2014 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) is composed of six academic departments, the Center on the Family, and the Western Insular Pacific Sun Grant Subcenter. Dr. Maria Gallo led the college as Dean in FY2014, and Interim Associate Dean/Director for Research J. Kenneth Grace was recruited in a national search to fill this position on a permanent basis. Charles Kinoshita continued as Associate Dean for Academic and Student Affairs, and the position of Interim Associate Dean/Director for Extension transitioned from Carl Evensen to Ashley Stokes, while a search was initiated to fill this position on a permanent basis.

In order to strengthen links between CTAHR and its many community and industry constituencies, the college hosts 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, assists in raising funds for college efforts, and ensures that CTAHR is accountable to the community and addresses state needs.

CTAHR administration and faculty continued to focus and strengthen research and extension activities within the framework provided by the ten program areas described in this Annual Report. As the only tropical, island state in the USA, CTAHR has unique natural resource, specialty crop, and community needs. In recognition of this, the first five of our ten program areas address local issues and priorities; while program areas 6-10 are those areas identified as national priorities by USDA NIFA.

Although we have continued our effort to refocus significant effort into the national priority areas, our five local program areas are equally important due to the unique Pacific Ocean location, environment, and economics of an island state 2,500 miles from the continental United States and the representing the most isolated island chain in the world. Hawaii has virtually every recognized soil type, rapid increases in elevation, annual rainfall variation from less than ten to over 400 inches, and the unique agricultural challenge of vog (volcanic fog). 63% of the state's 7,000 farms are less than 10 acres in size, and another 25% fall between 10-49 acres. Hawaii imports 89% of its food, and our agricultural landscape consists of specialty crops, many grown nowhere else in the USA.

Hawaii is also unique it its social and cultural mix, with many first-generation immigrants entering agricultural and a wide range of cultural practices and dietary preferences in the population. The costs of land, labor, and energy exceed those found in other states, with fuel costs adding significantly to the costs of production, importing agrochemicals and animal feed, and exporting products. Greater local food production is a State goal, with targets ranging from 10-50% increase. The high costs of energy (largely dependent on imported oil), water, and animal feed are major challenges. Although livestock producers in Hawaii are making progress towards the goal of quality grass-finished products, virtually all calves are still shipped to mainland feedlots due to lack of economical local feed supplements. Invasive species and the attendant costs of pest and disease management, and export limitations imposed by quarantine regulations also impose additional burdens on Hawaii's farmers. The first five of our ten program areas address these local challenges and unique situations.

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. As in past years, our FY2014 report documents program challenges and program successes, often incremental but sometimes transformational.

Initiatives described in earlier years continued to move forward in FY2014. The region-wide Children's Healthy Living Program for Remote Underserved Minority Populations of the Pacific (CHL), supported by a $25 million NIFA award reached mid-phase, and significant progress in developing locally appropriate dietary and behavioral interventions to battle childhood obesity across the American Pacific. The Tropical Hardwood Tree Improvement and Regeneration Center, a collaboration with Purdue University; and the Pacific Fire Exchange, a consortium to improve wildfire management on Pacific islands, gained new partners and provided both research and extension outcomes impacting forest and fire management in Hawaii and the Pacific islands. Conservation of Hawaii's precious natural resources and native biota and invasion biology continued to cross over program areas in FY2014, and to represent an increasing effort in CTAHR. Research continued on lignocellulosic and oil biofuel crops, recognizing Hawaii's energy needs. Research on rapid detection of both human and plant pathogens in the field, novel freezing technology, and sterilization and protection of produce during processing advanced food safety programming. 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.

The decreasing university budget, which not only funds academic programs in CTAHR, but also all research and extension activities, presented a significant challenge to CTAHR research efforts in FY2014, with research FTE decreasing due to retirements and other attrition from 43.2 FTE in FY2013 to 33.3 FTE in FY2014, a 23% decrease in research faculty in the college. Extension saw a smaller 6.7% decrease, and engagement with the public remained strong, with increasing numbers enrolling in the Master Gardeners program statewide, and initiation of strong community interest in school gardening activities.

