UH-CTAHR Coffee Research and Extension Update 2020-2021

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June 24, 2021

HCA Conference Webinar

Outline:

1. Coffee root-knot nematode management projects
2. Coffee berry borer IPM, Kauai and conference
3. Coffee leaf rust and resources
4. WPS, sprayer calibration and pesticide calculations
5. Soil and plant health project

Funding and collaborations

United Kau Farmers Cooperative

Hawaii's Coffee Industry

Managing Coffee Root-knot Nematodes with Velum® One

Koon-Hui Wang[z] and Roxana Myers[y]

[z]UH at Manoa, CTAHR, Dept. Plant & Environmental Protection Sciences

[y]USDA-ARS, Daniel K. Inouye U.S. Pacific Basin Agricultural Research Center

This project is in part supported by Bayer, and in part supported by CTAHR Hatch 9048H, POW 16-964 and NE2140 Multistate Project.

Kona Coffee Root-knot Nematode

(*Meloidogyne konaensis*)

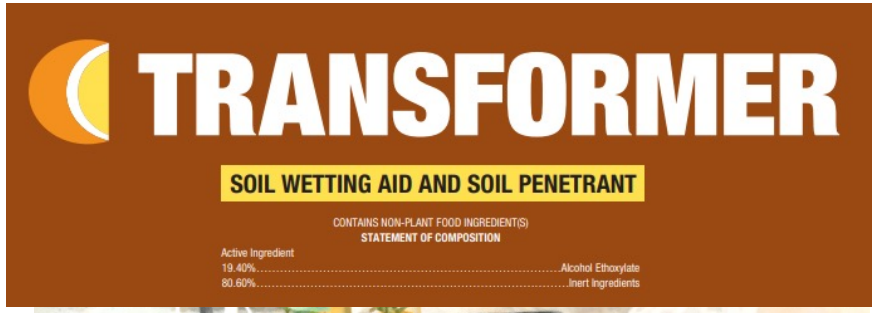
Kona coffee root-knot nematode causes coffee tree and yield decline, dieback and severe economic losses to coffee production in Hawaii

Poor roots reduce nutrient and water uptake.

(Below) A swollen coffee root with few feeder roots caused by CRKN.

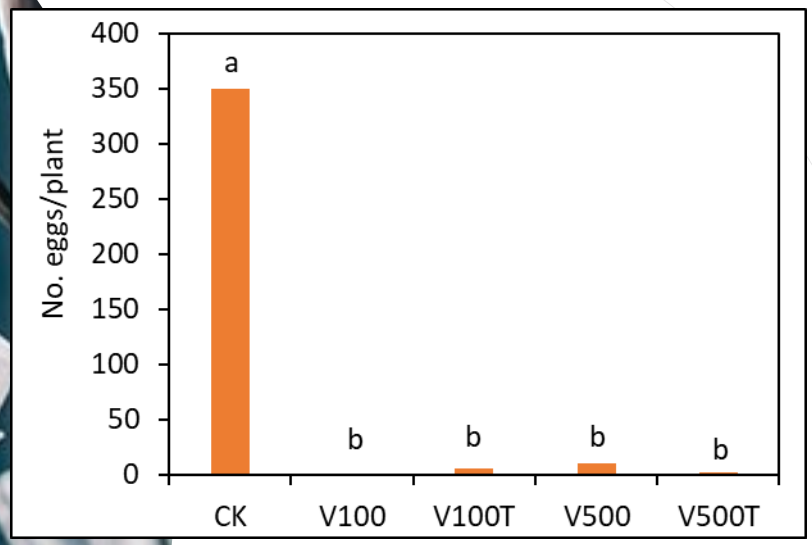
COOPERATIVE EXTENSION
UNIVERSITY OF HAWAI'I AT MĀNOA
COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESOURCES

