



# Optimizing Yield and Quality of Hawaii-grown Turmeric

## Collection and Evaluation of Curcuma Germplasm

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# Pick-up Locations

(Today 5/28/20@1:00-4:00 pm)

## **Wahiawa Extension Office**

910 California Ave.

Wahiawa, HI, 96786-2124

## **Pearl City Urban Garden Center**

955 Kamehameha Highway

Pearl City, HI, 96782-334

## **Waimānalo Research Station**

41-698 Ahiki St.

Waimanalo, HI 96795



# Historic Importance

- Food & Flavor
- Medicine
- Dye
- Religious





# Current Situation

- \$6.00/lb Farmgate (Hawai'i 2016)
- Production rapidly expanding (2018 estimate = 60-80 acres statewide)
- Local market easily saturated.
- Increased exports.
- Value addition.



# Turmeric

- Seasonal (April/May-February/March).
- 600 - 1,500 mm H<sub>2</sub>O/season.
- Turmeric removes on average per acre:
  - 120 pounds of nitrogen,
  - 30 pounds phosphate,
  - 220 pounds of potash and ~ 70 pounds of calcium and magnesium.
- Relatively low pest pressure.





# Preliminary Trials 2015-2018

- **Observational.**
- **Increase familiarity with local germplasm.**
- **Increase planting material.**

