

# 2009 University of Hawaii Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 05/26/2010

## I. Report Overview

### 1. Executive Summary

Hawaii's financial downturn has resulted in a significant reduction in state support. The University of Hawaii, Mānoa (UHM) has been making changes to accommodate a 26% reduction (\$66m) in general fund support. Some temporary relief has come from stimulus funding and salary savings, which will end in 2012. The attention of UHM is now focused on reducing current expenses and generating new revenues to meet the challenge of undiminished expectations in the face of fewer resources.

UHM is monitoring high-demand courses and shifting teaching personnel to meet demand. Energy conservation efforts have increased and as a result during the two month period from December 2009 to January 2010, electricity costs were by saving 177,000 kilowatt hours for a total reduction of \$225,000 as compared to the previous year and a total reduction for the year of 7%. This was accomplished primarily through the replacement of old mechanical systems, along with the closure of 20 campus buildings as part of Mānoa Green Days.

Unfortunately, the budget reductions have also reduced the number of UH Mānoa faculty, staff and administrators by nearly 6%, or 370 positions. Because of such losses, UHM has had to reduce services and restrict opportunities for faculty, staff, students and community members. In addition, because of building failures, most recently Gartley Hall, we face unexpected and significant costs to our campus repairs and maintenance budget.

While both civil service union and professional staff union have accepted a 5% pay cut, the savings will account for only 15% of 2011 budget shortfall. The newly approved faculty union contract included a temporary 5% salary cut; however, the anticipated savings from the faculty salary reductions will not be spent because this salary saving must be returned to the faculty in the years 4, 5 and 6 of the contract as lump sum payment of 25%, 25% and 50%, respectively. In addition, university must come up with an additional 3% salary increase in years 3 and 4 of the contract. This increase, coupled with the loss of federal stimulus funds after fiscal year 2011, translates into a substantial university budget gap that must be filled by other revenue sources. The State legislature has proposed another \$10 million cut for UH next year, which is about 3% reduction.

The College of Tropical Agriculture and Human Resources (CTAHR) has exhausted all budget reserves. A hiring freeze produced salary savings as retirements and resignations occurred, which accounted for more than half of the shortfall. However, more retirements to balance CTAHR's budget. Unlike other colleges on campus, CTAHR has not cut any positions at this time, although CTAHR likely cannot continue to avoid cutting positions. Newly hired tenure-track faculty members may need to be cut next year, which will mean that many CTAHR programs are going to face serious challenges in the next two years. CTAHR faculty continues to work on delivering tangible outputs that benefit local communities during these trying times.

For the first time in many years, University of Hawaii System, and University of Hawaii, Manoa have permanent leaderships in place. Dr. M.R.C. Greenwood joined UH as the new president in 2009. Dr. Greenwood has many years administrative experience in the University of California System, and as former chancellor of the University of California, Santa Cruz. At campus level, the addition of Dr. Reed Dasenbrock as the new vice chancellor for academic affairs has added additional creditability and stability to the leadership team. Dr. Dasenbrock came from the state of New Mexico, with extensive administrative experience with the University of New Mexico, and the New Mexico State University.

CTAHR Dean Andrew Hashimoto has announced his intention to step down on June 30, 2010. A national search of a new dean is underway. Three finalists were invited to Hawaii for campus interviews and the last candidate completed his interview in early March. The search committee met the last week of March to make recommendations to the vice chancellor of academic affairs who will make the final decision on the appointment of a new dean. Dr. Wayne Nishijima, associate dean for extension has retired on November 1, 2009, and Dr. Linda Cox has been appointed as the interim associate dean for extension. A permanent associate dean will be appointed by the new dean after his arrival.

Now that NIFA has added the newly established five national priority areas to CTAHR's five-year Plan of Work and Accomplishment Report the to program areas have been re-aligned and the expenditures have been re-calculated. CTAHR has tried to do a reasonably job meeting these new demands; however, it is almost impossible to do a decent job with such a short notice. With the five new program areas, CTAHR is now reporting on 12 program areas. Two old programs have been collapsed into the new program areas. However, more consolidation is needed to allow a more logical grouping and easier reporting next year. Eight program areas would be ideal for next year, instead of the ten now listed in our new Plan of Work. However, this change will have to wait for next year.

### Total Actual Amount of professional FTEs/SYs for this State

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	43.0	0.0	43.0	0.0
Actual	50.8	0.0	56.3	0.0

## II. Merit Review Process

### 1. The Merit Review Process that was Employed for this year

- Internal University Panel
- External Non-University Panel
- Expert Peer Review

### 2. Brief Explanation

CTAHR continues to use expert peer review panels to review individual Plans of Work, projects, publications, promotion and tenure applications, and post tenure reviews. All reviewers are asked determine if the program or project address the critical issues of strategic importance, including those identified by the stakeholders; utilize multi disciplinary approaches and provide evidence of integration of research and extension; address the needs of under served populations of the State; describe the expected outcomes and impacts; and result in improved effectiveness and/or efficiency.

CTAHR's peer project review process begins when a project proposal is submitted to a unit administrator. The unit administrator checks the proposal for completeness and format. A draft proposal that is ready for review is transmitted to the department's ad hoc Peer Review Committee. This committee is comprised of three departmental members who are familiar with the issue addressed by the plan or project. The Peer Review Committee reviews the proposal for (1) significance, (2) need, (3) approach, (4) new knowledge of programs to be generated, (5) potential for impact, (6) collaborative arrangements, (7) track record of the project leader(s), and (8) potential for success of the proposed project. After the committee completes its evaluation, the proposal and the peer evaluation forms are returned to the unit administrator. CTAHR administrators, program leaders and faculty may serve as resources to clarify plans of work for reviewers. Final review for plans of work occurs in the offices of the Associate Dean/Associate Director for Research and Associate Dean/Associate Director for Extension.

Each degree programs go through a comprehensive review by the university every five years. The review was organized in three distinct phases. In Phase 1, programs developed self-study documents describing curricula, students, research, outreach, staff support and facilities, and other important elements. Where possible, documents from other reviews (e.g., professional accreditations) were used as proxies for these reports. In Phase II, one or two members of the interview review team were assigned to each program and asked to carefully review his/her assigned program and develop a short (3 - 5 page) summary of strengths, weakness, and possible recommendations. Internal reviewers also conducted student interviews, toured facilities, interviewed faculty and administrators, and reviewed supplemental information. All of the self studies and internal review reports, as well as supplemental data were forwarded to the external reviewer. Phase III of the process involved a three-day site visit where the external reviewer and members of the internal review team met with faculty, students, staff, stakeholders, and administrators and conducted open-ended

interviews regarding the strengths, weaknesses, and suggestions for the future of CTAHR.

### **III. Stakeholder Input**

#### **1. Actions taken to seek stakeholder input that encouraged their participation**

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals

#### **Brief explanation.**

As a standard practice CTAHR includes stakeholders in search committees for all faculty positions, including researcher, extension specialist and agent positions, county administrators, department chairs, and college administrators. CTAHR faculty work closely with industry groups who work with and often advise these groups. This close working relationships provides a means for encouraging stakeholder participation and input on all matters of mutual concern. If CTAHR faculty is not available in a particular locale, stakeholders often call upon college administrators or the county administrators with their input and concerns.

#### **2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them**

##### **1. Method to identify individuals and groups**

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys

#### **Brief explanation.**

Stakeholders are considered by CTAHR to be anyone with an interest in, is be impacted by, or participates in the activity or issue. These typically include producers, processors, consumers, decision makers, students, alumni, community organizations, representatives of various State and federal agencies and members of the business community. Most of the commodities and program areas have one or more organizations representing their commodity or interests. Although input can be made by anyone and everyone, CTAHR prefers to listen to a spokesperson or organization that represents the majority of those affected by an issue.

#### **2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them**

##### **1. Methods for collecting Stakeholder Input**

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public

#### **Brief explanation.**

CTAHR employed a variety of methods including soliciting input from the CTAHR Board of Advisors (semi-

annual meetings), face to face discussions with industry representatives, the Hawai'i Farm Bureau Federation, and a long standing "Industry Analysis Process" and "Strategic Planning Process" that will be used in the next several years for key industries.

Other techniques used to gather stakeholder inputs were surveys, commodity organization meetings, through feedback and input from the Farm Bureau, direct input from stakeholders. CTAHR faculty and administrators regularly assist, facilitate and participate in strategic planning sessions for industry associations and organizations such as the Hawaii Association of Family and Consumer Education, Hawaii 4-H Foundation, Hawaii 4-H Livestock Association, Hawaii Coffee Growers Association, Hawaii Tropical Flowers and Shippers Association, Hawaii Tropical Fruit Growers Association, Hawaii Macadamia Nut Association, Hawaii Food Industry Associations, Hawaii Tea Society, and many others. CTAHR also receives many requests for research, outreach and other resources through emails, letters, meetings, and phone calls. Email list serve groups of CTAHR and external individuals are also used. Information, questions, and other exchanges take place on a regular basis.

