

Final Report

USDA/FSMIP: Revitalizing Hawaii's Ginger Farming by Establishing Turmeric Standards

15-FSMIP-HI-0003

Report By: Alvin Huang
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Brief Summary of Each Objective in Work Plan (scheduled for the first 6 months):

1. Instrumental methods to quantify color in Hawaii red turmeric.

The UV-Vis spectrophotometric data have clearly shown the typical curcumin peak at 423nm in Hawaii turmeric extract, while the imports contain unknown peaks at 368nm. A visual color chart will be established to correlate the UV-Vis data for farmers' use.

2. Laboratory procedure to determine heavy metal content in turmeric.

The ICP standard and several turmeric samples from Hawaii have been tested. The only heavy metal may be a concern in Hawaii turmeric is arsenic and more tests will be conducted to closely monitor this element.

3. Other culinary attributes of Hawaii turmeric.

The sensory method is deemed to be the best procedure in establishing objective measurement of the spiciness and mouth-feel of the turmeric product. A culinary trained, second year food science graduate students has been offered a graduate assistantship to start in July.

Other on-going project activities

1. Establish the Hawaii grading, packaging and labeling of fresh and cured turmeric roots.

The common elements in the Hawaii produce grading systems are 1) Basic varietal requirements, 2) the 'Free From' items and 3) the "Free From Injuries Caused By" items. These items can be determined visually and are similar for grading both ginger and turmeric roots.

The weight limit for Hawaii grade 1 ginger is "not less than 4 ounces (or 120 grams)".



The Hawaii turmeric roots randomly selected, washed/cleaned resulted an average weight of 4.29 oz (N=10). Eight of the 10 roots were above 4 oz. Photo above shows a typical Hawaii full size turmeric rhizome (on right), vs. an injured off-grade rhizome. Farm visits in late May will seek direct farmer input on grade establishment.

2. Promote the Hawaii turmeric with mail survey outreach to the spice trades to seek export opportunity.

A domain name (TurmericfromHawaii.com) has been secured. The website is being constructed to be used a promotion center for Hawaii's turmeric products. The two major turmeric suppliers (KauaiOrganicfarms.com and PinnerCreekOrganics.com) will be linked with this new website. Mail survey to west coast healthy food distributors have found very positive response in turmeric supply from Hawaii.

Describe unexpected delays or impediments:

The interagency funds transfer and the signing of subcontract agreement from University of Hawaii to Hawaii DOA took almost 4 months to complete, therefore, the original plan to attend the American Spice Trade Association (ASTA) meeting in April had to be changed. The ASTA 2016 meeting will be held in Scottsdale Arizona, from April 10 – 13. We are gearing toward a positive showing of Hawaii turmeric in the 2016 ASTA meeting.

Describe Favorable or unexpected development:

A poster presentation has been accepted for a National Value-Added Conference (May 18 in Austin, Texas) on our preliminary findings and plan for adding value to Hawaii turmeric through establishing standards.

Outline the work to be performed during the next six months:

Working closely with Hawaii DOA to firm up the grading and safety standards of Hawaii turmeric. Interisland trips planned in May for farm visits.

Having the new graduate assistant build up the culinary (color, visual and taste) attributes of Hawaii turmeric, in comparison with turmeric products from India. More monitoring on the arsenic content in Hawaii samples.

Comment on the level of grant funds and matching contributes to date:

A graduate assistantship has been committed for one year with grant funds (fall 2015 to summer 2016). First year ravel funds (\$5K) to Hawaii DOA is delayed until May, with the second year funds (\$4K) hopefully to be transferred in July. Hawaii DOA first year matching of \$5K for interisland travels and \$2k for supply have been set up. UH salary matching for the PI has been on-going.



Progress Report

Report Period: April 1 to September 30, 2015 (Second Six Month Period)

**Reported By: Alvin Huang, CTAHR, University of Hawaii
Sharon Hurd, Agricultural Development Div., Hawaii DOA**

Brief Summary of Each Objective in Work Plan (scheduled for the second 6 months):

Instrumental methods to quantify color in Hawaii turmeric rhizomes.

A visual color chart has been established to correlate the curcumin content (in the range of 0.5% to 3.5% w/w) to the color appearance of turmeric cut surface. Hawaii DOA will use funds available to purchase a hand-held colorimeter to gather direct reading data in a tri-colorimetric system of (L,a,b,) which is an international standard in color appearance measurement.

Other culinary attributes of Hawaii turmeric. The sensory method is deemed to be the best procedure in establishing objective measurement of the spiciness and mouth-feel of the turmeric product. The photo shows newly hired graduate assistant Elliott at work with able assistance from Chelsea in our sensory lab.

Other on-going project activities –

Establish the Hawaii grading, packaging and labeling of fresh and cured turmeric rhizomes.

The cured turmeric roots are the major form to be shipped to US Mainland. Farmers have been using electric dryers to cure the roots but the electricity costs in Hawaii are very high, especially on neighbor islands of Kauai and the Big Island where ginger and turmeric are grown. A 100% off-grid solar dehydrator developed for drying other crops will be tested for drying turmeric. Small scale solar drying has yielded very promising results both in terms of color and taste.

