

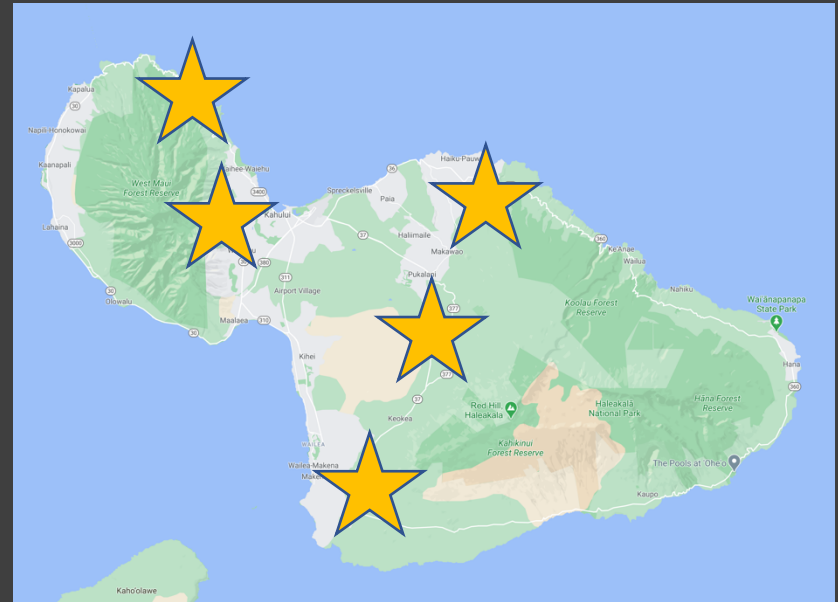
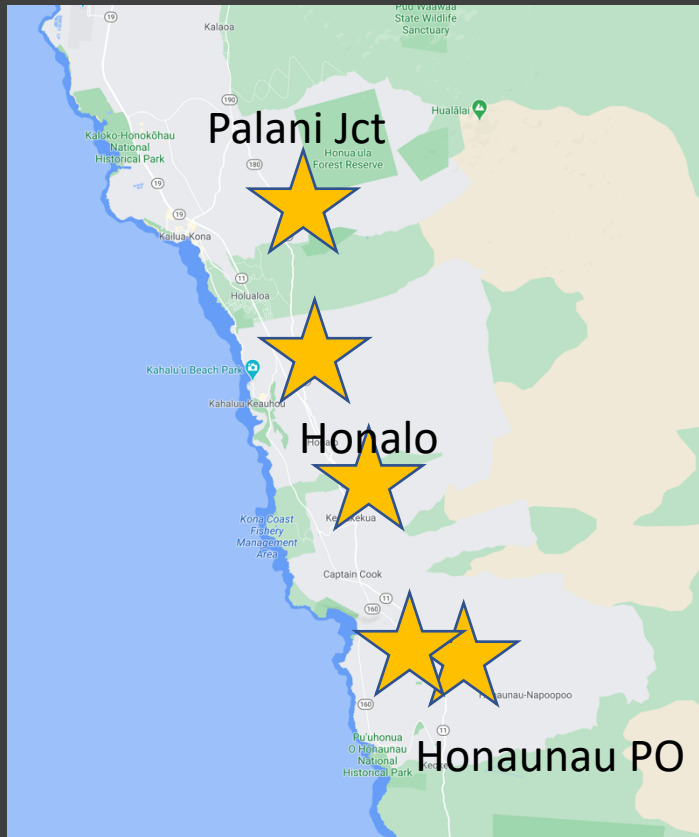


