the expiration date of this permit to ensure continued coverage. Permits requiring containment facilities may take a longer period of time to process.

PERMIT CONDITIONS

USDA-APHIS issues this permit to Miaoying Tian with the University of Hawaii in Honolulu, Hawaii. This permit authorizes the interstate movement of pure cultures of the listed regulated organisms from California for laboratory, growth chamber, and greenhouse research at the destination location identified above.

1. • This permit is issued by the United States Department of Agriculture's Animal and Plant Health Inspection Service (APHIS). It conveys APHIS regulations and requirements for the material(s) listed on this permit. It does not reduce or eliminate your legal duty and responsibility to comply with all other applicable Federal and State regulatory requirements.

   • The permit number or a copy of the permit must accompany the shipment.

   • You must be an individual at least 18 years old, or legal entity such as partnership, corporation, association, or joint venture.

   • You are legally responsible for complying with all permit requirements and permit conditions.

   • If you violate any applicable laws associated with this permit, you may face substantial civil or criminal penalties. We may cancel all current permits and deny future permit applications.

   • Without prior notice and during reasonable hours, authorized Federal and State Regulators must be allowed to inspect the conditions associated with the regulated materials/organisms authorized under this permit.

2. The permit holder must:

   • maintain a valid PPQ526 permit so long as the regulated materials/organisms are alive or viable,

   • not assign or transfer this permit to other persons without APHIS PPQ authorization,

   • maintain an official permanent work assignment, residence, or affiliation at the address on

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Vickie Brewster Vickie Brewster	01/25/2021

this permit,

- notify the Pest Permit Staff as soon as possible of any change in the permit holder's work assignment, residence, or affiliation,
- notify the Pest Permit Staff of the receipt of unauthorized and/or misdirected shipments of regulated materials/organisms,
- adequately mitigate environmental impacts resulting from unauthorized release of regulated materials/organisms and notify the Pest Permit staff immediately if one occurs,
- notify the Pest Permit Staff if the facility is damaged/destroyed or if you wish to decommission the facility,
- destroy all regulated materials/organisms prior to departure from the organization unless other arrangements are confirmed by the Pest Permit Staff.

Notifications to the Pest Permit Staff must be made via 866-524-5421 or pest.permits@usda.gov within one business day of the event triggering a notification.

3. This permit does not authorize movement or use of organisms listed in the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. If any organism listed as a Select Agent is identified from materials associated with this research, the permit holder is required to notify APHIS, Agriculture Select Agent Services (AgSAS) immediately by phone at 301-851-3300 option 3, and within seven (7) days submit APHIS/CDC Form 4A (Report of Identification of a Select Agent or Toxin in a Clinical or Diagnostic Laboratory) to APHIS, AgSAS; 4700 River Rd, Unit 2, Riverdale, MD 20737 (see instructions at: https://www.selectagents.gov/resources/APHIS-CDC_Form_4_Guidance_Document.pdf). Failure to comply with this requirement is a violation of the Agricultural Bioterrorism Protection Act of 2002. For a complete list of Select Agents please visit: https://www.selectagents.gov/selectagentsandtoxinslist.html
Select agents include: *Peronosclerospora philippinensis (Peronosclerospora sacchari), Coniothyrium glycines (formerly Phoma glycinicola and Pyrenochaeta glycines), Ralstonia solanacearum, Rathayibacter toxicus, Sclerophthora rayssiae, Synchytrium endobioticum, Xanthomonas oryzae, Bacillus anthracis, Brucella abortus, Brucella melitensis, Brucella suis, Burkholderia mallei, and Burkholderia pseudomallei.*

For applicants applying for a permit for Ralstonia solanacearum non-race 3 biovar 2, an exclusion letter will need to be submitted along with the application

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4. All persons working with the listed regulated materials/organisms must be informed of these permit conditions. Anyone working with these materials/organisms must agree to adhere to and sign/initial these conditions before beginning work. These signed conditions do not need to be submitted to USDA/APHIS but must be readily accessible and made available to Federal and State regulators upon request.