### **3. A statement of how the input will be considered**

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

#### **Brief explanation.**

Inputs collected as described in the previous section used in research, extension and instructional program planning. Stakeholder input is important for the review process for extension and research project proposals. If a project demonstrates that it is a stakeholder priority and has their support, chances of funding is significantly greater. Through the Industry Analysis Process, stakeholders assisted CTAHR in maintaining relevance of overall programs and help to assure program coordination among teaching, research and extension/outreach programs.

#### **Brief Explanation of what you learned from your Stakeholders**

Stakeholders from all industry groups demand more research and extension program support from CTAHR. Given the budget cuts that CTAHR has received and the hiring freeze that the State has implemented, these demands will be difficult to satisfy in the next few years. At the same time, communities across the State are facing major challenges as the unemployment rate increasing and State spending is cut for nearly every program. Every group feels that their interests should be our top priority, and they demand our attention and service.

IV. Expenditure Summary

<b>1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)</b>			
<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
1274815	0	1413011	0

<b>2. Totaled Actual dollars from Planned Programs Inputs</b>				
	<b>Extension</b>		<b>Research</b>	
	<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
<b>Actual Formula</b>	876140	0	1298138	0
<b>Actual Matching</b>	4436245	0	12505975	0
<b>Actual All Other</b>	575377	0	2314111	0
<b>Total Actual Expended</b>	5887762	0	16118224	0

<b>3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from</b>				
<b>Carryover</b>	0	0	0	0

## V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Sustain, Protect, and Manage Hawaii's Natural Resources and Environment
2	Hawaii's Diversified Tropical Crop Systems for Sustainability and Competitiveness
3	Hawaii's Livestock and Aquaculture Systems For Sustainability and Competitiveness
4	Invasive Species Education and Management
5	Youth, Family and Community Development
6	Health and Wellness of Hawaii's Families and Communities
7	Generate and Improve Hawaii's Products, Processes and Market
8	Global Food Security and Hunger
9	Climate Change
10	Sustainable Energy
11	Childhood Obesity
12	Food Safety

**V(A). Planned Program (Summary)****Program # 1****1. Name of the Planned Program**

Sustain, Protect, and Manage Hawaii's Natural Resources and Environment

**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

<b>KA Code</b>	<b>Knowledge Area</b>	<b>%1862 Extension</b>	<b>%1890 Extension</b>	<b>%1862 Research</b>	<b>%1890 Research</b>
102	Soil, Plant, Water, Nutrient Relationships	25%		46%	
111	Conservation and Efficient Use of Water	10%		2%	
112	Watershed Protection and Management	10%		8%	
121	Management of Range Resources	5%		5%	
123	Management and Sustainability of Forest Resources	10%		5%	
124	Urban Forestry	0%		3%	
125	Agroforestry	10%		5%	
133	Pollution Prevention and Mitigation	20%		14%	
402	Engineering Systems and Equipment	0%		7%	
403	Waste Disposal, Recycling, and Reuse	10%		2%	
404	Instrumentation and Control Systems	0%		3%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

<b>Year: 2009</b>	<b>Extension</b>		<b>Research</b>	
	<b>1862</b>	<b>1890</b>	<b>1862</b>	<b>1890</b>
Plan	1.0	0.0	6.4	0.0
Actual	1.4	0.0	6.0	0.0

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

<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
11644	0	236254	0
<b>1862 Matching</b>	<b>1890 Matching</b>	<b>1862 Matching</b>	<b>1890 Matching</b>
116246	0	1185297	0
<b>1862 All Other</b>	<b>1890 All Other</b>	<b>1862 All Other</b>	<b>1890 All Other</b>
1556	0	119370	0

**V(D). Planned Program (Activity)**

## 1. Brief description of the Activity

The main goal of this long-term research plan is to develop an integrated research approach at the forested watershed continuum by combining multi-scale field experiments with a strong numerical modeling to enhance our understanding of watershed hydrological processes, water yield and water quality as a result of variation of different controlling parameters, i.e., land use (reforestation/deforestation, invasive species, agricultural use, urbanization) extreme weather conditions (drought, flooding). Multi-locations at the watershed scale equipped with different hydrological and environmental sensors have been maintained during this year. Students have been using this project to collect data for their graduate research

1. Soil Nutrient Measurements: a. Soil nutrients were measured in situ from 2005-2008 using ion-exchange resin stakes. b. Resin stakes and resin bags were compared for their ability to detect treatment differences in nutrient availability. c. Soil phosphorus fractions were analyzed in the lab to determine the fate of fertilizer phosphorus. 2. Koa growth responses: a. Diameter growth of crop trees was conducted in 2005, 2006, and 2009. b. Litterfall was collected from 2005-2008. Nutrient concentrations were measured on cumulative samples to estimate annual nutrient return. c. Live leaf nutrient concentrations were measured from samples collected in 2007 and compared to previous samples collected in 2004. 3. Litter decomposition: Litterbags were placed in the field in 2007. Samples were collected over the first year to estimate mass loss and net nutrient mineralization or immobilization. 4. Soil water content: a. Volumetric soil water content was monitored continuously from 2005-2009 to compare effects of silvicultural treatments. b. The spatial heterogeneity of volumetric soil water content was assessed on two occasions within one year to compare the ability of continuous vs spatially integrated measurements of soil water content to detect seasonal trends and treatment differences. 4. Comparison of koa growth and nutrient availability over a long soil age gradient: a. Diameter increment growth and density was monitored at 3 sites that differed in soil age over a 4-year period. b. Soil nutrient availability was monitored over 2-year period. c. Soil phosphorus fractions were analyzed from soil samples collected at each site. d. Live leaves were collected from each site and analyzed for nutrient concentrations.

Over the time period of 10/01/08 to 09/30/09, efforts have concentrated on collecting field data within the experimental design established in the prior year when 20 permanent plots were established in two native forest sites in the Kohala Mountains on the Island of Hawaii: 1) Cattle area: an area where feral and domestic cattle have been present for 100+ years; and 2) Pristine area: an area of comparable substrate and dominant vegetation where feral cattle have never historically occupied the landscape. Field work over the past year has concentrated on a suite of measurements to compare ecosystem structure and nutrient availability between the two study sites, including: 1) floristic composition (biodiversity) and stand structure (stem density, basal area, leaf area index, seeding establishment.); 2) soil physical properties (soil classification, bulk density, texture); and soil chemical properties (total nitrogen content, inorganic nitrogen availability). In addition, a restoration study was established in the cattle-present study area to explore methods for restoring native species to what is a highly degraded understory dominated by nonnative grasses and sedges. For this work, 8 plots were established in a split-plot, randomized block design. Within each block, treatments consisted of native seed additions or no native seed additions to each of the following: 1) control; 2) herbicide; 3) herbicide and clip; and 4) addition of coarse woody debris. An initial survey of native seedling establishment was conducted in the summer of 2009.

## 2. Brief description of the target audience

As intended by the Land Grant perspective, CTAHR's "targeted" clients for this program in teaching are the undergraduate and graduate students in agriculture and associated fields. Targeted clients for research are peers and extension specialists. Clients for extension specialists are CTAHR's county extension agents and the counterpart professional personnel of sister state and Natural Resources Conservation Service, NRCS). Clients for extension agents are land users and commodity producers and their organizations (such as the Hawaii Association of Soil and Water Conservation Districts, Hawaii Forestry Industry Association, and the Hawaii Farm Bureau), extension staff in other CTAHR units and at sister institutions, and other members of the professional and community groups who can provide new and useful knowledge to facilitate making decisions is an important expectation for effectively meeting its commitments. Forest researchers. Forest managers.

### V(E). Planned Program (Outputs)

#### 1. Standard output measures



2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	1000	1600	50	150
<b>Actual</b>	18030	153914	7452	1425

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

**Patent Applications Submitted**

Year: 2009  
 Plan: 0  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2009	Extension	Research	Total
<b>Plan</b>	6	10	
<b>Actual</b>	7	29	36

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Grant proposals submitted.

Year	Target	Actual
2009	5	21

**Output #2**

**Output Measure**

- Presentations at international and national meetings.

Year	Target	Actual
2009	6	10

**Output #3**

**Output Measure**

- Number of workshops and other educational activities held

Year	Target	Actual
2009	20	188

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

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

**Outcome #1**

**1. Outcome Measures**

Number of people who actually adopt one or more recommended practices

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	17	1178

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

All residents and visitors in the State of Hawaii enjoy the State natural environment and will suffer should it not be sustained. Many residents also rely on the environment to support the tourism industry and provide employment for residents.

**What has been done**

Various stakeholders were educated about how to better manage Hawaii's open ranges, forest and urban landscapes using workshops, demonstrations, field days websites, publications and other outreach activities.

**Results**

Hawaii's watersheds and all the resources contained in these watersheds are more sustainable.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
403	Waste Disposal, Recycling, and Reuse

**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	Quantitative Target	Actual
2009	300000	540341

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Determining relationship between crop water use and yield for various crops of diversified Hawaiian agriculture can be a valuable aid for producers to optimize their cropping systems.

**What has been done**

Field experiments have been conducted at the Waimanalo Research Station, Oahu. This year, we continued evaluating the performance of soil water content sensor for estimating soil water content under Hawaii conditions and establishing optimal irrigation schedule for sweet corn grown on tropical soils. Organic matter (OM) affects several soil hydrological properties i.e. infiltration rate, (q) saturated hydraulic conductivity (Ksat).