COOPERATIVE EXTENSION
UNIVERSITY OF HAWAII AT MĀNOA
COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESOURCES

The Importance of Early Detection and Control of Coffee Leaf Rust

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December 23, 2020

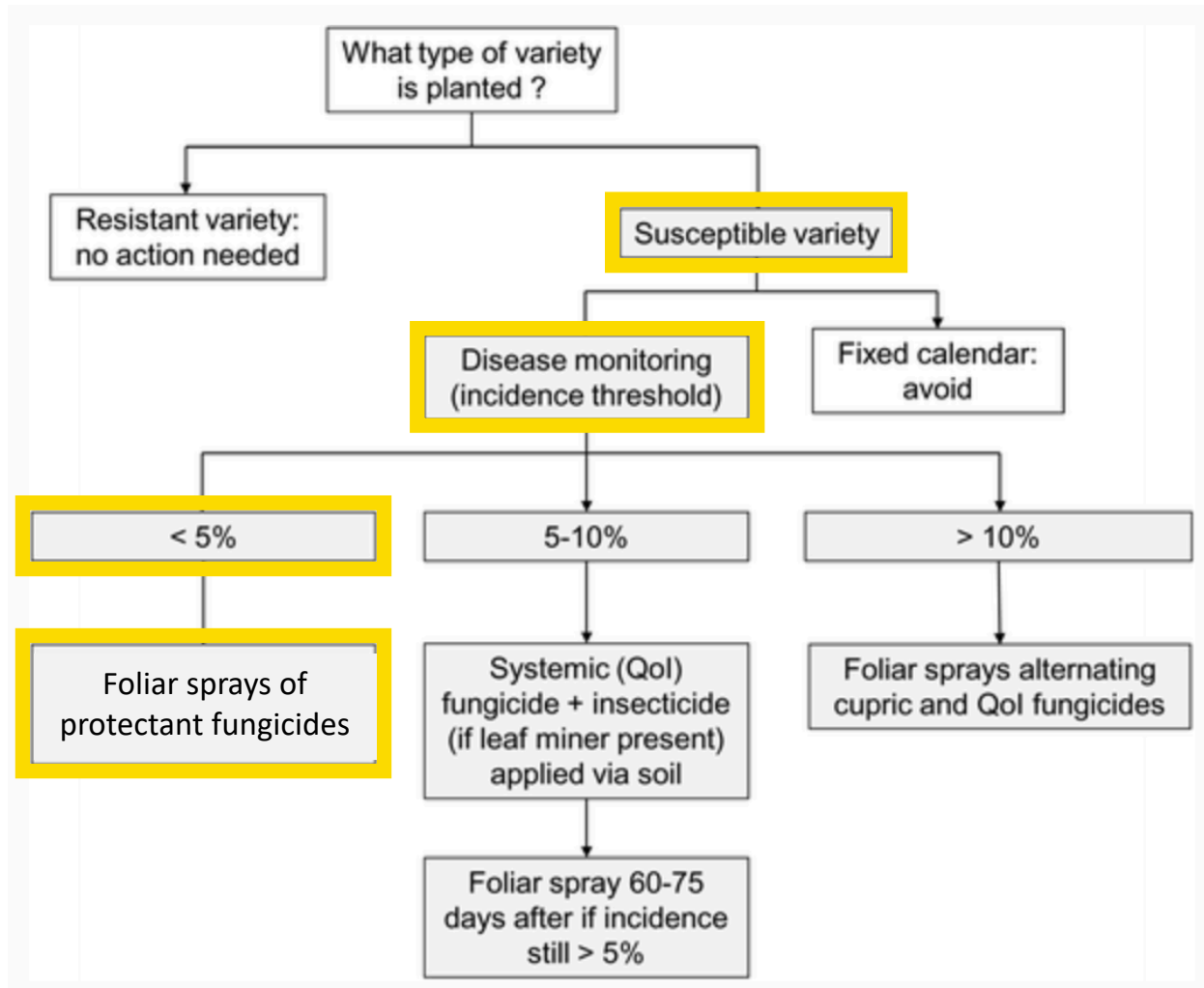


Where's CLR?

- Big Island – N. & S. Holualoa, Kainaliu, Honaunau
- Maui – Kahakuloa, Iao Valley, Haiku, Kula, Ulupalakua

