2012 University of Hawaii Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 06/27/2013

I. Report Overview

1. Executive Summary

The College of Tropical Agriculture and Human Resources (CTAHR) at the University of Hawaii at Manoa (UHM) ended FY2012 with a new Dean, Dr. Maria Gallo. CTAHR continued to focus and strengthen research and extension activities within the framework provided by the ten program areas described in this Annual Report. In recognition of the unique needs of the only tropical, island state in the USA and the composition of the seven units (six academic departments and a center) of which CTAHR is composed, the first five of these ten program areas address local issues and priorities; while program areas 6-10 are those identified as national priorities by USDA NIFA.

Over the past three years, CTAHR has increasingly re-focused efforts into these national priority areas, but it is important to recognize the unique tropical geography of Hawaii, 2,500 miles from the continental United States and the most isolated island chain in the world; unique environment with virtually every recognized soil type, rapid increases in elevation, and annual rainfall variation from less than ten to over 400 inches; unique farming situation with an average farm size of 148 acres and the majority of farms less than 10 acres, and a great variety of specialty crops, many grown nowhere else in the USA; and unique social and cultural mix, with many first-generation immigrants entering agricultural and a wide range of cultural practices and dietary preferences in the population. The costs of land, labor, and energy exceed those found in other states, with fuel costs adding significantly to the costs of production and of import of inputs (agrochemicals, animal feed) and export of products. With 85% of Hawaii's food imported, import replacement with locally grown products is an obvious but challenging goal. The cost of imported feed is a limiting factor for Hawaii's livestock industries - in no other state would it be more economical to ship calves over 3,000 miles to a feedlot, rather than to bring feed to the cattle. Although livestock industries in Hawaii are making progress towards the goal of quality grass-finished products, persistent drought conditions place economic stress on these ranchers. Thus, the first five of our ten program areas address local challenges and opportunities.

Within these ten program areas, CTAHR faculty engage in a broad spectrum of research and extension activities, including increasing forest productivity and protection of watersheds and coastal resources, improved cultivation and processing of specialty crops and development of value-added products, management of invasive species constantly threatening the "gateway" state of Hawaii, plant and animal breeding and genetic improvement, biofuel development to address soaring energy costs and fossil fuel depletion, stresses related to drought and climate change, food safety and security, and the health (mental, physical and economic) of Hawaii's citizens and communities. This report documents program challenges and program successes, often incremental but sometimes transformational.

Initiatives described in FY2011 continued to gain strength in FY2012, along with development of new research and extension (most often integrated) efforts. Significant progress was made in the region-wide Children's Healthy Living Program for Remote Underserved Minority Populations of the Pacific (CHL), supported by a $25 million NIFA award; and the Tropical Hardwood Tree Improvement and Regeneration Center, established in 2011 in cooperation with Purdue University and other partners gained momentum and funding. Forestry-related research and extension are growing areas of activity in CTAHR, and FY2012 saw the establishment of the Pacific Fire Exchange, a consortium to improve wildfire management on Pacific islands. Conservation of Hawaii's precious natural resources and native biota and invasion biology

crossed over program areas in FY2012, and represent increasing efforts in CTAHR. With a Sun Grant Subcenter formally established within CTAHR in FY2012, research on lignocellulosic and oil biofuel crops also continued to grow. Food safety is increasingly of concern at all levels of the food chain, and extension efforts such as the successful on-farm food safety certification coaching program were complemented by further development and verification of a handheld assimilating probe unit for rapid field detection of multiple environmental pathogens, and research on removal of bacterial pathogens during processing. CTAHR engagement with the public at large continued to expand as well, with increasing numbers enrolling in the Master Gardeners program statewide, and initiation of complementary home and school food gardening activities.

CTAHR leadership in FY2012 was provided by Interim Dean Sylvia Yuen, newly appointed Dean Maria Gallo, Interim Associate Dean for Extension Carl Evensen, Interim Associate Dean for Research J. Kenneth Grace, and Associate Dean for Academic Affairs Charles Kinoshita. Internal competitive funding opportunities within CTAHR continued to prioritize integration of research, extension and (where appropriate) instruction; multi- state and territory collaboration; and national priority program areas. In order to strengthen links between CTAHR and its many community and industry constituencies, Dean Gallo established a Dean's Council consisting of industry leaders and prominent members of the community with a strong interest in CTAHR. This group provides a sounding board for proposed initiatives, brings creative and out-of-the-box thinking to discussion of initiatives and priorities, will assist raising funds for college efforts, and ensures that CTAHR is accountable and addresses state needs.

At the end of FY2012, the college began the process of identifying and prioritizing both internal and external needs and opportunities in order to develop a new five year strategic action plan. The planning process will include the Advisory Board and other external stakeholders, and review of research and extension activities with respect to future state needs and availability of funding. Although there are no immediate plans to restructure CTAHR's ten planned program areas at this time, some restructuring and revision certainly may occur in the future to meet the objectives of the strategic action plan, and any such changes will be reflected in future activity reports and the CTAHR plan of work.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	60.0	0.0	56.0	0.0
Actual	47.4	0.0	44.9	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 to 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 underserved 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, supplemented by external reviewers as necessary, 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 proposed projects and plans of work for reviewers. Final review for projects and plans of work occurs in the offices of the Associate Dean/Associate Director for Research and Associate Dean/Associate Director for Extension.

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, can 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 face to face discussions with industry representatives, participation in trade association meetings, participation on the State of Hawaii Board of Agriculture, Hawaii Invasive Species Council and other state boards and committees; participation in adhoc state task forces such as the Coffee Berry Borer Taskforce; consultation with the Hawai'i Farm Bureau Federation, and long standing "Industry Analysis" and "Strategic Planning" processes that are applied to for key industries.

Other techniques used to gather stakeholder inputs were surveys, commodity organization meetings, through feedback and input from the Farm Bureau, and direct input from stakeholders. CTAHR faculty and administers 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.

Input is collected as described in the previous section is 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 increases 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

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1328880	0	1602779	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1558985	0	1667665	0
Actual Matching	4672220	0	9358351	0
Actual All Other	1271585	0	5707808	0
Total Actual Expended	7502790	0	16733824	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	0	0	0	0

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

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

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	18%		13%	
111	Conservation and Efficient Use of Water	6%		7%	
112	Watershed Protection and Management	10%		6%	
121	Management of Range Resources	13%		4%	
123	Management and Sustainability of Forest Resources	10%		4%	
124	Urban Forestry	0%		3%	
125	Agroforestry	5%		3%	
131	Alternative Uses of Land	0%		3%	
133	Pollution Prevention and Mitigation	11%		8%	
135	Aquatic and Terrestrial Wildlife	0%		3%	
136	Conservation of Biological Diversity	0%		8%	
205	Plant Management Systems	17%		6%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		6%	
212	Pathogens and Nematodes Affecting Plants	0%		6%	
402	Engineering Systems and Equipment	0%		6%	
403	Waste Disposal, Recycling, and Reuse	5%		3%	
404	Instrumentation and Control Systems	0%		6%	
605	Natural Resource and Environmental Economics	5%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Extension	Research

Year: 2012	1862	1890	1862	1890
Plan	3.0	0.0	6.0	0.0
Actual Paid Professional	3.2	0.0	7.2	0.0
Actual Volunteer	2.6	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
116569	0	208233	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
385125	0	1590993	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
36779	0	748984	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research and extension efforts to promote harmony between agriculture and environment continue to be a priority for CTAHR. Areas addressed by research and extension projects include agricultural waste management, forest resource management, agroforestry, range management, fire science, nutrient management, soil erosion, soil quality and bioremediation, biological diversity, rehabilitation of degraded and idle lands, handling of hazardous materials, and water quality. Research and extension efforts at preserving, protecting, and renewing Hawaii's natural resources continue to be an area of focus.

The CTAHR sponsored Agriculture and Environmental Awareness Day continued to enjoy great popularity in FY2012 on the islands of Kauai, Oahu, and Maui. Participating students (primarily fifth and sixth graders) investigate how agriculture and environmental science affect their lives and shape their future. Students explore issues such as food sustainability in Hawaii and globally, ecosystem protection, and bioenergy needs. With respect to job creation, they are introduced to a broad variety of agricultural and environmental career choices.

The forestry extension program made direct contacts with 573 forest landowners, managers, and professionals through email and telephone in FY2012. Visits to the forestry extension website (http://www.ctahr.hawaii.edu/forestry) increased 9% from last year, with 46,845 unique visitors. The Tropical Hardwood Tree Improvement and Regeneration Center, a cooperative effort with Purdue University and numerous state and federal agencies, nonprofits, and private entities, was initiated in October 2011, with over $400,000 in funding commitments. The Pacific Fire Exchange consortium, a complementary activity, was also established in FY2012 to promote improved efforts to model and manage wildfires on Pacific islands. In other forestry work to develop silvicultural systems for Koa management, timber volume of over 700 trees in a young Koa stand were measured, and 31 young Koa trees were harvested, assessed for defects, milled, and distributed to local woodworkers to evaluate consumer perceptions of wood quality. Another common tree in Hawaii (and throughout the

possible source of genes conferring tolerance to stresses, since it is highly tolerant to drought and virtually disease free. Several genes that appear to be related to stress tolerance were isolated in FY2012, and their functions are currently being determined. These may offer a route to drought tolerance in agricultural crops, an issue of increasing importance globally due to climate change.