**Results**

The findings of this project reinforce the general knowledge that organic amendments have many positive impacts on our natural resources. These should strengthen the use of organic amendments in Hawaii.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
133	Pollution Prevention and Mitigation
403	Waste Disposal, Recycling, and Reuse

## **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
- Other ()

### **Brief Explanation**

Natural disasters such as hurricanes, typhoons, floods, fires, often are destructive to natural resources such as reefs, water quality, forests, indigenous species, research plots and equipment.

When the economy is poor, public and private funding decreases and is more difficult to obtain.

Current and new quarantine and inspection procedures for imported materials affect the rate of new introductions of invasive species into the State.

When monies are in short supply, other more important public priorities may compete for available funds.

## **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

**V(A). Planned Program (Summary)****Program # 2****1. Name of the Planned Program**

Hawaii's Diversified Tropical Crop Systems for Sustainability and Competitiveness

**V(B). Program Knowledge Area(s)**

## 1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		6%	
202	Plant Genetic Resources	10%		2%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	10%		20%	
204	Plant Product Quality and Utility (Preharvest)	10%		11%	
205	Plant Management Systems	10%		40%	
206	Basic Plant Biology	10%		20%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		0%	
212	Pathogens and Nematodes Affecting Plants	10%		0%	
213	Weeds Affecting Plants	10%		0%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	10%		0%	
216	Integrated Pest Management Systems	10%		1%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	15.0	0.0	12.4	0.0
Actual	13.3	0.0	6.9	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
200125	0	144025	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1288438	0	1281708	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
136136	0	7440	0

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

Attempts to propagate selected cacao seedlings using rooted cuttings were discontinued. Instead we created rooted stock plants to provide scions for grafting using an air layering technique. We developed and tested a micro-grafting technique using green wood scions onto seedling rootstocks in the cotyledon stage. Our expectation is that by grafting below the cotyledons we will reduce the amount of rootstock orthotropic shoots produced. We created 5 grafted stock plants of 10 of the eleven selections. We have germinated the first 50 seedlings to be field planted as grafted trees late in 2009. Cooperators on Oahu island were identified and sites area being prepared. Based upon encouraging results from Erik Kling's MS research with tree shelters, we planted a six treatment establishment experiment in the largest commercial cacao orchard to compare different height and diameter pink tree shelters (Plantra, Inc, Minneapolis, MN) with grower made translucent film over wire cages.

Roadside re-vegetation utilizing native groundcovers is a new initiative in Hawaii. To develop establishment and maintenance protocols, large-scale propagation and selective weed control techniques for potential species need to be tested. During this reporting period this program evaluated hydroplanting techniques and screened pre- and post-emergence herbicides for establishing *Fimbristylis cymosa* and *Sporobolus virginicus*, two native Hawaiian ground covers species identified for use roadside erosion control. Hydroplanting trials indicate that *F. cymosa* can be efficiently established through hydroseeding while *S. virginicus* can be hydromulched using auxin treated apical cuttings. Oxadiazon and oryzalin can be safely used in transplanted *F. cymosa* plugs but not seedlings. Fluazifop-p-butyl and aminopyralid can be safely applied in seedlings and mature plants while sulfosulfuron should only be spot sprayed. For *S. virginicus*, oxadiazon, oxyfluorfen, sulfosulfuron and aminopyralid can be used for transplanted plugs while carfentrazone + MCPA + mecoprop + dicamba and triclopyr should only be spot sprayed. Information gathered from the study has been incorporated into establishment protocols for the two species. An experiment was conducted during spring 2008 to fall 2009 to examine the response of cabbage and zucchini in a native *Heteropogon contortus* (piligrass) living mulch (LM) system and compare it to a conventional bare ground (BG) system. The results of this study, piligrass LM had: 1) consistently reduced weed biomass up to five times compared to BG, 2) provided habitat for insects, thus it increased total population and biodiversity of insects, and 3) reduced plant and fruit damages due to pests and diseases. Nevertheless, BG yield was five times higher than LM treatment. The piligrass LM improved the physical quality of soil by increasing WAS (water aggregate stability).

Collaborative research with Dr. Lisa Keith, USDA Plant Pathologist, has been ongoing on the cause of macadamia quick decline (MQD), a problem that has been responsible for the death of a large number of mature macadamia trees in Hawaii. The research has focused on identifying the causal agent and determining control strategies for this disease. The research is being conducted in an orchard planted with the HAES 333 cultivar on the University of Hawaii Waikeke Agricultural Research Station. The work at this site is critical since previous work has shown that this cultivar is highly susceptible to MQD. Tests to complete Koch's postulates for MQD have been ongoing with organisms isolated from declining trees. Artificial inoculations of field grown trees with prospective pathogens are being conducted to duplicate the entire disease syndrome. Volcanic emissions are a concern for agricultural crops including macadamia, because of potential injury caused by high concentrations of hydrogen sulfide and hydrogen chloride in the emissions. These acid-precursor gases can affect plants directly or can acidify rainfall which can affect the soil and injure plants. Significant damage has been reported on a variety of plants from farmers in the downwind path of the northeasterly trades in the Kau district where protea flower growers have sustained heavy damage. Macadamia is in the same family (Proteaceae) and growers have reported that trees may have sustained damage to the foliage when emission concentrations are high. Visitations to orchards in near Pahala and Naalehu in the Kau district were made to determine whether trees in the orchard and in the nursery have sustained any damage and to document damage symptoms. Two new infestations of macadamia felted coccid (*Eriococcus ironsidei*) (MFC) were discovered and were outside of the initial infestation site in south Kona and found in February 2005. The new infestations were detected in Waiohinu and Pahala in the Kau district, the major macadamia growing area along the south eastern coast of Hawaii Island.

A variety of agricultural producers attended workshops, field days, demonstrations and presentations on pest and disease management strategies; new cultivars/varieties; nutrient management; weed management; and business management topics in order to make their operations more sustainable. The diamond back moth and fruit fly eradication programs are noteworthy because these two insects erode the competitiveness of Hawaii's agricultural producers.

### 2. Brief description of the target audience

Farmers and hobbyists, chocolatiers in Hawaii, legislators, general public.

Landscape contractors and turf grass managers are the primary audience for research and outreach seminars on topics dealing with roadside vegetation establishment and weed control in warm season turf. Vegetable farms are targets for no till living mulch research and seminars. Producers of potted ornamentals are targets for research and seminars on IPM practices for weed

control in both domestic and exported flower and foliage crops.

Hawaii Macadamia Nut Association and Hilo Macadamia Nut Association members, macadamia growers, processors and nursery operators.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	14250	8250	400	35
<b>Actual</b>	9797	110140	332	61

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

**Patent Applications Submitted**

Year: 2009

Plan: 4

Actual: 3

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2009	Extension	Research	Total
<b>Plan</b>	15	30	
<b>Actual</b>	23	18	41

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of workshops, research/field day demonstrations conducted

Year	Target	Actual
2009	140	151

**Output #2**

**Output Measure**

- Published information such as extension newsletters, fact sheets, videos, and other publications

Year	Target	Actual
2009	225	127



**Output #3**

**Output Measure**

- Presentations at international and national meetings

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	20	27

**Output #4**

**Output Measure**

- Number of diagnostic samples analyzed

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	14000	14550

**Output #5**

**Output Measure**

- Number of grant proposals submitted.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	25	23

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Increased awareness of best management practices to promote environmentally responsible agricultural and landscape management
2	Adoption of best management practices to promote environmentally responsible agricultural and landscape management
3	Number of people completing non-formal education programs
4	Number of people who adopt one or more recommended practices
5	Total dollar value of grants and contracts obtained.

**Outcome #1**

**1. Outcome Measures**

Increased awareness of best management practices to promote environmentally responsible agricultural and landscape management

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	350	553

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Understanding how to make agriculture more sustainable will make Hawaii more sustainable.

**What has been done**

Workshops, field days, demonstrations, presentations, websites and publications have been completed on a variety of topics that will help agricultural producers understand how to make the State more sustainable.

**Results**

Hawaii will be more sustainable and the agricultural producers will be more competitive.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
216	Integrated Pest Management Systems

## Outcome #2

### 1. Outcome Measures

Adoption of best management practices to promote environmentally responsible agricultural and landscape management

### 2. Associated Institution Types

- 1862 Extension

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	15	45

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Understanding how to make agriculture more sustainable will make Hawaii more sustainable.

#### What has been done

Workshops, field days, demonstrations, presentations, websites and publications have been completed and people's behavior has changed as a result so residents are working to make the State more sustainable.

#### Results

Hawaii will be more sustainable and the agricultural producers will be more competitive.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
216	Integrated Pest Management Systems

## Outcome #3

### 1. Outcome Measures

Number of people completing non-formal education programs

### 2. Associated Institution Types

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	40	3682

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Understanding how to make agriculture more sustainable will make Hawaii more sustainable.

**What has been done**

Educational programs on a variety of topics have taught agricultural producers how to make the State more sustainable and make their operations more competitive.

**Results**

Hawaii will be more sustainable and the agricultural producers will be more competitive.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
216	Integrated Pest Management Systems

**Outcome #4**

**1. Outcome Measures**

Number of people who adopt one or more recommended practices

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	25	422

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Understanding how to make agriculture more sustainable will make Hawaii more sustainable.