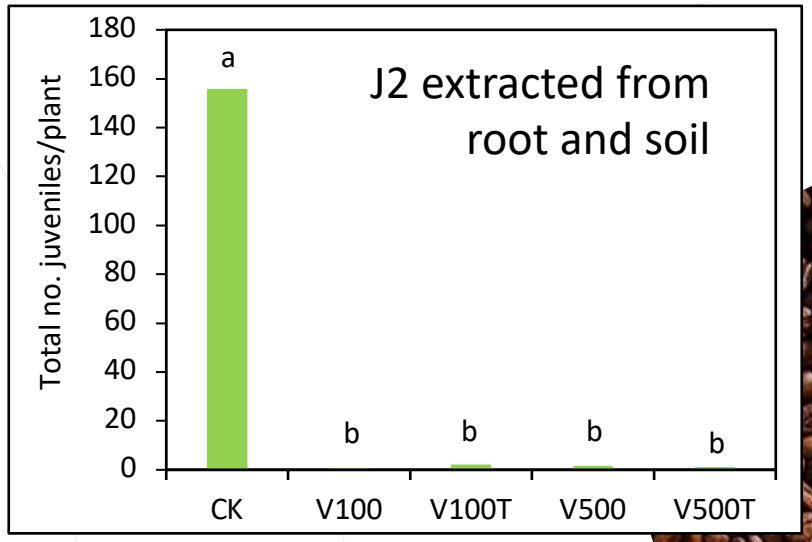
Greenhouse Trial

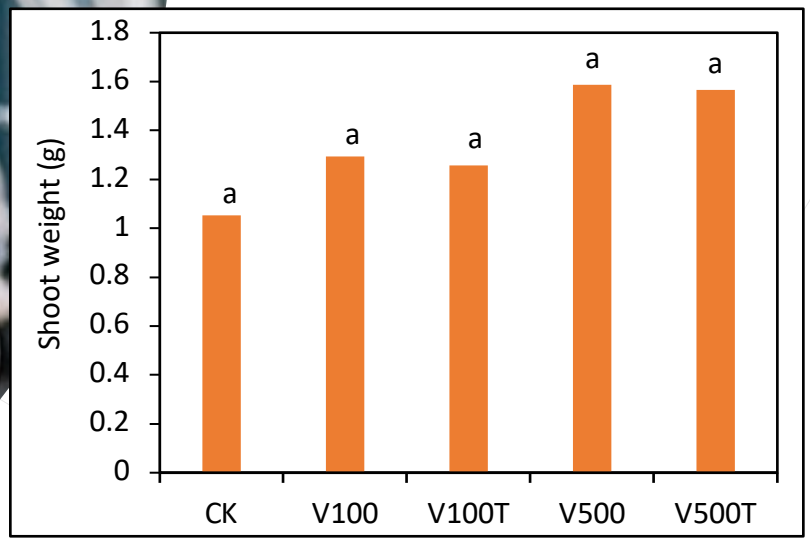


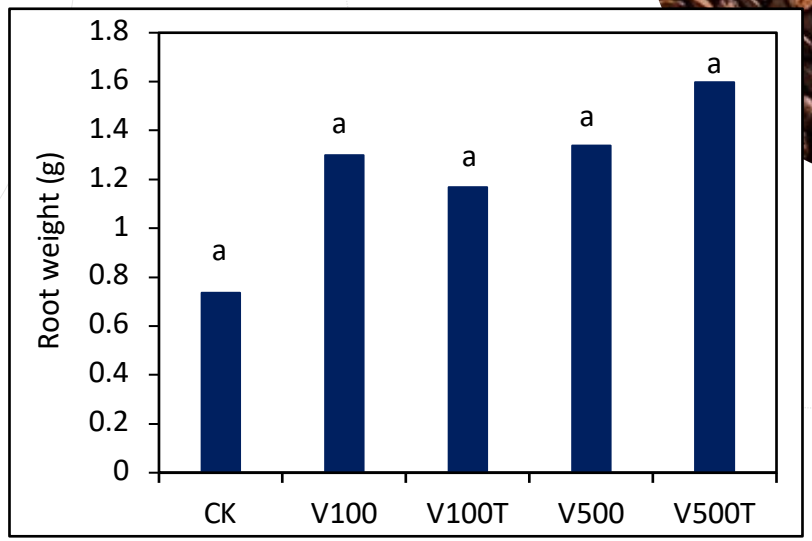
- Velum® One (a.i. fluopyram)-currently not yet registered for coffee. Tested at 6.5 fl oz/acre apply with:
  - 100 water gal/acre
  - 500 water gal/acre
    - With Transformer® (a soil wetting agent)
    - No Transformer®
  - No Velum® One control
- 8 replications (in Cone-tainer tubes)
- All tubes were inoculated with 100 *M. konaensis* second stage juveniles (J2) followed by Velum® One drenching on the same day.