   Note: these conditions may be copied and stored electronically for electronic signature and initialing provided that the permit number, authorized materials/organisms and life stages, release locations if applicable, and authorization statement all appear on the document with the permit number. Signing these conditions only indicates that the person working under this permit has read them; the permit holder is the sole responsible party under this permit.
5. All packages for transport must minimally consist of both inner/primary and outer/secondary packages securely sealed so that both are effective barriers to escape or unauthorized dissemination of the listed materials/organisms. The inner/primary package(s) will contain all regulated materials/organisms and must be cushioned and sealed in such a way that it remains sealed during shock, impact, and pressure changes that may occur. The outer/secondary shipping container must be rigid and strong enough to withstand typical shipping conditions (dropping, stacking, impact from other freight, etc.) without opening.
6. Upon receipt, all packages must be opened within a Class II or III biosafety cabinet, or within a still-air environment (e.g. a transfer hood with the air turned off), located within the facilities at the destination address identified above to prevent the potential dissemination of the package contents. Cultures must be in a sealed container during transport to or within the permit holder's assigned research facilities.
7. All research activities, plant inoculations and subsequent disease development must occur at the destination location identified above. This location must have facilities that are adequate to prevent the unauthorized dissemination of the regulated articles received under this permit. Access to this facility must not be accessible to the general public.
8. The regulated materials/organisms listed on this permit are strictly for research in a controlled environment such as a laboratory, growth chamber, or greenhouse. This permit is not valid if the regulated materials/organisms will be used for field research or release into the environment.
9. Records must be kept of all organisms maintained under this permit. Minimally the record will consist of the name of the organism identified to the lowest taxon possible, the country, or US state/territory, where each isolate was collected, the date the isolate was received, and the date and how the organism was devitalized. These records must be made available to Federal and State regulators upon request.
10. Regulated materials/organisms must be stored or maintained in an area that is not accessible to the general public.

Permit Number P526P-21-00350

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS.	DATE
Vickie Brewster Vickie Brewster	01/25/2021

WARNING: Any alteration, forgery or unauthorized use of this Federal Form is subject to civil penalties of up to $250,000 (7 U.S.C.s 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.s 1001)

11. DEVITALIZATION AND WASTE DISPOSAL

Upon completion of research, all organisms, inoculated plants, plant material, soil and/or growing media must be treated by heat or chemical means sufficient to kill, destroy, or otherwise deactivate plant pathogens. Glassware and other materials used to conduct research must be decontaminated prior to reuse or disposal.

12. As an alternative to the DEVITALIZATION AND WASTE DISPOSAL requirements listed above, devitalization/destruction of organisms and infected material may be conducted off site by a facility holding a valid PPQ compliance agreement prior to disposal. Vendor may or may not be in the same state. All organisms, contaminants and/or packaging materials must be in sealed containers during transport to this waste management facility in order to prevent any unauthorized dissemination of the regulated articles.
13. There is to be no further movement or distribution of the listed regulated materials/organisms within the United States and its territories unless the recipient holds, or is named as a responsible party on a valid PPQ526 permit for receipt of such materials/organisms.

END OF PERMIT CONDITIONS

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS.	DATE
Vickie Brewster Vickie Brewster	01/25/2021

NOTICE **SUBMIT TO uhpermit@hawaii.edu** NOTICE

APPENDIX A PQ-7 (01/04)

State of Hawaii
Department of Agriculture
PLANT QUARANTINE BRANCH
1849 Auiki Street, Honolulu, HI 96819-3100
Phone: (808) 832-0566, FAX: (808) 832-0584

For Office Use Only

Fee: $_____ Receipt No. _____

☐ Approve Permit No._____ Date: _____

☐ Disapprove ☐ Other _____

Processed by: _____ Date: _____

PERMIT APPLICATION FOR RESTRICTED COMMODITIES INTO HAWAII

4-71A for Microorganisms
71 for Animals
70 for Plants
150A for Soil

Do not leave blank

Date: _____

In accordance with the provision of Chapter 4-71A , Hawaii Administrative Rules of the Division of Plant Industry, Department of Agriculture, a permit is requested for the following commodities:

Please type or print clearly.

