Comparison of ʻŌlena Grown Aquaponically Versus in Soil

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Introduction

- Graduate Student at UH Mānoa, Kamakakūokalani Center for Hawaiian Studies
- Concentration in Hawaiian Perspectives on Geography and Resource Management
- Graduate Assistant with College of Tropical Agriculture and Human Resources
- Cultural Practitioner of Lomilomi, Lāʻau Lapaʻau

Kumu Levon Ohai

This work is dedicated to
my Kumu, Kūpuna and Aloha ʻĀina.

Kumu

Hoʻomana

Moʻolelo ʻŌiwi

Malāma ʻĀina

Indigenous Science

- Lomilomi
- Lāʻau Lapaʻau
- Mahi Lāʻau Lapaʻau
- Prayer and Mana
  - –"Tradition held that passed-on mana could be increased with prayers and appreciative use… Conversely mana abused or misused could be diminished or even lost" (Pukui et al. 150, 152).
  - –Waihona lāʻau lapaʻau project strives to restore diminished mana and essential nutrients.

Current Research

‘Auhuhu-Hola
Tephrosia Purpurea

Koʻokoʻolau
Bidens spp

‘Ōlena-Turmeric
Curcuma Longa L.

ʻŌlena

Common Name: Turmeric

- ʻŌlena is a Polynesian introduction
- Spiritual protection, cleansing and strengthening
- Medicine and dietary supplement
  - Sinus, ear infections, allergies, eye problems, strengthening all body systems
  - Skin conditions
- Natural dye
- U.S. National Institute of Health currently has registered 19 clinical trials

Objectives

- To determine the level of nutrients in the ʻōlena rhizome grown aquaponically versus soil.