<http://www.hawaiianorganicginger.com/>



RED HAWAIIAN TURMERIC



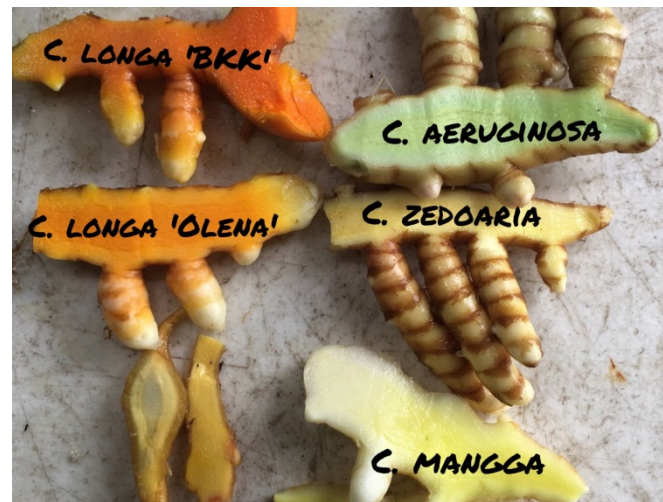
WHITE MANGO TURMERIC



INDIRA YELLOW TURMERIC



BKK TURMERIC





# Preliminary Trials 2015-2018















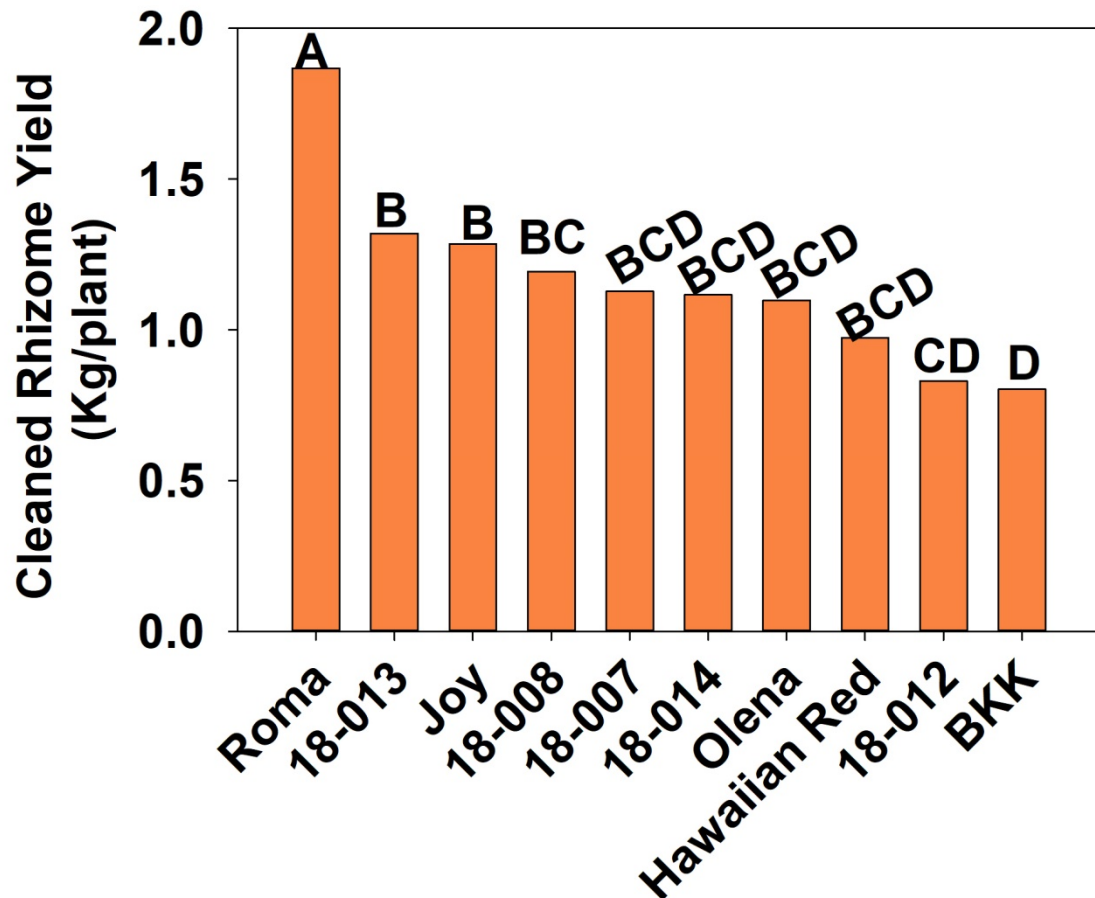




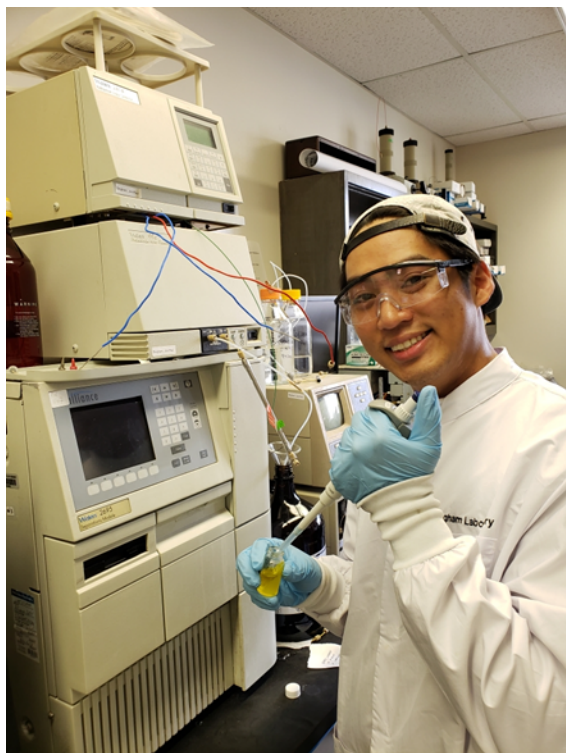


# Yield of *C. longa* 2020

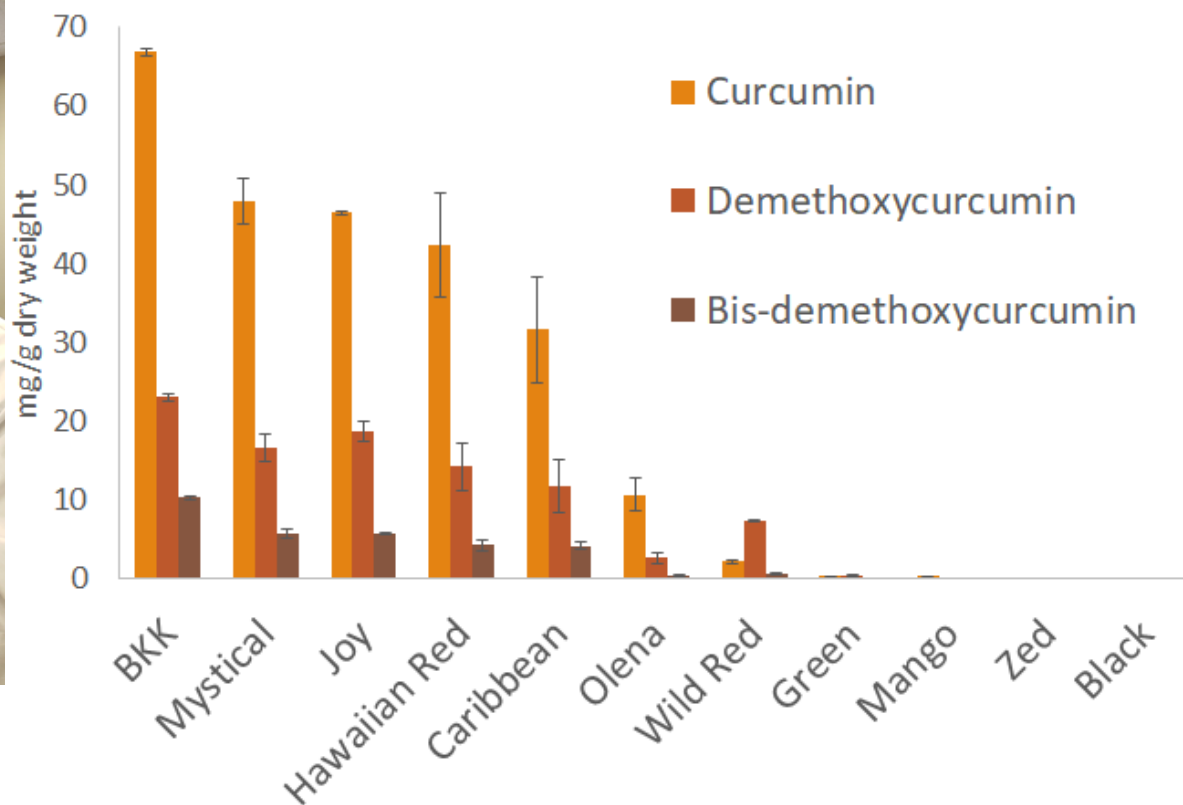
- Yields ranged between 0.75 – 2.0 kg of cleaned, marketable fingers per plant.
- Estimated @ ~ 16 - 43 t/ha.
- Reported commercial yield = 13 to 35 t/ha of fresh turmeric.
- Other attributes besides yield important.