Six months after nematode inoculation









Summary

- Velum® One suppressed *M. konaensis* egg production and juvenile numbers.
- Velum® One treatment led to slightly increase in shoot and root weight of coffee seedlings at 6 months after inoculation.
- Adjusting drenching coverage from 100 to 500-gal water/acre or adding adjuvant, Transformer® (soil wetting and soil penetrant) were not making any difference in this small dibble tube experiment.
- Field experiment needs to be conducted to further examine the drenching coverage rate and if a soil adjuvant is needed when applying Velum® One in coffee fields that are rain-fed.

Management of coffee root-knot nematode

Stuart T. Nakamoto, Roxana Myers, Andrea Kawabata, Matt Miyahira, Nick Yamauchi and Dylan Cunningham





Department of Agriculture STATE OF HAWAII

UNIVERSITY OF HAWAI'I MĀNOA 1907 UA MAU KE EA O KA 'AINA I KA PONO

USDA

NIFA

CRKN project activities

- Replant strategies with grafted trees on ‘Fukunaga’ and ‘Arnoldiana’ rootstock – 1st yr data next week
  - Next to declining or dying tree
  - Between trees
  - In original hole with 50:50 compost and soil
  - In original hole with original soil
- Bionematicide & chemical nematicide trial
  - Venerate and Movento
- Address bottlenecks for CRKN management
  - Clonal rootstock of mother-trees & availability of seed
  - Hands-on coffee grafting workshops (7)

https://www.hawaiicoffeeed.com/coffeegraftsignup.html

CBB IPM recommendations

- 2020 CBB integrated pest management document
  - https://www.ctahr.hawaii.edu/oc/freepubs/pdf/IP-47.pdf
- *New:* impact of feral and unmanaged coffee sites
- *New:* importance of starting the season with as low an infestation as is feasible
  - End-of season strip-pick, block stump pruning, early season spraying, and early season harvest of infested berries

Kauai Cooperative Extension activities

- Coordinate Kauai CBB response planning meeting
  - group consists of CTAHR, HDOA, and KISC
  - a monthly meeting for the CBB status update and rapid response planning
- A field trial on testing efficacy of *Beauveria bassiana* on CBB mortality at Kauai Coffee
  - at planning stage
- Survey of coffee root-knot nematode (*Meloidogyne konaensis*) on Kauai
  - with Dr. Koon-Hui Wang, UH-CTAHR nematologist
  - soil sampling initiated