Aquaponics

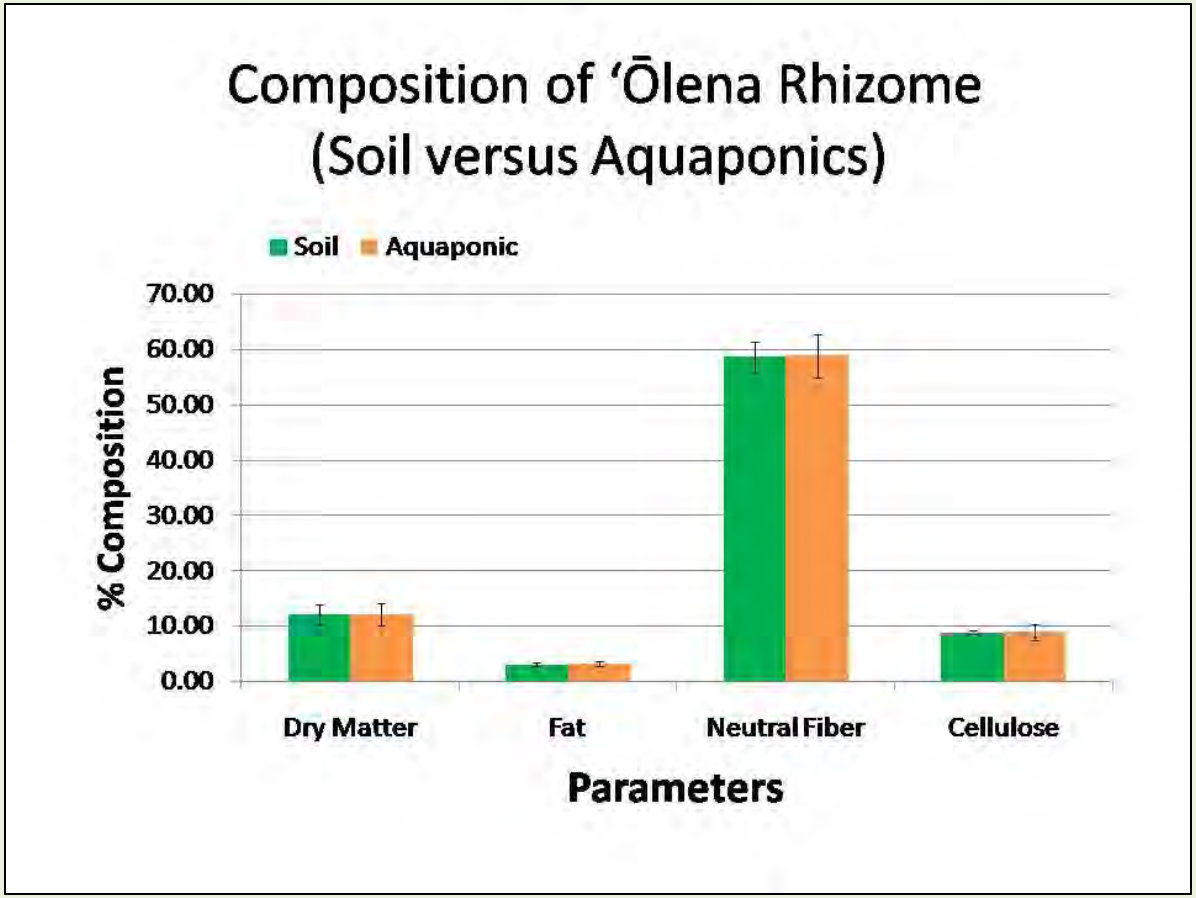
Terrestrial

Methods

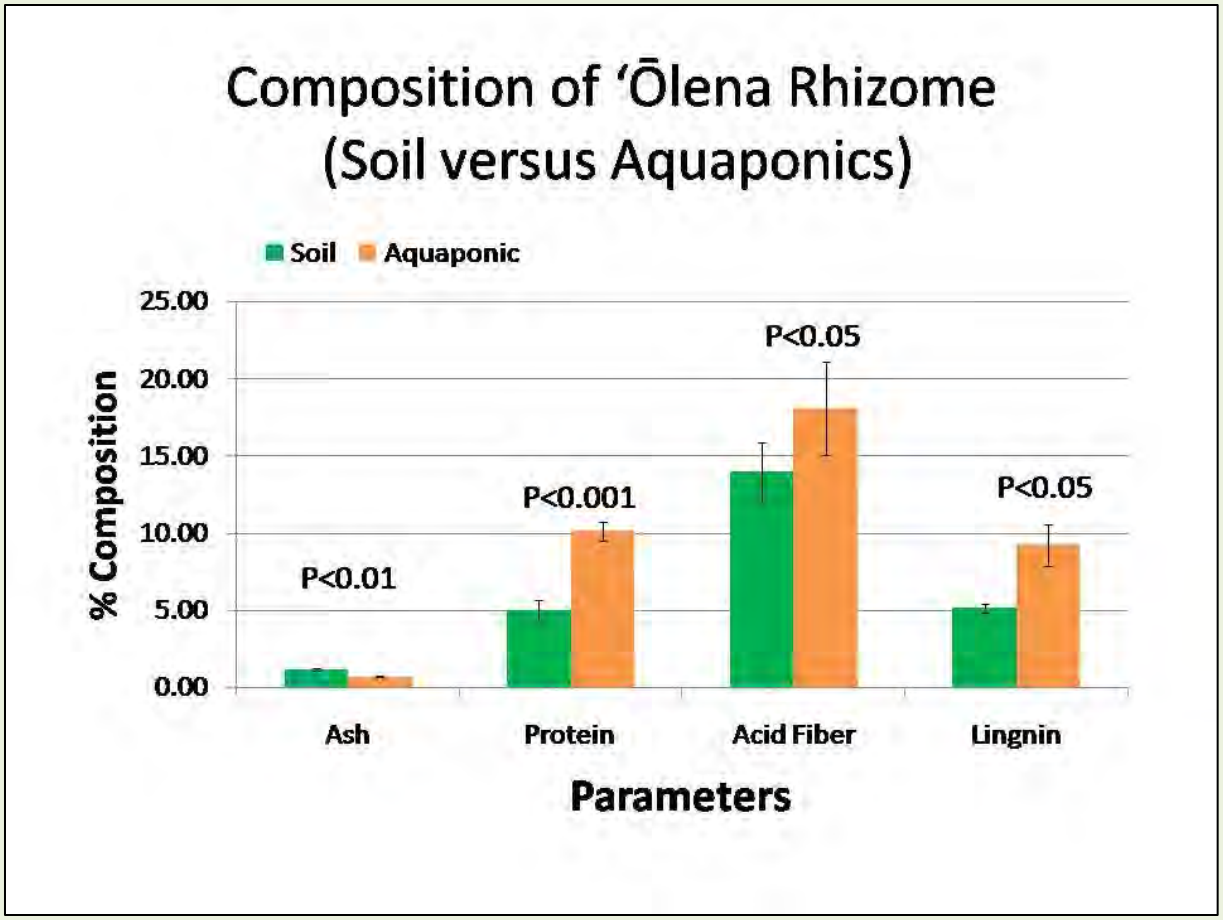
Preparation of Extracts

- 12 ʻōlena plants, 6 aquaponically grown and 6 terrestrial
- Rhizomes were dried and powdered
- Aqueous and ethanol extracts were made from each sample