Promote the Hawaii turmeric with mail survey outreach to the spice trades to seek export opportunity.

A domain name (TurmericfromHawaii.com) has been secured. The website is being developed as a promotion center for Hawaii's turmeric products. The website is now available (publicized) to search engines on the internet.



Describe unexpected delays or impediments:

On-site visits with turmeric farmers have not proceeded as planned. A workshop is being planned for next summer to open to all interested farmers.

Describe Favorable or unexpected development:

A poster presentation was conducted at the National Value-added conference last May in Austin Texas. A lot of interest was gathered from food processors about the availability of Hawaii turmeric supplies.

Outline the work to be performed during the next six months.

1. Working closely with Hawaii DOA to firm up the grading and safety standards of Hawaii turmeric. More interisland trips to visit farmers will be conducted in the coming months.
2. Having the new graduate assistant build up the culinary (color, visual and taste) attributes of Hawaii turmeric, in comparison with turmeric products from India. More monitoring on the arsenic content in Hawaii samples.
3. More experimentation on solar drying of turmeric rhizomes.

Comment on the level of grant funds and matching contributes to date:

Hawaii DOA first year matching of \$5K for interisland travels and \$2k for supply has been made available. UH salary matching for the PI has been on-going.

Request a shifting of \$1000 from travel to supply category in anticipation of solar drying costs and preparation for next year's workshop.

Progress Report

Report Period: October 1, 2015 to March 31, 2016 (Third Period Report)

**Reported By: Alvin Huang, CTAHR, University of Hawaii
co-PI Sharon Hurd, Agricultural Development Div., Hawaii DOA**

Brief Summary of Each Objective in Work Plan (scheduled for the third 6 months):

Instrumental methods to quantify color in Hawaii turmeric rhizomes.

A visual color chart has been distributed to several farmers in Hawaii for their QC use. Feedback has been positive.

Other culinary attributes of Hawaii turmeric.

The sensory panel has identified several common attributes among the Hawaii Red, Orange and Black varieties. The photo below shows Hawaii turmeric can command high price in California (photo taken in February 2016)



Other on-going project activities –

Establish the Hawaii grading, packaging and labeling of fresh and cured turmeric rhizomes.

A recent e-mail survey located 7 Farms currently growing Hawaii turmeric. Samples from these farms have been collected. Photo below shows the range of color among Hawaii turmeric rhizomes. The curcumin content ranges from 0.2% to 2.6% on dry weight base. The shelf life study indicates rhizomes of high curcumin content are shelf stable at the cured stage (moisture content 70% or lower) for up to 3 weeks. These results correlate well with the photo shown above. Photo taken in early February of this year, and demonstrating that Hawaii Red turmeric can be retailed for \$14.99/lb, even early in the season. This is most likely attributed to good shelf life and the high quality that rhizomes are able to maintain.



Describe unexpected delays or impediments:

The \$9000 sub-award from University of Hawaii to Hawaii DOA was established in the first year (April 2015), but funds were never transferred. We are currently trying to locate the sub-award document and figure out ways to expedite the fund transfer.

Describe favorable or unexpected development:

The originally planned Spice Trade Association meeting in April was only attended by co-PI Sharon Hurd. There were approximately 350 in total attendance. PI Alvin Huang attended the Natural Product Expo West in March with funding mainly from another grant, but distributed Hawaii turmeric samples and information, with very good acceptance from west coast brokerage firms.

Outline the work to be performed during the next six months.

1. Working closely with Hawaii DOA to firm up the grading and safety standards of Hawaii turmeric.
2. More experimentation on solar drying of turmeric rhizomes and its impact on shelf stability.

7. FINANCIAL ACCOUNTING

		Current Budget	EXP	ENC
	Categories			
C100	SALARIES & WAGES	42,600.00	51,724.00	
C101	OVERLOAD	0.00	0.00	
C102	CASUAL	0.00	0.00	
C103	STUDENT HELP-REGULAR	0.00	0.00	
C104	STUDENT HELP-WORKSTUDY	0.00	0.00	
C105	FRINGE BENEFITS	16,737.00	7,366.79	
C106	SERVICES-FEE BASIS	4,000.00	1,715.00	
	SUB-MTDC EXPEMPT	0.00	0.00	
C107	MATERIALS & SUPPLIES	8,000.00	9,500.33	
C108	TRAVEL-DOMESTIC	9,100.00	8,712.16	
C109	TRAVEL-INTERNATIONAL	0.00	0.00	
C110	PRINT & PUBLICATIONS	0.00	59.88	
C111	UTILITIES & COMMUNICATION	0.00	132.43	
C112	RENTALS	0.00	166.49	
C113	REPAIRS	0.00	0.00	
C114	TUITION	0.00	0.00	
C115	STIPENDS & ALLOWANCES	0.00	0.00	
C116	EQUIPMENT	0.00	0.00	
C117	OTHERS	0.00	1,059.92	
	Total Direct Costs	80,437.00	80,437.00	0.00
C990	Total Indirect Costs (%)	0.00	0.00	0.00
	Total Costs	80,437.00	80,437.00	0.00