Coffee root-knot nematode survey team at Kauai Coffee

By Roshan Manandhar

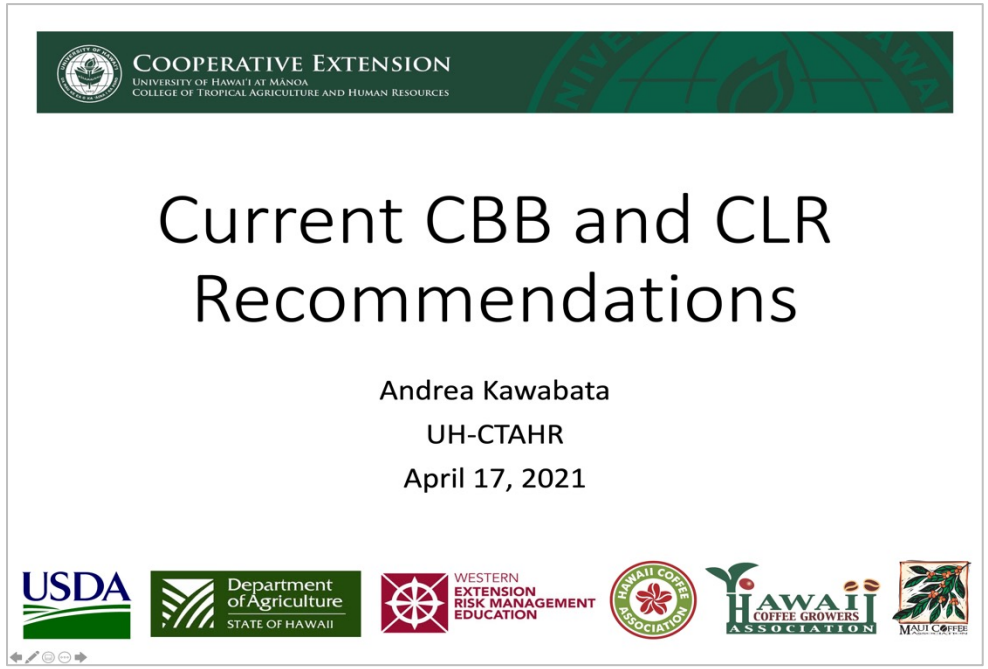
CBB & CLR conference

[Session 1 playlist](#)

[Session 2 playlist](#)

[Session 3 playlist](#)

[Session 4 playlist](#)



Coffee leaf rust in Hawaii

2020

Maui – Oct. 20

Kona – Oct. 31

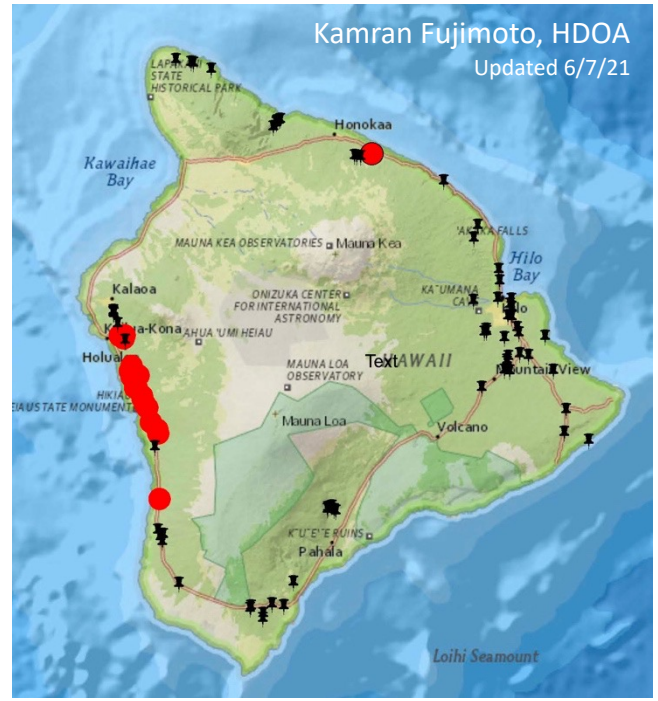
2021

Lanai – Jan. 15

Oahu – Jan. 25

Paauilo – Jun. 7

Molokai – Jun. 9*



www.HawaiiCoffeeEd.com

HOME | COFFEE LEAF RUST | CBB MANAGEMENT | EVENTS AND ANNOUNCEMENTS | MORE... | LOG IN

- Sanitation Protocol
- HDOA CLR Pest Alert
- Surveying, Sampling and Monitoring Publication - English ›
- CLR Spraying Information - English ›
  - Publicación CLR Spray - Español
  - Publication CLR Spray - Tagalog
  - Publication CLR Spray - Ilocano
- Priaxor Xemium Information
- Pruning Publication
- Coffee Leaf Rust Poster ›
- CLR Trifold Brochure
- CLR Presentations and Meetings
- CLR Publications

Select Language | Powered by Google Translate

…eia vastatrix)

Confirmed … Hawaii Island (Kona and Paauilo).