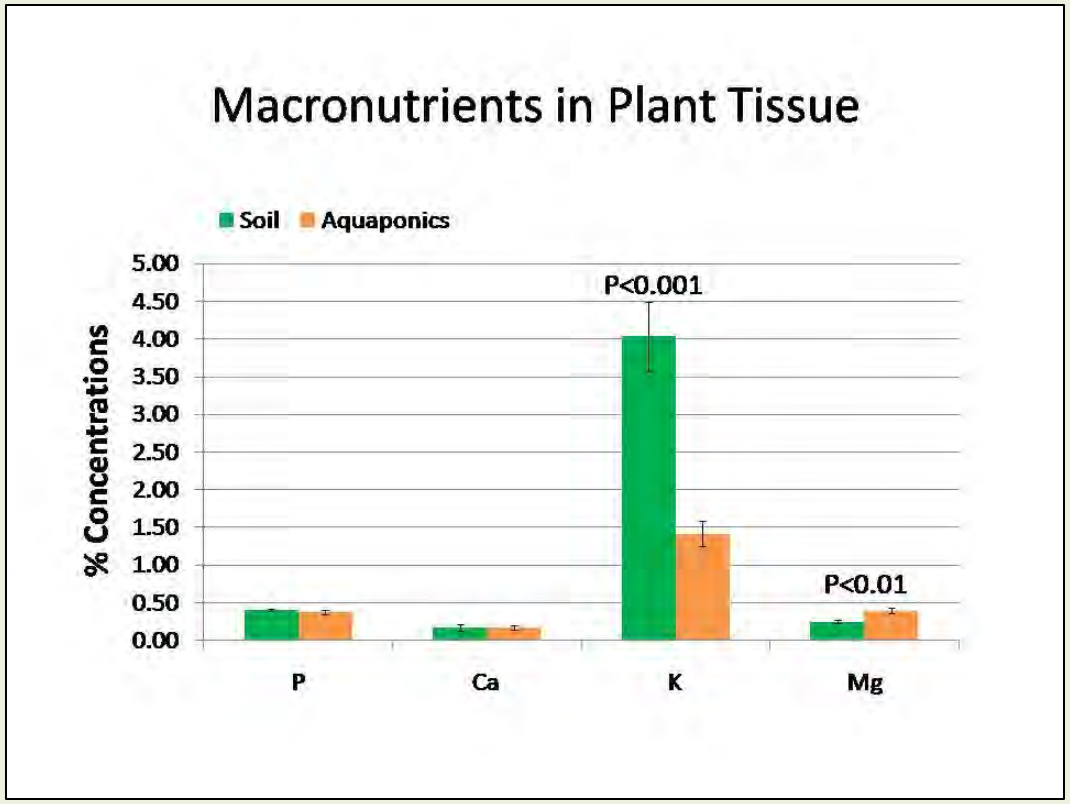
Results


Composition of ʻŌlena Rhizome
(Soil versus Aquaponics)
Soil
Aquaponic
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
% Composition
Dry Matter
Fat
Neutral Fiber
Cellulose
Parameters