Quantity Various or #,vol, wt.	Commodity Bacteria/Virus/Protozoan/Plasmid/DNA/Cell Line Catalog Number if applicable	Scientific Name SPELL OUT !! NO ABBREVIATIONS
Three	Phytophthora cinnamomi cultures from avocado	Phytophthora cinnamomi
	Put RENEWAL for Permit #, AMENDMENT for PERMIT # HERE	

THIS IS NOT FEDEX. THIS IS THE SENDER/Vendor. Use additonal Sheet if necessary

Name and address of shipper: Patricia Manosalva, University of California-Riverside

3401 Watkins Dr., Boyce Hall 1463, Riverside, CA 92521

(Mainland or Foreign address)

Approximate date of arrival: Provide an actual Date! 12/1/2021

Mode of Shipment: ☑ Mail ☑ Air Freight ☐ Boat

Type of Permit:

--- Import
☑ one time only ☐ multi-shipments

--- Intrastate shipment
☐ one time only ☐ multi-shipments

☐ Possession For commodity that is IN Hawaii not being imported

Object of importation:

☐ Kept caged at all time
☐ Used for propagation
☐ Imported for exhibition
☐ Imported for liberation
☑ Other purposes - specify LABORATORY RESEARCH

Please type or print clearly.

This is the PI NOT THE IBC

Applicant's Name Miaoying Tian

Company Name University of Hawaii (University of Hawaii; NOT CRCH, JABSOM)

(if applicable)

For commodity that is IN Hawaii not being

Hawaii Mailing Address 3190 Maile Way,

St. John 304, Honolulu, HI 86822

Telephone number 808-956-5305

INCLUDE YOUR EMAIL ADDRESSS

Facsimile number 808-956-2832, mtian@hawaii.edu

Fee Amount Enclosed (cash, check or mail order) $ 150

Add Instructional/Classroom Use if needed

(complete reverse side)

APPENDIX A

PLEASE COMPLETE THE FOLLOWING INFORMATION (attach extra sheet if necessary)

Do NOT LEAVE BLANK! Elaborate in Laymens Terms!!
Describe what you will do with the commodity

1. State in detail the reasons for introduction (include use or purpose).

Phytophthora cinnamomi pure cultures will be transported to University of Hawaii at Manoa campus for use as controls to study the diversity of the isolates collected in Hawaii. Experiments include lab-based fungicide sensitivity assays by growing them in petri dish, and pathogenicity assays to be performed in the lab and greenhouse.

This is part of a project (NIFA accession number:1023635) funded by USDA SCRI program, led by University of California at Riverside with University of Hawaii at Manoa as one of the sub-awardees.

2. Person responsible for the organism (include name, address and phone number). SAME AS APPLICANT Include Job Title

Miaoying Tian, PhD, Associate Researcher,
Department of Plant and Environmental Protection Sciences, University of Hawaii at Manoa
3190 Maile Way, St. John 304, Honolulu, HI 96822
(808) 956-5305, (330) 317-5390
The latest General Biosafety Principles and Practices training and Transportation of Biological Substances Awareness training dates: 02/09/2020 and 02/07/2020
The latest biosafety inspection by Todd Suda was performed virtually on 04/08/2021.
The latest lab inspection by Hubert Olipares was performed on 03/23/2021.

3. Location(s) where the organism will be kept and used (include address, contact and phone number).

3190 Maile Way, St. John 304, and Room 301
Honolulu, HI 96822
(808) 956-5305, (330) 317-5390

INCLUDE A FLOORPLAN

4. Method of disposition. ie. All waste will be autoclaved, Stocks will be stored in -70 Freezer in Room 123, Building ABC, Honolulu, HI Zipcode

The imported cultures will be stored in St. John 304. All experimental materials and waste containing the imported organisms will be autoclaved at 121° C for at least 45 minutes by using saturated steam under at least 15 psi of pressure. The plastic or glass containers that have been in contact with the imported microorganisms will be soaked in 10% bleach for at least 30 minutes before rinsed with water. Only the trained individuals are allow to access and handle the imported microorganisms.

5. Give an abstract of the organism with particular reference to potential impact on the environment of Hawaii (include impact to plants, animals and humans). Explain what you are importing, its life cycle,growth requirements, What will happen if it is released in environement, will it survive?

Avocado root rot pathogen Phytophthora cinnamomi is not known to cause harm to animals and humans. It has been around in Hawaii islands, including Oahu for many years. It is soil-borne. Accidental release during experimentation poses low levels of risks as the chance for it to find its host and infect its roots is low. Strict cautions will be taken to avoid the accidental release during the transport and experimentation. The samples will be transported according to DOT/IATA requirements by triple packaging with the label “UN3373, Biological Substance, Category B”, and may be opened for inspection. During experimentation, secondary containers will be used for all infected plant materials and pathogens maintained in the primary containers. All samples, waste and containers used for experimentation will be disposed as in 4.