Water management is a critical issue in an island ecosystem with competing demands from urban growth, agriculture, and natural and coastal resources. In FY2012, CTAHR staff developed prototype software for modeling water usage under different scenarios as a decision support tool; and continued research on micro-irrigation as an agricultural water conservation measure. Two novel bioreactors for wastewater treatment and reclamation were also designed: an Immobilized Bioprocess (IBP) and Bio-Entrapped Membrane Reactor (BEMR). Both are simple in operation and design, and require less maintenance than existing biological wastewater treatment options. Another approach to waste management of great potential value was found to be conversion of sewage sludge to biochar. This process converts toxic sludge to a safe product, can produce energy from the conversion process, and produces a highly effective soil amendment. In experiments on corn growth, one of the tested biochar plus fertilizer treatments improved biomass production by greater than 3-fold.

Research on an Assimilating Probe for rapid detection in the field of multiple human and plant/animal pathogens by detecting DNA amplicons replicated isothermically focused on enhancing the value of this $600 production cost, handheld device. Successful field trials were conducted in Guatemala in December 2011, to detect a quarantine bacterial wilt pathogen; and in cooperation with US FDA in 2012, for detection of Salmonella on food samples. This device is adaptable to a variety of environmental, plant and public health pathogens, and has a broad range of applications due to its cost, portability, accuracy, and multiplexing abilities.

Finally, CTAHR faculty are increasingly active in efforts to protect and conserve Hawaii's resources and endangered biota, including research on the impacts of animals and human interactions on natural environments, evaluation of biological control efforts post-implementation, such as release of an herbivorous moth for fireweed control, and conservation of endangered native plants and insect species. The University of Hawaii Insect Museum (UHIM) supported by CTAHR catalogued over 11,290 specimens for a digital database in FY2012, and welcomed 300 visitors, from visiting scientists to local school children learning about invasive and native insects and Hawaii's ecosystem. UHIM researchers documented the impact of urbanization on the declining range of the native Hawaiian moth genus Omiodes.

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, natural resource management, and allied 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 federal agencies (such as the Hawai'i State Departments of Agriculture, Health, and Land and Natural Resources, and the USDA Natural Resources Conservation Service, NRCS). Clients for extension agents are land users and commodity producers and their organizations (such as the Hawai'i Association of Soil and Water Conservation Districts, Hawai'i Forestry Industry Association, and the Hawai'i Farm Bureau), extension staff in other CTAHR units and at sister institutions, and other members of the professional community who deal with managing land, soil and water resources especially in tropical agro-ecosystems. Interfacing with other professional and community groups who can provide new and useful knowledge to facilitate making decisions is an important expectation for effectively meeting its commitments.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4897	138115	215	1

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

Patent Applications Submitted

Year: 2012
Actual: 1

Patents listed
Rima,J., Q. X. Li,L. Lizette. 2011. Generation of free radicals, analytical methods, bacterial disinfections, and oxidative destruction of organic chemicals using zero valent iron and other metals. US Patent 8,048,317 (Nov. 1, 2011).

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	5	45	50

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals submitted.

Year	Actual
2012	33

Output #2

Output Measure

- Presentations at international and national meetings.

Year	Actual
2012	31

Output #3

Output Measure

- Number of workshops and other educational activities held

Year	Actual
2012	49

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
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	67

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
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
125	Agroforestry
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife

205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
402	Engineering Systems and Equipment
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	Actual
2012	1732416

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Protecting Hawaii's natural resources preserves the islands unique environments and native species, enhances the well being of Hawaii residents, and promotes the main economic engine of the state, which is tourism.

What has been done
Forest conservation and restoration activities have taken place throughout the state, but particularly on the Big Island of Hawaii, where preservation and restoration of endangered native bird habitat has been enhanced by koa forest restoration. Invasive species control is being promoted by CTAHR faculty, particularly through collaboration with other agencies and private organizations. Soil and water conservation remain important activites statewide, along with animal waste management.

Results
Through a variety of research and extension programs, Hawaii residents and visitors are more aware of the environmental impacts of their activities. Many are increasingly adopting more sustainable and environmentally responsible practices.

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
135	Aquatic and Terrestrial Wildlife
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
404	Instrumentation and Control Systems
605	Natural Resource and Environmental Economics
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

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 (Quarantine procedures)

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.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	12%		4%	
124	Urban Forestry	0%		2%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		5%	
202	Plant Genetic Resources	2%		6%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	3%		3%	
204	Plant Product Quality and Utility (Preharvest)	4%		6%	
205	Plant Management Systems	22%		18%	
206	Basic Plant Biology	0%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	14%		5%	
212	Pathogens and Nematodes Affecting Plants	13%		13%	
213	Weeds Affecting Plants	6%		0%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	4%		0%	
215	Biological Control of Pests Affecting Plants	0%		4%	
216	Integrated Pest Management Systems	13%		6%	
502	New and Improved Food Products	0%		7%	
511	New and Improved Non-Food Products and Processes	0%		7%	
601	Economics of Agricultural Production and Farm Management	0%		2%	
604	Marketing and Distribution Practices	7%		5%	
903	Communication, Education, and Information Delivery	0%		2%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	16.0	0.0	10.0	0.0
Actual Paid Professional	11.4	0.0	8.0	0.0
Actual Volunteer	4.8	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
382803	0	288170	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1213445	0	2197875	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
417090	0	475142	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

A fundamental responsibility of the College of Tropical Agriculture and Human Resources is promotion of crop production in the State. Since most food consumed in Hawaii is imported, an important goal is to encourage import replacement through increased commercial as well as backyard and urban agricultural production. Likewise, promotion of diversified cropping helps to diversify the state's economy in the wake of sugarcane and pineapple plantation closures over the past several decades. Linkages with programs in other states and island territories assist CTAHR in these efforts. Research and extension efforts in FY2012 included all areas of tropical agriculture: breeding of new ornamental varieties, variety selection for pest and disease resistance, pest and disease management in both conventional and organic farming, identification and evaluation of potential new specialty crops and value-added processed foods, genetic modification and marker assisted selection, improved field and greenhouse cultivation methods, promotion of import replacement with locally grown produce, and aquaponics for sustainable no-soil agricultural production.

Urban horticulture clientele and Master Gardener volunteers statewide increased awareness of resources available to home gardeners through CTAHR, including fruit fly suppression, general plant pest and disease control, plant propagation, nutrient management and environmentally sound gardening. Statewide interest in Master Gardener programs continued to expand. In recognition of increasing public interest in home food gardens, as well as ornamental plants, CTAHR consulted with residents and the Neighborhood Board in the windward community of Waimanalo, on the opposite side of the island of Oahu from Honolulu on their interest in home food production, and a trial Master Gardener-like training program in this area is planned for FY2013.

Transgenic Rainbow papaya is well accepted by consumers, and recognized by a large percentage of growers in Hawaii as necessary to avoid the ravages of Papaya Ringspot Virus (PRSV). More than

82% of the papaya acreage planted in 2010-2011 consisted of Rainbow. In FY2012, following deregulation of Rainbow papaya for export to Japan, the first shipments were made to Japan, and this variety has been well accepted by the Japanese consumer market. On behalf of the Hawaii papaya industry, CTAHR collaborated with USDA-ARS and the Hawaii Department of Agriculture in submissions requesting deregulation by the People's Republic of China in FY2012, and this application is currently under consideration. Although research on genetic modification represents a very small portion of the overall research effort in CTAHR, transgenic banana lines are under field evaluation against banana bunchy top virus (BBTV), and transgenic tomato lines developed by USDA-ARS are similarly being evaluated to combat tomato spotted wilt virus (TSWV). In both cases, conventional selection efforts with non-transgenic banana clones from tissue culture and with locally-grown tomato varieties are also underway. It is possible that these efforts may complement each other and lead to development of lines with multiple (stacked) resistance factors. Separate research in CTAHR to identify the genes responsible for induction of disease by fungal plant pathogens may lead to very specific and targeted control methods.

Locally-grown avocados have been considered a logical target for replacement of imported produce for several years, but inconsistent supply due to lack of coordination among growers and consumer difficulty in differentiating locally-grown produce from exports were identified as obstacles to acceptance. Consumer studies in FY2012, however, demonstrated that focusing on more preferred avocado varieties and addition of a locally-grown label could substantially overcome these barriers. Other work in FY2012 identified the potential of blueberries as a greenhouse crop, avoiding fungal rust problems; and the potential value of a nutritional byproduct of tofu manufacture, "okara," in baking. A value-added okara shortbread cookie was developed by students, commercially produced at a local food manufacturing plant, and is now sold at all University of Hawaii Rainbowtique outlets, creating a value-added product from previously discarded material.

Tropical ornamentals are an important segment of commercial agriculture in Hawaii. Five new varieties of Dracaena were introduced to growers through the Hawaii Export Nursery Association (HENA), and economical bioreactor and tissue culture protocols were transferred to local tissue culture laboratories, with the result that 1,000 clones of each new variety has been produced by commercial laboratory on the island of Hawaii. Effects of different wavelengths of light on plant growth was also evaluated, and red and blue light-emitting diodes (LEDs) found to be efficient alternatives to fluorescent lights.