Through the work of many faculty teams, a Strategic Action Plan was developed by the college in FY2014. Implementation is currently underway, including some restructuring of extension programming, increasing integration of research and extension, increased pre-award assistance to researchers, an emphasis on collaboration, and more effective academic advising. CTAHR's ten planned program areas were determined to meet the needs of the college and the state at the present time. Should some restructuring and revision occur in the future to meet the objectives of the Strategic Action Plan, these changes 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: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	50.0	0.0	48.0	0.0
Actual	47.5	0.0	33.3	0.0

II. Merit Review Process

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

- Internal University Panel
- External Non-University Panel

- Expert Peer Review

2. Brief Explanation

CTAHR continues to use expert peer review panels to review individual Plans of Work, projects, publications, promotion and tenure applications, and post tenure reviews. All reviewers are asked 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 administers regularly assist, facilitate and participate in strategic planning sessions for industry associations and organizations such as the Hawaii Association of Family and Consumer Education, Hawaii 4-H Foundation, Hawaii 4-H Livestock

Association, Hawaii Coffee Growers Association, Hawaii Tropical Flowers and Shippers Association, Hawaii Tropical Fruit Growers Association, Hawaii Macadamia Nut Association, Hawaii Food Industry Associations, Hawaii Tea Society, and many others. CTAHR also receives many requests for research, outreach and other resources through emails, letters, meetings, and phone calls. Email list serve groups of CTAHR and external individuals are also used. Information, questions, and other exchanges take place on a regular basis.

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 developement of effecient and rapid means of bringing NIFA resources to bear, through CTAHR, on newly discovered invasive plant pests and diseases in Hawaii.

CTAHR stakeholders continue to join with those in Florida and the Caribbean in requesting that NIFA ressurect 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
1378329	0	1653561	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1304269	0	1613062	0
Actual Matching	5913173	0	8613506	0
Actual All Other	1401283	0	3812680	0
Total Actual Expended	8618725	0	14039248	0

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

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

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

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	7%		6%	
111	Conservation and Efficient Use of Water	0%		9%	
112	Watershed Protection and Management	7%		3%	
121	Management of Range Resources	8%		4%	
123	Management and Sustainability of Forest Resources	29%		4%	
124	Urban Forestry	0%		2%	
125	Agroforestry	0%		5%	
131	Alternative Uses of Land	0%		7%	
133	Pollution Prevention and Mitigation	0%		7%	
135	Aquatic and Terrestrial Wildlife	0%		1%	
136	Conservation of Biological Diversity	0%		4%	
205	Plant Management Systems	21%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	4%		8%	
212	Diseases and Nematodes Affecting Plants	3%		9%	
213	Weeds Affecting Plants	7%		4%	
402	Engineering Systems and Equipment	0%		2%	
403	Waste Disposal, Recycling, and Reuse	0%		2%	
404	Instrumentation and Control Systems	0%		1%	
605	Natural Resource and Environmental Economics	0%		9%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	14%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	3.5	0.0	7.0	0.0
Actual Paid	4.3	0.0	5.3	0.0
Actual Volunteer	474.0	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**
156048	0	284479	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
585048	0	1563616	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
33632	0	887503	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.

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.

In addition to presenting the third annual Forest Stewards master forest landowners training program in FY2014, and additional workshops to train forestry consultants, workshops for forestry and conservation nurseries were conducted for resource professional on Yap Island and Pohnpei Island in the Federated States of Micronesia. Research on forest resource management included surveying consumer preferences for koa wood color and figure as part of an assessment of young koa wood quality; developing an overall protocol for the Carbon Assessment of Hawaii (CAH) and produced wall to wall datasets of carbon stocks (soil carbon, coarse woody debris carbon, forest floor carbon, live biomass carbon); and characterization of stress-related genes in Leucaena leucocephala (leucaena) that may confer drought resistance in this stress tolerant tree legume.

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.

In FY2014, significant progress was made in development and application of economic evaluation tools for Hawaii's environment and resources that are inclusive of environmental and social costs, and human well-being. A proof of concept ecosystem service value trade-off model was tested to determine cost effectiveness of road rehabilitation on a watershed area. As an alternative to use of Gross Domestic Product (GDP) to assess the value of natural capital in Hawaii, a set of policy-relevant green accounting measures was developed, and applied to create a comprehensive wealth account for the state, to be updated annually. This is reported annually as the Green Progress Indicator (GPI). In FY2014, a pilot valuation study (focused on the value of forests, land and water) was performed using the GPI measures.

Waste management and cleanup of environmental contaminants are serious issues in island ecosystems. In FY2014, biochar-supported nano-scale photocatalysts were found to be effective in completely degrading both endocrine disruptors and pharmaceutical compounds (medical wastes). Biochar applications to soil were also found to increase magnesium tolerance in plants, and may well have implications for remediation of other heavy metals as well.

