

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% | | 16% | |
| 201 | Plant Genome, Genetics, and Genetic Mechanisms | 0% | | 6% | |
| 205 | Plant Management Systems | 0% | | 8% | |
| 402 | Engineering Systems and Equipment | 0% | | 10% | |
| 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% | | 30% | |
| | Total | 0% | | 100% | |

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

| Year: 2014 | Extension | | Research | |
|-------------------------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 0.0 | 0.0 | 2.0 | 0.0 |
| Actual Paid | 0.0 | 0.0 | 1.5 | 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 | 85409 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 0 | 0 | 338345 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 0 | 0 | 68288 | 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.

Field trials across the state continued in order to determine the optimal lignocellulosic substrate for ethanol production in Hawaii. Napier grass, a high yielding perennial feedstock was found to show very little change in cellulose content with age. Napier grass has limited drought tolerance, however, and Napier grass / pearl millet crosses were found to have both drought resistance and high biomass yield. An added benefit of this research in FY2014 was development of one of these crosses as nutritious animal forage, supporting synergy of biofuel and forage production in Hawaii.

In addition to Napier grass, three energycane varieties, ratooned green banagrass (a Napier grass / pearl millet hybrid), and purple banagrass were tested for Biochemical Methane Potential (BMP). Ratooned green banagrass had the highest methane yield per cultivation area, and warrants further study.

An additional sustainable energy project in CTAHR is the development of a photovoltaic solar dryer as an economical tool for drying taro and sweet potato. Reduction of dependence on fossil fuels for common agricultural practices is an important research direction to address food security issues on Pacific islands. In FY2014, a prototype solar dryer was released to local farmers and processors for evaluation. One of these producers has leveraged this technology into statewide grocery contracts expected to gross two million dollars in 2015.

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

| 2014 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|--------|------------------------|--------------------------|-----------------------|-------------------------|
| Actual | 16 | 0 | 0 | 0 |

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

| 2014 | Extension | Research | Total |
|--------|-----------|----------|-------|
| Actual | 0 | 6 | 6 |

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals submitted

| Year | Actual |
|------|--------|
| 2014 | 8 |

Output #2

Output Measure

- Presentations at national and international meetings.

| Year | Actual |
|-------------|---------------|
| 2014 | 3 |

Output #3

Output Measure

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

| Year | Actual |
|-------------|---------------|
| 2014 | 2 |

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 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2014 | 2 |

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

Effects of age were evaluated with Napier grass, a high yielding perennial feedstock. Five candidate biofeedstocks were evaluated for methane yield.

Results

It was found that Napier grass cellulose content does not change with age. Ratooned green banagrass was found to have the highest methane yield per cultivation area.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|----------------|--|
| 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 |
|-------------|---------------|
| 2014 | 293724 |

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 |
|----------------|--|
| 404 | Instrumentation and Control Systems |
| 501 | New and Improved Food Processing Technologies |
| 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.