

2013 University of Hawaii Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

The College of Tropical Agriculture and Human Resources (CTAHR) at the University of Hawaii at Manoa (UHM) began FY2013 with a new Dean, Dr. Maria Gallo. CTAHR continued to 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 eight units (six academic departments, a center and a sub-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 four 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 where the majority of farms are 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 South Pacific and Southeast Asian immigrants entering agricultural and a wide variety of cultural practices and dietary preferences in the population. The costs of land, labor, and energy far 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 88% 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 mentioned in FY2012 continued to gain strength in FY2013. 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 FY2013, and represent increasing

efforts in CTAHR. With the Insular Pacific Sun Grant Sub-center 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 on-farm food safety certification coaching program were complemented by research on rapid detection of pathogen in the field and sterilization and protection of produce 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. Finally, perhaps more so than in any other state in the nation, CTAHR addressed issues associated with regional and ethnic crops, including pest management, crop improvement, and documentation of dietary impacts and medicinal qualities.

CTAHR leadership in FY2013 was provided by Dean Maria Gallo, Interim Associate Dean/Director for Extension Carl Evensen, Interim Associate Dean/Director for Research J. Kenneth Grace, and Associate Dean for Academic and Student 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 the five national priority program areas. In order to strengthen links between CTAHR and its many community and industry constituencies, Dean Gallo established a Dean's Advisory 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 thinking to discussion of initiatives and priorities, will assist in raising funds for college efforts, and ensures that CTAHR is accountable and addresses state needs.

During FY 2013, the college engaged in 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 has included 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 that is currently being developed. Any such changes and reprioritization of activities will be reflected in future annual activity reports and the CTAHR plan of work.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	60.5	0.0	58.0	0.0
Actual	50.9	0.0	43.2	0.0

II. Merit Review Process

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

- Internal University Panel
- Combined External and Internal University 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 addresses 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 a minimum of three departmental members, supplemented by external reviewers as necessary, who are familiar with the issues 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, and anonymous reviews transmitted to the investigator. The revised project proposal is reviewed by the unit administrator, and passed, along with all reviews, to the appropriate Associate Dean/Director. 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 faculty positions, including researcher, extension specialist and agent positions, county administrators, department chairs, and college administrators. CTAHR faculty work closely with industry groups and associations. 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. College administrators also confer often with officers and executive staff of relevant stakeholder associations, such as the Hawaii Farm Bureau Federation, and the Hawaii Farmers Union United.

Additionally, the college is increasingly soliciting and receiving stakeholder input through social media, including Facebook, Twitter, stakeholder blogs, and release of both iPhone and Android Apps. The Dean and the Communications Services offices are particularly active on Twitter.

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 are surveys, commodity organization meetings, through feedback and input from the Farm Bureau or Farmers Union, and direct input from stakeholders. CTAHR faculty and administrators regularly assist, facilitate and participate in strategic planning sessions for industry associations and organizations such as the Hawaii Association of Family and Consumer Education, Hawaii 4-H Foundation, Hawaii 4-H Livestock Association, Hawaii Coffee Growers Association, Hawaii Tropical Flowers and Shippers Association, Hawaii Tropical Fruit Growers Association, Hawaii Macadamia Nut Association, Hawaii Food Industry Associations, Hawaii Tea Society, and many others. CTAHR also receives many requests

for research, outreach and other resources through emails, letters, meetings, and phone calls. Email list serve groups of CTAHR and external individuals are also used. Information, questions, and other exchanges take place on a regular basis.

Stakeholder input is increasingly solicited and received through Facebook, Twitter, and an increasing number of Apps released by CTAHR faculty for iPhone or Android use. Stakeholder blogs have been found to also be a useful means of obtaining timely information on needs and opportunities.

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 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 an investigator demonstrates that a project is a stakeholder priority, chances of funding are significantly greater. Through the Industry Analysis Process, stakeholders assisted CTAHR in maintaining relevance of overall programs and helped to assure program coordination among teaching, research and extension/outreach programs.

Brief Explanation of what you learned from your Stakeholders

College priorities and research and extension programs are in line with expressed stakeholder needs, although stakeholders from all industry groups would like to have increased support from CTAHR for their particular sector. Given past budget and staffing cuts, and restrictions on hiring, these requests will be difficult to satisfy in the next several years, although the State economy is now slightly better than in past years. CTAHR has an excellent relationship with the vast majority of its stakeholder groups, and these groups are working proactively through our elected state and federal officials to make their needs and the needs of the State of Hawaii known to NIFA through our elected officials.

Hawaii receives an average of 24 new insect introductions each year, and is the first port of call for pests that may well move on to attack agriculture in the continental USA. At this time, invasive agricultural pests such as the coffee berry borer, macadamia felted coccid, and the little fire ant are of grave concern to our stakeholders. They wish to see not only greater NIFA resources applied to these key pests of tropical agriculture and the American Pacific, but development of efficient and rapid means of bringing NIFA resources to bear, through CTAHR, on newly discovered invasive plant pests and diseases in Hawaii.