****

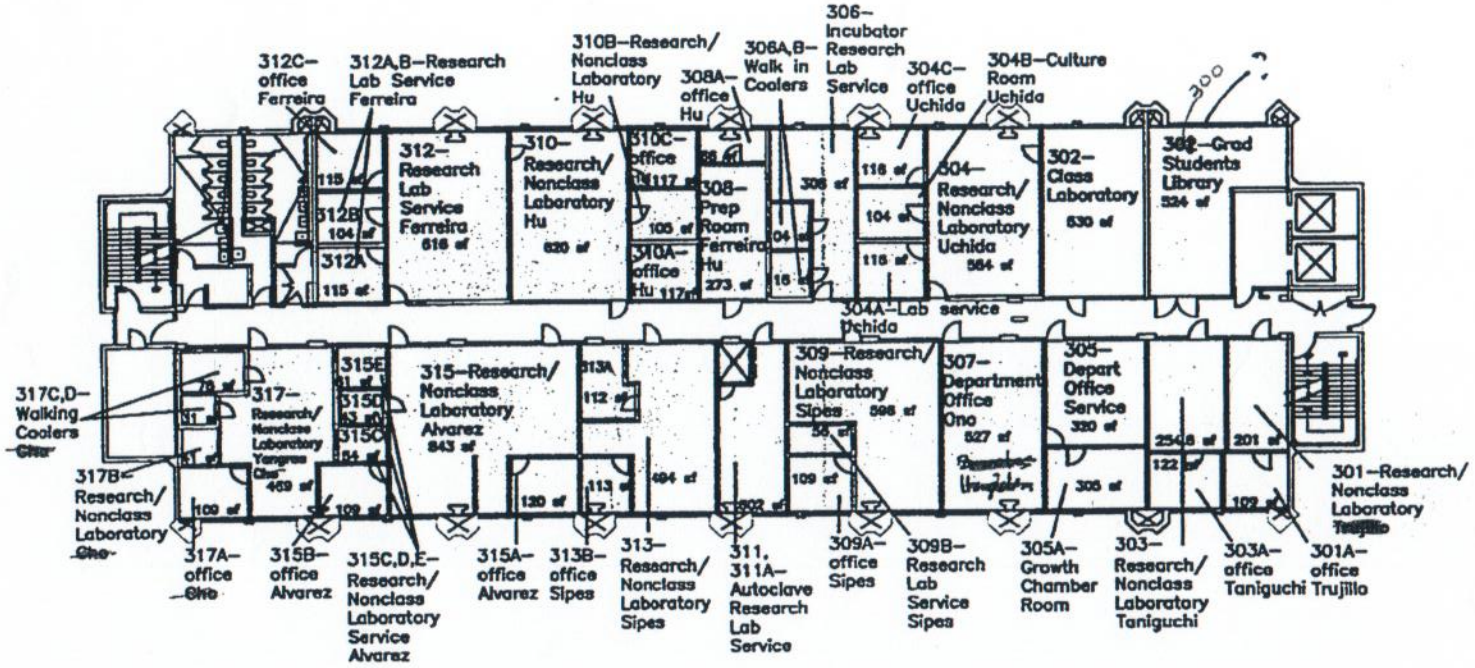
I request permission to import the articles as listed on the permit application and further, request that the articles be examined by an authorized agent of the Department of Agriculture upon arrival in Hawaii.

I agree that I, as the importer, will be responsible for all costs, charges or expenses incident to the inspection or treatment of the imported articles.

I further agree that damages or losses incident to the inspection or the fumigation, disinfection, quarantine, or destruction of the articles, by an authorized agent of the Department of Agriculture, shall not be the basis of a claim against the department or the inspectors for the damage or loss incurred.

Signature _____ **Date** 04/08/2021

(Applicant)



ST. JOHN – THIRD FLOOR PLAN
scale:1/16"=1'-0"

ASSIGNABLE SQ FT. – 10,326
GROSS SQ FT. – 14,535

PLANT AND ENVIRONMENTAL PROTECTION SCIENCES (PEPS) has 10,326 SQUARE FEET

APPENDIX A