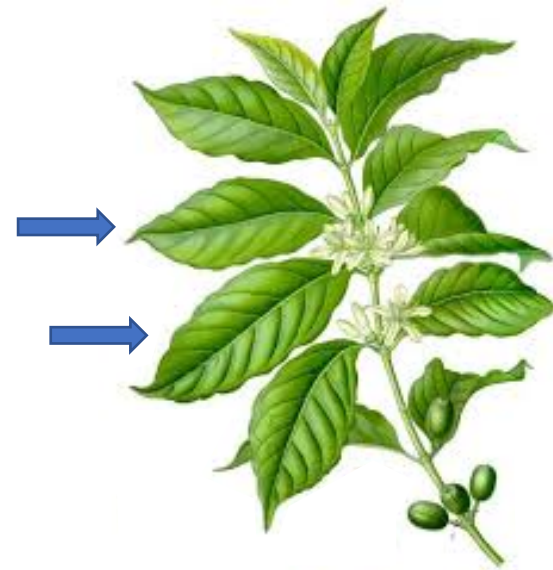
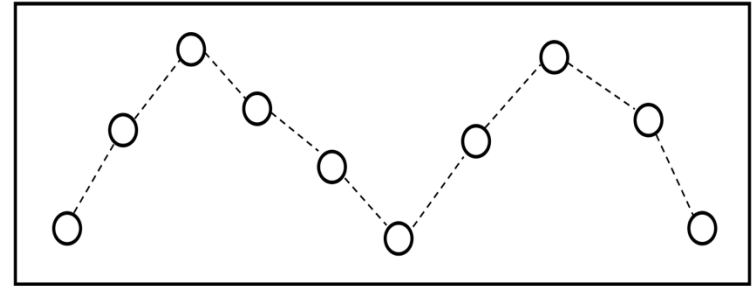