Aquaponics (soil-less plant and fish co-cultivation) is an increasingly popular agricultural method in Hawaii, suitable both for commercial vegetable production, and urban gardening at homes, schools, shelters where soil is rare or absent, mental health facilities, correctional facilities, and many other possible locations. The largest commercial aquaculture producer in the state, Maris Garden, produces 20,000 heads of lettuce and 500-800 pounds of tilapia and Chinese catfish monthly. Websites, extension materials and workshops are extremely popular with Hawaii residents. Research in this area in FY2012 focused on increased understanding of mechanisms in aquaponics, such as the value of different modes of pH mediation in soil-less cultivation of Chinese taro. The low inputs required for home aquaponics, and the ability to simultaneously produce both vegetables and protein make this an attractive food production system for the 21st century, particularly in island environments where land is limited.

The Local Immigrant Farmer Education (LIFE) program is a risk management training program for limited resource and underserved Filipino, Southeast Asian and other minority growers in Hawaii, which operates with the assistance of the USDA Risk Management Agency. LIFE has established a solid reputation for delivering timely, useful, quality outreach and education to Hawaii's producers. The program operates through grass roots efforts in reaching socially disadvantaged growers with small acreage and remote rural locations, such as recent Asian immigrants with limited English capabilities and little experience in diversified crop production. LIFE's educational program focuses on responsible farming, business management, and cost of production, risk management, and environmental stewardship. Information is delivered to growers in a manner respectful of their diverse cultures and backgrounds. A

total of 75 outreach events (workshops, fielddays, and demonstrations) were held statewide in FY2012. Workshop evaluations indicated growers learned an average of 7 new practices with potential on farm application.

2. Brief description of the target audience

The target audience for this program area is mainly the diversified farming community, especially those growing commercial or home garden crops. Main commercial crop industries served by CTAHR include floriculture and nursery, tropical fruit trees and nuts, vegetables, melons, herbs, and root or tuber crops. Many of these crops are tropical not commonly grown in the mainland US, so that research and extension outreach is very important to Hawaii producers. There is also a resurgence of interest in home and school gardening which is supported by CTAHR programs.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	22161	332690	1287	78733

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

Patent Applications Submitted

Year: 2012

Actual: 1

Patents listed

Cho, J. 2011. Colocasia plant named "Kona." US Patent No. PP22,420 (Dec. 27, 2011).

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	30	9	39

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, research/field day demonstrations conducted

Year	Actual
2012	306

Output #2

Output Measure

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

Year	Actual
2012	50

Output #3

Output Measure

- Presentations at international and national meetings

Year	Actual
2012	28

Output #4

Output Measure

- Number of grant proposals submitted.

Year	Actual
2012	41

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	Number of people who adopt one or more recommended practices
3	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	Actual
2012	16646

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Increased awareness of environmentally responsible agricultural and landscape management is the first step toward better decision making and improved practices.

What has been done
Workshops, field days, demonstrations, presentations, websites and publications have been completed on a variety of topics that will help agricultural and home garden 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
102	Soil, Plant, Water, Nutrient Relationships
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
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
502	New and Improved Food Products
604	Marketing and Distribution Practices

Outcome #2

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	Actual
2012	4875

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Moving from understanding of improved practice to actual adoption is obviously important to realizing the environmental, social and economic benefits associated with the improved practices.

What has been done
Developing improved practices (such as pest control, improved crop varieties, soil management, etc.) is done by research faculty, either in on-station or on-farm experiments. Adoptions usually require repeated instruction and follow up by extension educators, which is often done in conjunction with commodity associations. Also CTAHRS's Master Gardener programs involves repeated and in depth outreach to the general gardening public. This is done through fairs, phone hotlines and direct instruction of the public by the Master Gardener volunteers.

Results
Commercial crop and home garden production will be more productive and sustainable.

4. Associated Knowledge Areas

KA Code	Knowledge Area

102	Soil, Plant, Water, Nutrient Relationships
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
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
502	New and Improved Food Products
511	New and Improved Non-Food Products and Processes
604	Marketing and Distribution Practices

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	Actual
2012	5220008

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

Increased extramural funding has allowed CTAHR faculty and staff to conduct needed research and associated extension outreach activities.

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
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
502	New and Improved Food Products

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)

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

Invasive Species Education and Management

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
112	Watershed Protection and Management	0%		4%	
136	Conservation of Biological Diversity	0%		5%	
204	Plant Product Quality and Utility (Preharvest)	0%		6%	
205	Plant Management Systems	15%		8%	
211	Insects, Mites, and Other Arthropods Affecting Plants	20%		10%	
212	Pathogens and Nematodes Affecting Plants	15%		23%	
213	Weeds Affecting Plants	12%		10%	
215	Biological Control of Pests Affecting Plants	8%		15%	
216	Integrated Pest Management Systems	30%		9%	
312	External Parasites and Pests of Animals	0%		7%	
721	Insects and Other Pests Affecting Humans	0%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	5.0	0.0	5.0	0.0
Actual Paid Professional	2.9	0.0	5.3	0.0
Actual Volunteer	1.6	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
118956	0	299817	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
258098	0	842838	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
17961	0	232496	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Invasive species threaten the quality of agricultural products, the health of farming businesses and the surrounding natural and urban ecosystems. Sound management of agroecosystems in Hawai'i depends on mitigating the effects of alien invasive species. Invasive species threaten our native plant heritage and economically important plants, pastures, rangelands, forests, and critical watersheds. In addition to their economic damages, invasives also threaten conservation efforts for native endangered plants and insects. Invasive biology and conservation biology are opposite sides of the same coin. CTAHR plays a significant role in developing and delivering information and technologies that minimize the negative impacts of invasive species. Increasingly, CTAHR staff are also involved in efforts to conserve threatened native biota.

12,530 students in 350 public school classrooms have participated in a K-12 curriculum project focusing on biology and management of Hawaii's invasive termites, Termite Project: Educate to Eradicate. The college also maintains the University of Hawaii Insect Museum (UHIM), a repository for native and invasive insect species. Over 11,290 specimens from this collection have been placed in a digital database. Invasive fruit flies in the genera Bactrocera and Dacus are pests worldwide, and over 1,200 photos from the UHIM collection have been organized in a searchable online database: http://www.herbarium.hawaii.edu/fruitfly/. In FY2012, UHIM outreach efforts to educate the community on invasive and native insect species included 300 visitors, among them students from five local schools.

In FY2012, efforts continued to mitigate the impact of the coffee berry borer (CBB) in the Kona and Kau regions of the island of Hawaii. This beetle is the most devastating pest of coffee world-wide, and was first found a Kona coffee field by a CTAHR researcher in Fall 2010. Since its discovery, college staff working in collaboration with USDA-ARS researchers have developed a heat treatment technique for disinfesting coffee beans prior to shipment to Oahu for processing, are in the second year of a three year study of the efficacy of entomopathogenic fungi for CBB control, have optimized CBB trap design and placement for maximum trap catch, are evaluating insecticides for registration under the IR-4 program to facilitate minor crop registrations, have established that kaolin (powdered white clay labeled for use in certified organic production) applications to coffee trees decrease beetle infestation rates, and have established the efficacy of plant oils as repellents. Essential oils also hold promise against pickleworm, an invasive moth attacking cucurbits in Hawaii.

The "SWAT team" approach employed in FY2011 to combat the appearance of basil downy mildew on Oahu was used again in FY2012 when onion thrips, normally a pest of round onions, was found on green onions on the Waianae coast of Oahu. An extension agent familiar with the pest in round onions on Maui partnered with Oahu county agents, an extension specialist and researchers to initiate control

research, and deliver grower workshops on best management practices. Workshops and research efforts against basil downy mildew continued as well. Efforts also continued to refine hot water shower disinfestation treatments to more effectively target particular pests and minimize any impact on commodity quality, for both quarantine and export to out of state markets. Other research and extension efforts to minimize applications of conventional pesticides included demonstration that peptide toxins isolated from snail hunting marine gastropods can selectively affect mollusks, serving as models for highly selective pesticides. Also, bee keepers in Hawaii have adopted a formic acid based treatment for varroa mites developed by CTAHR. Vigilance and rapid response are essential in Hawaii, since new invasive pests and diseases are discovered each year. In FY2012, pepper mottle virus (PepMoV) was found in tomato plants in Hawaii, also representing the first report of natural infection in the USA. Plants infected with PepMoV show no impaired growth, but the majority of fruit are unsalable. A field survey of 292 plants representing 14 tomato varieties found an overall virus incidence of 20%, ranging from 5-48% for the different varieties, indicating that this newly discovered virus is a considerable threat to tomato production.

Invasive plants (weeds) are major problems in plant and animal agricultural systems, as well as natural systems, in Hawaii. Herbicide Ballistic Technology (HBT) employing paintball gun technology for targeted applications of very small quantities of herbicide has been readily adopted by federal, state, county, private, and nonprofit agencies concerned with weed control and eradication, since its development in CTAHR. Miconia is the most important invasive plant in Hawaii, particularly in natural systems such as watersheds, and use of this technology has reduced aerial application costs by 50%, while also minimizing or eliminating any impact of applications on non-target plants. In FY2012, efforts concentrated on both application, and training and certification of applicators, with four workshops conducted to introduce standard operating procedures for ground and aerial applications.