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, and evaluation of the first full year of impacts of release of an herbacious moth for fireweed biological control. The University of Hawaii Insect Museum (UHIM) supported by CTAHR increased their collection by 30,000 specimens in FY2014, and updated the museum online database with thousands of images and data files.

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

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	6657	53048	975	292

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	7	69	76

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals submitted.

Year	Actual
2014	71

Output #2

Output Measure

- Presentations at international and national meetings.

Year	Actual
2014	33

Output #3

Output Measure

- Number of workshops and other educational activities held

Year	Actual
2014	108

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
2014	398

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
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
136	Conservation of Biological Diversity
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse

Outcome #2

1. Outcome Measures

Total dollar value of grants and contracts obtained.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	3952689

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 or 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
131	Alternative Uses of Land
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases 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 quarentine 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	9%		5%	
124	Urban Forestry	2%		2%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		4%	
202	Plant Genetic Resources	5%		5%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		1%	
204	Plant Product Quality and Utility (Preharvest)	0%		6%	
205	Plant Management Systems	40%		17%	
206	Basic Plant Biology	0%		1%	
211	Insects, Mites, and Other Arthropods Affecting Plants	4%		2%	
212	Diseases and Nematodes Affecting Plants	6%		15%	
213	Weeds Affecting Plants	2%		0%	
215	Biological Control of Pests Affecting Plants	0%		5%	
216	Integrated Pest Management Systems	22%		12%	
502	New and Improved Food Products	0%		6%	
511	New and Improved Non-Food Products and Processes	0%		5%	
601	Economics of Agricultural Production and Farm Management	5%		4%	
604	Marketing and Distribution Practices	0%		5%	
903	Communication, Education, and Information Delivery	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	8.0	0.0
Actual Paid	12.0	0.0	10.8	0.0
Actual Volunteer	117.0	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**
652474	0	476686	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1372369	0	3808418	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
369250	0	936633	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, both for local use and for export. Since 88% of the food consumed in Hawaii is imported, an important goal for local food security 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 F2014 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.

Successful farming requires economic stability as well a success in crop cultivation. This can be challenging in Hawaii, where all crops are considered Specialty Crops, and 63% of the state's 7,000 farms are less than 10 acres in size. The Risk Management Hawaii (RMH) program addresses the challenge by providing education and training in management of production issues such as nutrition and pest control, crop diversification opportunities, food safety, marketing, farm business practices, Federal crop insurance and disaster assistance programs. In FY2014, attendees at the 75 RMH workshops rated the workshops as excellent (3.7 on a scale of 1-4), and 92% agreed that these educational sessions had increased their ability to manage agricultural risks. Diversified income sources are also of great value to Hawaii's farmers, and a draft set of best-management practices for farms engaged in "agri-tainment" (agritourism) was prepared.

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.

Important limiting factors in crop production in Hawaii are pests and diseases. Taro is a culturally-important primary food source in Hawaii (most often boiled and mashed as poi) and throughout the Pacific; and Taro Leaf Blight, a fungal disease, is one of the greatest threats to taro production. Using both conventionally bred taro hybrids, and field-resistant cultivars from Palau and Micronesia, progeny were produced with high resistance to the pathogen. Genotyping by sequencing (GBS) indicates that the resistant phenotype is not inherited in a dominant manner and is likely a complex, multi-locus, trait.

Efforts to increase the availability of crop extension services and more rapidly transfer research results focused on the release of two new mobile phone applications. "The Plant Doctor" app offers plant disease identification tools and rapid consultation by professionals; while "Pic-a-Papaya" encourages citizen scientists to submit photos and descriptions of possibly diseased papaya. This app combines Papaya Ring Spot Virus diagnosis, GMO testing of papaya, and plant replacement services for diseased or GMO papaya (if the latter is a concern to the client).

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 were active in use of eXtension and service on national committees.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	17821	164029	1378	5160

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	46	14	60

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, research/field day demonstrations conducted

Year	Actual
2014	281

Output #2

Output Measure

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

Year	Actual
2014	47

Output #3

Output Measure

- Presentations at international and national meetings

Year	Actual
2014	14

Output #4

Output Measure

- Number of grant proposals submitted.