**What has been done**

Workshops, field days, demonstrations, presentations, websites and publications have been completed and agricultural producer's behavior has changed as a result so residents are working to make the State more sustainable.

**Results**

Hawaii will be more sustainable and the agricultural producers will be more competitive.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
216	Integrated Pest Management Systems

**Outcome #5**

**1. Outcome Measures**

Total dollar value of grants and contracts obtained.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	4400000	4155813

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Most of Hawaii's beef animals are fed out on the Mainland due to lack of local feeds, and its dairy and poultry industries are moribund for the same reason. Corn is the answer. To provide high-yielding, tropically-adapted hybrids of feed and food corns that can be grown without pesticide in Hawaii.

#### What has been done

Breeding nurseries were again planted monthly to maximize disease and pest pressure in absence of pesticides that are never used in our corn breeding. Major genetic advance was made in selection of resistance to southern rust. The >2000 nursery rows included advanced generations of improvement of most Hawaii inbreds of silage and sweet corn, now summarized on [www.ctahr.hawaii.edu/hfs](http://www.ctahr.hawaii.edu/hfs)

#### Results

CTAHR-bred supersweet hybrids continued to dominate production by Hawaii's growers, with a few growers still attempting to grow ill-adapted Mainland hybrids (largely because of the ridiculous restriction on public use of the incredibly important transgenes BT and herbicide-resistance). Our dedication since 1962 to foster a vibrant seed industry has been rewarded by Hawaii's seed industry now ranking first among agricultural industries at \$150 million, exceeding that of sugar and pine plus many other crops.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
216	Integrated Pest Management Systems

### 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. Annual crops suffer immediate, although not permanent damage, while orchard crops may sustain long term damage. Damage to research plots, and equipment can also occur. When the economy is poor, public and private funding decreases and is more difficult to obtain. When monies are short, public priorities that relate to health and safety are more visible and will compete for available funds. The increase in petroleum prices have increased production costs.

**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.



**V(A). Planned Program (Summary)****Program # 3****1. Name of the Planned Program**

Hawaii's Livestock and Aquaculture Systems For Sustainability and Competitiveness

**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

<b>KA Code</b>	<b>Knowledge Area</b>	<b>%1862 Extension</b>	<b>%1890 Extension</b>	<b>%1862 Research</b>	<b>%1890 Research</b>
301	Reproductive Performance of Animals	30%		21%	
303	Genetic Improvement of Animals	20%		15%	
304	Animal Genome	10%		8%	
305	Animal Physiological Processes	10%		26%	
306	Environmental Stress in Animals	5%		10%	
307	Animal Management Systems	15%		7%	
308	Improved Animal Products (Before Harvest)	10%		6%	
312	External Parasites and Pests of Animals	0%		3%	
313	Internal Parasites in Animals	0%		4%	
	<b>Total</b>	<b>100%</b>		<b>100%</b>	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

<b>Year: 2009</b>	<b>Extension</b>		<b>Research</b>	
	<b>1862</b>	<b>1890</b>	<b>1862</b>	<b>1890</b>
Plan	4.0	0.0	4.2	0.0
Actual	4.0	0.0	0.7	0.0

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

<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
130177	0	11825	0
<b>1862 Matching</b>	<b>1890 Matching</b>	<b>1862 Matching</b>	<b>1890 Matching</b>
305323	0	86486	0
<b>1862 All Other</b>	<b>1890 All Other</b>	<b>1862 All Other</b>	<b>1890 All Other</b>
75378	0	62912	0

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

The size of the male sex-producing androgenic hormone (AH) in the freshwater prawn was partially characterized as a "small" protein molecule with less than 30 Kd in molecular weight. This work was done using the bioassay techniques of injecting sexually immature genetic female prawns with extracts of male androgenic gland hormone that had been processed through molecular filters into fractions. The work was presented by student Sam Hwang at the annual CTAHR Research Symposium in April 2008 and won a divisional prize. In addition male prawn androgenic glands have been subjected to the MALDI (Matrix Assisted Laser Desorption/Ionization) analysis to identify peptides in the gland. This work was done in cooperation with Dr. Andy Christie of the Bar Harbor Marine Laboratory and colleagues at the University of Wisconsin who performed the analysis. Over a dozen putative AH peptides were identified and sequenced.

In Hawaii, local protein sources are needed in order to maintain food security, and ranchers have been shipping the majority of the cattle to the US mainland and many are struggling to stay in business. A variety of extension workshops, field days, demonstrations, presentations, websites, and publications were completed on a variety of topics relative to ranch management. This helps ranchers be more competitive and more able to produce cattle.

## 2. Brief description of the target audience

- Students and researchers in animal growth field.

Prawn and shrimp aquaculture industry who will use all-female stock produced by sex-reversing parental broodstock with recombinant androgenic hormone.

- Ranchers and commercial aquaculture producers.

## V(E). Planned Program (Outputs)

### 1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	625	2225	40	10
<b>Actual</b>	2744	4025	272	542

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

#### Patent Applications Submitted

Year: 2009

Plan: 0

Actual: 0

#### Patents listed

### 3. Publications (Standard General Output Measure)

#### Number of Peer Reviewed Publications

2009	Extension	Research	Total
<b>Plan</b>	3	10	

<b>Actual</b>	2	3	5
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**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of workshops, conferences and other outreach events

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	10	50

**Output #2**

**Output Measure**

- Write grant proposal to secure additional funds

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	6	13

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Total dollar value of grants and contracts obtained.
2	Number of ranchers who have adopted a recommended practice
3	Increased numbers of beef cattle kept in Hawai'i for local consumption

**Outcome #1**

**1. Outcome Measures**

Total dollar value of grants and contracts obtained.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	125000	493750

**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 size of Hawaii's economy will increase if more external funds are received and more assistance can be provided to producers.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
301	Reproductive Performance of Animals
303	Genetic Improvement of Animals
304	Animal Genome
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)

**Outcome #2**

**1. Outcome Measures**

Number of ranchers who have adopted a recommended practice

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	9	1818

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Ranchers need to be more competitive by reducing costs and/or increasing revenues. Currently ranchers are struggling to stay in business.

**What has been done**

Workshops, demonstrations, field days, presentations, websites and publications have changed ranchers' behavior so they can better achieve their goals.

**Results**

Hawaii ranchers are more competitive and the local supply of cattle will be more secure.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
303	Genetic Improvement of Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)

**Outcome #3**

**1. Outcome Measures**

Increased numbers of beef cattle kept in Hawai'i for local consumption

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	250	323

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Ranchers can contribute more to the local economy if cattle are not exported the US mainland.

**What has been done**

More ranchers are keeping cattle in Hawaii because more options exist for marketing cattle locally.

**Results**

Hawaii's economy will have fewer leakages and Hawaii's food security will be increased.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
303	Genetic Improvement of Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)

**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**

Processing facilities will be able to handle increased production.  
 When the economy is poor, public and private funding decreases and is more difficult to obtain.  
 When monies are short, higher public priorities may compete for available funds.  
 Local producers are able to work together in concert and not compete against each other.  
 Significant drought may affect forage and other natural disasters may damage facilities.  
 Hi petroleum costs affects shipping rates that increase cost of shipping feed and animals.

**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.



**V(A). Planned Program (Summary)****Program # 4****1. Name of the Planned Program**

Invasive Species Education and Management

**V(B). Program Knowledge Area(s)**

## 1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
211	Insects, Mites, and Other Arthropods Affecting Plants	30%		20%	
212	Pathogens and Nematodes Affecting Plants	30%		50%	
213	Weeds Affecting Plants	30%		30%	
215	Biological Control of Pests Affecting Plants	10%		0%	
<b>Total</b>		100%		100%	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	8.3	0.0
Actual	3.2	0.0	4.1	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
45425	0	81573	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
351031	0	734406	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	263293	0

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

We surveyed aphid species on all major Hawaiian islands, analyzed and described geographic and host relationships. We also analyzed the morphological and ecological factors contributing to invasiveness in these species. Experiments were performed on deliberately introduced biological control agents of aphids; and on fortuitous biocontrol agents (that arrived by unknown means) to Hawaii. We presented the first description and gave life history information on a new species of aphid parasitoid, *Endaphis fugitiva*, found to parasitize the banana aphid, *Pentalonia nigronervosa* Coquerel, the vector of banana bunchy top virus. We published several papers in peer-reviewed scientific journals, and gave multiple talks, seminars, and presentations about our results at scientific symposia; and provided testimony and published a Draft Environmental Assessment

for the introduction of new aphid parasitoids in Hawaii.

**Anthurium mosaic:** In 2003, a disease with viral-like symptoms appeared at an anthurium farm on the island of Hawaii that supplies the cut flower market. The anthuriums were established about two years prior to the onset of the disease. Diseased anthurium plants collected from this farm exhibited mosaic, mottling, and vein-clearing symptoms on leaves, which along with the spathe, were often distorted with irregular margins, rendering the plants unsuitable for sale. We have isolated three distinct dsRNAs ranging from 3.0-3.5 kbp in size, from symptomatic anthurium plants. These dsRNA segments were completely sequenced and found to belong to a virus that is most closely related to members of the mycovirus family Chrysoviridae. An RT-PCR assay was developed to detect this putative virus.