Fireweed (Senecio madagascariensis) is the major pasture weed problem facing ranchers in Hawaii today. Maui County has sponsored an herbicide prescription program employing HBT and conducted by CTAHR staff to suppress infestations in priority pastures. Due to the cost and difficulty of herbicide treatment, CTAHR, USDA Forest Service and Hawaii Department of Agriculture staff have collaborated on a biological control program to collect, screen against nontargets, rear and release a Madagascan moth, Secusio extensa, to suppress this noxious and toxic weed. CTAHR researchers have censused prerelease fireweed populations in order to accurately determine impact of the moth after release, and permits and procedures were put in place in the latter part of FY2012 to allow release in FY2013.

2. Brief description of the target audience

Target audiences include 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 fruit flies work with extension educators to delivery best management practices to agricultural and residential clientele. Natural resource managers (including those responsible for forestry, rangeland and conservation lands) depend on CTAHR researchers and extension to develop and deliver technologies for improved control and management of invasive plants in Hawaii's landscapes.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4889	7500	1863	358

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	11	32	43

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days, demonstrations held

Year	Actual
2012	316

Output #2

Output Measure

- Number of grant proposals submitted

Year	Actual
2012	13

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	3094

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Residents are not aware of the problems associated with invasive species. Increased awareness of best management practices is the first step in implementing improvements in invasive species control and management.

What has been done
Workshops, demonstrations, filed days, presentations and publications make residents aware of the problems associated with invasive species and control practices which are most successful.

Results
Farmers and residents will be more likely to assist in controlling invasive species.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	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
Farmers and residents better understand how to control invasive species and Hawaii is better protected from crop destruction and ecosystem damage caused by invasive plants and animals.

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	Actual
2012	974375

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Funding is needed to conduct research and extension activities to augment that accomplished with formula funds.

What has been done
Extramural grants have been received and funding utilized.

Results
Hawaii has been able to better accomplish meaningful and comprehensive invasive species control.

4. Associated Knowledge Areas

KA Code	Knowledge Area
136	Conservation of Biological Diversity
205	Plant Management Systems
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
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

- 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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Youth, Family and Community Development

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	0%		2%	
102	Soil, Plant, Water, Nutrient Relationships	0%		2%	
124	Urban Forestry	0%		4%	
131	Alternative Uses of Land	0%		4%	
133	Pollution Prevention and Mitigation	0%		2%	
604	Marketing and Distribution Practices	0%		3%	
606	International Trade and Development	0%		2%	
608	Community Resource Planning and Development	0%		7%	
703	Nutrition Education and Behavior	0%		2%	
724	Healthy Lifestyle	8%		4%	
801	Individual and Family Resource Management	6%		16%	
802	Human Development and Family Well-Being	35%		17%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	10%		6%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	2%		9%	
805	Community Institutions, Health, and Social Services	9%		1%	
806	Youth Development	30%		10%	
903	Communication, Education, and Information Delivery	0%		9%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Extension	Research

Year: 2012	1862	1890	1862	1890
Plan	20.0	0.0	4.0	0.0
Actual Paid Professional	16.5	0.0	3.6	0.0
Actual Volunteer	47.1	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
419193	0	72989	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1534322	0	296923	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
252893	0	581366	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

More than any other social institution, the family has profound influences on the health and well-being of its members, particularly its youth and elderly. CTAHR strengthens families in Hawai'i's rural and urban environments by providing assistance in areas such as family health and lifespan development, financial and time management, youth development, parenting, and caring for the elderly. Each of these areas of emphasis impact community conditions and societal well-being, and CTAHR takes responsibility for collecting and compiling current social indicator data on Hawaii communities, and making the results accessible to government agencies, nonprofits, and policy makers through the Data Center maintained by the Center on the Family. Colleagues from UH community colleges, nonprofit organizations, and government agencies are partners on a number of CTAHR projects.

In FY2012, CTAHR reports on homeless services utilization, and on addiction treatment services in Hawaii were key references for policy makers and for media investigations of social conditions and the adequacy of services provided. In addition to the family and community development programs described below, CTAHR research and extension staff implemented integrated intervention programs to define and promote financial literacy and skills, and science literacy (including critical thinking skills and application of classroom learning to community problems) in Hawaii youth. The statewide "Kids Saving Project," implemented in 28 public schools to provide training in achieving financial security included partnerships with six credit unions and was recognized by the Hawaii State Legislature. Of 286 children in three public elementary schools enrolled in the program, 83% saved a total of $12,670; with statewide savings by participating students approaching $200,000. Curricular materials, including a creative financial skills game with commercial potential are attractive and engaging to teachers, students, and family member. Key findings from this program include the observations that students from low-income households are receptive to training and make smart financial choices; and that the training they receive often carries over to their caregivers, positively impacting family financial security.

Similar carry-over and community-wide benefits from CTAHR public school efforts were observed with science literacy curriculum and training projects addressing STEM curriculum needs.. The "Termite Project: Educate to Eradicate" K-12 curriculum project has reached 12,530 students in 350 public school classrooms over the past decade, and included both family education and community outreach modules. The "Gene-iuses on a Mission" curriculum and workshop project for grades 1-6 taught biotechnology concepts to 1,536 children in FY2012, through games, problem solving, and hands-on lab work. A hands-on professional development workshop for middle school teachers on bioenergy research and potential held in summer 2012 led to implementation of the methods taught in classrooms statewide, and distribution of a bioenergy manual for middle/high school teachers. Curriculum materials developed in each of these projects are available online for teachers throughout the state, as well as nationwide.

4-H is the major youth development program of the Cooperative Extension Service. This educational program provides hands-on learning experiences to help youth develop inquiring minds, learn practical skills, strengthen decision-making abilities, improve communication and interpersonal skills, and share their skills and experiences in leadership roles. An external review of the program was conducted in 2011, which found significant value, as well as problems of organizational structure, coordination and assessment which needed to be addressed. CTAHR is now working to implement program changes in program leadership, curriculum & volunteer development, and accountability and impact assessment. The number of 4-H members has increased from 9,437 in FY2009 to 12,045 in FY2012 while the number of volunteers has increased by 205 during that same period. An increase in the number of members has increased the participation in the annual statewide youth conference (Ahaolelo) which had 47 participants in FY2009 and 94 in FY2012.

"Get Moving for Health" is a 4-H Healthy Living project to motivate youth to be more physically active. In partnership with adults, youth leaders planned programs to reach at least 100 youth and 50 adults in their community. Youths and adults partner to implement projects in their communities statewide which encourage healthy lifestyle choices and changes through daily physical activities. This program was funded by the Walmart Foundation to involve Hawaii 4-H members, leaders, parents, and community members to be active and exercise more frequently. Hawaii's program was recognized by the Walmart Foundation as one of 8 superior programs nationwide and was invited to submit a follow up proposal for a program to improve nutrition in young people. The "Get Fueling for Health" program was developed in Hawaii and awarded $55,000 to continue in FY2012. More than 500 youth presented and then modified a typical week of meals for their family as a result of the Get Fueling for Health program. In follow up surveys with participants, 77% reported that the family was now more closely following the recommendations from USDA "My Plate" than they had prior to the youth becoming engaged in the 4-H nutrition program. Young people are reporting more physical activity as a result of the Get Moving for Health program. The initial effort in FY2012 has resulted in ongoing programs in 4-H clubs, Children, Youth and Family at Risk programs and in Military 4-H. The youth in their second year of the Get Fueling for Health program report they are eating less fast foods and more nutritious foods on most occasions.

Over 78% of older adults who live in the community and need long-term care services (transportation, bathing, eating, cleaning, shopping, etc.) depend on family and friends as their only source of help. In Hawaii, there are approximately 169,000 family caregivers who provide critical caregiving services to family and friends. These family caregivers have an increased risk of health problems, rate of depression and burnout, disruption of family relationships, and decreased effectiveness in the workplace. The professional caregiving infrastructure (home health aides, nursing homes, etc) is already stretched thin. If family caregivers become unable to provide care to their loved ones due to any of the above problems and the need for professional care increases, the care may simply not be available. As a result, the best option is to help family caregivers maintain their health, juggle the many caregiving responsibilities, and provide needed support. To do this, CTAHR developed and coordinates a partnership that plans, implements, and evaluates an evidence-based educational series called Powerful Tools for

Caregivers (PTC). In 2012, eight PTC series were completed, including 48 individual classes, and involving 85 participants. In this program, we collaborated with a gerontology specialist in Montana to aggregate multi-state PTC evaluation data. A six month follow up evaluation was implemented during FY2012 and FY2013 PTC classes were scheduled and marketed. We also collaborated with the Maui County Office on Aging on plans for expansion of the program to the islands of Lanai and Molokai. Of the 44 participants who completed the post-retrospective-pre evaluation, 97% (n=43) reported an improvement in at least 1 of 12 subject areas discussed in the series, with the "average" respondent reporting an improvement in 8 of the 12 areas. The most common areas of improvement included: asking for caregiving help, having an optimistic attitude about their role as caregiver, using tools to manage caregiver stress, feeling confident in caregiving abilities, taking action against caregiver discouragement, and finding caregiver resources. Of the 44 survey respondents, 93% (n=41) planned to continue their adoption of at least one of eight PTC tools; the "average" respondent indicated the adoption of five tools. Tools included: action plans, positive self-talk, relaxation techniques, "I" messages, assertive communication, Aikido communication styles, family meetings, and goal setting.

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;
- Teachers and students in grades K-12, their caregivers, and associated community members;
- The general public.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	19655	178680	14701	9519

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	21	9	30

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

Year	Actual
2012	19146

Output #2

Output Measure

- Number of volunteer hours

Year	Actual
2012	90509

Output #3

Output Measure

- Presentations at international and national meetings.