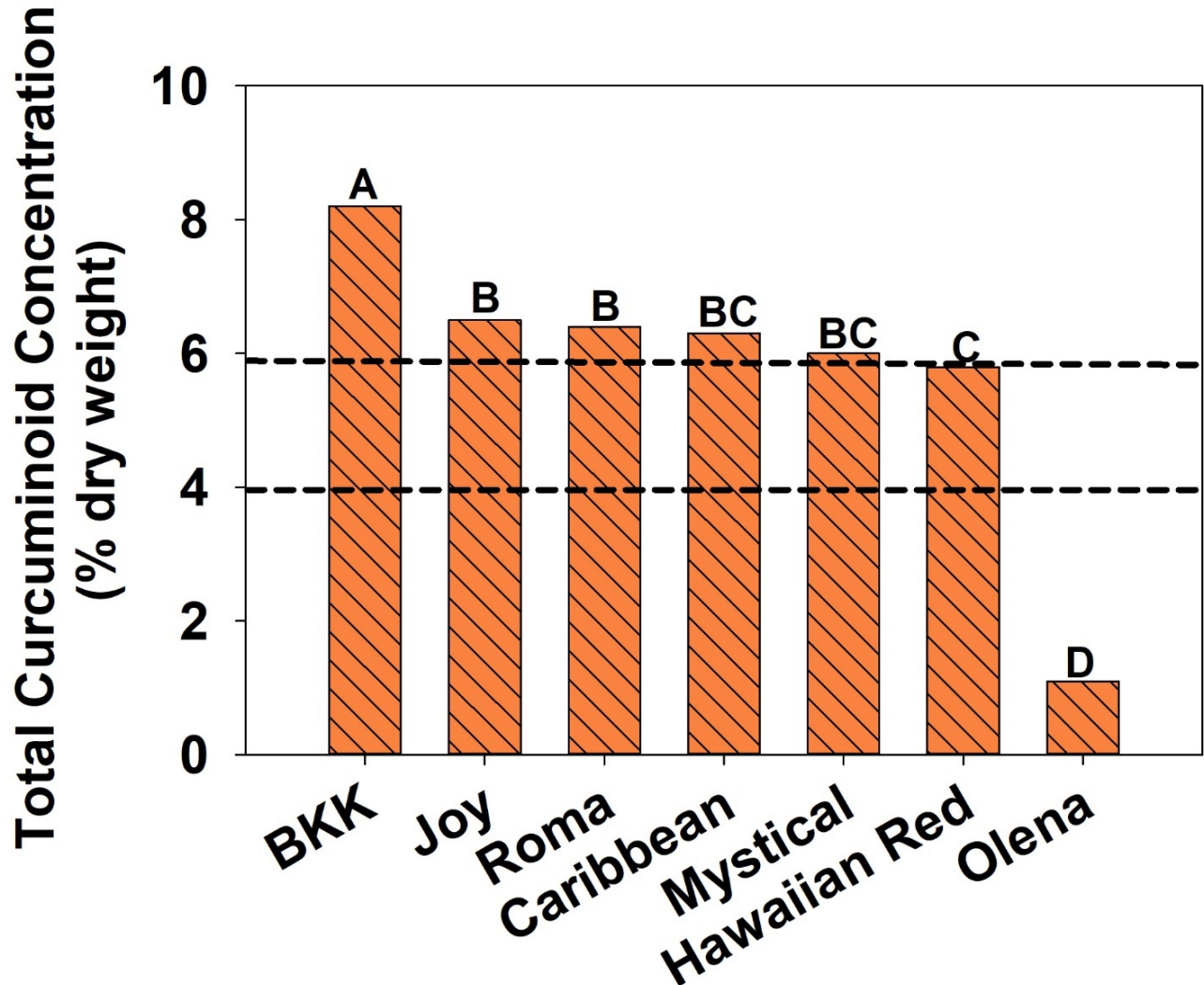
# HPLC Analysis of Curcuminoids



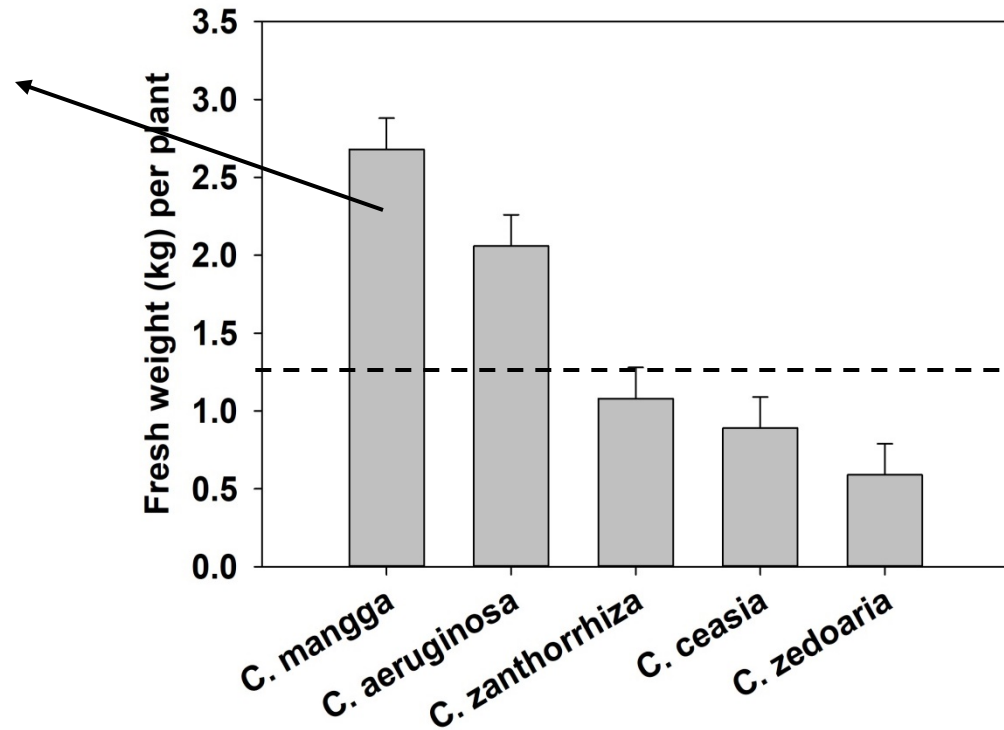
Major Curcuminoid Content of 2018 Turmeric



# Total Curcuminoid Content Waimanalo harvest 2019

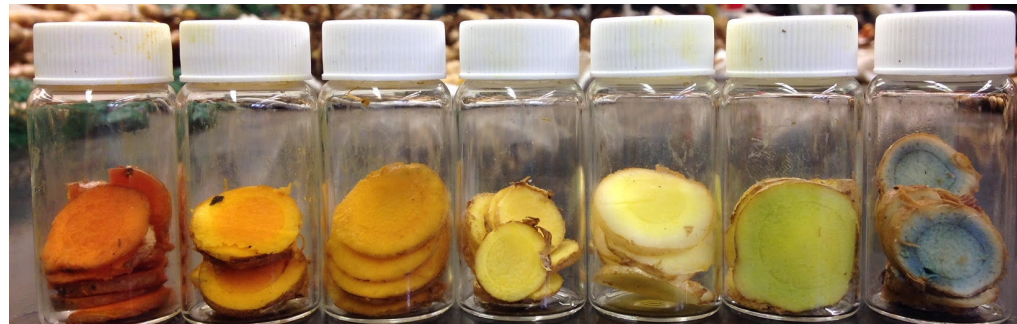
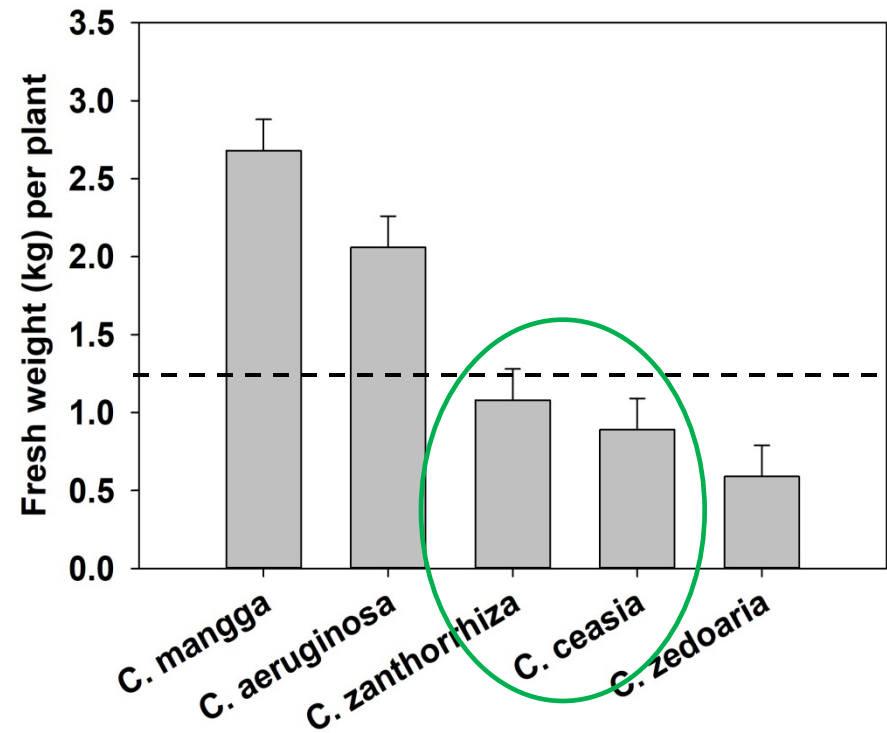