Year	Actual
2014	64

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of individuals completing non-formal education programs.
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

Number of individuals completing non-formal education programs.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	17821

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	Diseases and Nematodes Affecting Plants

213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
502	New and Improved Food Products
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices
903	Communication, Education, and Information Delivery

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
2014	1563

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
124	Urban Forestry
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	Diseases and Nematodes Affecting Plants
213	Weeds 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

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
2014	4449802

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
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	Diseases and Nematodes Affecting Plants
213	Weeds 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

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%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		1%	
204	Plant Product Quality and Utility (Preharvest)	0%		6%	
205	Plant Management Systems	0%		2%	
211	Insects, Mites, and Other Arthropods Affecting Plants	11%		8%	
212	Diseases and Nematodes Affecting Plants	0%		13%	
213	Weeds Affecting Plants	12%		21%	
215	Biological Control of Pests Affecting Plants	0%		18%	
216	Integrated Pest Management Systems	55%		11%	
312	External Parasites and Pests of Animals	0%		9%	
721	Insects and Other Pests Affecting Humans	0%		2%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	22%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	5.5	0.0
Actual Paid	2.3	0.0	3.0	0.0
Actual Volunteer	27.0	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**
46650	0	211170	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
256557	0	570856	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	879849	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 both within the state and out-of-state continued to need a variety of quarantine treatments for different agricultural products. As an alternative to the previously developed hot water shower treatment for potted plants, in FY2014, cold air treatment for 30 hours at 3.3 C was found to kill all stages of the coqui frog (Eleutherodactylus coqui). This is compatible with the common practice of shipping plants in refrigerated containers, and work is ongoing with the State of Hawaii to formalize this method of quarantine treatment.

A novel approach to the development of selective, "soft" pesticides investigated the use of peptides from a marine snail that actively hunts and kills other snails with these compounds. Methods were developed to enhance peptide production, and selectivity demonstrated with both naturally derived and bioengineered peptides. Degradation of the peptides, necessary for crop applications, was found to occur after 20 days. In other targeted insect control research, the use of imidacloprid tablets and/or spirotetramat drench in potting media was found effective as an alternative to broad-spectrum foliar sprays to eliminate anthurium whitefly and thrips.

Efforts continued to mitigate the impact of the coffee berry borer (CBB) in the Kona and Kau regions of the island of Hawaii, with annual compilation of research results into a manual of Hawaii-centric best management practices for farmers, and continued evaluation of the efficacy of both entomopathogenic fungi and alternatives practices. Research to combat the macadamia felted coccid in FY2014 focused both on evaluation of novel insecticide treatments, and on conservation and enhancement of predatory insect enemies of the coccid in Hawaii macadamia orchards.

In FY2014, over 50 aerial missions were completed to eliminate invasive weeds such as Miconia in natural systems using the Herbicide Ballistic Technology (HBT), a paintball gun technology for targeted applications of very small quantities of herbicide (reducing aerial application costs by 50%). Suppression of weeds along roadways focused on the use of the native Hawaiian species Pili grass (Heteropogon

contortus), and treatments were developed to relieve seed dormancy and facilitate seed production.

2. Brief description of the target audience

Target audiences include farmers, consumers, and rural citizens who can appreciate reduced pesticide inputs as we come to rely more on biological means of pest control. Scientists who study invasive species, and in particular fruit flies work with extension educators to delivery best management practices to agricultural and residential clientele. Natural resource managers (including those responsible for forestry, rangeland and conservation lands) depend on CTAHR researchers and extension to develop and deliver technologies for improved control and management of invasive plants in Hawaii's landscapes.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3499	2075	41	33

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	3	28	31

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days, demonstrations held

Year	Actual
2014	57

Output #2

Output Measure

- Number of grant proposals submitted

Year	Actual
2014	32

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Awareness created
2	Number of workshops implemented and demonstration installed for clientele education
3	Total dollar value of grants and contracts obtained.

Outcome #1

1. Outcome Measures

Awareness created

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	3500

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
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	Diseases 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

Outcome #2

1. Outcome Measures

Number of workshops implemented and demonstration installed for clientele education

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	783

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 projects 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
112	Watershed Protection and Management
136	Conservation of Biological Diversity
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