Year	Actual
2012	8

Output #4

Output Measure

- Grant proposals submitted.

Year	Actual
2012	25

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	Actual
2012	19145

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
Hawaii families in both rural and urban environments are assisted in areas such as family health and lifespan development, personal and family financial and time management, youth development, parenting, and caring for the elderly. This improves quality of life and productivity of Hawaii's residents and builds stronger communities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
124	Urban Forestry
133	Pollution Prevention and Mitigation
703	Nutrition Education and Behavior
724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and

	Communities
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
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	Actual
2012	19145

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 better skills on parenting, youth development and leadership.

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle
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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	3392501

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
133	Pollution Prevention and Mitigation
703	Nutrition Education and Behavior
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
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

The economic downturn and cuts in social services over the past several years have place great strains on many social institutions and social safety nets (eg. counseling, social services, food banks, charitable organizations) with serious implications especially for disadvantaged populations. It is under these circumstances that community based volunteer organizations such as 4H Youth Development, Master Gardeners and intergenerational programs (eg Grandparents Raising Grandchildren) become especially important and valuable. CTAHR is one of the main supporters and proponents of these programs in Hawaii.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Health and Wellness of Hawaii's Families and Communities

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
131	Alternative Uses of Land	0%		3%	
607	Consumer Economics	5%		3%	
608	Community Resource Planning and Development	10%		0%	
701	Nutrient Composition of Food	9%		10%	
702	Requirements and Function of Nutrients and Other Food Components	5%		24%	
703	Nutrition Education and Behavior	14%		15%	
704	Nutrition and Hunger in the Population	2%		3%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	5%		0%	
723	Hazards to Human Health and Safety	6%		0%	
724	Healthy Lifestyle	22%		10%	
802	Human Development and Family Well-Being	10%		15%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	12%		10%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	0%		7%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	5.0	0.0	4.0	0.0

Actual Paid Professional	4.6	0.0	3.8	0.0
Actual Volunteer	3.8	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
52396	0	118169	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
446220	0	584954	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
154001	0	78702	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The 2003 Hawai'i health survey revealed that more than half of Hawai'i's adults are overweight or obese. The rate of obesity in children ages 6 to 11 is twice the national average. About three-quarters of Hawai'i residents do not eat enough fruits and vegetables, and many suffer from diabetes, heart disease, high blood pressure, or diet-related cancers. To combine their strengths and enhance their effectiveness, CTAHR extension faculty in all four counties and two college departments (Human Nutrition, Food, and Animal Sciences and Family and Consumer Sciences) have joined together to coordinate their outreach in the areas of food, nutrition, and health under an umbrella program called Nutrition Education for Wellness, or NEW.

Nutrition education for improved health and wellness was accomplished through multiple college programs, including 4-H (such as "Get Moving for Health" and "Get Fueling for Health" Projects), the Nutrition Education for Wellness program (NEW), as well as the extramurally funded programs EFNEP (Expanded Food and Nutrition Education Program) and SNAP-Ed (Supplemental Nutrition Assistance Program-Education). EFNEP and SNAP-Ed nutrition educators report directly educating 652 families, which included 2680 adults and 1276 children. Through these contacts 74% of participants reported improvement in one or more food resource management practices, 86% reporting improvement in one or more nutrition practices, 56% reporting improvement in one or more of the food safety practices, 95% reporting positive change in any food group at exit (ie. food intake on exiting the program was nearer the recommended amount), and 23% reporting positive change in physical activity.

The Nutrition Education for Wellness (NEW) Program strengthens families and communities by increasing knowledge and skills in food, nutrition and health. Toward this goal, NEW strives to 1) provide educational programs that increase the likelihood of healthy food choices consistent with the most recent dietary advice as reflected in the Dietary Guidelines for Americans, MyPlate and Nutrition Facts; 2) provide practical foods and nutrition education training via training and technical assistance and services delivery, materials adaptation and development, resources support, development of practical applied research, evaluation, and collaboration facilitation; 3) safeguard the health and well-being of limited income households by promoting skills building and access to a healthy diet; and 4) provide statewide leadership and work with a diversity of organizations to achieve common goals. NEW participates in the national eXtension project "Families, Food & Fitness" through which web based information is available from CES

nationwide.

An aging population, economic duress, and social and cultural factors affecting food choice all contribute to social, environmental, and health stress in Hawaii. Iron deficiency, obesity, and diabetes are common conditions in Pacific populations; and appropriate choice, handling and preparation of locally available foods are topics requiring integrated research and extension efforts. Seaweed (limu) is an under-utilized vegetable in Hawaii, and measurement of iron content identified 10 seaweeds demonstrated greater iron content per gram than spinach; with nori containing twice the iron of spinach, and locally grown red ogo containing 10-fold more iron. Bioavailability tests are highly warranted with these seaweeds. Bitter melon was found to inhibit secretion of inflammatory molecules such as tumor necrosis factor alpha implicated in diabetes development, and studies are continuing on the molecular and cellular anti-inflammatory mechanisms of under-utilized vegetables found in local farmers' markets. Rice is the most common carbohydrate in local diets, and research in FY2012 established that refrigeration increases the content of metabolism-resistant starch in selected brown rice varieties, indicating that handling and storage can affect selection of appropriate varieties for glycemic control and weight management.

The Hawaii Diabetes Detection and Prevention Project reaches adults with diabetes and those who may be at risk through community screening events and diabetes education programs. During FY2012, most of the project outreach has been on the island of Hawai'i, with one community event on Molokai for Native Hawaiian residents. Twenty (20) community screening events were held in partnership with local businesses, government agencies, and health centers. 1,099 adults were screened for average blood sugar (A1C), with 316 (29%) having results at or above 6%, indicating diabetes or pre-diabetes. Median age of those screened was 54 years, about two-thirds were ethnically non-White, 39% of participants had a close relative with diabetes, 33% were diagnosed with hypertension, and 22% were diagnosed with diabetes or pre-diabetes. Project staff gave 13 presentations on diabetes (nutrition and management, 234 people), and participated in 8 health fairs with diabetes information. The third annual Diabetes Summit was coordinated and held in collaboration with the Joslin Diabetes Center, reaching 102 adults with workshops for patients and family members and health care professionals. Inquiries about diabetes have also been answered via phone calls and email. The diabetes screening events, health fairs, and presentations have increased awareness of diabetes, the risk factors associated with diabetes, and how one can live well with diabetes. Employers who have participated in events have increased their understanding of diabetes and the importance of diabetes management. Participants with diabetes and family members at the Diabetes Summit learned about simple approaches to meal planning, role of physical activity in diabetes management, barriers and solutions to being physically active, and diabetes treatment based on key diabetes tests.

2. Brief description of the target audience

The target clients are 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 targeting seniors and youth. High risk groups include minority populations, Pacific Islanders, obese and diabetic individuals.

3. How was eXtension used?

The CTAHR Nutrition Education for Wellness (NEW) Program participates in the national eXtension project "Families, Food & Fitness" through which web based information is available from CES nationwide by incorporating the program's 6 focus messages in statewide training.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	14961	35402	6511	20642

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	57	9	68

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of outreach activities and events conducted

Year	Actual
2012	923

Output #2

Output Measure

- Presentations at international and national meetings.

Year	Actual
2012	24

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2012	14

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	Actual
2012	167

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Resident who want or are required to know how to apply pesticides properly.

What has been done
Short courses, newsletters, and study guides educated people about proper pesticide use.

Results
Residents use pesticide correctly and 167 people received training and new licenses or recertification.

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	Actual
2012	1430

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Residents who want healthier lifestyles.

What has been done
Workshops, demonstrations, and presentations educate people about how to have a healthy lifestyle

Results
Residents improve their health through adoption of improved health practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
703	Nutrition Education and Behavior
723	Hazards to Human Health and Safety
724	Healthy Lifestyle
802	Human Development and Family Well-Being

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	4944

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Health and wellness of families and communities requires that scientific information be presented to the public in ways that they can grasp and use to modify their behavior.

What has been done
Workshops, extension publications, informal training and we-based information has been developed and implemented.

Results
Hawaii's families and communities have the opportunity to achieve healthier lifestyle and improve wellness.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
701	Nutrient Composition of Food
703	Nutrition Education and Behavior
723	Hazards to Human Health and Safety
724	Healthy Lifestyle

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1175384

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Extramural funding is needed to augment program funds for health and wellness.

What has been done
Grant funds were applied for and received.