CTAHR stakeholders join with those in Florida and the Caribbean in requesting that NIFA resurect and fund the Tropical and Subtropical Agricultural Research program (TSTAR). The small \$6.2 million annual investment in CTAHR, defunded in FY2010, was of enormous benefit to Pacific and Caribbean stakeholders, and provided funds essential to address constant threats from invasive pests, and protect and develop the crops that are uniquely important in the American Tropics.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1228310	0	1486234	0

2. Totaled Actual dollars from Planned Programs Inputs				
Extension			Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1573970	0	1322879	0
Actual Matching	5799418	0	9167420	0
Actual All Other	2044394	0	5910008	0
Total Actual Expended	9417782	0	16400307	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	{No Data Entered}	{No Data Entered}	{No Data Entered}	{No Data Entered}

V. Planned Program Table of Content

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

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

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

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%		7%	
111	Conservation and Efficient Use of Water	6%		9%	
112	Watershed Protection and Management	10%		3%	
121	Management of Range Resources	13%		3%	
123	Management and Sustainability of Forest Resources	10%		4%	
124	Urban Forestry	0%		2%	
125	Agroforestry	5%		4%	
131	Alternative Uses of Land	0%		5%	
133	Pollution Prevention and Mitigation	11%		6%	
135	Aquatic and Terrestrial Wildlife	0%		1%	
136	Conservation of Biological Diversity	0%		4%	
205	Plant Management Systems	17%		12%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
212	Pathogens and Nematodes Affecting Plants	0%		15%	
402	Engineering Systems and Equipment	0%		2%	
403	Waste Disposal, Recycling, and Reuse	5%		6%	
404	Instrumentation and Control Systems	0%		1%	
605	Natural Resource and Environmental Economics	5%		9%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		2%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Extension	Research
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Year: 2013	1862	1890	1862	1890
	Plan	3.0	0.0	6.0
Actual Paid Professional	4.3	0.0	7.0	0.0
Actual Volunteer	2.4	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
142532	0	162326	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
561414	0	1392120	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
67567	0	1366852	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 goal of the Wildfire Extension program for Hawaii is a reduced threat to ecosystems and communities in the Pacific from wildfire. To further this goal, the Pacific Fire Exchange (PFX) is a partnership between CTAHR, the US Forest Service (USFS) and the Hawaii Wildfire Management Organization (HWMO). Regular interactions through the PFX advisory panel include the US Fish and Wildlife Service (USFWS) in Honolulu, the USDA National Resource Conservation Service in Guam, Kamehameha Schools (a native Hawaiian educational institute), the Hawaii state Department of Forestry and Wildlife (DOFAW), the US Army Environmental Division, the Pacific Island Climate Change Cooperative, the Center for the Environmental Management of Military Lands, the Army Fire Department, the Nature Conservancy, and the Pacific Disaster Center. Facilitation of wildfire preparedness planning has been applied in one-on-one settings and provides clientele with increase awareness of the problem, knowledge about how to improve conditions, and a better understanding of their ability to mitigate fire risk.

The CTAHR sponsored Agriculture and Environmental Awareness Day continued to enjoy great popularity in FY2013 on the islands of Kauai, Oahu, and Maui. Participating fifth and sixth grade 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. For example, in March 2013 600 5th graders were hosted by the UH Cooperative Extension Service at the Pearl City Urban Garden Center, and presentations and educational

booths were extended to the public by hosting the event for two days, with 431 visitors on the Saturday after the event, coinciding with the monthly Second Saturday at the Garden program

Waste management and cleanup of environmental contaminants are serious issues in island ecosystems. In FY2013, researchers synthesized and characterized nano-scale photocatalysts to degrade synthetic chemicals and medical wastes such as endocrine disruptors in wastewater. Conversion of sewage sludge to biochar for soil amendment, and use of cellulosic wastes for biochar were also found to be highly useful processes, although both the source of the biochar and the characteristics of the soil have major impacts on the value of biochar applications for promotion of plant growth. Sewage sludge biochar in infertile soil increased plant biomass by nearly 300%, but applications to fertile soil had no significant impact on plant growth.

CTAHR faculty continued efforts to 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 increased their collection by 5,000 specimens, and museum staff participated in 25 events.

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

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	7873	138306	2141	10

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

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	7	41	48

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals submitted.

Year	Actual
2013	40

Output #2

Output Measure

- Presentations at international and national meetings.

Year	Actual
2013	40

Output #3

Output Measure

- Number of workshops and other educational activities held

Year	Actual
2013	58

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
2013	90

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

All residents and visitors in the State of Hawaii enjoy the State's 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 resource 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
605	Natural Resource and Environmental Economics
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

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
2013	1677582

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 activities 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 and fires are often destructive to natural resources such as reefs, water sheds, forests, indigenous species habitats, research plots or 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 installation. 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%		8%	
124	Urban Forestry	0%		2%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		6%	
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%		7%	
205	Plant Management Systems	22%		22%	
206	Basic Plant Biology	0%		1%	
211	Insects, Mites, and Other Arthropods Affecting Plants	14%		4%	
212	Pathogens and Nematodes Affecting Plants	13%		12%	
213	Weeds Affecting Plants	6%		0%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	4%		0%	
215	Biological Control of Pests Affecting Plants	0%		5%	
216	Integrated Pest Management Systems	13%		6%	
502	New and Improved Food Products	0%		4%	
511	New and Improved Non-Food Products and Processes	0%		6%	
601	Economics of Agricultural Production and Farm Management	0%		3%	
604	Marketing and Distribution Practices	7%		3%	
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: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	16.0	0.0	10.0	0.0
Actual Paid Professional	12.4	0.0	12.9	0.0
Actual Volunteer	1.2	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
667890	0	329164	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1414992	0	3240373	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
480583	0	1049197	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. Research and extension efforts in F2013 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.

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. Master Gardeners have become the "volunteer" public face of the Cooperative Extension Service at numerous events statewide, including county fairs and Plant Doctor booths at Farmers Markets. The UH Master Gardener website was completely redeveloped in 2013 to include home gardener information, as well as pages representing each individual program throughout the State (Kauai, Oahu, Maui, Kona, and Hilo), www.ctahr.hawaii.edu/UHMG. This site received 11,489 visitors and 34,884 page views during this reporting period, with 58% new visitors and 42% returning viewers. Recently added is a School Garden Resources page with information on grants and resources for the increasing population of school garden educators and volunteers.