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
2014	2513346

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
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
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%	
134	Outdoor Recreation	0%		1%	
205	Plant Management Systems	5%		0%	
602	Business Management, Finance, and Taxation	0%		3%	
604	Marketing and Distribution Practices	3%		5%	
606	International Trade and Development Economics	0%		2%	
608	Community Resource Planning and Development	3%		6%	
724	Healthy Lifestyle	0%		5%	
801	Individual and Family Resource Management	12%		1%	
802	Human Development and Family Well-Being	35%		20%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	6%		14%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	0%		13%	
805	Community Institutions and Social Services	0%		3%	
806	Youth Development	36%		14%	
903	Communication, Education, and Information Delivery	0%		4%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	17.0	0.0	4.0	0.0
Actual Paid	17.1	0.0	3.3	0.0
Actual Volunteer	1271.0	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**
180269	0	67781	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
2273307	0	475794	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
283901	0	454992	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 FY2014, CTAHR reports on homeless services needs and utilization and on substance abuse treatment services in Hawaii were again important references for policy makers and for media investigations of social conditions and the adequacy of services provided. The Quality Care program provided training and technical assistance to childcare centers and family childcare providers seeking financial incentives from the state for meeting voluntary standards. Educational packets were provided to 251 family childcare providers in FY2014, and more than 1500 registered providers have received technical assistance from 2010-2014.

Child development and early childhood education are important areas for CTAHR researchers and extension efforts. The Hui A'o Mua (HAM) Early Reading First program was developed to give preschool teachers a research-based literacy curriculum, supported by intensive workshops and in-class coaching, and including a weekly home curriculum. Evaluation of the efficacy of the HAM program in FY2014 indicated that the intensive professional development and in-class support raised classroom quality to levels considered excellent. Strategies to engage parents were also very successful. Although the resource commitments required are substantial, HAM children showed substantial advantages on emergent reading, and HAM children with low receptive vocabulary sores and low to average alphabet knowledge showed better outcomes than children with similar low skills.

Adolescence can be a vulnerable period, and mindfulness training is an innovative way to address

mental health and delinquency issues. Mindfulness regards mental health as the ability to be fully present in an equilibrated way with moment to moment experiences. Studies conducted in 2013-2014 with incarcerated Native Hawaiian and Pacific Islander youth, who have a disproportionally higher incarceration rate than Caucasians or East Asians in Hawaii, demonstrated measurable reductions in stress, anxiety, and aggression (both behaviorally and biochemically). As a result, mindfulness training was also provided to K-12 teachers and counselors, and the state Office of Youth Services is collaborating with CTAHR to provide training to youth and family-serving agencies in Hawaii.

2. Brief description of the target audience

As intended by the Land Grant perspective, CTAHR's "targeted" clients for this program in **instruction** are the undergraduate and graduate students in family and consumer sciences 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 Health and Social Services; adults (4-H leaders) and youth (ages 5-19) through the 4-H Youth Development program; young children and parents through the literacy programs; adults through the Family Education and Family Community Leadership Programs; home gardeners; and the elderly, extension staff in other CTAHR units and at sister institutions; and other members of the professional community who deal with family, youth and health issues. Clients for **extension agents** are children, youth and families "at risk" in targeted communities through the "New Community Projects" program, kindergartners and parents through the "KAMP" programs, adults (4-H leaders) and youth (ages 5-19) through the 4-H Youth Development program, young children and parents through the literacy programs, adults through the Family Education and Family Community Leadership Programs, home gardeners, and the elderly, extension staff in other CTAHR units and at sister institutions, and other members of the professional community who deal with family, youth and health issues.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	17900	269342	17061	10259

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	45	14	59

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
2014	14361

Output #2

Output Measure

- Number of volunteer hours

Year	Actual
2014	66416

Output #3

Output Measure

- Presentations at international and national meetings.

Year	Actual
2014	15

Output #4

Output Measure

- Grant proposals submitted.

Year	Actual
2014	42

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of individuals who adopt at least one new practice learned.
2	Number of stakeholders completing non-formal education programs on parenting, youth development, and leadership development.
3	Total dollar value of grants and contracts obtained.

Outcome #1

1. Outcome Measures

Number of individuals who adopt at least one new practice learned.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	6588

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
608	Community Resource Planning and Development
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
903	Communication, Education, and Information Delivery

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	14361

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
124	Urban Forestry
608	Community Resource Planning and Development
724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
805	Community Institutions and Social Services
806	Youth Development
903	Communication, Education, and Information Delivery

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
2014	3657635

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Health and Wellness of Hawaii's Families and Communities

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
131	Alternative Uses of Land	0%		7%	
201	Plant Genome, Genetics, and Genetic Mechanisms	15%		0%	
404	Instrumentation and Control Systems	0%		3%	
511	New and Improved Non-Food Products and Processes	0%		3%	
701	Nutrient Composition of Food	0%		5%	
702	Requirements and Function of Nutrients and Other Food Components	0%		13%	
703	Nutrition Education and Behavior	61%		5%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	24%		0%	
724	Healthy Lifestyle	0%		21%	
802	Human Development and Family Well-Being	0%		13%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		9%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	0%		17%	
806	Youth Development	0%		4%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	5.0	0.0	4.0	0.0
Actual Paid	4.9	0.0	3.2	0.0