**Ti Ringspot:** In early 2009, ti farmers on the windward side of the island of Oahu reported unusual symptoms on their ti plants. Symptoms were small (3-15mm) ringspots present primarily on the basal 2/3 of the leaf. These viral-like symptoms have not been previously reported from ti. Symptomatic plants were widespread at affected farms, and according to the farmers, the disease spread quickly throughout the fields. Agarose gel electrophoresis revealed that high molecular weight (15-20 kbp) dsRNA was present in both types of tissue. The dsRNAs were isolated from the gel and used as templates for molecular cloning. We sequenced over 300 clones from the dsRNA libraries that were generated. Analysis of the sequence data revealed that at least four previously unreported species of closteroviruses were present in the ti samples.

**Tomato yellow leaf curl virus:** Tomato yellow leaf curl is perhaps the most destructive viral disease of tomato (*Lycopersicon esculentum*) with losses of up to 100% in the tropics and subtropics. The disease is caused by Tomato yellow leaf curl virus (TYLCV) (*sensu lato*), a complex of circular monopartite ssDNA viruses of the genus Begomovirus, Family Geminiviridae. On tomato, TYLCV inhibits leaflet growth, causing yellowing and upward curling of the leaf margin. Flowers are aborted, and the entire plant will develop a stunted appearance. Whiteflies (*Bemisia tabaci*) are the natural vector of TYLCV which transmit the virus in a persistent, circulative manner. In October 2009, a home gardener in Kahului, Maui reported tomatoes with symptoms similar to tomato yellow leaf curl to the University of Hawaii Agricultural Diagnostic Service Center (ADSC) in Manoa. Samples were sent through the ADSC to our laboratory where we isolated DNA from symptomatic tissues. PCR was performed using degenerate primers PAR1c715 and PAL1v1978. An amplicon of expected size (~1.5 kilobases) was generated, cloned, and sequenced. The sequence data revealed the tomato plants were infected with a strain of TYLCV that was most similar (>98% identical) to strains of TYLCV from Japan (Tochigi and Tomigusuku) and China (ZJHZ12, Sh10, and ZJ8). This represents the first known case of TYLCV in Hawaii.

## 2. Brief description of the target audience

Farmers, consumers, and rural citizens who can appreciate reduced pesticide inputs as we come to rely more on biological means of pest control. Scientists who study invasive species and in particular aphid biology.

### V(E). Planned Program (Outputs)

#### 1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	80	700	300	300
Actual	619	37	0	0

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

##### Patent Applications Submitted

Year: 2009

Plan: 0

Actual: 2

#### Patents listed

#### 3. Publications (Standard General Output Measure)

##### Number of Peer Reviewed Publications

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<b>2009</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	5	10	
<b>Actual</b>	0	36	36

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of workshops, field days, demonstrations held

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	2	14

**Output #2**

**Output Measure**

- Number of grant proposals submitted

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	10	0

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Awareness created
2	Number of agency professionals, including extension agents who implement or install demonstration or similar programs for clientele education
3	Total dollar value of grants and contracts obtained.

## Outcome #1

### 1. Outcome Measures

Awareness created

### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

### 3a. Outcome Type:

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	30	45

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Residents are not aware of the problems associated with invasive species.

#### What has been done

Workshops, demonstrations, field days, presentations and publications make residents aware of the problems associated with invasive species.

#### Results

Residents will be more likely to assist in controlling invasive species.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants

## Outcome #2

### 1. Outcome Measures

Number of agency professionals, including extension agents who implement or install demonstration or similar programs for clientele education

### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	8	9

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Residents are unaware of how to control invasive species.

**What has been done**

Demonstration project have been installed.

**Results**

Residents will better understand how to control invasive species and Hawaii will become more sustainable

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants

**Outcome #3**

**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	Quantitative Target	Actual
------	---------------------	--------

2009                      300000                      1174290

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Resources are needed to fund research and extension programs.

**What has been done**

Extramural funds have been received

**Results**

Hawaii's economy will benefit from the funds received and the environment will be more sustainable as invasive species are better controlled.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants

**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**

Intentional introductions of invasive species  
 Lack of funding/grant proposals don't come through.  
 Other agencies and partners are not willing to partner and coordinate efforts.  
 Communities and stakeholders are not willing to cooperate or don't do their share of the effort.

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

1. Evaluation Studies Planned

- After Only (post 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.



**V(A). Planned Program (Summary)**

**Program # 5**

**1. Name of the Planned Program**

Youth, Family and Community Development

**V(B). Program Knowledge Area(s)**

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
801	Individual and Family Resource Management	10%		4%	
802	Human Development and Family Well-Being	20%		94%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	10%		2%	
805	Community Institutions, Health, and Social Services	20%		0%	
806	Youth Development	40%		0%	
<b>Total</b>		100%		100%	

**V(C). Planned Program (Inputs)**

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	14.0	0.0	3.1	0.0
Actual	20.8	0.0	5.0	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
287242	0	120993	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1678533	0	536614	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
113820	0	1021397	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

**2. Brief description of the target audience**

- Academic researchers in the fields of family science, human development, sociology, economics, public policy, education, and social services.;

- Administrators of state and local nonprofit agencies relating to health, human services, education, and economic development.;

- Service providers and advocates who work with children, families, or the aging, especially those who work with at-risk groups; State legislators and policy makers;

- The general public.

### V(E). Planned Program (Outputs)

#### 1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	7250	31000	12250	7500
<b>Actual</b>	65966	151663	11285	6692

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

##### Patent Applications Submitted

Year: 2009

Plan: 0

Actual: 0

#### Patents listed

#### 3. Publications (Standard General Output Measure)

##### Number of Peer Reviewed Publications

2009	Extension	Research	Total
<b>Plan</b>	3	5	
<b>Actual</b>	1	103	104

### V(F). State Defined Outputs

#### Output Target

#### Output #1

##### Output Measure

- Number of people completing non-formal education programs on parenting, youth development, and leadership development

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	125	22826

**Output #2**

**Output Measure**

- Number of volunteer hours

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	60000	36876

**Output #3**

**Output Measure**

- Presentations at international and national meetings.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	5	13

**Output #4**

**Output Measure**

- Grant proposals submitted.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	10	32

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of stakeholders who increased knowledge in at least one issue
2	Number of stakeholders completing non-formal education programs on parenting, youth development, and leadership development, who adopt one or more parenting principles, behaviors, or practices
3	Total dollar value of grants and contracts obtained.

**Outcome #1**

**1. Outcome Measures**

Number of stakeholders who increased knowledge in at least one issue

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	7	22826

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Residents want a better quality of life.

**What has been done**

Workshops, demonstrations, presentations, website and publications gave residents the knowledge to have a better quality of life.

**Results**

Residents know how to improve their quality of life.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

**Outcome #2**

**1. Outcome Measures**

Number of stakeholders completing non-formal education programs on parenting, youth development, and leadership development, who adopt one or more parenting principles, behaviors, or practices

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	60	3588

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Residents want a better quality of life.

**What has been done**

Workshops, demonstrations, presentations, website and publications gave residents the knowledge to have a better quality of life.

**Results**

Residents have changed their behavior so they have a better quality of life.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
806	Youth Development

**Outcome #3**

**1. Outcome Measures**

Total dollar value of grants and contracts obtained.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	1250000	1544760

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Resources are needed for research and extension programs to assist Hawaii's families and communities.

#### What has been done

Funds were obtained.

#### Results

Hawaii economy was improved as external funds were received and Hawaii's communities are better off as a result of the research and extension programming.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
805	Community Institutions, Health, and Social Services
806	Youth Development

### V(H). Planned Program (External Factors)

#### External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

#### Brief Explanation

Availability of funding and support from non-profit agencies.  
Availability and willingness of youth and adult volunteers to assist with programs.  
Collaboration and partnership can be developed with other agencies and non-governmental groups.  
Community leaders are willing to collaborate.

### 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.



**V(A). Planned Program (Summary)****Program # 6****1. Name of the Planned Program**

Health and Wellness of Hawaii's Families and Communities

**V(B). Program Knowledge Area(s)**

## 1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
702	Requirements and Function of Nutrients and Other Food Components	0%		14%	
703	Nutrition Education and Behavior	10%		0%	
704	Nutrition and Hunger in the Population	10%		0%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	20%		42%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	20%		30%	
722	Zoonotic Diseases and Parasites Affecting Humans	10%		10%	
723	Hazards to Human Health and Safety	10%		4%	
724	Healthy Lifestyle	20%		0%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	6.0	0.0	3.0	0.0
Actual	2.9	0.0	5.1	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
57275	0	110391	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
239769	0	882503	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
92541	0	229118	0

**V(D). Planned Program (Activity)**

### 1. Brief description of the Activity

The extension programs related to health and wellness of Hawaii's families and communities focused on assisting consumers to make healthy food choices and have more active lifestyle. A variety of activity were undertaken, including, workshops, websites, newspaper articles, e-newsletters, and radio shows.

