

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Sustainable Energy

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
102	Soil, Plant, Water, Nutrient Relationships	0%		6%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		6%	
205	Plant Management Systems	0%		8%	
404	Instrumentation and Control Systems	0%		10%	
501	New and Improved Food Processing Technologies	0%		12%	
502	New and Improved Food Products	0%		8%	
511	New and Improved Non-Food Products and Processes	0%		50%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.5	0.0
Actual Paid Professional	0.0	0.0	1.6	0.0
Actual Volunteer	0.0	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
0	0	22979	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	425759	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	1703758	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Hawaii has the highest energy costs in the nation, due to dependence upon imported fossil fuels for power and transportation. The goals of CTAHR programs in this area are to (1) efficiently grow perennial crops on marginal lands as feedstock for biofuels; (2) develop and promote the use of these locally produced biofuels as alternatives to imported fossil fuels; (3) identify useful and commercially-viable co-products of biofuel cultivation and processing; and (4) develop energy efficient methods for production and processing of agricultural produce.

To determine the optimal lignocellulosic substrate for ethanol production in Hawaii, and optimal cultivation practices, napier grass, energycane, sweet sorghum and sugarcane plots were established at three elevations with three irrigation regimes. In FY2013, low biomass yields and need for multiple harvesting indicated that sweet sorghum to costly an option for use in the tropics, and these trials were terminated. Two promising hybrid crosses of napier and pearl millet were identified, however, with the potential for high biomass yield and drought resistance, two highly desirable characteristics. One of these crosses, under the name banagrass, was incorporated into the field evaluations. Field trials with the oil crop *Jatropha curcas* demonstrated that fertilizer applications are essential on marginal land, despite reports to the contrary, and research is continuing to optimize nutrient applications for greater oil yields.

Development of a photovoltaic solar dryer as an economical tool for drying taro and sweet potato proceeded with development of procedures for pretreatment of taro corms and documentation of the drying rate of the treated corms over a 48 hour period. Reduction of dependence on fossil fuels for common agricultural practices is an important research direction to address food security issues on the Pacific islands.

2. Brief description of the target audience

Hawaiian Electric Company is a target for improved energy production, and partially supports this research. The DOD Office of Naval Research is also interested in providing the military with clean, renewable transportation fuel. Private firms such as Hawaiian Commercial and Sugar Company (HC&S) (grasses), Pacific Biodiesel Inc., Zeachem Inc., and Hawaii Pure Plant Oil (HPPO) (*Jatropha*) are partners and target audiences for these efforts. Lastly, the Hawaii Agricultural Research Center (HARC), Hawaii Natural Resources Institute, College of Micronesia, University of Guam, Oregon State University, and Washington State University are both collaborators in current efforts and audiences for improved biofuel production technologies.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	10	0	40	0

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	0	2	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals submitted

Year	Actual
2013	7

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2013	0

Output #3

Output Measure

- Number of workshops and other educational/outreach activities held.

Year	Actual
2013	3

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Identified types of bioenergy crops suitable for Hawaii environment.
2	Dollar value of grants and contracts received

Outcome #1

1. Outcome Measures

Identified types of bioenergy crops suitable for Hawaii environment.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Hawaii is dependent on imported fossil fuels and has the highest energy costs in the nation. Biofuel production with locally grown biomass or oil crops is necessary for energy sustainability in Hawaii.

What has been done

Field trials were conducted at three elevations and with three irrigation regimes. Input needs and costs were evaluated for four grasses and Jatropha, and a new grass cross developed. Results were presented in a field day with 7 farmers and extension agents in attendance.

Results

Fertilizer application was found necessary for Jatropha on marginal soils, despite reports to the contrary. Low biomass yield of sweet sorghum was found to make it too costly for tropical cultivation. A napier-pearl millet cross was identified as a promising alternative to sweet sorghum, and field tests initiated.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
201	Plant Genome, Genetics, and Genetic Mechanisms
205	Plant Management Systems
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies

502	New and Improved Food Products
511	New and Improved Non-Food Products and Processes

Outcome #2

1. Outcome Measures

Dollar value of grants and contracts received

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	119005

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Resources are needed to conduct research and extension programs to assist stakeholders.

What has been done

Resources were obtained and programs were conducted.

Results

Hawaii's economy benefited from external funds and programming to assist stakeholders was conducted.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
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511 New and Improved Non-Food Products and Processes

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

This is a relatively new program area for the college, and faculty numbers are limited. Funding for the Sun Grant program has been drastically reduced since FY2010.

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 the associate deans for research and extension. Funds are not released for those projects which did not show tangible.

Key Items of Evaluation

None.