

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Global Food Security and Hunger

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	0%		4%	
102	Soil, Plant, Water, Nutrient Relationships	15%		5%	
104	Protect Soil from Harmful Effects of Natural Elements	0%		5%	
121	Management of Range Resources	0%		4%	
131	Alternative Uses of Land	4%		1%	
205	Plant Management Systems	16%		16%	
212	Pathogens and Nematodes Affecting Plants	6%		10%	
301	Reproductive Performance of Animals	18%		0%	
305	Animal Physiological Processes	10%		12%	
306	Environmental Stress in Animals	8%		2%	
307	Animal Management Systems	12%		10%	
402	Engineering Systems and Equipment	0%		6%	
502	New and Improved Food Products	2%		0%	
503	Quality Maintenance in Storing and Marketing Food Products	0%		7%	
511	New and Improved Non-Food Products and Processes	0%		11%	
601	Economics of Agricultural Production and Farm Management	3%		5%	
607	Consumer Economics	3%		2%	
608	Community Resource Planning and Development	3%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Extension	Research
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Year: 2013	1862	1890	1862	1890
	Plan	8.0	0.0	23.0
Actual Paid Professional	6.8	0.0	7.8	0.0
Actual Volunteer	0.8	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
220036	0	417253	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
768567	0	1719982	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
415409	0	648967	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

CTAHR can play a pivotal role in supporting the national priorities in global food security and hunger because Hawai'i has an environment that is similar to that of other developing countries in the tropical and subtropical regions. This program utilizes integrated research, extension, and education projects to provide knowledge and technologies to generate and improve products and processes for existing and expanded markets.

Since the first "inoculated deep litter system" (IDLS) piggery in the United States was constructed four years ago under a CTAHR extension agent in Hilo, the facility design is now recommended as a best waste management practice by USDA NRCS and the Hawaii Department of Health. USDA now allows cost-sharing to aid in the construction or conversion of existing swine production facilities to incorporate IDLS components. Regulatory agencies were able to witness IDLS' ability to handle waste with no pen cleaning or discharge of waste water over 4 years, significantly reducing the negative impacts of effluent on soil, fresh water, and shorelines. During the past year, 40 small-scale poultry enclosures ("Hubbell Bubbles") using a modified IDLS were constructed in Hilo, providing food and a source of income to these families. The accessibility of incorporating IDLS components into new or existing swine or poultry production facilities through federal cost-sharing and the inherently low cost of maintaining these facilities bring the state a step closer to food self-sufficiency.

In 2013 a regional conference (Tropical Pasture and Livestock Management Conference) was held on the Pacific island of Tinian, CNMI (<http://manoa.hawaii.edu/ctahr/tpalm/index.html>). Many Hawaii producers participated in this four day conference. Four workshops covering Artificial Insemination practices and Beef Herd Management were also held throughout the Pacific region. Also a Stockman's Fall Field Day was held at the Mealani Agricultural Research Station providing participants with information on low-input beef cattle production, risk management, drought management, and the Secusio rearing and release program for fireweed control. As a result of the workshops and demonstration/trials, over 45

producers have indicated adoption of at least one or more technologies or management practices presented. Many have planted sample seed provide during workshops into their pastures, adopted better animal husbandry practices and/or grazing management practices. Several producers are now conducting, with assistance, herd genetic improvement through artificial Insemination programs. Producers are making better management decisions regarding pasture condition and weed management.

Taro (*Colocasia esculenta*) is an important crop in Hawaii especially to native Hawaiians. An important initiative of the native Hawaiian community is the preservation and cultivation of native Hawaiian taro. Historically, there were as many as 300 taro (kalo) varieties in native Hawaiian communities, while today there are only 60-70 native Hawaiian taro varieties in cultivation. Taro is also thought to be a crop with significant value for local as well as global food production potential since it is productive, highly nutritious (a high protein staple crop with gluten free and highly digestible starch), and relatively pest and disease resistant. CTAHR maintains germplasm collections on research stations on the islands of Kauai, Oahu, Molokai and Hawaii. In 2013, field days were held on the islands of Oahu (250 participants) and Molokai (180 participants) which attracted commercial farmers, back yard growers and a multi-generational mix of community members. The objectives of the field days were to educate commercial farmers and the general public about the work being conducted by CTAHR and partnering agricultural agencies across the state in promoting sustainable and organic agriculture, showcasing our taro collections, and demonstrating how research, education and innovation are being used to protect, propagate and perpetuate taro using transitional as well as nontraditional methods. Thousands of taro plants of over 60 varieties were distributed at these events to hundreds of participants who will grow them in the farms and homes.