# Yield of other species





# Yield of other species





# Kauai *Curcuma* Trials





# Kauai Agricultural Research Center

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- Elevation: 530'
- Annual Rainfall: 98"
- Soil: Halii Series
  - Oxisol
  - Clayey
  - Moderately well drained
  - Highly weathered
  - Low natural fertility





# Where to start?

## Taste the rainbow!

- Tested 4 *Curcuma* species in 2017-2019:
  - *Curcuma longa*, 2 varieties
  - *Curcuma caesia*
  - *Curcuma mangga*
  - *Curcuma zedoaria*
  - *Boesenbergia rotunda* (fingerroot ginger)
- Added 4 more varieties of *C. longa* in 2019-2020



# *Curcuma longa* - Turmeric



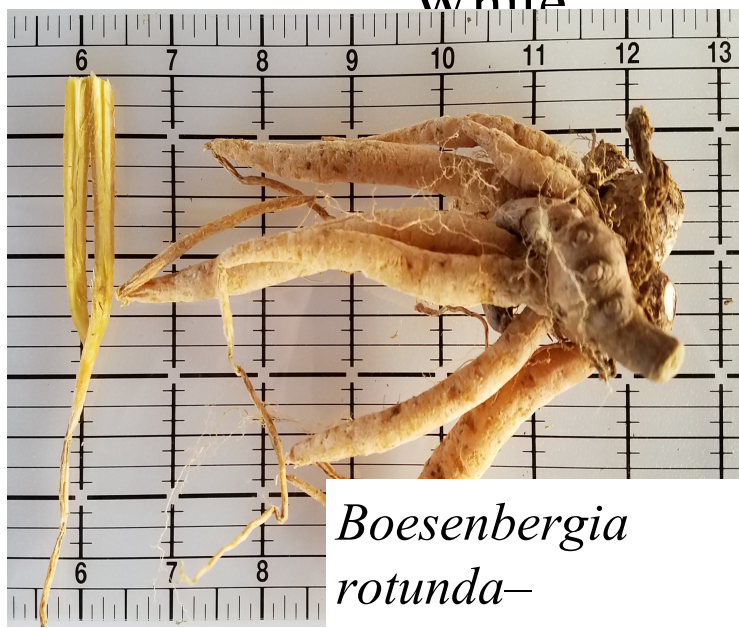




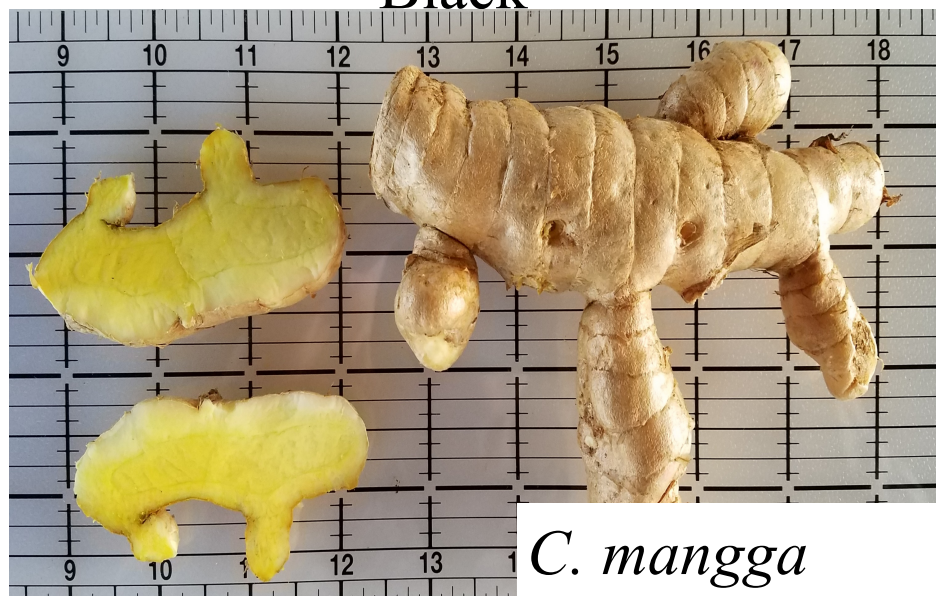
*C. zedoaria*  
“White”



*C. caesia*  
“Black”



*Boesenbergia*  
*rotunda*—



*C. mangga*  
“M...”