At the same time, programming was also aimed at educating people about the long-term effects of serious chronic illnesses such as diabetes, and high blood pressure. Outreach activities that assist people in determining if they the symptoms associated with diabetes or high blood pressure help people understand that these symptoms should be taken seriously and that lifestyle changes can be useful in addressing them.

Earlier studies from our laboratory indicated that bitter melon (BM) improves high-fat diet (HFD)-associated obesity and insulin resistance. Current mechanistic studies demonstrated that BM regulates glucose metabolism and ameliorates insulin resistance by modulating ER stress and gluconeogenesis pathway.

### 2. Brief description of the target audience

The target clients included the general public. However, some programs, such as the expanded Food and Nutrition Program and the Supplemental Nutrition Assistance program were geared toward specific groups such as low income families and families on food stamps. Specialized programs are also target seniors and youth. Minority populations, Pacific Islanders, obese and diabetic individuals.

#### V(E). Planned Program (Outputs)

##### 1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	4100	10200	1100	150
<b>Actual</b>	4911	29367	912	1633

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

###### Patent Applications Submitted

Year: 2009

Plan: 0

Actual: 0

#### Patents listed

##### 3. Publications (Standard General Output Measure)

###### Number of Peer Reviewed Publications

2009	Extension	Research	Total
<b>Plan</b>	2	3	
<b>Actual</b>	0	33	33

#### V(F). State Defined Outputs

##### Output Target

**Output #1**

**Output Measure**

- Number of outreach activities and events conducted

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	110	139

**Output #2**

**Output Measure**

- Presentations at international and national meetings.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	5	24

**Output #3**

**Output Measure**

- Grant proposals submitted.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	5	5

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of people trained and who receive their pesticide applicators license
2	Number of people who changed their behavior to better their health
3	Number of people who increased their knowledge in health and wellness through outreach activities
4	Total dollar value of grants and contracts obtained.

**Outcome #1**

**1. Outcome Measures**

Number of people trained and who receive their pesticide applicators license

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	80	122

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Resident do not know how to apply pesticides.

**What has been done**

Short courses, newsletters, and study guides educated people about proper pesticide use.

**Results**

Residents use pesticide correctly and 122 people received their licenses.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
723	Hazards to Human Health and Safety

**Outcome #2**

**1. Outcome Measures**

Number of people who changed their behavior to better their health

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	75	891

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Residents do not have healthy lifestyles.

**What has been done**

Workshops, demonstrations, and presentations educate people about how to have a healthy lifestyle.

**Results**

Residents have healthier lifestyles.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

**Outcome #3**

**1. Outcome Measures**

Number of people who increased their knowledge in health and wellness through outreach activities

Not Reporting on this Outcome Measure

**Outcome #4**

**1. Outcome Measures**

Total dollar value of grants and contracts obtained.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	250000	638430

**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
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
722	Zoonotic Diseases and Parasites Affecting Humans
723	Hazards to Human Health and Safety
724	Healthy Lifestyle

**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**

- When the economy is weak, public and private funding decreases and is more difficult to obtain.
- When funding has decreased, other issues may be concerned priorities and compete for available funds.
- High cost of petroleum and increased worked demand are directly or indirectly increasing the cost of all goods and services.

**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.



**V(A). Planned Program (Summary)****Program # 7****1. Name of the Planned Program**

Generate and Improve Hawaii's Products, Processes and Market

**V(B). Program Knowledge Area(s)**

## 1. Program Knowledge Areas and Percentage

<b>KA Code</b>	<b>Knowledge Area</b>	<b>%1862 Extension</b>	<b>%1890 Extension</b>	<b>%1862 Research</b>	<b>%1890 Research</b>
501	New and Improved Food Processing Technologies	10%		20%	
502	New and Improved Food Products	10%		3%	
503	Quality Maintenance in Storing and Marketing Food Products	5%		2%	
511	New and Improved Non-Food Products and Processes	0%		45%	
601	Economics of Agricultural Production and Farm Management	25%		15%	
602	Business Management, Finance, and Taxation	5%		0%	
603	Market Economics	15%		5%	
604	Marketing and Distribution Practices	10%		0%	
605	Natural Resource and Environmental Economics	0%		10%	
607	Consumer Economics	15%		0%	
608	Community Resource Planning and Development	5%		0%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

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

<b>Year: 2009</b>	<b>Extension</b>		<b>Research</b>	
	<b>1862</b>	<b>1890</b>	<b>1862</b>	<b>1890</b>
Plan	1.3	0.0	5.7	0.0
Actual	1.2	0.0	3.1	0.0

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

Extension		Research	
<b>Smith-Lever 3b &amp; 3c</b> 40046	<b>1890 Extension</b> 0	<b>Hatch</b> 78364	<b>Evans-Allen</b> 0
<b>1862 Matching</b> 67533	<b>1890 Matching</b> 0	<b>1862 Matching</b> 494848	<b>1890 Matching</b> 0
<b>1862 All Other</b> 71349	<b>1890 All Other</b> 0	<b>1862 All Other</b> 2451	<b>1890 All Other</b> 0

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

Microwave heating and ohmic heating systems were employed to enhance sugar release from taro wastes for subsequent ethanol production. Improvement of glucose release via two systems was evaluated with different experimental protocols which first one is that taro waste samples were microwave and ohmic heating pretreated and then enzymes were added in taro waste samples, and second one is that hydrolyzing enzymes were added in taro waste samples before mild microwave radiation and ohmic heating. For comparison with conventional heating method, water batch heating system was used as control. In the first protocol, the highest glucose yield (65.33 glucose mole %/L) was obtained from the sample with ohmic heating pretreatment. On the other hand, glucose yield from the sample with microwave heating was less than the one with control. In the second protocol, the sample with microwave pretreatment produced the highest glucose yield (43.41 glucose mole %/L), compared with samples with ohmic heating and control. Even though reducing sugar release from sample with microwave pretreatment was highest, there was not significant difference between microwave and ohmic heating pretreatment. The enzyme inoculation after ohmic pretreatment yielded a higher sugar release than the one before ohmic pretreatment. Although the one prior to microwave pretreatment yielded a higher sugar release than the one after its pretreatment, p-value (0.236, alpha=0.05) indicated little significant difference. Microwave might inhibit enzymatic activities for starch hydrolysis due to partial overheating on the surface of sample (moisture loss) and medium conditions (pH, temperature) were not optimized for enzymatic activities. The sugar release of taro wastes with ohmic pretreatment increased the yield by 44.22% more than control and microwave pretreatment showed 14.64% yield decrease. The amounts of sugar release from taro wastes with enzymes added prior to microwave and ohmic pretreatments were higher than the control by 17.07% and 12.32%, respectively.

Fouling modeling of plate heat exchanger was initiated using the computational fluid dynamics (CFD) coupled with 3D image scanner. The scanned image (IGES file generated with Solidworks) was imported to Gambit preprocessor (Fluent, Inc., Lebanon, NH) for grid tuning and meshing of plate heat exchanger. A computational domain developed in Gambit was so huge and required high use of memory for simulation in Fluent (Fluent, Inc., Lebanon, NH). Therefore, the whole domain needs to be divided into 6 subsections, which were intended to be appended together in Fluent. The data points of temperature at different locations and fouling masses in the whole plates with different surface finishes (the control vs. the hydrophobically coated) have been obtained. The model was expected to simulate foulant crystallization on the surfaces with different surface energies.

Blueberry rust (*Naohidemyces vaccinii*) is a fungal disease that had been reported from ohelo in Hawaii in the early 1900s and appeared on blueberry in Waimea in May 2007. Rust subsequently infected plantings at both Mealani and Lalamilo stations. This disease, combined with economic conditions, has resulted in major changes in the project, requiring re-direction of original project objectives. Soil Acidification Trial related to original project objective: Acidification curves were developed for target soils, draft publication developed. The next phase will investigate effects of various acidification levels on blueberry production under selected conditions.

Extension programs that generate and improve Hawaii's products, processes and market focus on the development of value added products. One approach that is being used to add value to products is the use of sustainable and organic production systems. Products such as fresh fruits and vegetables, beef, pork, chickens and eggs are included. As far as processed products, sweet potato chips, pesto, cheese, butter, milk and poi are included.

Producers are also being encouraged to try direct marketing such as subscription marketing, roadside stands, and farmer markets in order to add value to their products. Business management assistance aids producers as they determine which strategies are the most successful at increasing profitability.

## 2. Brief description of the target audience

- Food industries in need of decent thermal and non-thermal food processing techniques specialized for personalized or individualized food production.
- Dairy and juice industries which intensively use plate heat exchanger systems for pasteurization process.
- Potential growers, farmers, and homeowners interested in blueberries have been cautioned about the rust problem and advised on our ongoing efforts to find resistant cultivars and develop management strategies.
- Extension programs involve specialists and county agents who direct their efforts to agricultural producers.

### V(E). Planned Program (Outputs)

#### 1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	80	75	0	0
<b>Actual</b>	850	325	199	10

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

##### Patent Applications Submitted

Year: 2009

Plan: 0

Actual: 0

##### Patents listed

#### 3. Publications (Standard General Output Measure)

##### Number of Peer Reviewed Publications

2009	Extension	Research	Total
<b>Plan</b>	1	2	
<b>Actual</b>	2	13	15

### V(F). State Defined Outputs

#### Output Target

##### Output #1

##### Output Measure

- Develop new food and other products of added value.