Coffee Lea… Brochure

Published 2/17/21

CLR LOOK-A-LIKE

Cercospora leaf spot which is also known as iron spot (*Cercospora coffeicola*), is a coffee disease most commonly mistaken for coffee leaf rust (CLR).

Characteristics of Cercospora leaf spot:

- Small, circular, brown spots (1-3 mm) surrounded by a light-yellow halo and found anywhere on the upper leaf surface including leaf veins.
- Under magnification on the lower leaf surface, spots contain small depressions caused by tissue collapse.
- No powdery spores on the lower leaf surface.

STOP THE SPREAD

Before entering and when exiting a coffee farm, and prior to traveling interisland:

- Change into clean clothing and footwear.
- Wash materials with detergent and hot water and dry on high heat.
- Sanitize tools, materials, supplies, etc. used on the farm.
- Use ≥ 70% alcohol or a fresh solution of 10% bleach to sanitize with. If bleach is used, rinse or oil metal to prevent corrosion.

COFFEE LEAF RUST

A NEW COFFEE DISEASE IN HAWAII

LOOKING FOR CLR ON YOUR FARM

Coffee leaf rust (CLR) spores can spread easily so it's important to survey and monitor the whole farm as well as follow strict sanitation protocols. Disease severity can also progress quickly under favorable, warm, rainy conditions. Looking often and using proper management techniques can slow its spread and impact. Very importantly, CLR needs to be detected at infestation levels <5% for currently available fungicides to work.

Where to look and pay attention to:

- Bottom third of the coffee tree
- Shaded areas

MANAGING CLR

Worldwide, coffee industries have endured

RESOURCES

Learn how to:

- survey, sample and monitor for CLR,
- spray and rotate fungicides to suppress CLR, and
- prune for CLR and coffee berry borer control.

Proper sanitation protocols and other CLR information, including translated materials and presentations, can be found at: **HawaiiCoffeeEd.com/CLR**

Table 1. List of fungicides currently licensed by the Hawaii Department of Agriculture with directions for use on coffee grown in Hawaii. Licensed products and label changes happen frequently. Refer to http://npirspublic.ceris.purdue.edu/state/state_menu.aspx?state=HI or https://opendata.hawaii.gov/ for currently licensed products and their approval labels (2/17/21).