Results
Health and wellness programs and extension outreach were expanded with the additional grant funds.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
703	Nutrition Education and Behavior
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
723	Hazards to Human Health and Safety
724	Healthy Lifestyle
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and

Commercial Structures

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 considered priorities and compete for available funds.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Global Food Security and Hunger

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	0%		5%	
102	Soil, Plant, Water, Nutrient Relationships	15%		5%	
131	Alternative Uses of Land	4%		0%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		4%	
204	Plant Product Quality and Utility (Preharvest)	0%		7%	
205	Plant Management Systems	16%		12%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		6%	
212	Pathogens and Nematodes Affecting Plants	6%		15%	
213	Weeds Affecting Plants	0%		3%	
301	Reproductive Performance of Animals	18%		0%	
305	Animal Physiological Processes	10%		10%	
306	Environmental Stress in Animals	8%		4%	
307	Animal Management Systems	12%		7%	
502	New and Improved Food Products	2%		4%	
503	Quality Maintenance in Storing and Marketing Food Products	0%		3%	
511	New and Improved Non-Food Products and Processes	0%		11%	
601	Economics of Agricultural Production and Farm Management	3%		2%	
607	Consumer Economics	3%		2%	
608	Community Resource Planning and Development	3%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	8.0	0.0	22.0	0.0
Actual Paid Professional	6.7	0.0	12.6	0.0
Actual Volunteer	1.4	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
407410	0	565499	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
606849	0	2833648	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
387539	0	688700	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

Hawaii aquaculture researchers and extension specialists have developed educational opportunities in the area of aquaponics, the production of hydroponic crops using fish effluent. Through this partnership, growers obtain access to starter fish and educational resources to produce fish and edible crops successfully in a safe and cost effective manner. Educational workshops were held to educate growers about aquaponics and the benefits of creating a sustainable system to produce fish and edible crops successfully in a safe and cost effective manner. Workshops were hands-on grower field days to show interested growers how to set up an aquaponic system using local sources of materials and supplies. Aquaponics utilizes the waste from the fish to supplement the nutritional needs of the plants. Participants were able to see the parts, plumbing, pumps, and other supplies needed to get started in aquaponics, and assemble grow beds. A new challenge being encountered by aquaponic producers is the rejection of third party food safety certification of this emerging technology due to the direct association of the "manure" from fish with plant crops. This results in an automatic failure when based on terresterial standards irrespective of the differences between warm and cold blooded animals. CTAHR have countered concerns being raised about food safety, to the satisfaction of the Hawaii Department of Agriculture allowing Food Safety Certification to be granted to aquaponic producers.

Aquaculture (fish cultivation) is also being furthered in Hawaii by CTAHR research on improved shrimp propagation and diet, and identification of genetic markers for tilapia lines and other commercial fish. In FY2012, researchers demonstrated that native Hawaiian spiny lobsters can be cultured, opening

the path to commercial culture of these desirable species. An evaluation of production costs and profitability of the entire aquaculture industry in Hawaii was completed, and mollusk and crustacean farms were found to perform the strongest. Labor costs in aquaculture are about 3.5-fold greater than those in the continental USA, with 58% of aquafarms generating a profit in 2007 (the base study year), but 39% unable to cover expenses.

In land-based agriculture, researchers and extension specialists dealt with global pest and disease problems reaching Hawaii, including developing a pilot unit for heat treatment of coffee beans to eliminate the coffee berry borer, and identifying a new pepper mottle virus attacking tomatoes. Sunn hemp was found to be a particularly effective "green manure," suppressing nematode populations; and producing grape tomato yields equivalent to use of organic fertilizer when integrated with Korean "Natural Farming" methods incorporating indigenous microogranisms (IMO). Sunn hemp was also among the green manures found to be promising with dryland taro. Research emphasized crops of particular importance in the Pacific region, and the popular virus-free Rainbow papaya was deregulated for sale in Japan, and shipments initiated. Five taro cultivars were identified as partially resistant to taro leaf blight and corm rots, suggesting that conventional selection and breeding will be useful in combating this severe taro disease.

Efforts with livestock emphasized pasture management, selection of appropriate cattle genetics, and development and evaluation of bioactive myostatin-inhibiting molecules, which were demonstrated to improve muscle growth. A protein produced through recombinant bacterial technology was evaluated, with results suggesting this may be a cost-effective approach to an improved animal nutrient. A new website was developed to extend effective methods of Tropical Pasture and Livestock Management: http://manoa.hawaii.edu/ctahr/tpalm/indes.html. Hawaii and other Pacific islands are unique in employing long-distance shipping in the livestock industry, and preliminary results of animal welfare research indicate that shipping does not induce environmental stress in calves, although transit holding pen conditions and the condition of ranch facilities receiving the animals are potentially critical points.

In fragile Pacific Island ecosystems plagued by food insecurity, collaborative work by CTAHR to establish the Marianas Grazing Academy has provided a foundation to show that there are viable local options to enhance community food security and protect the environment. Results show that strategic management of pasture lands will enhance the availability of local meat products and simultaneously enhance soil quality and C sequestration, two invaluable ecosystem services. Our initial work measuring land use effects on soil fertility and C stocks indicates that traditional agricultural systems not only provide various nutrient dense crops, but they require low inputs and little mechanical disturbance of the soil, which protect soil resources for the long term.

The dry litter technology (DLT), a nutrient management system for small-scale hog operations, was developed by CTAHR in partnership with local, state and federal partners involved in reducing pollution threats for the improvement of water quality. The dry litter waste management system has been called "a model for the Pacific" in American Samoa. There are now more than ninety (90) installations of the DLT system in the western and south Pacific basin, including Hawaii, Territories of American Samoa and Guam, Commonwealth of the Northern Mariana Islands, Republic of Palau, Republic of the Marshall Islands and Federated States of Micronesia-Pohnpei State. Additional funding (USDA NIFA, $30,000) was received allowing continued work with partners in the Western and South Pacific Land Grant institutions to provide technical expertise on small scale piggery waste management. Multi-state institution collaboration include: American Samoa Community College, Northern Marianas College, College of the Marshall Islands, College of Micronesia-FSM, Palau Community College, University of Arizona and the University of Nevada at Reno. Freshwater and marine water baseline data were collected in cooperation with the Pohnpei Environmental Protection Agency. The strategic water sampling protocol brought tremendous awareness of the negative impacts of piggery operations on the water resources of the island, as has been found in all other Pacific Islands studied. Other studies in Hawaii, American Samoa and the Northern Marianas have shown the value of improved piggery waste management in reducing the incidence of the

bacterial disease leptospirosis in humans.

2. Brief description of the target audience

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

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	6013	16502	1197	1469

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

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	22	65	87

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days and demonstrations.

Year	Actual

2012	123

Output #2

Output Measure

- Presentations at international and national meetings

Year	Actual
2012	19

Output #3

Output Measure

- Grant proposals submitted

Year	Actual
2012	44

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

Number of people that adopt one or more recommended practices.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	919

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Total dollar value of grants and contracts obtained

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2440938

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Funds are needed to undertake research and extension activities to assist producers.

What has been done
Grant funds have been received.

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
301	Reproductive Performance of Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management

607 Consumer Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Climate Change

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		10%	
104	Protect Soil from Harmful Effects of Natural Elements	0%		10%	
111	Conservation and Efficient Use of Water	50%		13%	
112	Watershed Protection and Management	17%		13%	
122	Management and Control of Forest and Range Fires	25%		0%	
123	Management and Sustainability of Forest Resources	0%		20%	
132	Weather and Climate	0%		7%	
133	Pollution Prevention and Mitigation	8%		10%	
136	Conservation of Biological Diversity	0%		7%	
405	Drainage and Irrigation Systems and Facilities	0%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.0	0.0
Actual Paid Professional	0.8	0.0	0.7	0.0
Actual Volunteer	0.2	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
49545	0	78802	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
60510	0	122352	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1986	0	285961	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Global climate change will continue to affect Hawai'i's tropical, island environment as well as other Pacific Islands. The availability of water is of great concern, particularly in rural areas where water-delivery systems that used to be maintained by the large plantations have fallen into disrepair. Water catchment systems are a common solution; however, water quality is affected by many variables. For example, acid rain caused by volcanic gas (VOG) is a major concern in the state, particularly on Hawai'i Island where long-term volcanic eruptions continue. Increased urbanization also contributes to global warming, and researchers and extension personnel are pursuing mitigation efforts via urban horticulture and forestry. Continuing activities in this area are to (1) conduct a needs assessment for stakeholders in urban and rural areas; (2) develop and deliver educational programs directed at catchment systems and urban horticulture in order to mitigate or prevent the negative effects of global warming; (3) develop remote sensing methods to monitor land-based pollution influences on the coastal environment; and (4) gain a better understanding of the fuel, climatic, and fire behavior components of the grass/wildfire cycle in Hawaii.

Methodology was developed and verified to analyze the cross-sensor compatibility of multi-sensor data. In addition, a method to cross-calibrate spectral vegetation data from multi-sensor data was established. These methodologies greatly improve the resolution of analyses of the impacts of atmospheric pollution such as VOG on the coastal environment in Hawaii. The Pacific Fire Exchange consortium was established to promote research on wildfire behavior, impacts and management on Pacific islands. First efforts of the PFE include developing a fire risk index for Community Wildfire Protection Plans in Hawaii.

Research efforts in FY2012 did not focus solely on natural ecosystems. In an additional project, management of the impact of climate change and changing irrigation needs in agricultural and landscape settings in Hawaii was facilitated by comparison of two decision support systems in Honolulu, Hawaii and Maricopa County, Arizona. This work resulted in irrigation schedules for several different landscape situations in Honolulu.