Aquaponics (soil-less plant and fish co-cultivation) is an increasingly popular agricultural method in Hawaii. However, many aquaponic and hydroponics growers are faced with poor plant growth despite adequate nutrition present in grow beds. By developing a water quality-monitoring program, CTAHR researchers identified low oxygen levels in the affected grow beds. Findings showed despite adequate dissolved oxygen (DO) levels in nutrient tanks, low oxygen levels in grow beds result in poor crop production and yields. Low DO levels increased pythium growth on roots, which led to poor nutrient uptake and ultimately poor plant growth. Growers were advised to pump oxygen into grow beds to increase DO levels, and aquaponic and hydroponic crops of participating growers who installed oxygen lines have now doubled in size.

CTAHR faculty coordinated and provided technical support to an international network of tissue culture labs to meet the demand for new plants for international markets. Services provided included tissue culture protocol development, technology transfer, mentoring, tutoring, and problem for a variety of crops: coffee, coconut, Anthurium, pitcher plants, dracaena, blueberries, day lilies, carnation, Heliconia, Phalaenopsis, peach palm, cedar, and oil palm.

Analysis of food production in Hawaii in FY2013 revealed that 88% of available food is sourced from imports. Thus, import replacement, promotion of new crops (such as blueberries and tea), and identified additional sources of revenues for Hawaii farmers is a matter of food security. Important limiting factors in crop production in Hawaii are pests and diseases. In FY2013, for example, a new fungal disease was found on Basil, and three new Fusarium species were discovered infecting dendrobium orchids. New hand-held assays for rapid detection of bacterial pathogens in the field were deployed in Guam and Hawaii. Registrations for two fungicides effective against ti leaf spot were submitted through the IR-4 program. Sunn hemp was demonstrated to be an effective cover and border crop for trapping out plant feeding pests.

Research on locally-sourced soil amendments to improve soil quality focused on biochar and green manures. In experiments with wood-based, corn cob, and sewage sludge biochars, the latter two increased biomass greatly when applied to infertile Oxisol soil, but had no impact on plant growth in a fertile Mollisol; and the wood-based biochar had no effect in either soil. Clearly, correlations between biochar application and plant growth are more complicated than is often assumed.

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?

Aquaculture faculty are active in use of eXtension and service on national committees.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	24522	207777	1672	1909

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

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	38	46	84

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, research/field day demonstrations conducted

Year	Actual
2013	194

Output #2

Output Measure

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

Year	Actual
2013	52

Output #3

Output Measure

- Presentations at international and national meetings

Year	Actual
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2013 49

Output #4

Output Measure

- Number of grant proposals submitted.

Year	Actual
2013	30

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
2013	12724

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

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

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
2013	1720

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
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
2013	3533031

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
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102	Soil, Plant, Water, Nutrient Relationships
124	Urban Forestry
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
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
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices
903	Communication, Education, and Information Delivery

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%		5%	
205	Plant Management Systems	15%		2%	
211	Insects, Mites, and Other Arthropods Affecting Plants	20%		8%	
212	Pathogens and Nematodes Affecting Plants	15%		21%	
213	Weeds Affecting Plants	12%		19%	
215	Biological Control of Pests Affecting Plants	8%		16%	
216	Integrated Pest Management Systems	30%		10%	
312	External Parasites and Pests of Animals	0%		8%	
721	Insects and Other Pests Affecting Humans	0%		2%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	5.0	0.0	5.0	0.0
Actual Paid Professional	2.3	0.0	3.8	0.0
Actual Volunteer	0.4	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
54133	0	148049	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
244450	0	796399	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	639101	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 Hawaii 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 impacts of invasive species.

Hawaii nurseries shipping ornamental potted plants out-of-state continued to use hot water on plants for disinfestation of coqui frogs (*Eleutherodactylus coqui*), nettle caterpillar (*Darna pallivitta*), and little fire ants (*Wasmannia auropunctata*) as part of a systems approach to quarantine pest management developed by CTAHR faculty. In FY 2013 more than 80,000 potted plants (estimated \$3.9 million) were hot water-showered, and nearly all 35 species and cultivars tolerated the heat well; 2,112 coqui frogs (adults, juveniles, egg clutches) and numerous ants, slugs, snails, lizards, and worms were killed and removed by the treatment. Use of hot water on potted ornamental plants continues to be validated as a practical, cost-effective IPM strategy available to large-scale commercial growers, to prevent pest interceptions by receiving ports in the US and Guam.

Currently, there are four fruit fly species of economic importance to Hawaii: Melon fly (*Bactrocera cucurbitae*), Mediterranean fruit fly (*Ceratitis capitata*), Oriental fruit fly (*Bactrocera dorsalis*), and Solanaceous (Malaysian) fruit fly (*Bactrocera latifrons*). These four fly species attack over 400 different host plants. To ensure the sustainability of the fruit fly area wide program, extension agents across the state are continuing to deliver fruit fly suppression workshops to producers and backyard gardeners. The cooperators in CTAHR's Area-wide Fruit Fly Suppression Program comprise 357 commercial farm acres; many have been participants for several years and have adapted management strategies to suit their farming operations. As a result, growers have reduced infestation rates and crop losses significantly, thus increasing their farm revenue. Many growers have also reduced their reliance on organophosphate insecticides and adopted the use of GF-120 protein bait spray. In addition, the parasitoid *Diachasmimorpha kraussi*, which was released to control the Solanaceous fruit fly was found to be well established and surviving at relatively low numbers.

