

Establishing a Breeding Pipeline to Safeguard the Hawaii Coffee Industry

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Introduction

- Coffee leaf rust arrives in Hawaii - 2020
- Hawaii coffee industry cultivates susceptible varieties
- Objective:** Establish an efficient coffee breeding system to provide growers with resistant and high-quality varieties.

Materials and Resources

- HARC germplasm: Commercial arabica, Catimor hybrids, Obata, & CLR resistant F1's
- Feral coffee with robust CLR sporulation
- 1 collaborating coffee farmer/ major island
- Multi-agency working group of public & private organizations

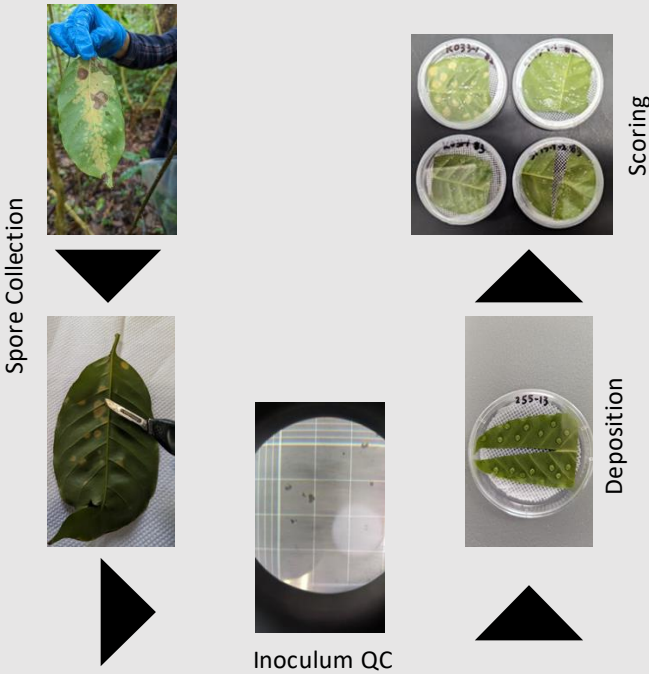
Methods

- Self F1's to generate segregating F2 populations
- Cross Obata x Hawaii Commercial Cultivars: F1's
- Evaluate: CLR resistance, agronomic, quality

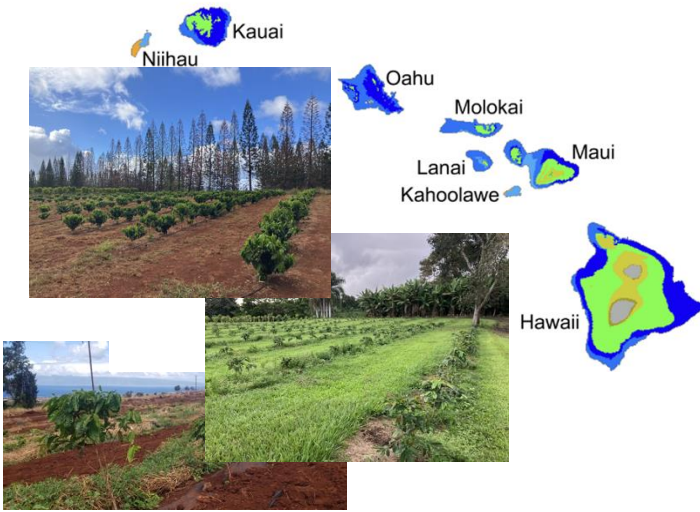
Crosses

Group	Female	Male	F1	F2
Mokka	T5175 or T8667	5 Mokkas	16	1090
Mokka	1 Mokka	T5175	3	129
Mokka	2 Mokka	Obata	46	NA
Red Catuai	T5175 or T8667	2 Catuais	9	749
Red Catuai	1 Catuai	T8667	4	199
Red Catuai	2 Catuai	Obata	215	NA
Typica	T5175 or T8667	3 Typicas	13	522
Typica	1 Typica	T5175	4	156
Typica	3 Typica	Obata	123	NA
Yellow Catuai	T8667	1 Catuai	4	142
Yellow Catuai	2 Catuai	T5175	6	252
Yellow Catuai	2 Catuai	Obata	189	NA
Ethiopian	ET258 & ET52	Obata	81	NA

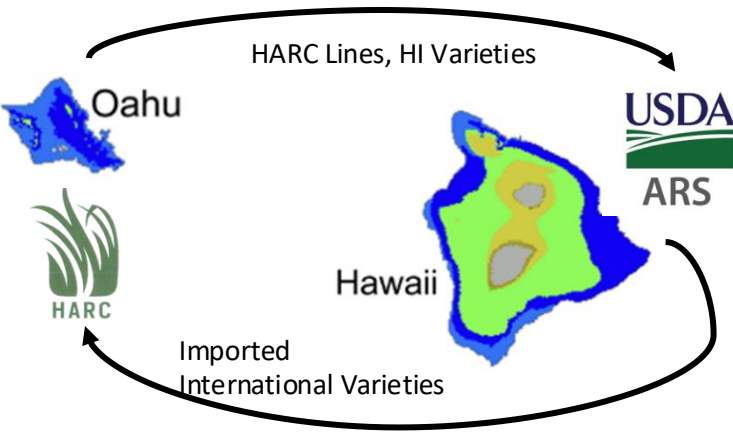
CLR Resistance – Bioassay Phenotyping



CLR Resistance – Field Evaluation



Germplasm Repository - Duplication



Results

- Bioassay protocols of whole leaf – 300 genotypes evaluated/week
- CLR inheritance – large maternal effect, 2 major loci & complementary epistasis
- Genotype confirmation – 96 SNPchip
- Field evaluation (in-process) – CLR resistance confirmation, agronomic performance, metabolomic + cupping quality
- Germplasm duplication – transition of HARC collected varieties from HI and HARC bred lines to USDA-PBARC; USDA-PBARC imported international varieties to HARC