Results

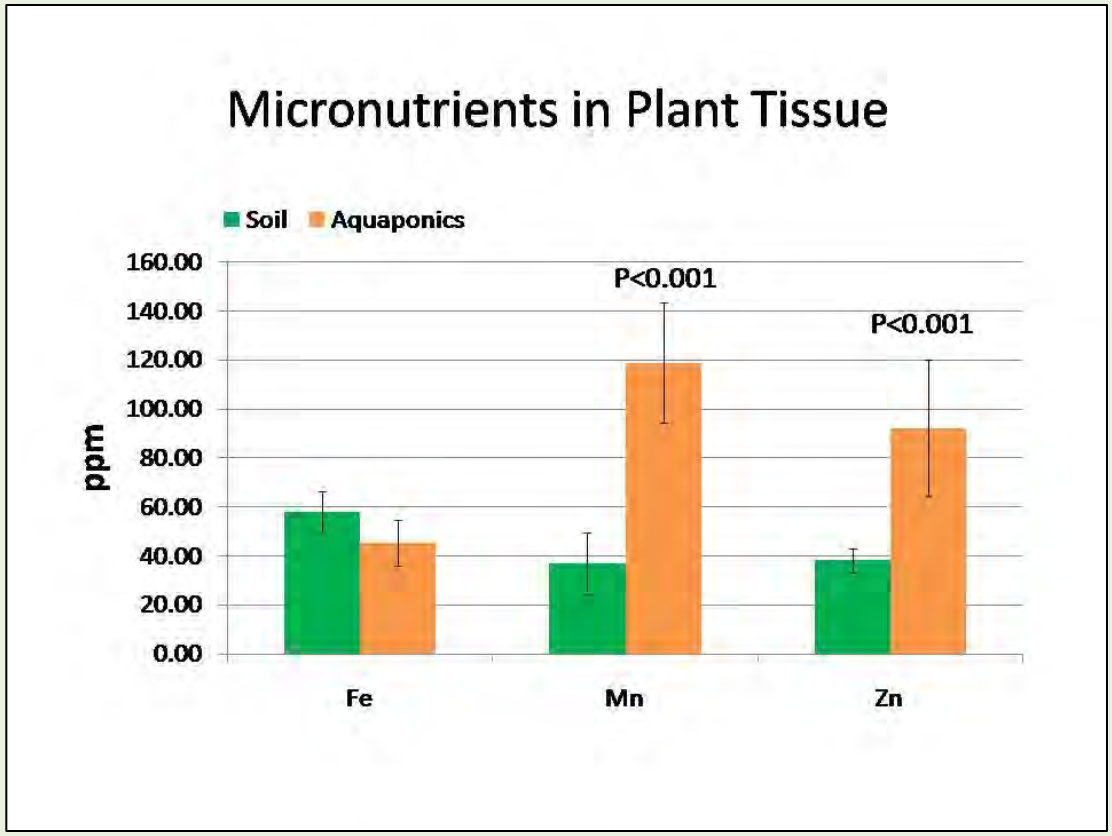

Composition of ʻŌlena Rhizome
(Soil versus Aquaponics)
Soil
Aquaponic
% Composition
25.00
20.00
15.00
10.00
5.00
0.00
P<0.01
P<0.001
P<0.05
P<0.05
Ash
Protein
Acid Fiber
Lingnin
Parameters

Nutrient Results



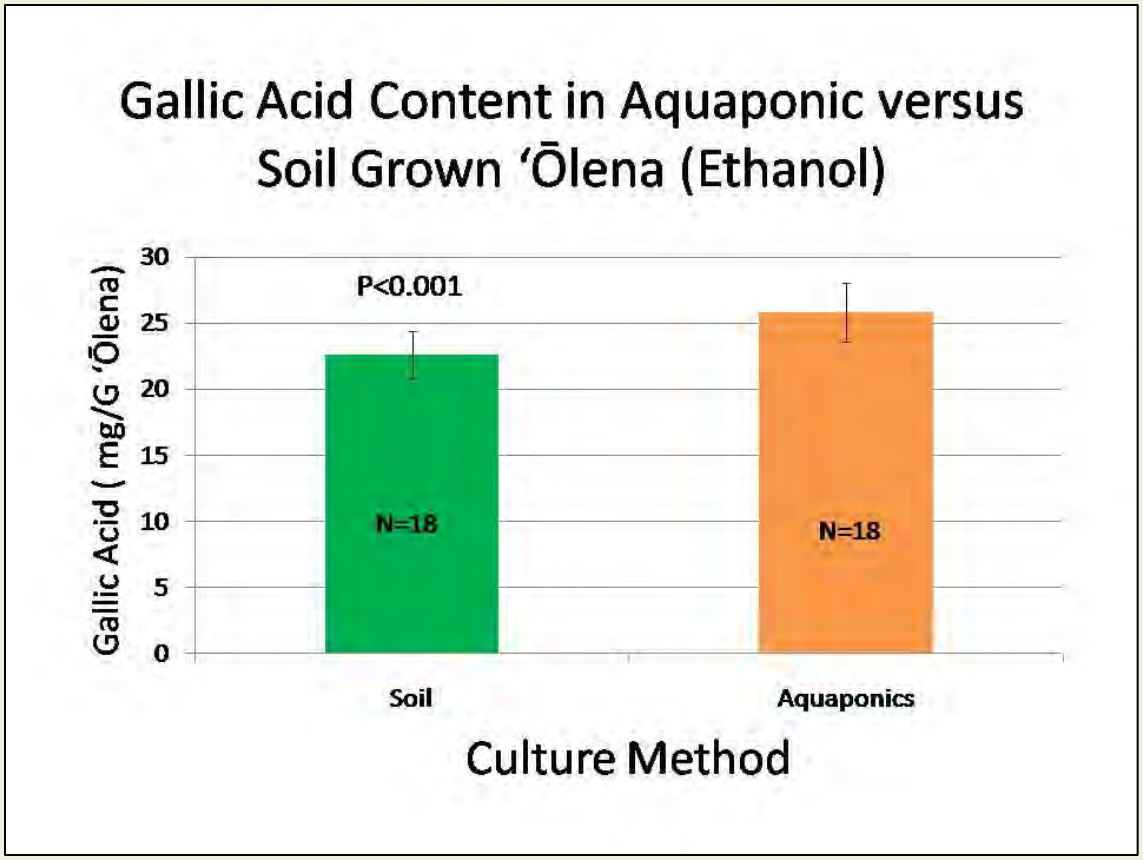
- Phosphorus (P), Calcium(Ca), Potassium (K), Magnesium (Mg)