The diamondback moth (DBM) is a major pest of crucifers, including head cabbage, Chinese cabbage, broccoli, bok choy and watercress. The crucifer industry was valued at \$7.5 million in Hawaii

(Hawaii Agricultural Statistics Service, 2009). This pest is notorious for its resistance to many classes of pesticides. When insecticides are not used in a sound insecticide rotation schedule, resistant DBM are selected and control failures result, causing massive crop losses. The DBM Insecticide Resistance Management Program was developed at the CTAHR in order to enable growers to manage the DBM effectively by rotating insecticide chemistries on an areawide basis. As a result of this continuing effort, diamondback moth populations continued to be very low in Maui and Hawaii Counties through 2013. This method of rotating very effective insecticides with less effective ones seems to prevent buildup of high DBM populations during the hot summer months.

In FY2013, the DBM resistance management team collected and reared populations of DBM from statewide crucifer growers. Bioassays were conducted to identify resistance to six commercially available crop protection chemicals: Avaunt, Synapse, Rimon, Radiant, Movento, and Proclaim. Bioassays for the Oahu population concluded that there was no resistance to Synapse while there was some resistance to Avaunt (54%), Rimon (8%), Radiant (62%), Movento (41%), and Proclaim (98%). As a result, recommendations were made to remove Radiant and Avaunt from the spray rotation for six months due to the high level of resistance.

Efforts continued to mitigate the impact of the coffee berry borer (CBB) in the Kona and Kau regions of the island of Hawaii, with distribution of Hawaii-centric best management practices to farmers, and evaluation of the efficacy of both entomopathogenic fungi and alternatives such as a garlic-based pesticide, which was found to have significant but minor repellent effect. The macadamia felted coccid, introduced to Kona in 2005, also began to cause significant macadamia losses, with research efforts focused on biological control, identification of effective insecticides, and modification of orchard structure to obtain spray coverage.

Weed management efforts involved both application of Herbicide Ballistic Technology (HBT), employing paintball gun technology for targeted applications of very small quantities of herbicide, to combat *Miconia* in natural systems (reducing aerial application costs by 50%); and turf grass weed control through development of a novel tank mix of the post-emergence herbicides mesotrione and metribuzin to replace herbicides discontinued by the US EPA in 2009.

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 deliver 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

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3906	1940	1464	5

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

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	9	23	32

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days, demonstrations held

Year	Actual
2013	129

Output #2

Output Measure

- Number of grant proposals submitted

Year	Actual
2013	19

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
2013	1412

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, field 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
2013	17

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
2013	1025404

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
112	Watershed Protection and Management
136	Conservation of Biological Diversity
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

312	External Parasites and Pests of Animals
721	Insects and Other Pests Affecting Humans

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, different priorities in extramural grant programs
- Difficulty in coordination with external agencies and partners

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
124	Urban Forestry	0%		3%	
131	Alternative Uses of Land	0%		6%	
604	Marketing and Distribution Practices	0%		3%	
606	International Trade and Development	0%		2%	
608	Community Resource Planning and Development	0%		6%	
703	Nutrition Education and Behavior	0%		2%	
724	Healthy Lifestyle	8%		7%	
801	Individual and Family Resource Management	6%		7%	
802	Human Development and Family Well-Being	35%		14%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	10%		13%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	2%		19%	
805	Community Institutions, Health, and Social Services	9%		1%	
806	Youth Development	30%		14%	
903	Communication, Education, and Information Delivery	0%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	20.0	0.0	4.0	0.0

Actual Paid Professional	18.8	0.0	4.5	0.0
Actual Volunteer	47.3	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
371410	0	29860	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
2137634	0	470757	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
749588	0	198415	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

More than any other social institution, the family has profound influence 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 FY2013, 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. Over the past 4 years, a total of 1881 children have saved over \$321,000, for an average of \$171 saved per child. This savings project brings together as partners, State government, University of Hawaii, credit unions and banks, the school system, and parent, to enable and support young children, especially those from low income families, to open a savings account, to build a savings habit, and to build assets over time. 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.

Other significant public policy activities included implementation of the Quality Rating and Improvement System Pilot with child care centers and family child care providers. The Early Reading First literacy project served over 160 Head Start children and their families with over 1,400 hours of in-class

coaching, teacher in-service training, and parent education workshops. Measurements of classroom quality were well above national norms. In addition to annual reports on the state of homelessness in Hawaii, and provision of such social services as elder care, a comprehensive report on 10 years of trends in demographics and service utilization patterns was published by the Alcohol and Drug Treatment Project.

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. 4H is a community of young people across Hawaii who are learning leadership, citizenship, and life skills. This educational program helps 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. 4-H youth have taken leadership roles in designing projects, writing grant proposals and securing funds to implement projects in their community. For example, working in partnership with the local hospital, the Kona 4-Hers delivered hundreds of books and burp pads (approximately 50 per month) to newborn babies and their mothers to promote the benefits of reading aloud. The youth have taken the skills learned through the Kona 4-H program and applied it to helping others.

Hawaii 4-H programs also include school enrichment activities such as the "Kindergartners Are Most Precious (K.A.M.P.) program. This school readiness and transition program reached 341 incoming kindergartners and 375 parent(s) or primary caregiver(s) from 6 public schools statewide in 2013. This program utilized 80 volunteers who help to welcome families to the school and instill a sense of belonging and excitement about education. Each KAMP program is designed to address individual school needs, but all include the following components: 1) parent-child interactive learning games 2) introduction to school facilities; 3) introduction to school faculty and staff 4) practice separation time between parent and child; 5) parent workshop; 6) child group activity in classrooms 7) nutritious snack 8) message reinforcing parental involvement in child's education, and most importantly 9) introduction to the 4-H Cloverbud Program.

