

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Sustainable Energy

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
511	New and Improved Non-Food Products and Processes	0%		100%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	0.8	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	717	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	190551	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	768846	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The state of Hawai'i depends heavily upon imported fossil fuels for power and transportation. The ultimate goals of this program are to efficiently grow perennial crops on marginal lands as feedstock for biofuels and to develop and promote the use of these locally produced biofuels as alternatives to imported fossil fuels. The objectives of this program are to (1) demonstrate the technical and economic feasibility of

producing ethanol from lignocellulosic biomass, (2) demonstrate the technical and economic feasibility of producing vegetable oil for biodiesel production, and (3) demonstrate the technical and economic feasibility of producing charcoal from bioresidue generated in the course of producing ethanol and biodiesel. Planned activities are to (1) determine the optimal yield and quality of guinea grass for conversion as a function of harvesting frequency, irrigation, and fertilizer treatments; (2) conduct field experiments with *Jatropha curcas*, a tree that produces a nut with great potential as a source of oil for conversion into biodiesel; and (3) develop and demonstrate the use of dried guinea grass and the shell and husk of *Jatropha* nuts as feedstock for conversion into charcoal using flash carbonization.

On the continental US, dry matter yield ranging from 15 - 30 Mg/ha/yr is considered high. In Hawaii, our long growing season enable us to produce dry matter yield as high as 100 Mg/ha/yr. High yields in Hawaii, however, have been obtained on prime agricultural lands, and our goal is to retain these lands for food production and learn to produce biomass for biofuels on the state's marginal, underutilized lands. In Hawaii, these underutilized lands occur at high elevations where air temperature is too low for most crops, and in the rain shadow of our high mountains where rainfall too low. Guinea grass is drought tolerant, but is not suitable for the high elevation zones. Our work shows that napier grass can perform well at 1000m elevation. We now need to learn whether napier grass can perform well in the dry, high elevations zones of the state. The napier grass-millet hybrid, developed by Dr. Joy is a promising candidate for the cool, dry zones of the state. High oil yields claimed by *Jatropha* promoters have not been achieved in practice. However, high yielding trees have been identified, but seeds from these trees produce progeny that vary greatly in size, shape and oil yield. We are pursuing tissue culture as a route to consistently high-yielding trees. Our research so far indicates that charcoal is a high specific surface, variable charge material with physical and chemical properties very similar to our high specific surface, variable charge clay soils. However, the charcoal used to purify sewage water has its pores filled with nutrients removed from the sewage water, and this nutrient-rich biochar may have the carbon sequestering and agronomic value we have been looking for.

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) and Hawaii Pure Plant Oil (HPPO) (*Jatropha*) are partners and target audiences for these efforts. Lastly, the Hawaii Agricultural Research Center (HARC) and Hawaii Natural Resources Institute are both collaborators and audiences for improved biofuel production.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA}	{NO DATA}	{NO DATA}	{NO DATA}
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010

Plan:

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals submitted.

Year	Target	Actual
2010	{No Data Entered}	8

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Target	Actual
2010	{No Data Entered}	0

Output #3

Output Measure

- Number of workshops and other educational activities held.

Year	Target	Actual
2010	{No Data Entered}	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Dollar value of grants and contracts obtained.

Outcome #1

1. Outcome Measures

Dollar value of grants and contracts obtained.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1677728

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
511	New and Improved Non-Food Products and Processes

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

This is a relatively new program area for the college, and faculty numbers are limited due to both retirements and competing program needs.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)

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 progress.

Key Items of Evaluation

None.