Actual Volunteer	39.0	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**
81059	0	145523	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
572694	0	592930	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
348116	0	100847	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

An aging population, economic duress, and social and cultural factors affecting food choice all contribute to social, environmental, and health stress in Hawaii. Iron deficiency, obesity, and diabetes are common conditions in Pacific populations; and appropriate choice, handling and preparation of locally available foods are topics requiring integrated research and extension efforts. Analysis of available data indicates that non-anemic iron deficiency is particularly common, with a host of possible negative effects, and may generally escape clinical diagnosis. Seaweed (limu) is an under-utilized vegetable in Hawaii, and prior work identified 10 seaweeds demonstrated greater iron content per gram than spinach; with nori containing twice the iron of spinach, and locally grown red ogo containing 10-fold more iron. However, research in FY2014 indicated that many of these seaweeds, including red ogo do not provide more bioavailability of iron than spinach, due to their low iron absorption efficiency. Notable exceptions were nori and sea lettuce, which provided 3 and 5-fold more iron availability per gram dry matter than spinach. Moreover, vitamin C increased iron bioavailability by over 200% in nori and sea lettuce, although it had no effect on other seaweeds.

Studies on the nutritive value and beneficial dietary effects of other under-utilized local food plants in FY2014 found that bitter melon juice improves glucose and lipid metabolism, improved chronic inflammation, and also prevented weight gain in mice fed a high-fat diet. Mechanistic studies are in progress, and this area of research is particularly important in Hawaii, where Native Hawaiians and Pacific Islanders have more than twice the rate of obesity-associated type 2 diabetes compared to Caucasians, and are more than five times more likely to die from the disease.

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

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2580	4400	1565	580

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	30	26	56

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of outreach activities and events conducted

Year	Actual
2014	37

Output #2

Output Measure

- Presentations at international and national meetings.

Year	Actual
2014	12

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2014	17

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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Individuals 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
Individuals received training and new licenses or recertification, and apply pesticides safely and correctly.

4. Associated Knowledge Areas

KA Code	Knowledge Area
{No Data}	null

Outcome #2

1. Outcome Measures

Number of people who changed their behavior to better their health

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	798

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
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
2014	2495

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
701	Nutrient Composition of Food
703	Nutrition Education and Behavior
724	Healthy Lifestyle
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

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
2014	704893

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
724	Healthy Lifestyle
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

- When the economy is weak, public and private funding decreases and is more difficult to obtain.
- When funding has decreased, other issues may be considered priorities and compete for available funds.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Global Food Security and Hunger

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	0%		1%	
102	Soil, Plant, Water, Nutrient Relationships	8%		6%	
131	Alternative Uses of Land	2%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		1%	
204	Plant Product Quality and Utility (Preharvest)	0%		3%	
205	Plant Management Systems	24%		2%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
212	Diseases and Nematodes Affecting Plants	0%		6%	
216	Integrated Pest Management Systems	4%		3%	
301	Reproductive Performance of Animals	8%		2%	
302	Nutrient Utilization in Animals	0%		13%	
305	Animal Physiological Processes	30%		16%	
306	Environmental Stress in Animals	0%		2%	
307	Animal Management Systems	0%		8%	
503	Quality Maintenance in Storing and Marketing Food Products	0%		7%	
511	New and Improved Non-Food Products and Processes	0%		13%	
601	Economics of Agricultural Production and Farm Management	4%		7%	
607	Consumer Economics	4%		0%	
608	Community Resource Planning and Development	8%		0%	
703	Nutrition Education and Behavior	8%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	7.0	0.0	13.0	0.0
Actual Paid	6.1	0.0	4.0	0.0
Actual Volunteer	595.0	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**
182526	0	251592	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
684882	0	853011	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
352211	0	366997	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.

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.