Nutrient Results

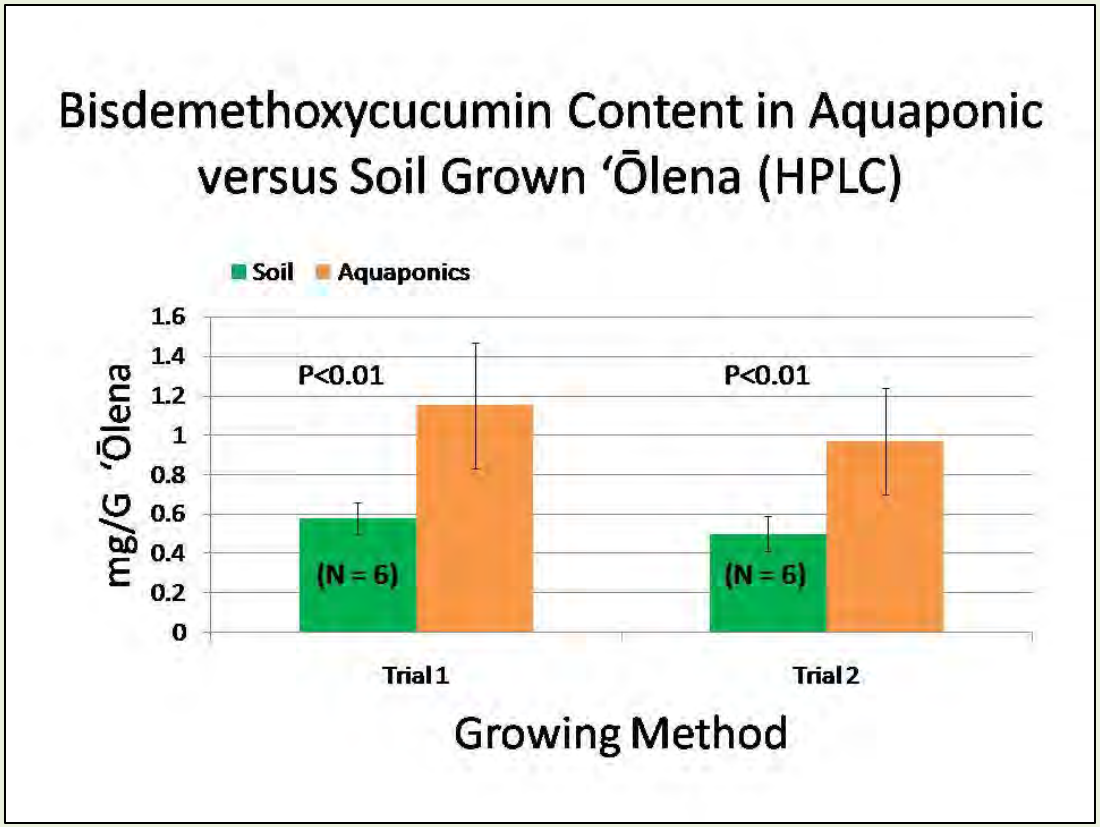


- Iron (Fe), Manganese (Mn), Zinc (Zn)