# Preliminary trial – 2017-2019



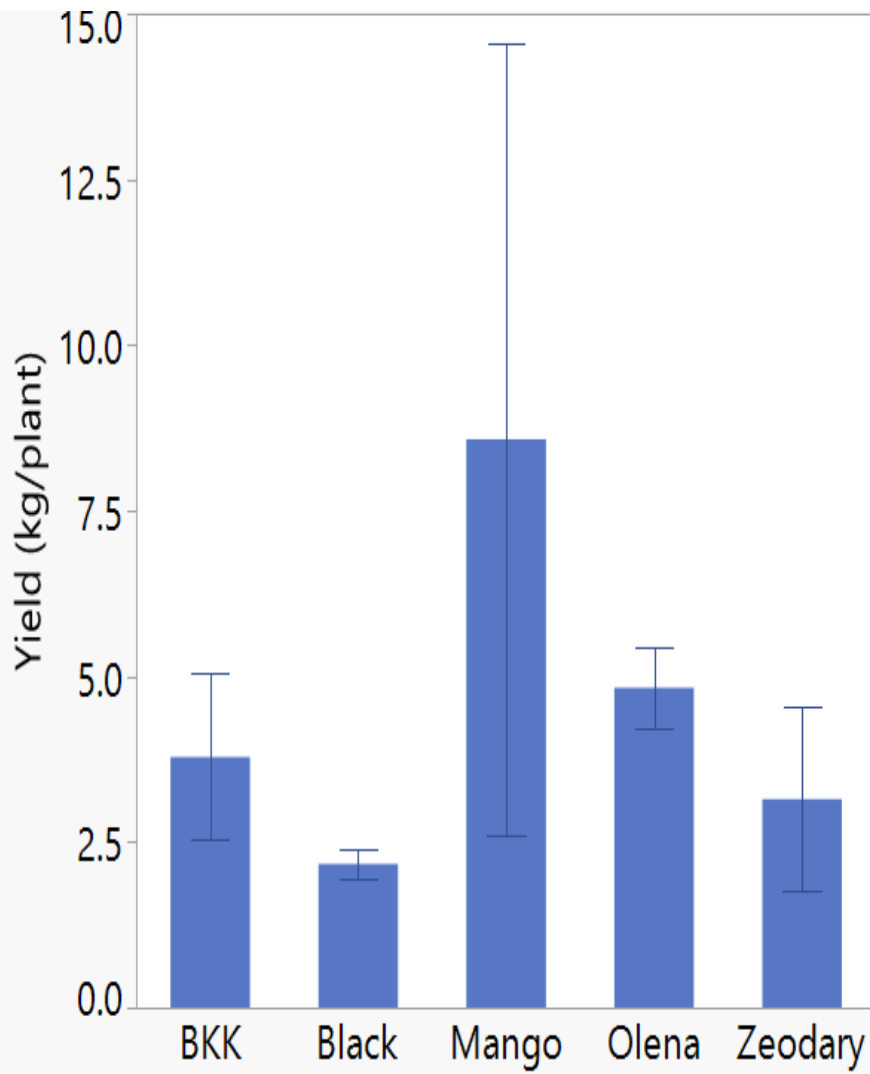


# Preliminary trial – 2017-2019

- Planted Sept 2017
- Organic fertilizer: dry crumbles
- No irrigation
- \*\*Allowed to grow a second season\*\*
- Harvested April 2019



# Preliminary trial – 2017-2019



Each error bar is constructed using 1 standard error from the mean.

- High variability
- Only 3 replicates
- No statistical differences detected

Note: This yield data includes the mother corms



# Kauai Trial – 2019-2020







## *C. longa* variety trial

- With irrigation this time!
- Sustane 8-2-4 applied at rate equal to 175 lb N/ac at planting
- Weeded by hand twice during the season
- Planted June 2019  
Harvested Feb 2020



# *Curcuma longa* – 4 new varieties this year





# Harvest

The old-  
fashioned  
way...