**Year**

**Target**

**Actual**

2009	1	0
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**Output #2**

**Output Measure**

- Presentations at international and national meetings.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	5	1

**Output #3**

**Output Measure**

- Grant proposals submitted.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	10	6

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of people who increase their knowledge or complete non-formal education programs on economic or enterprise development
2	Number of new businesses started and number of existing businesses maintaining or expanding operations resulting from economic development programs
3	Total dollar value of grants and contracts obtained

**Outcome #1**

**1. Outcome Measures**

Number of people who increase their knowledge or complete non-formal education programs on economic or enterprise development

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	30	69

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Residents need education so they can better engage in on economic or enterprise development.

**What has been done**

Workshops, presentations and publications were completed to assist residents.

**Results**

Residents are more able to engage in economic or enterprise development.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
503	Quality Maintenance in Storing and Marketing Food Products
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
607	Consumer Economics
608	Community Resource Planning and Development

**Outcome #2**

**1. Outcome Measures**

Number of new businesses started and number of existing businesses maintaining or expanding operations resulting from economic development programs

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	3	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

{No Data Entered}

**What has been done**

{No Data Entered}

**Results**

{No Data Entered}

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
502	New and Improved Food Products
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

**Outcome #3**

**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	Quantitative Target	Actual
2009	66000	127360

**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**

External funds were received and programming was conducted.

**Results**

Residents are better able to generate products, processes and markets.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
607	Consumer Economics
608	Community Resource Planning and Development

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

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

**Brief Explanation**

Raw products are available to make into value added products or to develop export markets. The "Hawai'i" mystique can be used as an advantage in marketing Hawai'i's products.



Collaboration and partnerships can be developed and maintained with other governmental agencies.

A population of forward thinking businesses are willing to invest in new ideas, new products and new markets.

Producers are willing and wanting to coordinate production to meet consistent, year round demands for their products.

Affordable transportation will be available.

#### **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

**V(A). Planned Program (Summary)**

**Program # 8**

**1. Name of the Planned Program**

Global Food Security and Hunger

**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	10%		15%	
104	Protect Soil from Harmful Effects of Natural Elements	0%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		5%	
202	Plant Genetic Resources	0%		5%	
204	Plant Product Quality and Utility (Preharvest)	0%		5%	
205	Plant Management Systems	20%		10%	
212	Pathogens and Nematodes Affecting Plants	20%		5%	
301	Reproductive Performance of Animals	0%		5%	
305	Animal Physiological Processes	0%		5%	
306	Environmental Stress in Animals	10%		2%	
307	Animal Management Systems	20%		5%	
402	Engineering Systems and Equipment	0%		3%	
501	New and Improved Food Processing Technologies	10%		5%	
502	New and Improved Food Products	0%		10%	
601	Economics of Agricultural Production and Farm Management	10%		10%	
604	Marketing and Distribution Practices	0%		5%	
<b>Total</b>		100%		100%	

**V(C). Planned Program (Inputs)**

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Actual	2.1	0.0	20.0	0.0

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

Extension		Research	
<b>Smith-Lever 3b &amp; 3c</b> 89971	<b>1890 Extension</b> 0	<b>Hatch</b> 381473	<b>Evans-Allen</b> 0
<b>1862 Matching</b> 185112	<b>1890 Matching</b> 0	<b>1862 Matching</b> 6168604	<b>1890 Matching</b> 0
<b>1862 All Other</b> 16576	<b>1890 All Other</b> 0	<b>1862 All Other</b> 410359	<b>1890 All Other</b> 0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

The extension programming aimed at global food security and hunger is aimed at maintaining food production across the State in order to replace imports. Increasing diversified agricultural has long been a Statewide strategy in order to reduce the heavy reliance on imported food products. Fruit and vegetables production occurs year round in Hawaii, which makes the output subject to various disease and pest problems. At the same time, information that assist producers in business decision making is needed in order to provide producers with a more competitive position.

**2. Brief description of the target audience**

The target audiences for extension programs in global food security and hunger are agricultural producers and backyard or subsistence producers. Both specialists and agents across the State are involved in assisting producers to sustain their productivity, in the face of high inputs costs and increased production risks.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>Actual</b>	365	3384	0	0

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

**Patent Applications Submitted**

Year: 2009

Plan:

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2009	Extension	Research	Total
<b>Plan</b>			
<b>Actual</b>	1	84	85

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- {No Data Entered}

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

## **Outcome #1**

### **1. Outcome Measures**

{No Data Entered}

### **V(H). Planned Program (External Factors)**

#### **External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Populations changes (immigration, new cultural groupings, etc.)

#### **Brief Explanation**

- Natural disasters can affect food production. In some cases, the entire food production/marketing system may be disrupted.
- economic outlook can affect those interested in starting or expanding operations and those interested in household food production.
- Population changes may affect program develop and delivery. Immigrants do not respond to traditional programming the same as locals.

### **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.

**V(A). Planned Program (Summary)****Program # 9****1. Name of the Planned Program**

Climate Change

**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%		45%	
111	Conservation and Efficient Use of Water	50%		20%	
112	Watershed Protection and Management	0%		15%	
123	Management and Sustainability of Forest Resources	0%		10%	
124	Urban Forestry	50%		0%	
132	Weather and Climate	0%		5%	
136	Conservation of Biological Diversity	0%		5%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Actual	0.8	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
7346	0	28120	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
62639	0	137191	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
50993	0	70810	0

**V(D). Planned Program (Activity)**

## 1. Brief description of the Activity

Rainwater catchment systems are promulgated as an environmentally sound method of reducing dependence on limited municipal water supplies in CTAHR extension programming. A community educational effort that involves a phone and e-mail ask-the-expert service, a website, literature, workshops, demonstrations, and home test kits/supplies provides step-by-step

support to develop and maintain a residential water catchment system. At the same time, a stakeholder association and interaction with an international professional organization is facilitated in order to further support this program.

An extension program in urban forestry and green roofs is helping combat the effects of global warming by encouraging the use of trees and other plant materials in urban areas.

**2. Brief description of the target audience**

The rainwater catchment program and the urban forestry program are aimed at the general public.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>Actual</b>	901	43270	0	0

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

**Patent Applications Submitted**

Year: 2009

Plan:

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2009	Extension	Research	Total
<b>Plan</b>			
<b>Actual</b>	9	2	11

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- {No Data Entered}



**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

## **Outcome #1**

### **1. Outcome Measures**

{No Data Entered}

### **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**

- Any natural disaster may alter the effect of climate change on Hawaii.
- The economic situation will determine what resources are available via appropriations and other funding mechanisms.
  
- Other issues may affect the interest in global warming at the community, state or federal level. As interest changes, then public policy, government regulations, other priorities and other programming will be affected.

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

#### **1. Evaluation Studies Planned**

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

#### **Evaluation Results**

#### **Key Items of Evaluation**

**V(A). Planned Program (Summary)****Program # 10****1. Name of the Planned Program**

Sustainable Energy

**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

<b>KA Code</b>	<b>Knowledge Area</b>	<b>%1862 Extension</b>	<b>%1890 Extension</b>	<b>%1862 Research</b>	<b>%1890 Research</b>
204	Plant Product Quality and Utility (Preharvest)	0%		100%	
	<b>Total</b>	0%		100%	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

<b>Year: 2009</b>	<b>Extension</b>		<b>Research</b>	
	<b>1862</b>	<b>1890</b>	<b>1862</b>	<b>1890</b>
<b>Actual</b>	0.0	0.0	1.7	0.0

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

<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
0	0	42	0
<b>1862 Matching</b>	<b>1890 Matching</b>	<b>1862 Matching</b>	<b>1890 Matching</b>
0	0	627306	0
<b>1862 All Other</b>	<b>1890 All Other</b>	<b>1862 All Other</b>	<b>1890 All Other</b>
0	0	120949	0

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

Three greenhouse tests were conducted to evaluate the value of biochar produced from three feedstocks as a soil amendment. The three biochars tested were produced from (1) sewage sludge, corn cob, and macadamia nut shell. The results indicate that the ability of biochar to improve plant performance depends on its volatile matter content, and the volatile matter content, in turn, depends on the temperature at which the feedstock is converted into biochar. The trials also show that biochar alone does not improve plant growth when added to soils, but will enhance plant growth when added in combination with fertilizers. Eight varieties of energycane varieties obtained from the USDA/ARS research unit in Houma, LA have been planted for evaluation at the Waimanalo Experiment Station. The energycane trials are part of a Sun Grant project obtained under this project to find new energy crops for the lower temperature, high elevation zones of the tropics and subtropics. Sixty oil palm trees were shipped to the Waimanalo station for planting and 40 more were planted at the Waikeke Station. The aim of these trials is to evaluate oil palm performance in diverse environments of the state. The PI attended a Department of Energy biomass program meeting in Washington DC in April, and was invited to an all-expense paid conference on "Aviation Biofuel" sponsored by the US

Air force and USDA. In both conferences, our work on producing feedstock on marginal lands by growing perennial crops that make efficient use of water and nutrients so that prime agricultural lands can be preserved for growing food crops. In November, the PI was invited by Hawaiian Electric Company to give a talk on our work on bioenergy.