Trade Name	Active Ingredients	FRAC Group	EPA Reg. No.	Labels	Notes	Compatibility with BotaniGard®[1]	Coffee Leaf Rust *H. vastatrix* Rate (per acre)	Est. Cost[3] per Application/Acre	
								Low Rate	High Rate
Serenade ASO	QST 713 strain of *Bacillus subtilis*	44	264-1152	Label	OMRI	Yes, but NOT at 8 qts per 100 gal (see chart)	2.0-4.0 qts	$23.50	$47.00
Badge SC	Copper Oxychloride + Copper Hydroxide	M1	80289-3-10163	Label		Yes[2]	1.0-3.0 pints	$5.88	$17.63
Badge X2	Copper Oxychloride + Copper Hydroxide	M1	80289-12-10163	Label	OMRI	Yes[2], but tested at 2.5 lbs/A per 100 gal water	1.0-3.0 lbs	$12.00	$36.00
Champ Formula 2 Flowable Agricultural Fungicide / Bactericide	Copper Hydroxide	M1	55146-64	Label		Yes[2]	1.33-2.66 pints	$7.48	$9.84
Champ WG Agricultural Fungicide	Copper Hydroxide	M1	55146-1	Label		Pending	2.0-4.0 lbs	$17.00	$34.00
Cueva Fungicide Conc.	Copper Octanoate	M1	67702-2-70051	Label	OMRI	Pending	0.5-2.0 gals	$30.00	$120.00
Kocide 3000	Copper Hydroxide	M1	91411-2-70051	Label		Yes (see chart)	0.75-1.75 lbs	$9.00	$21.00
Kocide 3000-O	Copper Hydroxide	M1	91411-11-70051	Label	Organic	Yes[2]	0.75-1.75 lbs	$9.00	$21.00
Mastercop Bactericide/Fungicide	Copper Sulfate Pentahydrate	M1	55272-18-66222	Label	OMRI	Yes[2]	0.5-1.5 pints	$7.13	$21.38
Nu-Cop HB	Copper Hydroxide	M1	42750-132	Label		Pending	1.0-2.0 lbs	$12.00	$24.00
Nu-Cop 30HB	Copper Hydroxide	M1	42750-281	Label		Yes[2]	0.75-1.75 lbs	$9.00	$21.00
DoubleNickel LC Biofungicide	*Bacillus amyloliquefaciens strain D747*	BM 02	70051-107	Label	OMRI	Yes[2]	0.5-6.0 qts	$7.50	$90.00
DoubleNickel 55 Biofungicide	*Bacillus amyloliquefaciens strain D747*	BM 02	70051-108	Label	OMRI	Yes[2]	0.25-3.0 lbs	$9.63	$115.50
OxiDate 2.0	Hydrogen Dioxide + Peroxyacetic Acid	Not classified	70299-12	Label	OMRI	No	0.25% to 1.0%	Gals. water needed/A $58.00/gal	

[1] See the BioWorks BotaniGard® Compatibility Chart here. "Pending" means that the exact product was not listed as tested by BioWorks. Per email from BioWorks dated 11/2/20, these products still need to be tested for compatibility with *Beauveria bassiana*. Results will be forthcoming.
[2] Per email from BioWorks dated 11/2/20 and 1/14/21, these products have been determined compatible with BotaniGard®.
[3] Estimated costs are based on local retail prices and are for the fungicide only.

Worker protection standard (WPS) training with HDOA and UH-CTAHR

Sprayer calibration

College of Tropical Agriculture and Human Resources
University of Hawai'i at Mānoa

Pesticide Risk Reduction and Education
DRAFT - May 2021
PRRE

Sprayer Calibration with Handheld Sprayer Systems for Orchard Crops

Andrea Kawabata[1], Jensen Uyeda[1], Matt Miyahira[1], Rosemary Gutierrez[1], Shannon Sand[2], and Stuart T. Nakamoto[3]

[1]Tropical Plant and Soil Sciences, [2]Natural Resources and Environmental Management, [3]Human Nutrition, Food and Animal Sciences

Introduction

Calibrating spray equipment is an important step in applying pesticides such as fungicides, insecticides, or miticides to a targeted crop and pest (disease, insect, etc.). Proper calibration of a sprayer helps to ensure accurate spray coverage and rate per acre according to the product label.

This document provides a step-by-step guide and explanation of how to calculate the gallons-per-acre rate (GPA) and rate per gallon for orchard crops (Appendix 1). It also provides a farm example in Appendix 2. This guide can be used for calibrating a motorized backpack mist blower, battery-powered backpack sprayer, and small, motorized tank sprayer with hose and wand attachment (Fig. 1). Maintaining consistent pressure using hand pump sprayers makes calibration difficult; however, these procedures will also provide estimates for non-mechanized sprayers as well.

Why Calibrate a Sprayer?

Ideally, a pesticide is applied at the concentration that kills the targeted pest(s) in the field, then quickly disappears from the environment. Spray coverage must be accurate to be effective. The amount of chemical applied needs to be correct and in the recommended dosage.

Spraying too much pesticide wastes money by using more product than is needed. Applying too much pesticide and otherwise not following the label is also illegal. Violations can result in fines and jail time by both federal and state authorities, and crop or harvests can be confiscated and destroyed. The reputation of you and your farm could be damaged so future business is lost. Over-applying pesticides will unnecessarily expose you, your family and your community to potentially toxic chemicals, and also has environmental impacts such as runoff that eventually reaches the ocean, or contamination of groundwater. Crop injury and phytotoxicity (Fig. 2) can also occur.