The mission of Hawaii Association for Family and Community Education (FCE) is living the "Aloha Spirit" to strengthen individuals, families and communities through Continuing Education, Developing Leadership, and Community Action. In keeping with their mission to strengthen individuals, families and communities through Continuing Education, Developing Leadership and Community Action, they have provided educational workshops on topics such as but not limited to Health and Wellness issues (physical activity, walking, aging gracefully, healthy eating, Healthwise Vaccines workshop, Journals of Love for oncology patients); Home, Community, and Environment issues (candidates forum; identity theft workshop; reduce, reuse, recycle; elder abuse; trash to treasure workshops; Na Tutu-Grandparents Raising Grandchildren); International programs (Dress A Girl Around the World), Youth Education programs (Character Counts, Books for Newborns, Fire Fighters booklets) and Technology (Skype, digital camera, computer, iPad). Continuing education is important to FCE members and they have provided several educational scholarships through the Alice P. Trimble Foundation to help individuals with their schooling. Members adopted at least one recommended practice in making healthy food choices, participating in regular physical activity, making informed decisions that affect their personal life, and using technology to communicate and/or share information with others.

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

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	23609	163924	19531	6537

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	21	14	35

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
2013	28086

Output #2

Output Measure

- Number of volunteer hours

Year	Actual
2013	90905

Output #3

Output Measure

- Presentations at international and national meetings.

Year	Actual
2013	15

Output #4

Output Measure

- Grant proposals submitted.

Year	Actual
2013	44

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
2013	5856

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
124	Urban Forestry
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
2013	2632

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
2013	2998188

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
124	Urban Forestry
131	Alternative Uses of Land
604	Marketing and Distribution Practices
606	International Trade and Development
608	Community Resource Planning and Development
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
805	Community Institutions, Health, and Social Services
806	Youth Development
903	Communication, Education, and Information Delivery

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 placed strains on social institutions and social safety nets (eg. counseling, social services, food banks, charitable organizations) with serious implications for disadvantaged populations in particular. 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%		5%	
404	Instrumentation and Control Systems	0%		3%	
511	New and Improved Non-Food Products and Processes	0%		3%	
607	Consumer Economics	5%		2%	
608	Community Resource Planning and Development	10%		0%	
701	Nutrient Composition of Food	9%		8%	
702	Requirements and Function of Nutrients and Other Food Components	5%		13%	
703	Nutrition Education and Behavior	14%		12%	
704	Nutrition and Hunger in the Population	2%		0%	
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%		19%	
802	Human Development and Family Well-Being	10%		12%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	12%		7%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	0%		13%	
806	Youth Development	0%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Extension	Research

Year: 2013	1862	1890	1862	1890
	Plan	5.0	0.0	4.0
Actual Paid Professional	4.8	0.0	3.6	0.0
Actual Volunteer	1.1	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
53772	0	136198	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
495549	0	594666	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
317850	0	17015	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 EFNEP program (Expanded Food and Nutrition Education Program). In FY2013, EFNEP nutrition educators report directly educating 721 families, which included 1840 adults and 1586 children. Through these contacts 81% of participants reported improvement in one or more food resource management practices, 82% reporting improvement in one or more nutrition practices, 67% reporting improvement in one or more of the food safety practices, and 27% 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. NEW has incorporated FF&F's 6 focus messages (prepare and eat more meals at home, enjoy more fruits and vegetables, move more every day, rethink your drink, right size your portions, tame the tube) into NEW program functioning. During 2013, the NEW website received a total of 28,648 website visits which has significantly reduced the need to print and store hard copies of resources and program materials. The web site has enabled community agencies and programs to access food and nutrition education materials and resources as needed.

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 past measurements of iron content identified 10 seaweeds with greater iron content per gram than spinach. However, bioavailability studies during the current reporting period indicated that many of these seaweeds actually do not provide more bioavailable iron, due to their low iron absorption efficiencies. For example, although red ogo was found to contain 10-fold more iron than spinach, its extremely low absorption efficiency makes it a poor dietary source. Notable exceptions were nori and sea lettuce, which provide 3 and 5-fold more bioavailable iron than spinach, respectively. With respect to obesity and diabetes prevention, bitter melon has been found to inhibit secretion of inflammatory molecules implicated in diabetes development, and noni (*Morinda citrifolia*) was demonstrated in FY2013 to not only improve glucose and lipid metabolism, but also prevent weight gain in mice fed an extremely high fat diet containing 58% fat.

Methods to enhance self-awareness have been found to be important means of improving both mental and physical health. In 2013, a mindfulness-based positive youth development program was developed and pilot tested at the Hawaii Youth Correctional Facility. A pre-post study of 34 incarcerated youths demonstrated statistically significant reductions in stress (measured by salivary cortisol) and impulsivity, and improved functioning in immune response (assessed by IgA), self-regulation and mindfulness. At the other end of the age spectrum in Hawaii, body scanning and creation of a 3D personal avatar was initiated with 188 seniors as a means to self-monitor body size and posture, and enhance interest in clothing selection and fit.

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

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	8724	35962	5568	13766

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

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	21	15	36

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of outreach activities and events conducted

Year	Actual
2013	410

Output #2

Output Measure

- Presentations at international and national meetings.

Year	Actual
2013	6

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
------	--------

2013

8

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
2013	158

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
2013	611

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
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
2013	1993

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
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
2013	561488

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, enabling research and extension activities.