One of the greatest constraints for the livestock industry in Hawaii is transportation (fuel costs). With virtually no local sources of animal feed, imported feed is extremely expensive. An economic analysis of aquaculture (fish cultivation) in Hawaii found that production costs are 3.5-fold greater than in the continental USA. The state exports approximately $17.4 million in live cattle to mainland feed lots, and conversely 90% of the beef consumed in Hawaii is imported. In support of Hawaii livestock producers, FY2014 efforts focused on animal genetics and muscle development, biological indicators of stress, development of local animal feed sources, and drought management and pasture quality improvement to assist the nascent grass-fed beef industry. Evaluation of pastures statewide resulted in development and release of the online Drought Management and Forage Production Decision Support Tool (http://globalrangelands.org/hawaii). Research was also initiated in FY2014 to develop grass cultivars that are drought tolerant, nutritious, and optimized for cultivation under local environmental conditions. Napier grass is a tropical forage that can produce high biomass yields. However, temperature and drought stress limit its productivity. To address this limitation, Napier grass varieties were crossed with pearl millet

varieties which are well known for their high drought tolerance, and select hybrids were found to out-perform Napier grass varieties for yield, nutritional content, and digestibility.

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 increasingly interested in food sustainability issues, the audience can include large segments of the population.

3. How was eXtension used?

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

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	17010	27335	9021	13520

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	31	18	49

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days and demonstrations.

Year	Actual
2014	424

Output #2

Output Measure

- Presentations at international and national meetings

Year	Actual
2014	21

Output #3

Output Measure

- Grant proposals submitted

Year	Actual
2014	63

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4573

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
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants

301	Reproductive Performance of Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
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
703	Nutrition Education and Behavior

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
2014	2985126

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
201	Plant Genome, Genetics, and Genetic Mechanisms
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
301	Reproductive Performance of Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
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
703	Nutrition Education and Behavior

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	25%		30%	
111	Conservation and Efficient Use of Water	35%		40%	
112	Watershed Protection and Management	25%		0%	
405	Drainage and Irrigation Systems and Facilities	15%		30%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.0	0.0
Actual Paid	0.0	0.0	0.0	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**
1055	0	1487	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
54880	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Global climate change will continue to affect Hawaii'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 exclosures located throughout the state, and to distribute the results to ranchers on each island. The Drought Management and Forage Production Decision Support Tool (http://globalrangelands.org/hawaii) developed from this work has been released to the public. Increasing temperatures were also reported to be affecting lettuce producers in FY2014, while increasing salinity is anticipated by taro growers. CTAHR extension personnel joined in the national Climate Hub initiative in FY2014, an effort to coordinate technology transfer and extension efforts to mitigate the impacts of climate change across landgrants and federal agencies. To further this effort, college staff met with our western region counterparts, and formed a Hawaii alliance with federal partners.

Climate change research addressed the seasonal phenology, and its inter-annual variability, of native forests in Hawaii; and also continued to examine the impact of temperature increase on carbon pools in live and dead biomass in tropical forests. A 1.5 year continuous time series of top-of-the-canopy photos was acquired by mounting a digital fisheye imaging system at two native forest sites on the island of Hawaii. In comparison to a MODIS vegetation index time series, and in situ meteorological data, the fisheye camera time series illustrated moderate fluctuations in canopy greenness not otherwise observable, demonstrating the value of in situ near-surface remote sensing in monitoring native Ohia forest dynamics.

The recently established Pacific Fire Exchange (PFX), one of 14 consortia arising from a national effort of the Joint Fire Sciences Program, was active in fire prevention extension programming with wildfire professionals in Hawaii, Guam and Palau; and in research to better model wildfire behavior in the tropics, particularly in the common invasive guinea grass.

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

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days, or demonstrations conducted

Year	Actual
2014	0

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2014	2

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2014	17

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

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. Fire-fighting professionals are better prepared and more effective.

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

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

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, and better able to mitigate impacts.

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
405	Drainage and Irrigation Systems and Facilities

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
2014	597933

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
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
405	Drainage and Irrigation Systems and Facilities

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 developing program for the college. Higher resolution data needs to be obtained to track coastal sediment plumes over time. Models of fire behavior developed in temperate regions are not necessarily transportable to the tropics, and there is a need for improved tropical models.

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%		16%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		6%	
205	Plant Management Systems	0%		8%	
402	Engineering Systems and Equipment	0%		10%	
404	Instrumentation and Control Systems	0%		10%	
501	New and Improved Food Processing Technologies	0%		12%	
502	New and Improved Food Products	0%		8%	
511	New and Improved Non-Food Products and Processes	0%		30%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	2.0	0.0
Actual Paid	0.0	0.0	1.5	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	85409	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	338345	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	68288	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

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

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

2. Brief description of the target audience

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

.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

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

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	6	6

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals submitted

Year	Actual
2014	8

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual

2014	3

Output #3

Output Measure

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

Year	Actual
2014	2

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

Identified types of bioenergy crops suitable for Hawaii environment.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	2