Taro leaf blight (TLB), caused by an oomycete pathogen, is a worldwide disease that threatens sustainable taro cultivation. Although researchers in Hawaii were successful in past years in developing TLB resistant lines through genetic modification, public concern over cultural values and resistance to this methodology necessitated destruction of the research products and abandonment of this otherwise successful approach to TLB resistance. Current research emphasizes development of resistant hybrids through conventional breeding, including marker-assisted selection. Results of a mail-in consumer survey with 476 respondents established that taro hybrids developed through marker-assisted selection were acceptable to consumers, but that an educational program to inform consumers of the difference between this technique and genetic modification was an essential prerequisite to acceptance, since both genetics and DNA hold strong negative connotations when associated with agriculture. Markers have now been identified that segregate with resistance and susceptibility, and validation for us to accelerate breeding efforts is currently in progress.

Aquaculture (fish cultivation) and aquaponics (soil-less plant and fish co-cultivation) hold great promise as space-efficient and intensive methods of food production. FY2013 research established Hawaiian slipper lobsters as good candidates for aquaculture, and testing of holding systems was initiated. Economic analysis found that crustacean and mollusk farms were the strongest performers in commercial aquaculture in Hawaii, although production costs were 3.5-fold greater than in the continental USA. Aquaponics researchers focused on effective pest management on vegetable crops, and demonstrated that the properties of Hawaiian herbs of medicinal value grown in soil and in soil-less culture were equivalent, addressing concern of cultural practitioners and opening up cultivation possibilities.

The high cost of imported agricultural inputs continues to be a major problem in Hawaii for aquaculture, livestock production and crop production. In a spin-off from biofuels feedstock research, research was initiated in FY2013 on drought-tolerant grass crosses for pasture and livestock feed. Innovative methods of using locally produced inputs, such as vermicompost teas, were also evaluated and extended through both publications and workshops. A green manure cropping system was also demonstrated to reduce incidence of plant parasitic nematodes and promote greater yields of taro.

2. Brief description of the target audience

This program audience is quite diverse, encompassing ranchers and commercial and hobbyist livestock producers in Hawaii and the American-affiliated Pacific Islands, aquaculturists, food industries and marketers, as well as scientists, students, and educators involved in knowledge generation and dissemination. Since the general public in the Pacific Islands is increasing interested in food sustainability issues, the audience can include large segments of the population.

3. How was eXtension used?

Aquaculture faculty participated in development of eXtension through national committee membership, and are active users.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	8724	35962	5568	13766

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2013
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	55	26	81

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days and demonstrations.

Year	Actual
2013	100

Output #2

Output Measure

- Presentations at international and national meetings

Year	Actual
2013	10

Output #3

Output Measure

- Grant proposals submitted

Year	Actual
2013	34

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of people that adopt one or more recommended practices.
2	Total dollar value of grants and contracts obtained

Outcome #1

1. Outcome Measures

Number of people that adopt one or more recommended practices.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	826

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

People need to be more competitive in reducing costs and/or increasing revenues. Currently many farmers and ranchers are struggling to stay in business and produce food for global consumers. At the same time increased food production in home gardens and backyards can be an important supplement to incomes and local food sufficiency. Better food processing and marketing practices will leader to greater profitability, food availability and food safety.

What has been done

Workshops demonstrations, field days, presentations, websites, and publications have changed many peoples knowledge and behavior so they can better achieve their sustainable food production goals.

Results

Hawaii and Pacific Island farmers, ranchers and residents are more competitive and the local supplies of food will be more abundant and secure.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
305	Animal Physiological Processes
307	Animal Management Systems
503	Quality Maintenance in Storing and Marketing Food Products
511	New and Improved Non-Food Products and Processes

Outcome #2

1. Outcome Measures

Total dollar value of grants and contracts obtained

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	2143349

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Funds are needed to undertake research and extension activities to assist producers.

What has been done

Grant funds have been received.

Results

The information needed by the public will be provided and the size of Hawaii's economy will increase if more external funds are received and more assistance can be provided to producers and the public.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
121	Management of Range Resources
131	Alternative Uses of Land
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
301	Reproductive Performance of Animals

305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
402	Engineering Systems and Equipment
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management
607	Consumer Economics
608	Community Resource Planning and Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

Natural disasters such as hurricanes, typhoons, floods, fires, often are destructive to crops, livestock operations, and home garden production. When these events occur, local food production can be temporarily disrupted and island residents become increasingly dependent on imported foods. If transportation facilities are also impaired, local food shortages occur. Under normal conditions, island food production and processing is greatly impacted by mainland and foreign producers with greater economies of scale. This leads local producers and processors to specialize in niche markets, which leads to a high percentage of imported foods, particularly for many staple food materials. Also fragile island environments have led to many government regulations on land use, food production and pollution control, which are perceived by producers as stifling their productivity and profitability. When local economies experience downturns, public priorities that relate to health and safety can be stressed, causing less funding to be available to on-going research, education and public outreach.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

All projects conducted under this program were peer-reviewed before initiation. Annual progress reports were collected and evaluated by Associate Deans for research and extension. Funds were not released for those projects which did not show tangible progress.

Key Items of Evaluation

None.