Results

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
404	Instrumentation and Control Systems
511	New and Improved Non-Food Products and Processes
607	Consumer Economics
608	Community Resource Planning and Development
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population

711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
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
806	Youth Development

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 is limited, other issues may be considered higher 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%		4%	
102	Soil, Plant, Water, Nutrient Relationships	15%		5%	
104	Protect Soil from Harmful Effects of Natural Elements	0%		5%	
121	Management of Range Resources	0%		4%	
131	Alternative Uses of Land	4%		1%	
205	Plant Management Systems	16%		16%	
212	Pathogens and Nematodes Affecting Plants	6%		10%	
301	Reproductive Performance of Animals	18%		0%	
305	Animal Physiological Processes	10%		12%	
306	Environmental Stress in Animals	8%		2%	
307	Animal Management Systems	12%		10%	
402	Engineering Systems and Equipment	0%		6%	
502	New and Improved Food Products	2%		0%	
503	Quality Maintenance in Storing and Marketing Food Products	0%		7%	
511	New and Improved Non-Food Products and Processes	0%		11%	
601	Economics of Agricultural Production and Farm Management	3%		5%	
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: 2013	Extension		Research	
	1862	1890	1862	1890

Plan	8.0	0.0	23.0	0.0
Actual Paid Professional	6.8	0.0	7.8	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
220036	0	417253	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
768567	0	1719982	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
415409	0	648967	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 utilizes integrated research, extension, and education projects to provide knowledge and technologies to generate and improve products and processes for existing and expanded markets.

Since the first "inoculated deep litter system" (IDLS) piggery in the United States was constructed four years ago under a CTAHR extension agent in Hilo, the facility design is now recommended as a best waste management practice by USDA NRCS and the Hawaii Department of Health. USDA now allows cost-sharing to aid in the construction or conversion of existing swine production facilities to incorporate IDLS components. Regulatory agencies were able to witness IDLS' ability to handle waste with no pen cleaning or discharge of waste water over 4 years, significantly reducing the negative impacts of effluent on soil, fresh water, and shorelines. During the past year, 40 small-scale poultry enclosures ("Hubbell Bubbles") using a modified IDLS were constructed in Hilo, providing food and a source of income to these families. The accessibility of incorporating IDLS components into new or existing swine or poultry production facilities through federal cost-sharing and the inherently low cost of maintaining these facilities bring the state a step closer to food self-sufficiency.

In 2013 a regional conference (Tropical Pasture and Livestock Management Conference) was held on the Pacific island of Tinian, CNMI (<http://manoa.hawaii.edu/ctahr/tpalm/index.html>). Many Hawaii producers participated in this four day conference. Four workshops covering Artificial Insemination practices and Beef Herd Management were also held throughout the Pacific region. Also a Stockman's Fall Field Day was held at the Mealani Agricultural Research Station providing participants with information on low-input beef cattle production, risk management, drought management, and the Secusio rearing and release program for fireweed control. As a result of the workshops and demonstration/trials, over 45 producers have indicated adoption of at least one or more technologies or management practices presented. Many have planted sample seed provide during workshops into their pastures, adopted better animal husbandry practices and/or grazing management practices. Several producers are now conducting, with assistance, herd genetic improvement through artificial Insemination programs. Producers are making

better management decisions regarding pasture condition and weed management.

Taro (*Colocasia esculenta*) is an important crop in Hawaii especially to native Hawaiians. An important initiative of the native Hawaiian community is the preservation and cultivation of native Hawaiian taro. Historically, there were as many as 300 taro (kalo) varieties in native Hawaiian communities, while today there are only 60-70 native Hawaiian taro varieties in cultivation. Taro is also thought to be a crop with significant value for local as well as global food production potential since it is productive, highly nutritious (a high protein staple crop with gluten free and highly digestible starch), and relatively pest and disease resistant. CTAHR maintains germplasm collections on research stations on the islands of Kauai, Oahu, Molokai and Hawaii. In 2013, field days were held on the islands of Oahu (250 participants) and Molokai (180 participants) which attracted commercial farmers, back yard growers and a multi-generational mix of community members. The objectives of the field days were to educate commercial farmers and the general public about the work being conducted by CTAHR and partnering agricultural agencies across the state in promoting sustainable and organic agriculture, showcasing our taro collections, and demonstrating how research, education and innovation are being used to protect, propagate and perpetuate taro using transitional as well as nontraditional methods. Thousands of taro plants of over 60 varieties were distributed at these events to hundreds of participants who will grow them in the farms and homes.

Taro leaf blight (TLB), caused by an oomycete pathogen, is a worldwide disease that threatens sustainable taro cultivation. Although researchers in Hawaii were successful in past years in developing TLB resistant lines through genetic modification, public concern over cultural values and resistance to this methodology necessitated destruction of the research products and abandonment of this otherwise successful approach to TLB resistance. Current research emphasizes development of resistant hybrids through conventional breeding, including marker-assisted selection. Results of a mail-in consumer survey with 476 respondents established that taro hybrids developed through marker-assisted selection were acceptable to consumers, but that an educational program to inform consumers of the difference between this technique and genetic modification was an essential prerequisite to acceptance, since both genetics and DNA hold strong negative connotations when associated with agriculture. Markers have now been identified that segregate with resistance and susceptibility, and validation for us to accelerate breeding efforts is currently in progress.