Our ONLY choice currently



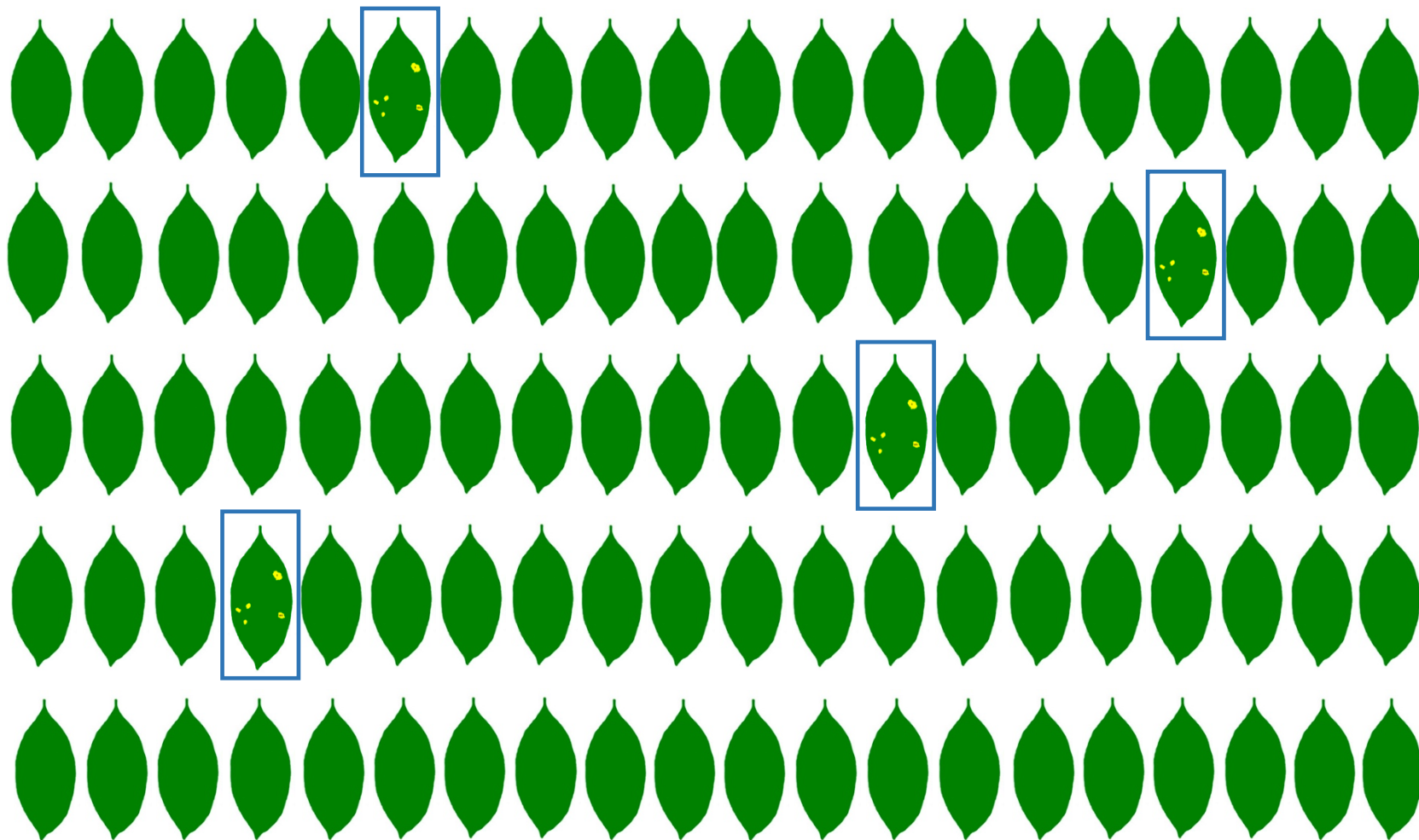
CLR monitoring

- Randomly select 10 trees per plot or acre
- Randomly collect 10 leaves per tree from the lower third of the plant
 - Middle of the branches (third or fourth pair of leaves)



CLR sampling and monitoring

- Collect a total of 100 leaves per plot or acre
- Count the number of leaves with CLR symptoms
 - 15 leaves = 15% incidence
 - 35 leaves = 35% incidence



We need to...

- Know what CLR looks like on leaves
- Look for CLR symptoms





Appendix C: Examples of Coffee Leaf Rust (CLR) on Leaves with Various Stages of Development

Upper (top) and lower (bottom) leaf surfaces showing CLR symptom progression from early (left) to advanced (right) infection. Actual leaf size is not shown in these photos; however, the diameter of some spots is noted. For CLR spot size reference: $\frac{1}{10}$ mm