## 2. Brief description of the target audience

Energy producers such as Hawaiian Electric Company. State Agencies interested in lessening state dependence on imported fossil fuels such as Department of Agriculture. This project is partially funded by the above firms and we submit reports on our progress in producing feedstock for a biofuel industry that is still in its infancy and is seeking knowledge in which direction it needs to take.

### V(E). Planned Program (Outputs)

#### 1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>Actual</b>	0	0	0	0

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

##### Patent Applications Submitted

Year: 2009

Plan:

Actual: 0

##### Patents listed

#### 3. Publications (Standard General Output Measure)

##### Number of Peer Reviewed Publications

2009	Extension	Research	Total
<b>Plan</b>			
<b>Actual</b>	0	0	0

### V(F). State Defined Outputs

#### Output Target

##### Output #1

##### Output Measure

- {No Data Entered}

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

## **Outcome #1**

### **1. Outcome Measures**

{No Data Entered}

### **V(H). Planned Program (External Factors)**

#### **External factors which affected outcomes**

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities

#### **Brief Explanation**

CTAHR started the sustainable bioenergy program three years ago under our strategic plan implementation plan. Several faculty members are engaged in this new program, and we have obtained Department of Energy special grant and USDA special grant (Sun Grant Western pacific subcenter) to support this new program. However, funds have not been released. External forces favor this new research program at this time; however, it will take time before we can see fruits from this new program.

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

#### **1. Evaluation Studies Planned**

- During (during program)

#### **Evaluation Results**

This new program has made good progress in evaluating new energy crops for our tropical environment. It will take longer time to see outcome from this program.

#### **Key Items of Evaluation**

None.

**V(A). Planned Program (Summary)**

**Program # 11**

**1. Name of the Planned Program**

Childhood Obesity

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	34%		50%	
704	Nutrition and Hunger in the Population	0%		50%	
724	Healthy Lifestyle	33%		0%	
802	Human Development and Family Well-Being	33%		0%	
<b>Total</b>		100%		100%	

**V(C). Planned Program (Inputs)**

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Actual	0.2	0.0	1.1	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
2265	0	6420	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
23648	0	187620	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
3490	0	6012	0

**V(D). Planned Program (Activity)**

1. Brief description of the Activity

On-going extension programs in nutrition education and youth development address childhood obesity as a component. Nutrition education programming is generally aimed at adults and teaches them how to make healthy food choices for themselves and for their families. As adults make healthier food choices, then the children in the family will also begin to eat healthier.

Youth development programs have begun to incorporate efforts to get youth more active. Projects that strive to engage children in physical exercise on a daily basis have been initiated across the State.

**2. Brief description of the target audience**

The target audiences for the extension programming are youth, adults and families. The target audiences for the research program are peer scientists, governmental agencies, and general public.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>Actual</b>	87	2011	239	76

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

**Patent Applications Submitted**

Year: 2009

Plan:

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2009	Extension	Research	Total
<b>Plan</b>			
<b>Actual</b>	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- {No Data Entered}



**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

## **Outcome #1**

### **1. Outcome Measures**

{No Data Entered}

### **V(H). Planned Program (External Factors)**

#### **External factors which affected outcomes**

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

#### **Brief Explanation**

Economic concerns may redirect funding to other programmatic areas and other public priorities.

Population trends may cause a change programming effectiveness. For example, Pacific Islanders value obesity and the consumption of various unhealthy foods, which will increase programmatic challenges.

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

#### **1. Evaluation Studies Planned**

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

#### **Evaluation Results**

This program is a new one for us. Although we have active program in obesity and nutrition area, our focus is not in childhood obesity. NIFA is forcing us to create this new program, and we are adding this new program area last month. As in all our programs, we conduct peer review of the proposed activities, and provide feedbacks to the faculty. We will have more to report this time next year.

#### **Key Items of Evaluation**

None.

**V(A). Planned Program (Summary)**

**Program # 12**

**1. Name of the Planned Program**

Food Safety

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
306	Environmental Stress in Animals	0%		15%	
307	Animal Management Systems	0%		10%	
501	New and Improved Food Processing Technologies	50%		25%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	30%		25%	
722	Zoonotic Diseases and Parasites Affecting Humans	20%		25%	
<b>Total</b>		100%		100%	

**V(C). Planned Program (Inputs)**

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Actual	1.0	0.0	1.8	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
4624	0	98658	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
117973	0	183392	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
13538	0	0	0

**V(D). Planned Program (Activity)**

1. Brief description of the Activity

Fresh fruits and vegetables represent an essential part of our daily diet. The U.S. consumption of fresh-cut produce has increased at an annual rate of approximately 10% since 1995. Unfortunately, a number of food-borne outbreaks have been associated with contaminated fruits and vegetables. Little is known about the fate of pathogenic bacteria on fresh-cut pineapple

and papaya. We explored the bacteria diversity on fresh-cut mango during refrigeration using a molecular technique, polymerase chain reaction-denaturing gradient gel electrophoresis (PCR-DGGE). Two mango samples were prepared and stored at 10 degree Celsius. The aerobic plate count (APC) and yeast and mold count (YMC) were determined at 0, 3, 6, and 9 days. Meanwhile, bacterial DNA was extracted from each sample and subjected to the PCR-DGGE targeting a highly variable region (V3) of the bacterial 16S rRNA gene. Identification of bacterial species was achieved by purifying and sequencing the bands in the DGGE profile.

*E. coli* O157:H7, *Salmonella*, and *L. monocytogenes* are three serious pathogenic bacteria known to be present on fresh produce and able to survive in certain acidic juices. Little is known about the fate of these pathogenic bacteria in pineapple and guava juices. Moreover, the deadly pathogens may enter a viable-but-nonculturable state in response to stressing acidic conditions. Maintaining virulence and pathogenic potential, stressed cells of the pathogenic bacteria may be underestimated or even escape detection if standard culture methods are solely employed. This project investigates how the pathogenic bacteria survive in pineapple and guava juices. We evaluated the ability of acid and cold stressed *Salmonella* Typhimurium to regain culturability under reduced oxidative tension. Overnight culture of this pathogen was inoculated at 107 cfu/ml into tryptic soy broth adjusted to pH 3.5 with citric, malic, acetic, lactic, or hydrochloric acids. After inoculation, all samples were held statically at 4 degree Celsius. At designated intervals, 1 ml of each sample was diluted in phosphate-buffered saline and plated on tryptic soy agar (TSA) and TSA containing catalase (TSA-CL, 2,000 U/plate). All the plates were counted after incubation at 35 degree Celsius for 48 h.

The extension food safety programs had three basic components. The first program was aimed at consumers and involved educational programs that addressed food borne illness. A variety of educational materials were developed and delivered, including poster, a video, hand-outs, and 37 presentations. In addition, 44 volunteers were trained to deliver educational programs. The second effort concentrated on delivering seven group presentations, 35 one-on-one coaching sessions, and three publications aimed at educating agricultural producers about farm food safety and good agricultural practices. In addition, extramural grants were received to fund this work. The third program targeted food processing businesses and involved the delivery of 25 short courses, including certification courses, two websites and development of 38 different sets of course material. In addition, extramural grants were received to fund this work.

## 2. Brief description of the target audience

The three food safety extension programs targeted consumers, agricultural producers and food processors. Consumers have food safety concerns relative to the safe handling and preparation of food. Topics such as washing produce, cooking and storage temperature, and proper food handling were covered. Agriculture producers face a variety of food safety concerns and these need to be addressed in order for producers to be able to gain access to various markets. A food safety certification program has been developed in Hawaii, however many producers need educational assistance in order to become certified. Food processor face even more stringent food safety regulations and risks than agricultural producers. Target audiences for the research program are farmers, juice processors, and consumers.

### V(E). Planned Program (Outputs)

#### 1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual	1015	31312	2427	780

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

### Patent Applications Submitted

Year: 2009

Plan:

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

<b>2009</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>			
<b>Actual</b>	3	5	8

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- {No Data Entered}

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Increased knowledge of farm, processing and consumers food safety

**Outcome #1**

**1. Outcome Measures**

Increased knowledge of farm, processing and consumers food safety

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	{No Data Entered}	945

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Food processors, farmers and consumers have food safety challenges.

**What has been done**

Workshops, demonstrations, one-to-one consultations, websites and publications on various food safety issues were completed.

**Results**

Farmers, food processors and consumers now recognize the importance of food safety throughout the marketing channel and know what they can do to ensure that the food that they handle will not be a source of food borne illness.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
722	Zoonotic Diseases and Parasites Affecting Humans

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

### **Brief Explanation**

State and federal laws and regulations could change, which would affect the behavior of businesses relative to food safety.

Natural disasters could interrupt control systems and prevent them from coming back on-line.

Public policy change could impact the expectations of consumers and others in the marketing channel, relative to food safety.

A shortage of resources due to the economic situation, or a change in competing public or programmatic interests could draw attention away from food safety.

An increase in immigrants involved in agriculture or food processing could increase the need for food safety educational programs.

### **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 will submit annual progress report to document their accomplishments. Associate deans for research and extension are responsible for monitoring satisfactory progress has been made before funding release.

### **Key Items of Evaluation**