Aquaculture (fish cultivation) and aquaponics (soil-less plant and fish co-cultivation) hold great promise as space-efficient and intensive methods of food production. FY2013 research established Hawaiian slipper lobsters as good candidates for aquaculture, and testing of holding systems was initiated. Economic analysis found that crustacean and mollusk farms were the strongest performers in commercial aquaculture in Hawaii, although production costs were 3.5-fold greater than in the continental USA. Aquaponics researchers focused on effective pest management on vegetable crops, and demonstrated that the properties of Hawaiian herbs of medicinal value grown in soil and in soil-less culture were equivalent, addressing concern of cultural practitioners and opening up cultivation possibilities.

The high cost of imported agricultural inputs continues to be a major problem in Hawaii for aquaculture, livestock production and crop production. In a spin-off from biofuels feedstock research, research was initiated in FY2013 on drought-tolerant grass crosses for pasture and livestock feed. Innovative methods of using locally produced inputs, such as vermicompost teas, were also evaluated and extended through both publications and workshops. A green manure cropping system was also demonstrated to reduce incidence of plant parasitic nematodes and promote greater yields of taro.

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?

Aquaculture faculty participated in development of eXtension through national committee membership, and are active users.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	8724	35962	5568	13766

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	55	26	81

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days and demonstrations.

Year	Actual
2013	100

Output #2

Output Measure

- Presentations at international and national meetings

Year	Actual
2013	10

Output #3

Output Measure

- Grant proposals submitted

Year	Actual
2013	34

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
2013	826

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
2013	2143349

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
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
121	Management of Range Resources
131	Alternative Uses of Land
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
301	Reproductive Performance of Animals

305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
402	Engineering Systems and Equipment
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management
607	Consumer Economics
608	Community Resource Planning and Development

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%		15%	
111	Conservation and Efficient Use of Water	50%		20%	
112	Watershed Protection and Management	17%		0%	
122	Management and Control of Forest and Range Fires	25%		0%	
123	Management and Sustainability of Forest Resources	0%		30%	
132	Weather and Climate	0%		10%	
133	Pollution Prevention and Mitigation	8%		0%	
136	Conservation of Biological Diversity	0%		10%	
405	Drainage and Irrigation Systems and Facilities	0%		15%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	2.0	0.0
Actual Paid Professional	0.8	0.0	0.6	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
52536	0	26813	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
69436	0	82158	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	222917	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.

The CTAHR Range Management Specialist has continued to collect and analyze data from 15 Weather station/forage production enclosures located throughout the state. The data collected to date (2008-2013) have been used to develop a Drought Management and Forage Production Decision Support Tool that has been released to the public and can be found at: <http://globalrangelands.org/hawaii>. The project was originally funded through the NRCS-Conservation Initiative Grant Program. Subsequent funding was provided through CTAHR. In addition, through this project Hawaii Livestock producers received drought management and mitigation support through direct outreach and assessment of drought impacts for the USDA-FSA NAP-Forage program.

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. In 2013 the Rainwater Catchment program became a collaborative effort of CTAHR with Hawaii Seagrant.

Climate change research examined the impact of temperature increase on carbon pools in live and dead biomass in tropical forests, both above and below ground, and suggested that the size and distribution of these carbon pools will be less sensitive to rising temperatures than has been predicted by

ecosystem models. The recently established Pacific Fire Exchange (PFX), one of 14 consortia arising from a national effort of the Joint Fire Sciences Program, was also both in fire prevention programming with wildfire professionals in Hawaii, Guam and Palau; and in research to model wildfire behavior in the tropics, particularly in the common invasive guinea grass. Field data were used to parameterize a custom fuels model, which better predicted fire behavior than either the national standard or previous custom fuel models. Accurate prediction of wildfire behavior is essential for effective wildfire management.

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

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3951	2527	0	0

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

Patent Applications Submitted

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	4	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days, or demonstrations conducted

Year	Actual
2013	4

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2013	4

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2013	7

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
2013	62

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.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	30

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Hawaii residents need to anticipate and plan for possible effects of climate change, including weather variability and drought.

What has been done

Workshops, demonstrations and nonformal education activities have been carried out.

Results

Hawaii residents are better informed about possible impacts of climate change.

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

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
2013	691638

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 agricultural sectors 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
102	Soil, Plant, Water, Nutrient Relationships
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
136	Conservation of Biological Diversity

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. Higher resolution data needs to be obtained to track coastal sediment plumes over time; and models of fire behavior developed in temperate 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
102	Soil, Plant, Water, Nutrient Relationships	0%		6%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		6%	
205	Plant Management Systems	0%		8%	
404	Instrumentation and Control Systems	0%		10%	
501	New and Improved Food Processing Technologies	0%		12%	
502	New and Improved Food Products	0%		8%	
511	New and Improved Non-Food Products and Processes	0%		50%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.5	0.0
Actual Paid Professional	0.0	0.0	1.6	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	22979	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	425759	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	1703758	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

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

2. Brief description of the target audience

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

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

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

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

Patent Applications Submitted

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	2	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals submitted

Year	Actual
2013	7

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2013	0

Output #3

Output Measure

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

Year	Actual
2013	3

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

Identified types of bioenergy crops suitable for Hawaii environment.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

What has been done

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

Results

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

4. Associated Knowledge Areas

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

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

Outcome #2

1. Outcome Measures

Dollar value of grants and contracts received

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	119005

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

What has been done

Resources were obtained and programs were conducted.

Results

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

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

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%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.0	0.0
Actual Paid Professional	0.3	0.0	0.1	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
3433	0	150	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
35286	0	5613	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
13397	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.