# Improvised washing stations



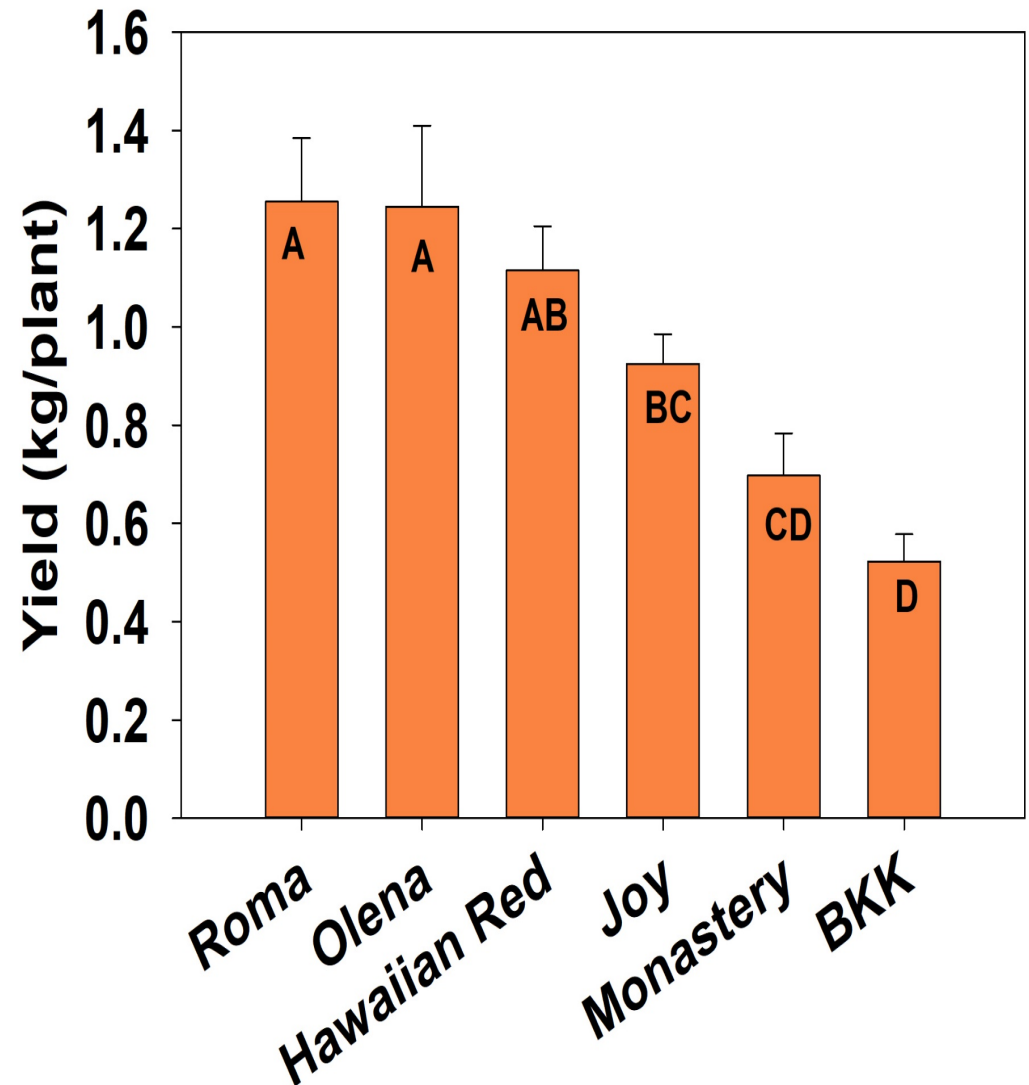


# Separating rhizomes from mother corms and starch roots



# Kauai yield of *C. longa* – 2020 harvest

- Yields ranged between 0.38 – 1.66 kg of cleaned, marketable fingers per plant.
- Estimated @ ~ 8 - 35 t/ha.
- Reported commercial yield = 13 to 35 t/ha of fresh turmeric.
- Other important attributes?





# Mahalo nui!

Emilie Kirk  
Kauai County Cooperative  
Extension  
UH-CTAHR

[erkirk@hawaii.edu](mailto:erkirk@hawaii.edu)







# 2018 Trial Location

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- Kula Agricultural Park
- Elevation: 1100'
- Annual Rainfall: < 20"
- Soil: Keahua series
  - Slightly weathered
  - Sticky when wet
  - Well drained
  - Naturally fertile



- 5 varieties of *C. longa*
  - ‘BKK’
  - ‘Hawaiian Red’
  - ‘Joy’
  - ‘Mystic’
  - ‘Olena’



- 3 species of *Curcuma*
  - *C. aromatica* (Aromatica)
  - *C. caesia* (Black)
  - *C. manga* (Mango Ginger)







Trial planted May 1, 2018





October 2018



# Harvest Day February 25, 2019





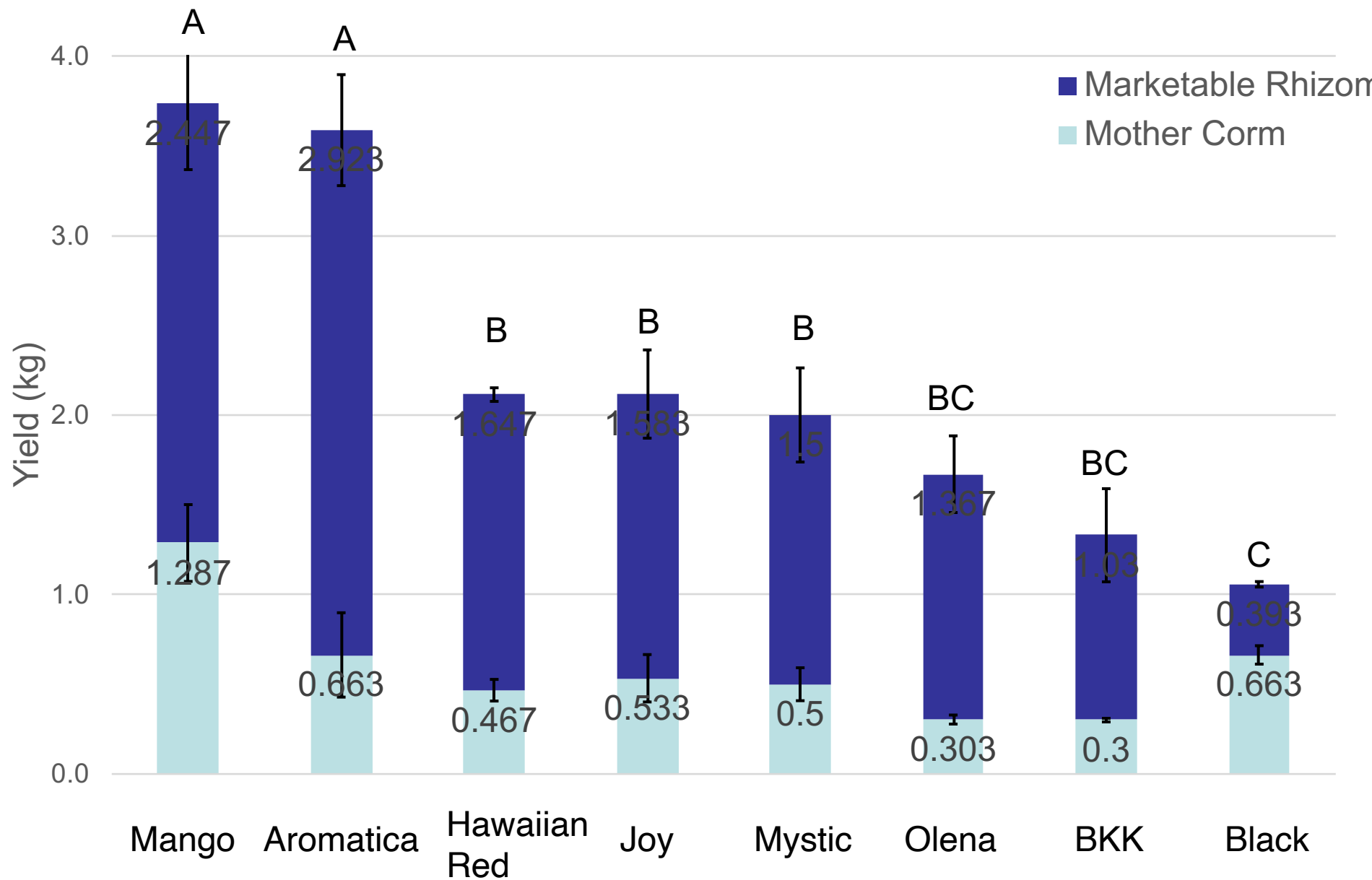
# Troubleshooting Manual Harvest













# Results

- No significant differences in rhizome yield among the orange *C. longa* varieties
- “Aromatica” and “Mango Ginger” highest yielding for rhizomes