Spraying too little pesticide also wastes money by spending time and product without getting the expected results. The grower will either need to re-treat or suffer from lower yields and quality from a damaged crop. An even bigger problem is that over time, misapplication can hasten the process of a pest developing resistance to the pesticide. Resistance will result in sprays not working even at the correct amount, so in addition to the cost of the wasted spraying, the pest still damages the crop so revenues are lower. Further, fewer pesticides are available and often are more costly. Spraying accurate amounts can help to slow the process by which pests develop resistance to pesticides.

Always read the pesticide product label before use. Wear proper personal protective equipment and follow all label instructions. The label is the law and it is a violation of federal law to use a pesticide product in a manner inconsistent with its labeling.

Footnote: For the use of herbicides in orchards, consider following the 1/128th sprayer calibration method explained by publications noted in the "References" section.

BADGE X2

THE LABEL IS THE LAW. Read the product label prior to use and follow ALL label directions.

BEFORE SPRAYING, calibrate your sprayer to determine the proper amount of water used per acre.

FILL IN THE GREEN SECTIONS BADGE X2 LABEL

Determine How Much Product to Add per Gallon of Water or per Tankful

Product	BADGE X2 Per Acre	BADGE X2 Total Farm	
Rate per Acre	2.5		Pounds per Acre
Acre(s) in Coffee to be Sprayed	1		Acre(s)
Gallons of Water Used per Acre	30	30	Gallons of Water per Acre
	30	30	Total Gallons for 1 Acre(s)
Amount (oz) of Product per Gallon of Water	1.33	1.33	Ounces of Product per Gallon of Water
Amount (g) of Product per Gallon of Water	37.80	37.80	Grams of Product per Gallon of Water
Spray Tank Volume	3		Gallons of Water per Tankful
Amount (oz) of Product per Tankful	4.00	4.00	Ounces of Product per Tankful
Amount (g) of Product per Tankful	113.40	113.40	Grams of Product per Tankful
Number of Tankfuls	10.0	10.0	Tankfuls for 1 Acre(s)

WEIGH THE PRODUCT FOR ACCURACY.

For young trees or recently stumped trees with new growth, test the product and rate on a small number of trees first and watch for leaf burning and other phytoxicity effects on the plants. If phyto is observed, stop the use of this product immediately.

Mixing Instructions:

1. Fill the tank with half of the water volume needed.
2. Measure and add the proper amount of product to the tank.
3. Mix well when adding the product to the tank.
4. Fill the remainder of the tank with water to the proper gallonage needed.
5. Mix well and maintain agitation for even distribution of the solution.

BADGE SC | BADGE X2 | BOTANIGARD ES | BOTANIGARD 22WP | CHAMP FORMULA 2 FLOW

- Importance of sprayer calibration
- Adjust for good spray coverage
- Determine water use per acre
- Assists with calculations
- Determine amount of product per gallon of water
- Follow label rate directions
- Over-and under-use of pesticides
- Avoid pesticide resistance
- Avoid plant phytotoxicity
- Reduce costs

Producer-driven implementation of soil health management systems adapted to diverse cropping systems in tropical and subtropical island regions

UH-CTAHR: Jonathan Deenik, Susan Crow, Tai Maaz, Joshua Silva, Jensen Uyeda, and Andrea Kawabata

Puerto Rico: David Sotomayor-Ramirez and Guillermo Ortiz

American Samoa: Ian Gurr

USDA United States Department of Agriculture

Natural Resources Conservation Service

"Saili le Atamai" Since 1970

- 3-year on-farm project
- 20 farms from Puerto Rico, American Samoa, Oahu, Maui, and Hawaii
- 4 coffee farms in Kona and Kau
- Impacts of implementing compost, living mulches, establishment of Leucaena shade trees, soil health and nutrient management plans

Thank you!

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