Today's hectic lifestyles often lead parents and caregivers to make less-than-desirable food choices for meals. Obesity and being overweight has reached epidemic proportion in the United States. These conditions are key factors for chronic diseases, such as heart disease, diabetes, arthritis, high blood pressure, stroke and some types of cancer. The leading causes of these conditions are poor diet and lack of physical activity. Unhealthy eating habits and lack of physical activity can begin at an early age. Parents have a strong and sustained influence on children's habits and access to food and recreational activities. Youth are easily influenced by media and their friends. Hawaii 4-H extension faculty developed and conducted the "I Take Charge Of My Health" program, consisting of educational workshops for youth and adults on the importance of regular physical exercise to build healthy bodies and eating foods the My Plate way. Participants have indicated improvement in their food choices and an increase in their physical activity level.

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. In FY2013, baseline data collection of child health metrics and activity measurements were completed in both treatment (intervention) and control communities in each region, and participants and procedures were finalized in preparation for initiation of programming in FY2014. The intervention techniques resulting from this community-guided program will be of great value in reducing obesity incidence in at-risk Pacific Islander and Native Alaskan populations.

Childhood obesity and incidence of diabetes are correlated health concerns. Choosing foods that are high in dietary fiber aids in weight loss and improves blood glucose control. Rice is a primary starch in Hawaii, and research efforts focused on quantification of dietary fiber content, as measured by resistant starch, in different rice varieties and with different cooking methods. A high resistant and low resistant variety were selected for clinical trials. Three community presentations were also given to 180 participants emphasizing the importance of including adequate dietary fiber from a variety of local food sources.

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

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	395	1598	514	741

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

Patent Applications Submitted

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	1	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2013	8

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2013	0

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2013	0

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
2013	1202

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
2013	214

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
2013	5085672

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
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

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 relatively 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
212	Pathogens and Nematodes Affecting Plants	0%		14%	
404	Instrumentation and Control Systems	0%		7%	
501	New and Improved Food Processing Technologies	25%		22%	
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%		7%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	14%		7%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	22%		36%	
723	Hazards to Human Health and Safety	0%		7%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	1.5	0.0	1.5	0.0
Actual Paid Professional	0.4	0.0	1.4	0.0
Actual Volunteer	0.1	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
8228	0	50087	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
72090	0	439593	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	63786	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

New government standards such as Good Agricultural Practices and Good Handling Practices (GAP & GHP) developed by agencies such as the USDA and the US Food and Drug Administration are putting edible crop producer's agricultural practices under close scrutiny. The objective of GAP & GHP is to minimize risk or outbreaks associated with food borne illnesses. We suspect legislative and government regulations addressing microbial food safety hazards will shortly become mandatory government regulated policies. Increased food safety measures may minimize hazards related to microbial food borne illnesses, increase consumer confidence in the safety of locally produced fruits and vegetables, and increase marketing potential for producers. At present GAP and GHP are voluntary government based programs. However, in FY2012, approval of the Food Safety and Modernization Act (FSMA) accelerated concerns over food safety and compliance.

CTAHR has continued our efforts in educating growers about food safety practices on farm and in the packing areas with the assistance of CTAHR food safety coaches. Through one on one farm coaching visitation and consultations, growers indicated an increase in knowledge and heightened level of competencies in identifying high-risk areas. New food safety educational workshops have also included implementation of the Central Notification Site for on farm safety and worker protection. Further, we have conducted on farm trials evaluating the efficacy of aqueous ozone as a post-harvest treatment for commodities such as papayas, basil, etc. Modified operations have minimized the risk associated with food safety issues and secured their marketplace. 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. Eight grower workshops were conducted in FY2013; and LIFE partnered with the Hawaii Department of Agriculture to conduct on-farm worker protection workshops in immigrant farmers' native languages. CTAHR faculty also conducted food handling workshops for employees in food processing facilities in Hawaii, and throughout the American Pacific.

In FY2013 CTAHR faculty and staff conducted four farm food safety workshops/conferences for 100 growers, agricultural trainees, and other interested parties. Seven food safety workshops were also held in partnership with Department of Health for temporary food vendors and to discuss Hawaii legislative rule changes. Consumer information related to current food safety issues, such as rat lung work, food recalls, seasonal food safety tips were disseminated through emails distribution lists and website postings. As a result of these activities, approximately 54 growers, wholesalers and other interested individuals recognized the importance of food safety throughout the market system and increased their knowledge of GAPs. 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, 4) chilling foods promptly. Growers that participated in 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, improved awareness of pesticide and labor laws and use of traceback labels on boxes.

Research efforts emphasized improved/alternative methods of sterilization and decontamination of tropical fresh and processed foods. Combined microwave and ohmic heating was found to be an improved method of evenly heating solid-liquid food mixtures, such as in processing of canned soups. For post-harvest microbial decontamination of fresh produce surfaces, a photothermal guiding system was developed with a pulsed carbon dioxide laser and adjustable beam expander. This system was optimized to ensure uniform radiation of the sample, and microbial inactivation was increased by addition of conjugated gold nanoparticles to the fruit surfaces. To enhance the safety of fresh-cut produce and unpasteurized tropical fruit juices, guava, noni and lime juices were tested as additive anti-bacterial agents. Lime juice possessed the strongest inhibition properties against the common food-borne pathogens *Escherichia coli*, *Salmonella typhimurium* and *Listeria monocytogenes*. Risks to consumers from pesticide contamination were addressed in pesticide residue evaluations under the IR-4 program to establish guidelines for pesticide registration.

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

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3	10	1	5

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

Patent Applications Submitted

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	1	9	10

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days and demonstrations

Year	Actual
2013	2

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2013	5

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2013	3

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
2013	20

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
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
2013	286793

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
212	Pathogens and Nematodes Affecting Plants
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
511	New and Improved Non-Food Products and Processes
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
723	Hazards to Human Health and Safety

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.