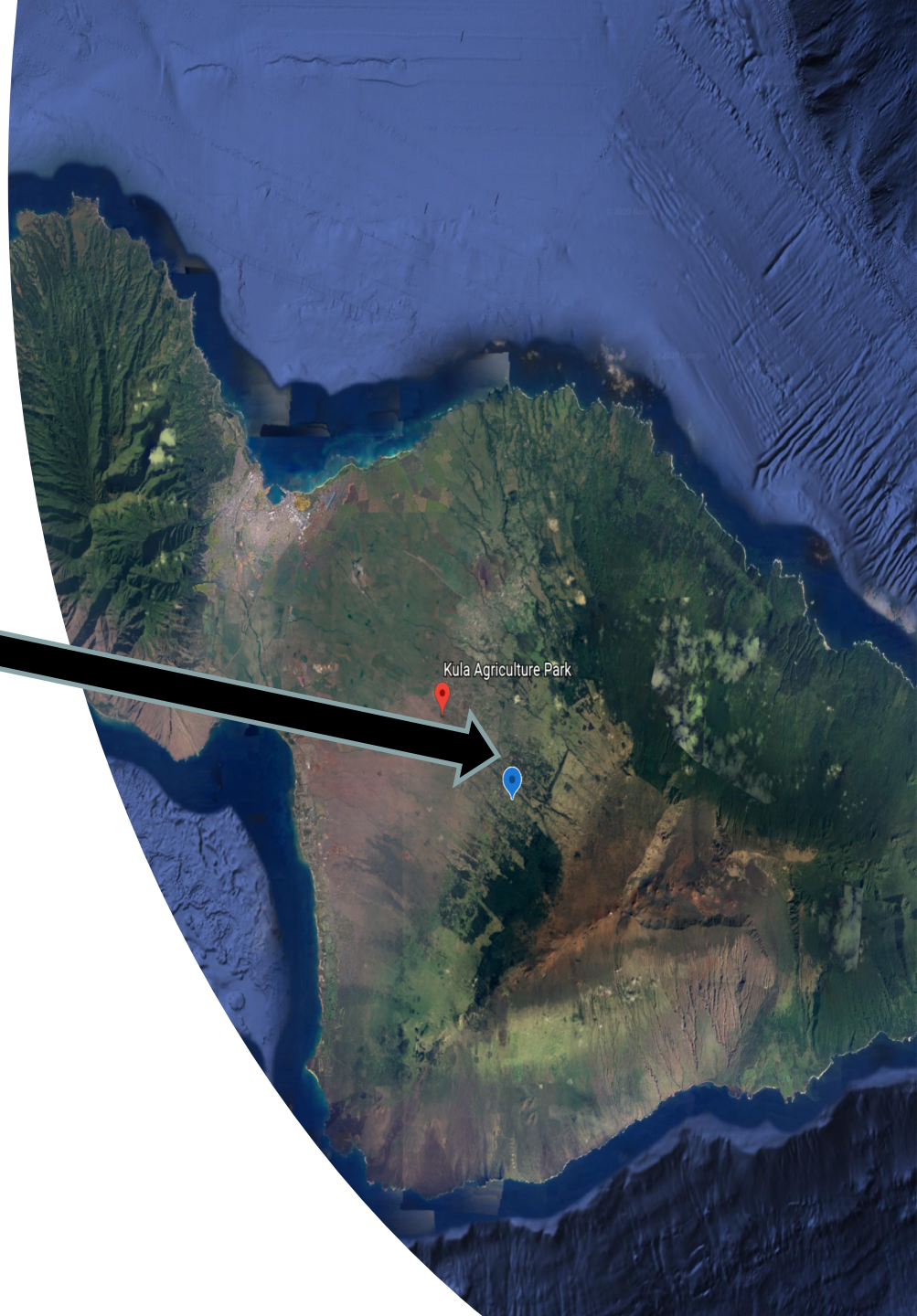
Photo: G.  
Teves



# 2019 Trial Location

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- Maui Agricultural Research and Extension Center
- Elevation: 3300'
- Annual Rainfall: 24"
- Soil: Kula series
  - Fluffy texture
  - Good tilth
  - High water holding capacity
  - Fast permeability
  - Naturally fertile





# 2019 Planting

- ‘Hawaiian Red’
- ‘Olena’
- ‘Joy’
- ‘BKK’
- ‘Roma’ (new addition)
- Planted July 2019



Data coming soon!



Thank you!

[kylielw@hawaii.edu](mailto:kylielw@hawaii.edu)





Department  
of Agriculture

STATE OF HAWAII

# Marketing Turmeric

Market Development Branch  
Hawaii Department of Agriculture  
May 28, 2020





## Turmeric in the time of COVID-19

### **Market research**

- <https://www.mccormickscienceinstitute.com/>
- Immunity – Antioxidant

### **Statistics**

- USDA,
- Euromonitor International

### **Grants**

- Federal (SCBG, SPP, STEP etc.)



**Hawaii  
Seal of Quality  
Program  
Overview**







# Application Process



- Visit SOQ pre-qualify checklist
- Download an application form from the HDOA website and fill out.
- Mail to HDOA with \$50 check.
- Inspection by Quality Assurance Division.
- One-year Agreement to sign.
- Renew Agreement every year.





# SOQ Member Benefits



- Professional Photography
- Listing HDOA Website, Facebook page, SOQ brochures
- Creating Rack Cards
- Retail & Culinary Events
- Media/Public Relations Campaign
- Free collateral







Contact: Yukashi Smith  
808-973-9627  
yukashi.m.smith@hawaii.gov  
[hdoa.hawaii.gov/add/md/seals-of-quality](https://hdoa.hawaii.gov/add/md/seals-of-quality)

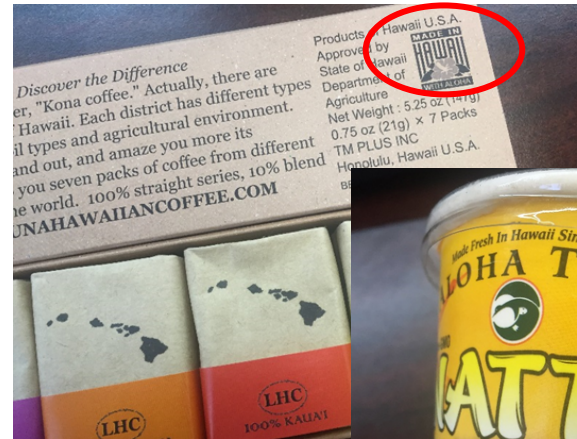




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of Agriculture

STATE OF HAWAII

## “Made in Hawaii with Aloha” Program



- Differentiate Hawaii products from products made elsewhere yet called Made in Hawaii
- 51% or more cost must be incurred in the state
- Registration is Free
- 1 year term (renew every year)
- [www.hdoa.Hawaii.gov/madewithaloha](http://www.hdoa.Hawaii.gov/madewithaloha)