A series of workshops were conducted throughout the Pacific Islands addressing topics in soil fertility, soil diversity, nutrient management, soil quality, and organic farming. The target audiences included Master Gardner training sessions (Kona, Oahu), New Farmer trainings (Hamakua, Maui), Kauai Taro Growers Association (Kauai), Aloha Arborists Association (Oahu), MA`O organic farm interns (Oahu), and ranchers, farmers and agricultural professionals in the Northern Marianas Islands, Palau, and Pohnpei. Soil research activities across the Pacific Islands included a field experiment comparing different fertilizers for wetland taro production (Hawaii), demonstration plots assessing improved pasture species on soil fertility and carbon storage (Guam and the Northern Marianas), comparison of feedstock ingredients

on compost quality, and compost beneficial use experiments (Pohnpei). The taro fertilizer experiment showed no difference in N availability or yield of taro from fish/bone meal, urea, or slow release fertilizer. Soil analysis of demonstration plots established on four ranches on Guam, Rota, Tinian, and Saipan showed that improved forage grasses increase soil organic carbon (C) stocks. Preliminary results suggest that in addition to improving cattle nutrition with higher quality forages, the improved grasses provide other ecosystem services such as enhanced soil quality and the potential to increase C sequestration. In the composting experiments nitrogen availability was highest and C:N ratios lowest with the 1/3 pig manure & 2/3 wood chips feed stocks, which mimics dry litter pig waste management systems. Locally made composts produced equivalent or better crop yields than commercial fertilizers.

The Rainwater Catchment Education and Research program in Hawaii focuses on both improving water quality for domestic use catchment systems and mitigating the effects of variable rainfall through conservation activities. The program maintains a website (http://www.ctahr.hawaii.edu/hawaiirain/) providing information on system design, maintenance and safety. Testing supplies and kits are also distributed. Since 2011, the program has developed significant national and international collaborations with other rainwater catchment associations in Taiwan, China, Europe, Australia and the continental USA. Collaboration with these international groups will facilitate sharing of information on safe and efficient rainwater harvesting methods. Also, starting in 2012, the Rainwater Catchment program has become a collaborative effort of CTAHR with Hawaii Sea Grant.

2. Brief description of the target audience

The rainwater catchment program and irrigation support research are aimed at the general public. Remote sensing activities target government agencies and NGOs concerned with coastal pollution monitoring and management; and pasture and forest ecosystem studies are addressed to government, NGOs and private land managers, particularly those involved in wildfire management, as well as being actively incorporated into instructional activities.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	980	4500	0	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	2	10	12

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days, or demonstrations conducted

Year	Actual
2012	5

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2012	4

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2012	9

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of people that adopt one or more recommended practice.
2	Number of people who increase their knowledge or complete non-formal education on climate change related issues.
3	Dollar value of grants and contracts obtained.

Outcome #1

1. Outcome Measures

Number of people that adopt one or more recommended practice.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	800

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Rain catchment systems for domestic water use are impacted by low or variable rainfall distribution and by poor water quality. Drought and rainfall variation also can cause problems with watershed management, ecosystem restoration and wild fires.

What has been done
A domestic rainwater catchment program provides educational information to Hawaii residents statewide as well as internationally. Programs are being initiated to improve watershed and fire management.

Results
Rainwater catchment users have improved their domestic water quality.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
133	Pollution Prevention and Mitigation

Outcome #2

1. Outcome Measures

Number of people who increase their knowledge or complete non-formal education on climate change related issues.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

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	Actual
2012	372505

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Extramural funding is necessary to determine the impacts of climate change on Hawaii and other Pacific Island natural resources, and the agriculture and communities supported by those resources.

What has been done
Funds were solicited from extramural agencies.

Results
Funding obtained enables further research on the issues associated with climate change in the Pacific Basin.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water

112	Watershed Protection and Management
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
132	Weather and Climate
133	Pollution Prevention and Mitigation

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

This is a relatively new program for the college, and a difficult economic climate for obtaining extramural funding. Higher resolution data needs to be obtained to track coastal sediment plumes over time; and models of fire behavior developed in temporate regions are not necessarily transportable to the tropics.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Sustainable Energy

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
404	Instrumentation and Control Systems	0%		10%	
501	New and Improved Food Processing Technologies	0%		12%	
502	New and Improved Food Products	0%		8%	
511	New and Improved Non-Food Products and Processes	0%		70%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.5	0.0
Actual Paid Professional	0.0	0.0	2.6	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	17719	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	690949	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	2607531	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

To determine the optimal lignocellulosic substrate for ethanol production in Hawaii, and optimal cultivation practices, napiergrass, energycane, sweet sorghum and sugarcane plots were established at three elevations with three irrigation regimes. In FY2012, sweet sorghum yielded four harvests per year, each of 19-21 tons/hectare independent of the irrigation regime; while energycane yielded one harvest that dropped from 48 tons/hectare with 100% plantation irrigation to 34 tons/hectare at 50% irrigation. Preliminary results on conversion of napiergrass to biofuel indicated that energy usage ranged from 78-357 kilojoules/hectare per year, depending upon the efficiency and local availability of commercial-scale biorefineries. Edible fungi grown on fermentation residue from ethanol production may have value as fish/animal feed, or in human nutrition.

Another source of bioenergy is Jatropha curcas, a tropical tree that produces a nut with great potential as a source of oil for conversion into biodiesel. Trials with 12 Jatropha varieties indicated that adequate nutrients and water are essential to produce high oil yields. Preliminary data with biochar produced by carbonization of Jatropha residue applied as a plant nutrient indicate potential as a co-product.

Other efforts to develop and promote applications that are not fossil-fuel dependent included adaption of a solar dehydrator developed for dehydration of taro slices to breadfruit flour production in Hawaii and Western Samoa. Taro and breadfruit have similar starch composition, and both are important Pacific island foods.

2. Brief description of the target audience

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

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	8	0	0	200

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	1	2	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals submitted

Year	Actual
2012	6

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2012	6

Output #3

Output Measure

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

Year	Actual

2012 1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

Identified types of bioenergy crops suitable for Hawaii environment.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	8

3c. Qualitative Outcome or Impact Statement

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

What has been done
Eight middle school teachers were directly trained in bioenergy basics in a workshop in summer 2012, including review of the grasses and oil crop (Jatropha) under investigation in CTAHR. A manual for teachers was also produced and made available.

Results
Teachers trained in the workshop, and those using the manual each reach approximately 25 (or more) middle and high school students each year in their classrooms, extending knowledge of bioenergy and crop research in Hawaii.

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes

Outcome #2

1. Outcome Measures

Dollar value of grants and contracts received

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	6135424

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Resources are needed to conduct research and extension programs to assist stakeholders.

What has been done
Resources were obtained and programs were conducted.

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Childhood Obesity

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	50%		0%	
704	Nutrition and Hunger in the Population	10%		0%	
724	Healthy Lifestyle	40%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.0	0.0
Actual Paid Professional	0.3	0.0	0.0	0.0
Actual Volunteer	0.8	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
5312	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
28646	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
3102	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Health and wellness have long been issues for Hawai'i's communities. The high cost of living in Hawai'i and the resulting need for multiple incomes in the household reduce time and energy available for food preparation, leading to greater consumption of fast food. In addition, cultural practices in Hawai'i place emphasis on food consumption as a part of virtually all social activities, and the local diet is high in starch (e.g., white rice, macaroni salad) and fat (e.g., processed meat products, fried items). Although traditional health and wellness programming in CTAHR has focused on adults, growing concern over childhood obesity is shifting the focus to youth. For example, the rate of obesity in children in Hawai'i ages 6 to 11 is twice the national average. CTAHR faculty participate in regional and national efforts to identify the factors contributing to weight gain in young children, particularly in low-income households in order to develop obesity prevention programs.

Young people who have been involved in the 4-H nutrition program are reporting more physical activity as a result of the Get Moving for Health program. The initial effort in 2012 has resulted in ongoing programs in 4-H clubs, Children, Youth and Family at Risk programs and in military 4-H. The youth in their second year of the Get Fueling for Health program report they are eating less fast foods and more nutritious foods on most occasions. More than 500 youth presented and then modified a typical week of meals for their family as a result of the Get Fueling for Health program. In follow up surveys with participants 77% reported that the family was now more closely following the recommendations from USDA "My Plate" than they had prior to the youth becoming engaged in the 4-H nutrition program.

On the island of Kauai, nineteen schools were provided with and adopted a Farm-to-Children ("Farm to Keiki") wellness policy which resulted in reducing the amount of unhealthy foods served and increasing the consumption of fresh fruits and vegetables through snack programs, taste tests, cooking activities, school gardening, school meals and/or farm field trips. All schools were able to implement the following section of the policy: eliminate sugar sweetened beverages or diet soda at school, provide drinking water throughout the school day and at all meal times, serve only low-fat or non-fat milk for children over the age of two and provide milk substitutes as needed, provide 60 minutes of physical activity per day and limit TV/screen time. Attempts were made to offer a variety of fresh fruits and vegetables for snacks/meals and at least one fruit or vegetable per day, institute a healthy party policy and inform all staff, parents and caregivers about the wellness policy and encourage all involved parties to follow it.. Statewide, the Farm to Keiki program was delivered to 550 preschool children, who participated in at least two monthly lessons on improved food choices for 12 months.

The Childrens' Healthy Living Program for Remote Underserved Minority Populations of the Pacific (CHL), supported by a five-year CAP grant from USDA, is a major effort to integrative research on diet and obesity promoting factors in native Pacific populations with prevention problems and culturally appropriate community-scale interventions in Hawaii, American Samoa, Northern Marianas, Guam, Micronesia and Alaska. A local advisory committee steers and supports program efforts in each location. Experimental design (such as selection criteria for intervention and control communities in each partner location) and data collection methods are both locally appropriate and standardized throughout the region, in order to allow region-wide analyses and assessment of success in meeting program goals. Community selections, pilot trials to standardize methodology, and initial collection of child health metrics and activity measurements were completed in the majority of locations in FY2012. The intervention techniques resulting from this community-guided program will be of great value in reducing obesity incidence in at-risk Pacific Islander populations.