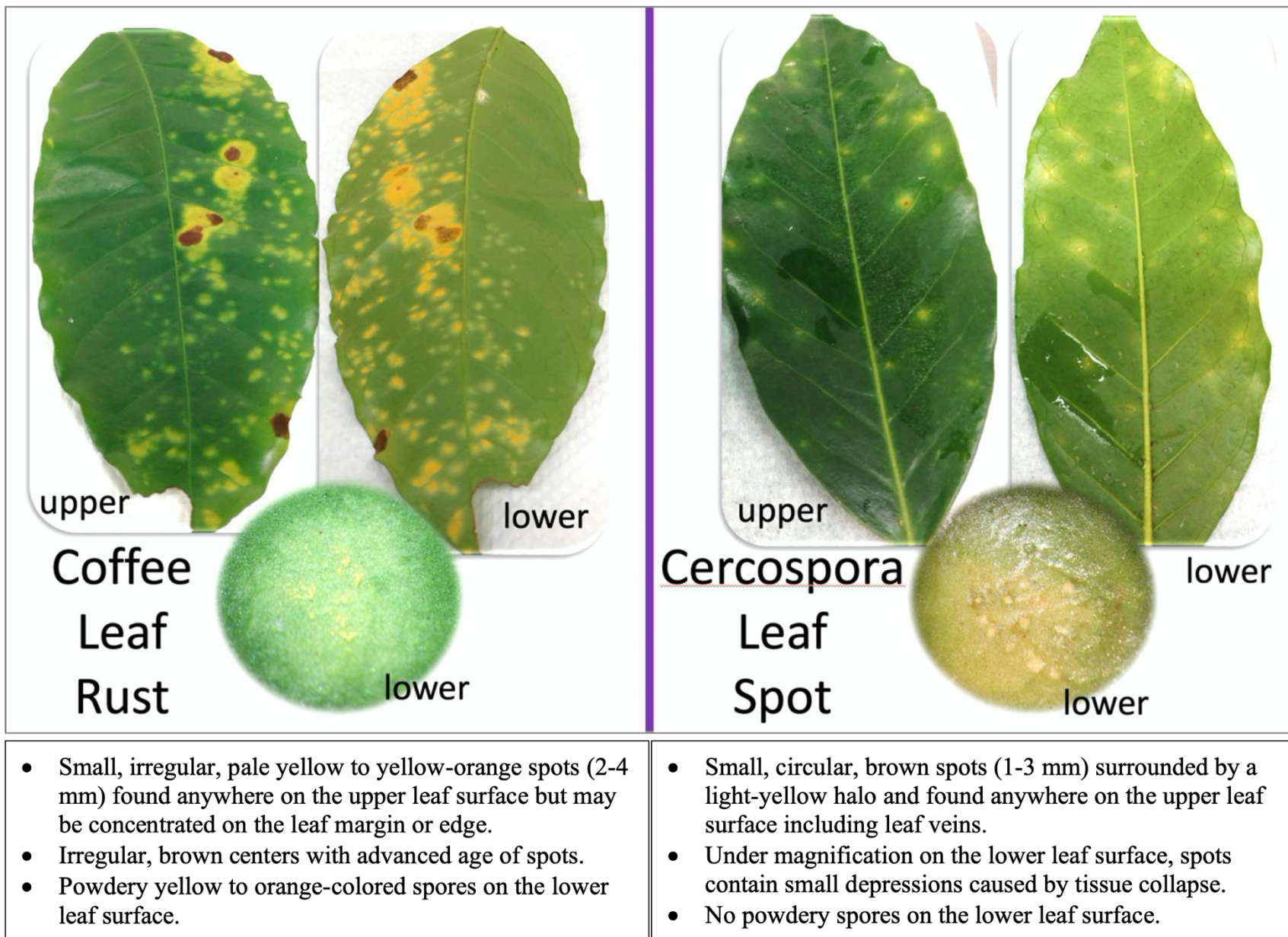


Appendix F: Examples of What are NOT Coffee Leaf Rust

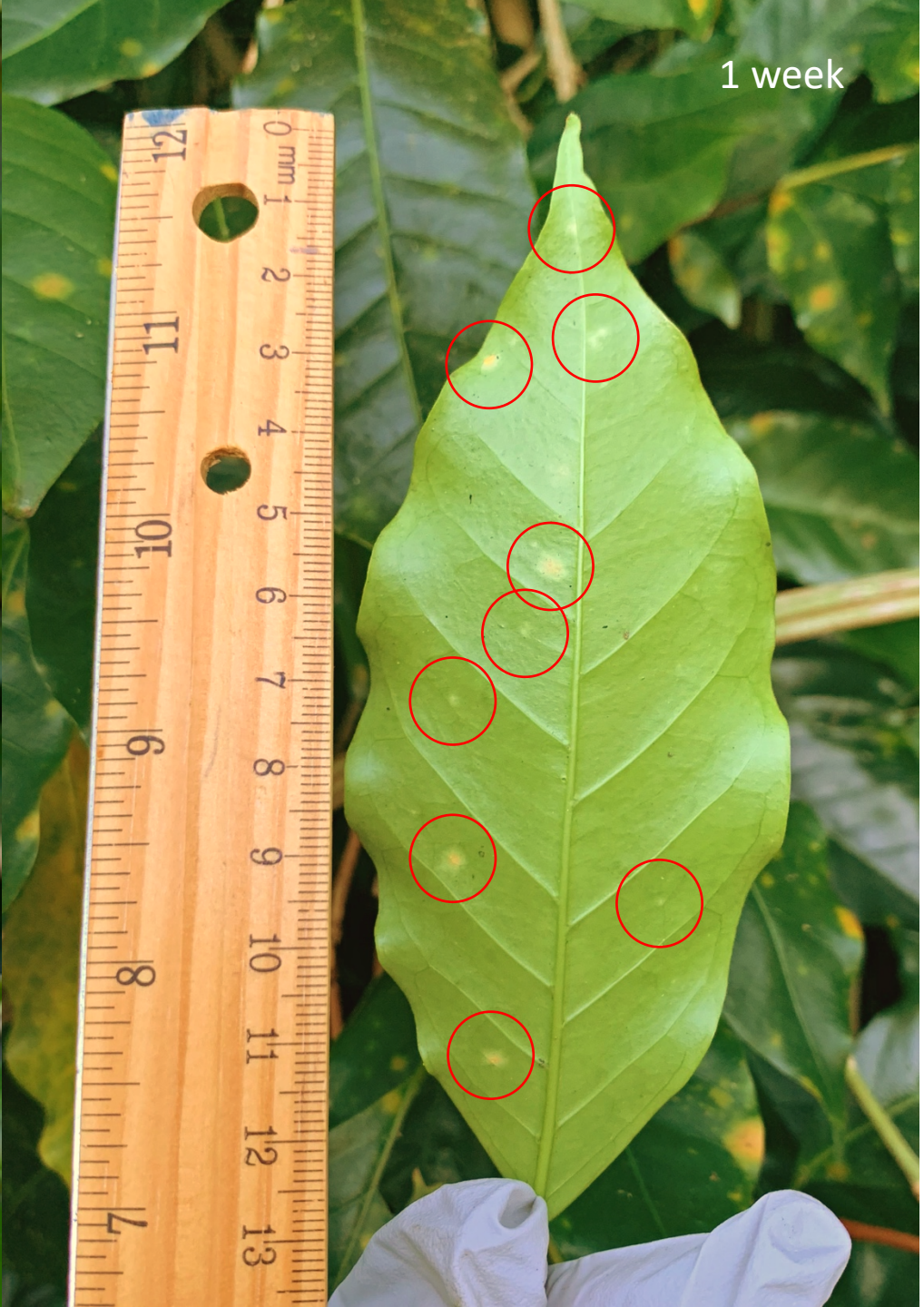
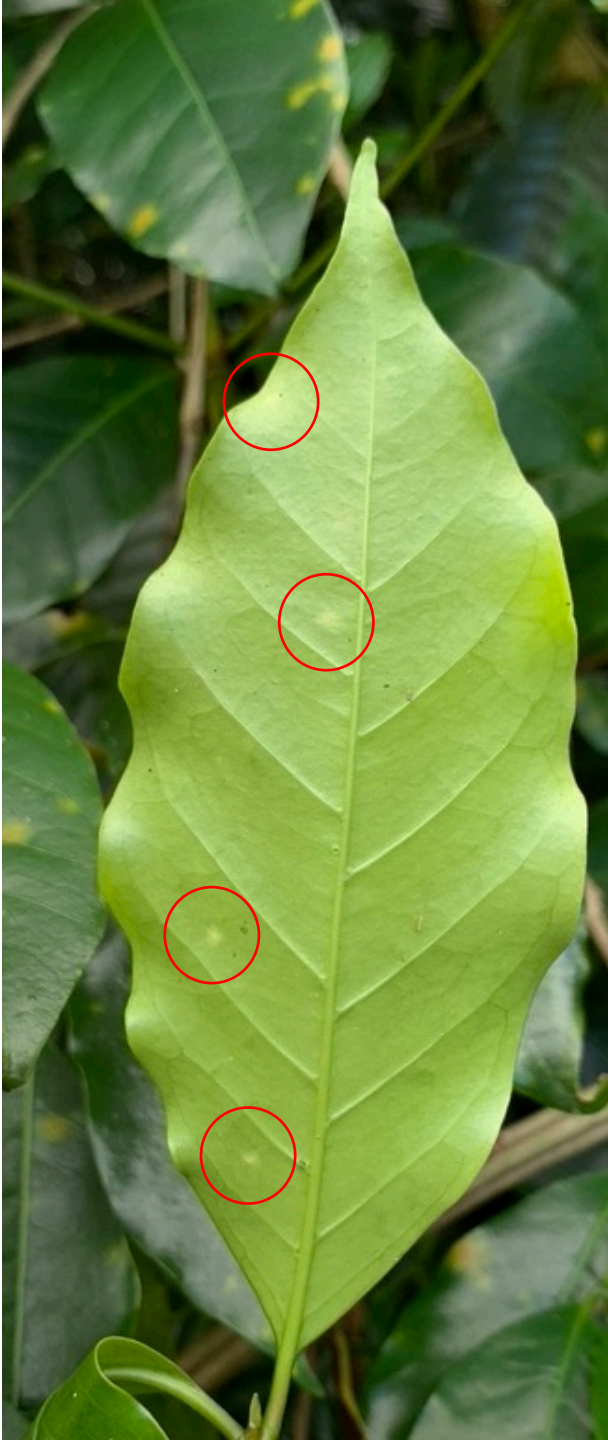
These photos of upper and lower leaf surfaces provide visual examples of other nutritional, pest, and disease symptoms but NOT coffee leaf rust. If unsure, submit your leaf/leaves for proper ID.



Appendix D: Differences Between Coffee Leaf Rust (CLR) and Cercospora Leaf Spot Symptoms







Sanitation protocols



CLR Sanitation Protocol

As a precaution, please adopt the following decontamination protocols regardless of where you are surveying/gathering materials.