# Hawaii Agriculture & Food Products Database

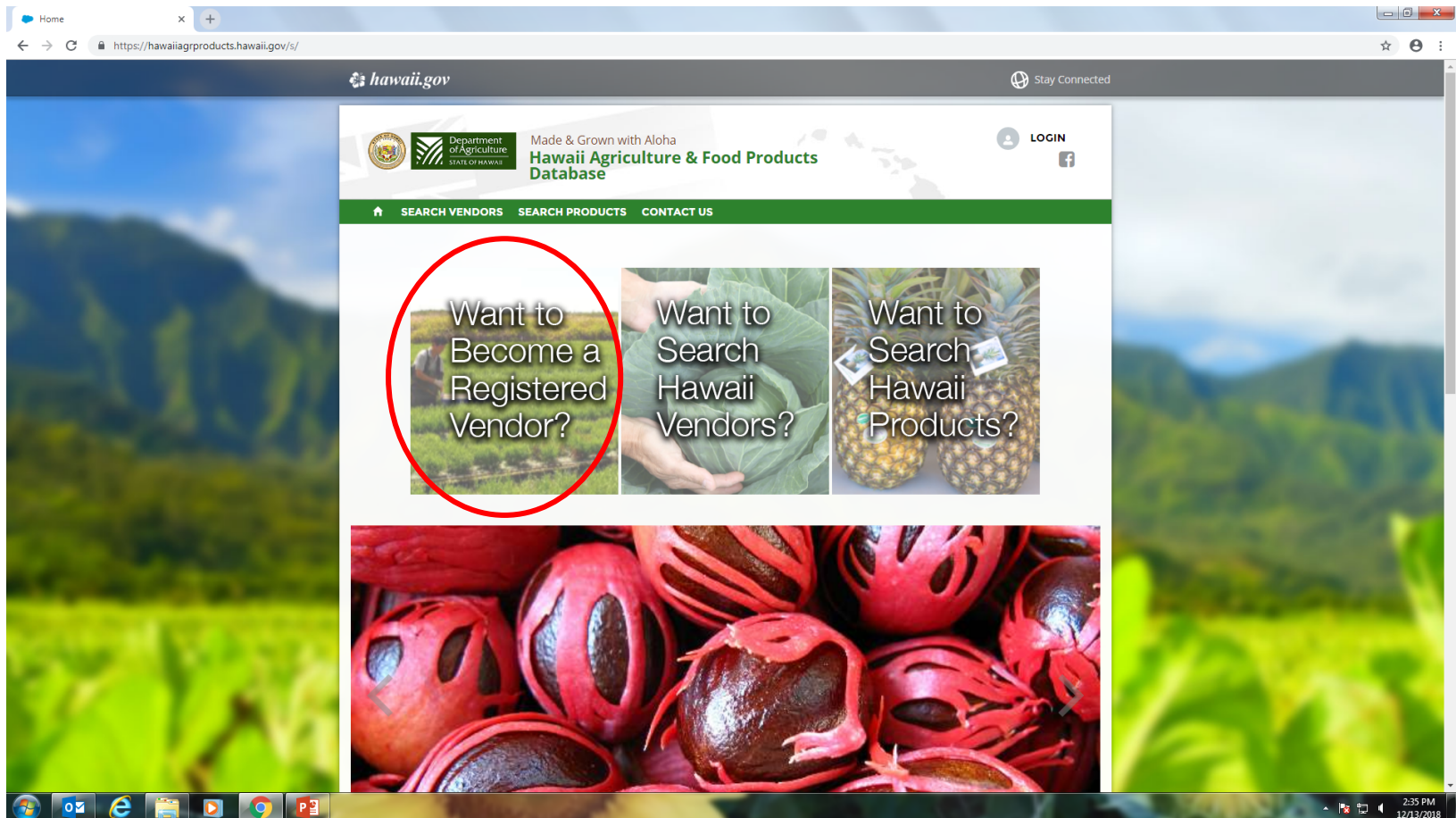
- Links vendors and buyers
- Total value of products must be at least 51% of Hawaii origin, either raw product, added value or both
- No cost to Hawaii agribusinesses
- Business owners can update their own data & inventory
- Includes product certifications
- Prerequisite for the Aina Pono Farm to School Initiative
- <https://hawaiiagrproducts.hawaii.gov/s/>





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STATE OF HAWAII

# Hawaii Agriculture & Food Products Database



# Hawaii Agriculture & Food Products Database

SearchProducts x +  
https://hawaiiagrproducts.hawaii.gov/s/searchproducts

Department of Agriculture  
STATE OF HAWAII  
Made & Grown with Aloha  
Hawaii Agriculture & Food Products Database  
LOGIN

SEARCH VENDORS SEARCH PRODUCTS CONTACT US

**Disclaimer:** This database is a voluntary listing that is non-exclusive and shall not be considered as an endorsement by the State of Hawaii of the products and vendors listed. Vendors are responsible for the content represented and the State of Hawaii is not responsible for determining the accuracy of the information given or the quality of the products listed.

### Hawaii Agriculture & Food Products Search

Please note that to select multiple items AND remove selected options, you need to hold CTRL (Command ⌘ on Mac) and click your selection. Your results will be displayed below.

Product Name:  Product Description:

Product Category:  Product Type:

Certifications: 

- Certified Halal
- Certified Kosher
- Certified Made in Hawaii
- Certified Seals of Quality
- GAP/Food Safety Certified

HS Code:

Product Name	Product Category	Product Type	Certification Seals	Business Name
No data available in table				

Showing 0 to 0 of 0 entries Previous Next

HELPFUL LINKS POLICIES  
Seals of Quality Terms of Use  
Made in Hawaii with Accessibility  
Aloha

contact email  
website

STATE OF HAWAII

11:27 AM  
12/18/2018





Department  
of Agriculture

STATE OF HAWAII

# Mahalo!



Phone: 808-973-9595

Email: [hdoa.md@Hawaii.gov](mailto:hdoa.md@Hawaii.gov)

# Mahalo



*SeaSons*  
ORGANICS





# ‘Roma’





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