2. Brief description of the target audience

Target audiences are food producers and retailers, caregivers, and members of the public (particularly those from Pacific lineages at risk from diabetes) participating in community wellness programs and community development programs such as 4H. Current programs focus on children and families from at-risk native populations in communities in Hawaii, and across the Pacific region.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	724	1298	608	1307

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

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	1	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, filed days, or demonstrations conducted.

Year	Actual
2012	45

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual

2012	0

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2012	2

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 childhood obesity issues.
3	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	Actual
2012	381

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Information is needed by children, parents and health professionals on best means of reducing childhood obesity in Hawaii and the Pacific Region.

What has been done
Stakeholders have received appropriate information on reducing childhood obesity through improved diet and increased exercise through workshops, demonstrations, extension publications and nutrition website. Partnerships have been established with other Pacific basin jurisdictions.

Results
Children in Hawaii have begun to change their behavior and are losing weight in a healthy manner. Infrastructure is being developed with collaborating jurisdictions to implement an effective childrens healthy living (CHL) program throughout the Pacific Region.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of stakeholders completing non-formal education programs on childhood obesity issues.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1209

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Information is needed by children, parents and health professionals on best means of reducing childhood obesity in Hawaii and the Pacific Region.

What has been done
Stakeholders have received appropriate information on reducing childhood obesity through improved diet and increased exercise through workshops, demonstrations, extension publications and nutrition websites. Partnerships have been established with other Pacific basin jurisdictions.

Results
Children in Hawaii have begun to change their behavior and are losing weight in a healthy manner. Infrastructure is being developed with collaborating jurisdictions to implement an effective childrens healthy living (CHL) program throughout the Pacific Region.

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

Dollar value of grants and contracts obtained.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	69734

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Resources are needed to organize and implement healthy living and obesity prevention programs for children in Hawaii and the Pacific Basin.

What has been done
Resources were solicited to promote healthy living and develop and implement methods and tools to combat childhood obesity.

Results
Resources were obtained, including a NIFA CAP grant to promote healthy living and develop and implement methods and tools to combat childhood obesity.

4. Associated Knowledge Areas

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

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

This is new program area for the college. State and federal regulations governing the inclusion of children in research can cause delays in program initiation and implementation.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Food Safety

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
402	Engineering Systems and Equipment	0%		6%	
404	Instrumentation and Control Systems	0%		16%	
501	New and Improved Food Processing Technologies	25%		48%	
502	New and Improved Food Products	11%		0%	
503	Quality Maintenance in Storing and Marketing Food Products	28%		0%	
511	New and Improved Non-Food Products and Processes	0%		10%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	14%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	22%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.5	0.0
Actual Paid Professional	1.1	0.0	1.1	0.0
Actual Volunteer	0.6	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
6801	0	18267	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
139005	0	197819	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
234	0	8926	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Good Agricultural Practices (GAP) and certification of agricultural producers for food safety in order to avoid bacterial or other contamination of produce have become increasingly important to processors, retailers, and the public. This concern continues up the processing chain through processing plants and into restaurant operations. Compliance is challenging for Hawaii's small farms, many of which are operated by recent immigrants with limited English language skills. In FY2012, approval of the Food Safety and Modernization Act (FSMA) accelerated concerns over food safety and compliance. To address these needs, CTAHR continued the food safety certification coaching program, one of the only such one-on-one coaching programs in the nation, developed over the past 20 years to assist local farmers with GAPs and certification audits. In addition, CTAHR's Local and Immigrant Farmer Education (LIFE) program offers workshops for socially disadvantaged producers on correct handling and application of pesticides, fertilizer/pesticide monitoring and record keeping, and sanitation requirements to reduce risk of food borne illness. Four grower workshops were conducted in FY2012; and LIFE partnered with the Hawaii Department of Agriculture to conduct on-farm worker protection workshops in immigrant farmers' native languages. CTAHR faculty also conduct food handling workshops for employees in food processing facilities in Hawaii, and throughout the American Pacific.

Research efforts emphasized improved detection of pathogens, and improved/alternative methods of decontamination and pasteurization. Electrical impedance spectroscopy (EIS), using a novel nano-needle probe biosensor, was demonstrated to be a highly specific and accurate alternative to fluorescence microscopy for detection and quantification of Escherichia coli cells. Microbial decontamination of fresh produce, in particular, due both to the fragile nature of these materials, and growing concerns over residues left by chemical decontamination treatments. An effective photothermal nanotherapy, using a pulsed CO2 laser, was developed as an alternative to chemical treatment, and was demonstrated to heat-sterilize a localized area around targeted bacteria such as E. coli without damaging the food surface. This method of sterilization is also applicable to liquids such as fruit juices. Detection of E. coli and Salmonella in refrigerated acidic juices is problematic, and temperature adaptation and reduced oxidative tension were found to greatly improve detection and recovery of these pathogens. For use in food processing facilities, particularly in dairy applications, an energy efficient nanocomposite coating technique using superhydrophobic and superhydrophilic layers was developed and demonstrated to be highly effective in preventing fouling and removing bacteria from food contact surfaces.

The handheld field device developed in CTAHR for simultaneous detection of multiple environmental pathogens in the field was validated with US FDA in 2012 in trials detecting Salmonella on food samples. Efforts continued to add further value to this $600 (production cost) device, which is adaptable for rapid field detection of a variety of plant and public health pathogens.

Farmers who participated in CTAHR educational workshops or coaching sessions have made changes to reduce microbial risks on the farm including improving hand hygiene facilities and practices, improving pest control in fields and packing areas, mitigation efforts to minimize animal activity in the growing and packing areas, removal of used materials that can attract pests, employee training on GAP, development of farm maps, water testing, and use of traceback labels on boxes. Approximately 54 growers, wholesalers and other interested individuals recognized the importance of food safety throughout the market system and increased their knowledge of GAP to minimize microbial risks. Approximately 240 adults and youth increased their knowledge of safe food handling practices, such as 1) keeping foods out of the danger zones, 2) using of food thermometers to cook to proper temperatures, 3) keeping foods separate to prevent cross-contamination, and 4) chilling foods promptly. In the past year, information was disseminated through the Food Safety website and Keep It Simple and Safe (KISS) website got 1903 hits.

Fifteen short courses and accompanying course materials for the Hawaii food industry members were delivered focusing on Hazard Analysis, Critical Control Point and Preventive Controls Systems. This is because buyers and inspectors are including competence in these systems as a requirement for purchasing of produce, ingredients, or foods. Other courses on bioterrorism, Country of Origin Labeling (COOL), prerequisite programs for food safety, Food Allergens Control Programs, and general food safety workshops remained popular with the clientele. Requests for designing Food Allergen Control Programs, and training staff on food allergies continued to increase. Compliance to food additive regulations, microbial contamination training sessions, and brief presentations on general food safety (especially on hot topics) were also popular. Increasingly more of the food manufacturers are now following their control programs, partially due to the insistence of food inspectors and the mandatory requirements of buyers. Consumer pressure to be more transparent in the use of processing methods and technologies, and the pervasive concern for food safety are influencing the long-term changes among the food processors. The changes are demonstrated by the processors' willingness to attend certification courses that are mandated by their buyers and by their food inspectors.

A series of meetings were held with CTAHR, Hawaii Department of Agriculture, Hawaii Department of Health, Hawaii Farm Bureau Federation, individual growers, and school garden supporters to discuss good agricultural practices, food safety certification, organic certification, water quality, and animals in food production areas. This improved dialog is expected to result in increased collaboration in educational programs on food safety.

2. Brief description of the target audience

This program reaches from farms to food processing facilities; to consumers, hospitals and research facilities. Detection and mitigation of food-borne pathogens is a critical concern for local farms and processing facilities, home gardeners, medical laboratories, and the many importers and retailers of food products imported from outside of the State of Hawaii.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	751	10769	525	1040

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

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	1	6	7

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days and demonstrations

Year	Actual
2012	30

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2012	9

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2012	8

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of people adopting one or more practices which result in improved food safety.
2	Dollar value of grants and contracts obtained.

Outcome #1

1. Outcome Measures

Number of people adopting one or more practices which result in improved food safety.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	310

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Protection of food safety is both an individual and well as a societal responsibility. Farms, food processors, markets, restaurants as well as the individual consumer all have their respective responsibilities in maintaining a safe food supply. CTAHR has the responsibility to provide science-based information on food safety to all these groups.

What has been done
Training of farmers and food processors has been accomplished through individual coaching, extension publications, websites, workshops and non-formal education. Individuals have reported adoption of practices learned.

Results
The safety of Hawaii's fresh and processed foods has been improved through these activities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
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

Outcome #2

1. Outcome Measures

Dollar value of grants and contracts obtained.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	630198

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Improved food safety practices by food producers, processors and consumers are needed to protect public health. Funding is needed to support these programs, as well as research on improving food safety.

What has been done
Extramural funds have been obtained.

Results
Hawaii's food supply is safer.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
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

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

Retailers and consumers have a strong interest in food safety, but processors and farmers face difficulties from the costs associated with food safety certification, particularly in a weak economy. Thus, funding for this program, and public/client and political interest is inconsistent.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.