If possible, only visit one field location per visit. Never go from one site to another site without cleaning your hands, shoes, tools, and vehicle.

Check that vehicle has been decontaminated including inside mats, tires and underside of vehicle before entering. Use alcohol wipes or sprays as on commonly touched areas.

Decontaminate hands and equipment before and after you survey/collect samples. To reduce the risk of moving spores from one tree to another, sanitize hands and tools after each tree.

When entering coffee farms, please keep in mind quarantine measures on infected and non-infected fields. If possible, meet farmer at gate to get materials or park outside of property away from coffee trees and enter field on foot.

After exiting vehicle, put on protective clothing (disposable or sterile coveralls).

Clean shoes or boots with a brush to remove debris and spray with 70% alcohol or dip in freshly prepared 10% bleach prior to entering field. A sanitizing footbath/mat can be used with a disinfectant. Or change shoes when entering and exiting vehicle, store shoes in a plastic bag, and disinfect shoes at office.

A freshly prepared 10% solution of chlorine bleach and water can be used on tools as long as tools are oiled afterwards, as chlorine bleach will corrode metal tools.

When leaving field: remove coverall and place in plastic bag and seal. Disinfect shoes with ethanol or bleach solution.

Vehicles used in infected areas should be thoroughly cleaned; run vehicle through car wash and include underside wash when returning from field and before returning to office. If the carwash is closed or unavailable, power wash field vehicle on gravel.

Disinfect equipment and tools and store in clean area.

Field clothing should be machine washed with detergent in hot water and dried under high heat. Disposable coveralls should be autoclaved prior to disposal.

Please be careful when using alcohol and bleach and follow all label precautions to prevent damage to your eyes, skin, respiratory system, clothing, and equipment. Correctly label spray bottles with a Sharpie pen and take bottles with you in any field vehicle for use before and after all field activities. Store bottles in the vehicle in such a manner that they do not spill.

Mention of trademark, proprietary product, or vendor does not constitute a guarantee or warranty of the product by the U.S. Dept. of Agriculture and does not imply its approval to the exclusion of other products or vendors that also may be suitable.



>5% CLR incidence rate

- Contact fungicides will not effectively control CLR in the leaves
- Leaf removal, pruning, and spraying may be necessary to reduce the CLR incidence level to under 5%.
- Without the use of systemic fungicides for control, expect defoliation and yield losses in the following season(s).

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 (11/4/20).

Trade Name	Active Ingredients	FRAC Group	EPA Reg. No.	Labels	Notes	Compatibility with BotaniGard® ¹	<i>H. vastatrix</i> Rate (per acre)	Est. Cost ³ per Application/Acre	
								Low Rate	High Rate
Serenade ASO	QST 713 strain of <i>Bacillus subtilis</i>	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		Pending	1.0-3.0 pints	\$5.88	\$17.63
Badge X2	Copper Oxychloride + Copper Hydroxide	M1	80289-12-10163	Label	OMRI	Pending	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
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	<i>Bacillus amyloliquefaciens</i> strain D747	BM 02	70051-107	Label	OMRI	Yes ²	0.5-6.0 qts	\$7.50	\$90.00
DoubleNickel 55 Biofungicide	<i>Bacillus amyloliquefaciens</i> strain D747	BM 02	70051-108	Label	OMRI	Yes ²	0.25-3.0 lbs	\$9.63	\$115.50

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, these products have been determined compatible with BotaniGard®.

³ Estimated costs are based on local retail prices and are for the fungicide only.

Next couple of months...

- Look for CLR symptoms
- Spray with the proper fungicides and correct rates
- Strip-pick for CBB management
- Spray for CLR before pruning
- Prune; consider block stumping; keep on farm
- Keep the trees healthy
- Look for CLR symptoms



Rust on your farm?

- Double bag leaf tissue and soil samples
 - Call or make an appointment
 - <https://cms.ctahr.hawaii.edu/ce/Find-Us>
- Resources for Hawaii
 - [Surveying, sampling, and monitoring of CLR for early disease control](#)
 - [Spraying to suppress CLR](#)
 - [Spanish](#)
 - [Ilocano](#)
 - [Tagalog](#)
 - [USDA sanitation protocols](#)
 - [HDOA field guide and submission form](#)

Thank you!

- Questions
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