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
511	New and Improved Non-Food Products and Processes

Outcome #2

1. Outcome Measures

Dollar value of grants and contracts received

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	293724

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies
511	New and Improved Non-Food Products and Processes

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

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%		50%	
724	Healthy Lifestyle	50%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		50%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.0	0.0
Actual Paid	0.2	0.0	0.3	0.0
Actual Volunteer	1.0	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**
3452	0	39876	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
25359	0	55812	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
14173	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Health and wellness have long been issues for Hawaii'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. 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 integrate research on diet and obesity promoting factors in native Pacific populations with 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 FY2014, baseline data collection of child health metrics and activity measurements were completed in both treatment (intervention) and control communities, and dietary and activity interventions were initiated. This large-scale, yet community based, project includes 990 children (aged 2-8 years) in Hawaii, and 5,200 children across all Pacific locations. The locally appropriate intervention techniques are anticipated to be of great value in reducing obesity incidence in at-risk Pacific Islander and Native Alaskan populations. Additionally in FY2014, CHL efforts began to focus on program sustainability and expansion beyond the test communities in each region.

Meta-analysis also began in FY2014 on the results of a multistate study of parental influence on child obesity, and modification of parenting practices as an aid to obesity prevention. A focused study of qualitative study involving in-depth participant interviews was also initiated to obtain greater insights on the effects of cultural attitudes and beliefs on weight, body image, diet, and physical activity in early adolescents in Hawaii.

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

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12	30	27	12

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	2	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2014	1

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2014	2

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual

2014 4

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 people who adopted one or more recommended practices.
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
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	33

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
724	Healthy Lifestyle

Outcome #2

1. Outcome Measures

Number of people who adopted 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
2014	0

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
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
2014	5016844

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
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

This is 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
404	Instrumentation and Control Systems	0%		8%	
501	New and Improved Food Processing Technologies	0%		25%	
511	New and Improved Non-Food Products and Processes	0%		8%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		8%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%		43%	
723	Hazards to Human Health and Safety	0%		8%	
724	Healthy Lifestyle	100%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	1.5	0.0	1.5	0.0
Actual Paid	0.4	0.0	1.9	0.0
Actual Volunteer	7.0	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**
736	0	49059	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
88077	0	354724	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	117571	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 programs. However, implementation of the Food Safety and Modernization Act (FSMA) in the near future will greatly accelerated concerns over food safety and compliance.

In FY2014, CTAHR continued efforts to educate growers about food safety practices on farm and in packing areas with the assistance of CTAHR food safety coaches, educational workshops, production of two thorough and locally-appropriate posters for display on-farm, and development of a comprehensive food safety website with a pre-audit checklist. 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. CTAHR faculty also conducted food handling workshops for employees in food processing facilities in Hawaii and throughout the American Pacific.

Research efforts in FY2014 stressed both field detection of contaminants and pathogens, and improved/alternative methods of sterilization and decontamination of tropical fresh and processed foods. Technology for handheld devices for pathogen detection in the field by isothermal DNA amplification and detection were released commercially; and the properties of a peroxidase from the windmill palm tree, Trachycarpus fortune, were evaluated for possible use in biosensors or immunochemical kits for field pesticide residue detection. Risks to consumers from pesticide contamination were also addressed in pesticide residue evaluations under the IR-4 program to establish guidelines for pesticide registrations for use in minor crops.

Computational modeling for combined microwave and ohmic heating in a continuous flow system were established in FY2014, allowing future design of a production scale unit for evenly cooking 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. In trials in FY2014, there were no traces of microbial survivors after a treatment time of three minutes, demonstrating the efficacy of this novel technique. To enhance the safety of fresh-cut produce and unpasteurized tropical fruit juices, java plum juice was tested against pathogens both in culture and on

inoculated fresh-cut cantaloupe. Java plum juice significantly reduced pathogen concentration, likely due to its high content of organic acids and phenolic compounds. This may provide an eco-friendly solution to enhance the microbiological safety of cut fruit.

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

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	125	300	270	120

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	14	14

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days and demonstrations

Year	Actual
2014	4

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2014	6

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2014	5

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

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
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
724	Healthy Lifestyle

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
2014	323085

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, and education in food safety provided.

Results
Hawaii's food supply is safer, and Hawaii's agricultural industry is more competitive and better prepared for the Food Safety Modernization Act and compliance programs required by retailers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies
511	New and Improved Non-Food Products and Processes
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
724	Healthy Lifestyle

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.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
460	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
2	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
3	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
1	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.