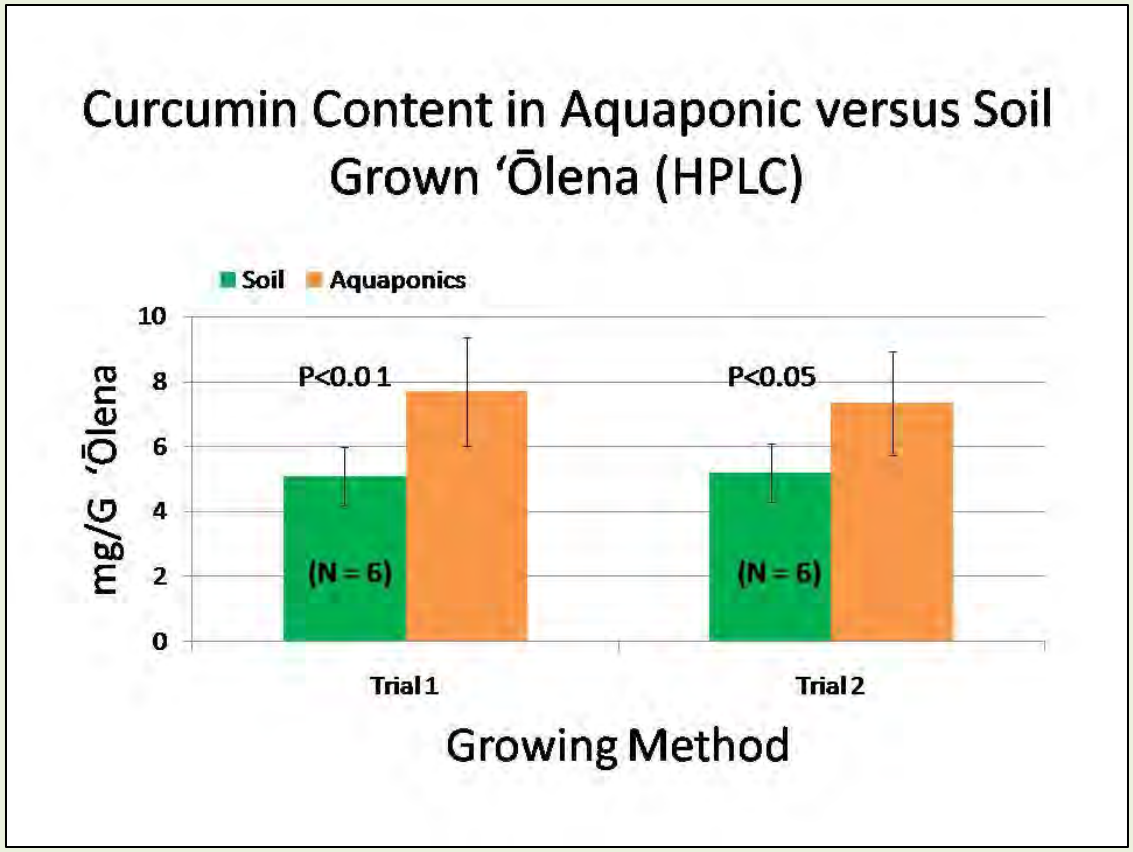
Antioxidant Results



Antioxidant Results



Antioxidant Results



Summary

- ‘Ōlena grown in soil was significantly higher in ash, iron (Fe), potassium (K), and boron (B).
- ‘Ōlena grown aquaponically was significantly higher in crude protein, acid fiber, lignin, copper (Cu), manganese (Mn), zinc (Zn), and magnesium (Mg)
- ‘Ōlena grown aquaponically was significantly higher in curcumin, gallic acid equivalent, and bisdemethoxycurcumin.
- No statistical differences in dry matter, neutral fiber, P, Ca, Na, fat, and cellulose.

Application

- The mana and essential nutrients although different reflect their own strengths.
- Each with their own character
  - Grown in organic soil
  - Grown in cinder with nutrients from fish effluent
  - Grown with prayer and care
  - Each may stand alone but the waiwai of my research is stronger in it's unity
- Curcuminoid levels vary with extraction methods
  - Ethanol extraction showed higher levels
- Rhizomes vary with location, sources, cultivation and methods of processing
  - Rhizomes when dried are sensitive to light and heat

Future Investigation

- Aquaponics vs soil comparisons to determine yield, growth, and quality.

Mahalo

Hawaiinuiākea School of Hawaiian Knowledge

Kamakakūokalani Center for Hawaiian Studies

College of Tropical Agriculture and Human Resources

Molecular Biosciences and Bioengineering

Plant and Environmental Protection Sciences

Tropical Plant and Soil Sciences

Windward Community College