2015 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 FY2015, J. Kenneth Grace continued as Associate Dean/Director for Research, and Charles Kinoshita continued as Associate Dean for Academic and Student Affairs. The position of Interim Associate Dean/Director for Extension transitioned from Ashley Stokes to Marianne Berry, and to the appointment of Kelvin Sewake to the position at the end of FY2015. Mr. Sewake brings 30 years of experience as a CTAHR extension agent to the position.

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 work 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 continue to focus significant effort on the national priority areas, our five local program areas remain 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 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 nearly 89% of its food, and our agricultural landscape includes specialty crops 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) 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.

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 FY2015 report documents program challenges and program successes, often incremental but sometimes transformational.

Initiatives described in earlier years continued to progress in FY2015. The region-wide Children's Healthy Living Program for Remote Underserved Minority Populations of the Pacific (CHL), supported by a $25 million NIFA award entered its final year, and demonstrated significant progress in developing and implementing dietary and behavioral interventions to battle childhood obesity across the American Pacific. Conservation of Hawaii's natural resources and native biota and invasion biology continued to cross over program areas in FY2015, and to engage with such collaborative inter-university and inter-agency efforts as the Tropical Hardwood Tree Improvement and Regeneration Center, and the Pacific Fire Exchange. Research continued on lignocellulosic and oil biofuel crops, recognizing Hawaii's energy needs, and included a new effort to use insects (soldier blackflies) as a means of processing food waste for biodiesel production. Efforts continued to combat the continual influx of invasive insect pests and associated plant diseases entering Hawaii. With FSMA on the near horizon, food safety projects addressed both Good Agricultural Practices and Good Handling Practices training for farmers and processors, and development of novel postharvest treatments and processing methods for Hawaii's fresh produce. As a uniquely situated Pacific island state, CTAHR continued to address issues associated with specialty regional and ethnic crops, including pest management, crop improvement, and documentation of dietary impacts and medicinal qualities.

This year, due to retirements and other personnel changes, no formal FTE nor Hatch or Smith Lever funds were committed to Program Area 7 - Climate Change. Although we are thus not reporting on this program area this year, it should be noted that strong efforts involving the challenges and mitigation of climate change continued in cross-cutting projects within other program areas. CTAHR is an active member of the USDA Western Regional Climate Hub, and faculty participated in both western region extension workshops in this area, and in an insular Pacific conference on the topic in Guam. This is a new area as a distinct focus for CTAHR faculty, and we have re-balanced our portfolio to bring more support to Climate Change in FY2016. We expect that research and extension efforts will accelerate in subsequent years.

Continuing decreases in the university budget, which not only funds academic programs in CTAHR, but also all research and extension activities, and over $500 million in deferred cumulative repair and maintenance (CDRM) system-wide presents significant challenges to CTAHR research and extension efforts. Over $30 million in CDRM at off-campus Experiment Station facilities is a major concern, and indicative of the larger national concern over the $7+ billion costs to repair the decaying Experiment Station structure identified in FY2015 by the APLU. Despite these challenges, research continued to advance in FY2015, and extension engagement with the public remained strong, with increasing numbers enrolling in the Master Gardeners program statewide.

Despite the modern reality of budget challenges, morale is high in the college and the Strategic Action Plan developed in FY2014 continues to guide our efforts. In FY2015, this included establishing a new office for more comprehensive academic advising, offering faculty a higher level of pre-award assistance with grant submissions, and initiation of a series of seminars and working groups emphasizing increased collaboration. CTAHR is focused on assisting our stakeholders and providing the leadership required to move agriculture, resource management, and sustainable communities forward in the State of Hawaii.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	50.0	0.0	49.0	0.0
Actual	46.1	0.0	31.3	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
- Other (Social Media)

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
- Other (Social Media)

Brief explanation.

CTAHR employs 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 Dean's Advisory Committee, 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.

Stakeholders also express concern over the repair and maintenance needs of agricultural experiment station facilities. Although, due to budget issues, the University of Hawaii has a great deal of deferred repair and maintenance needs, the university is committed to gradual release of funds for CTAHR stations, and a due diligence architectural inspection was approved in FY2015. This is a national issue, however, as evidenced by the $7+ billion in experiment station repair needs identified by the Association of Public and Landgrant Universities (APLU). Stakeholders believe that NIFA could play a role in funding on a national basis for repair and upgrades to the agricultural experiment station.

CTAHR stakeholders continue to join with those in Florida and the Caribbean in requesting that NIFA resurrect 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
1384797	0	1640985	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	922111	0	2157208	0
Actual Matching	4110806	0	10416315	0
Actual All Other	938746	0	4733264	0
Total Actual Expended	5971663	0	17306787	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%		12%	
111	Conservation and Efficient Use of Water	0%		3%	
112	Watershed Protection and Management	7%		6%	
121	Management of Range Resources	8%		3%	
123	Management and Sustainability of Forest Resources	29%		4%	
124	Urban Forestry	0%		2%	
125	Agroforestry	0%		4%	
131	Alternative Uses of Land	0%		2%	
133	Pollution Prevention and Mitigation	0%		11%	
135	Aquatic and Terrestrial Wildlife	0%		2%	
136	Conservation of Biological Diversity	0%		4%	
205	Plant Management Systems	21%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	4%		3%	
212	Pathogens and Nematodes Affecting Plants	3%		16%	
213	Weeds Affecting Plants	7%		0%	
403	Waste Disposal, Recycling, and Reuse	0%		4%	
605	Natural Resource and Environmental Economics	0%		10%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	14%		4%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	7.0	0.0
Actual Paid	5.2	0.0	6.1	0.0
Actual Volunteer	282.5	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**
170675	0	340785	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
656663	0	2303831	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
76718	0	1520766	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research and extension efforts to promote harmony between agriculture and the environment, and to effectively manage Hawaii's natural resources, 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 to preserve, protect, and renew Hawaii's natural resources continue to be an area of focus.

Of particular interest in FY2015 were results of work to develop a new approach to assessing the impact of land use change on soil carbon dynamics in Andisols, volcanic ash derived soils that are widespread in Hawaii and have a particularly high capacity to store soil carbon. This approach was applied to an area along the Hamakua Coast, north of Hilo on the island of Hawaii that recently underwent change from grazed pasture to managed eucalyptus forest. Initial analysis suggests that carbon accumulates rapidly in mineral-associated pools during the growth cycle, thereby providing a climate change mitigation service.

The Wildland Fire Program worked to improve the available metrics on the impact of fire in Hawaii and the American Pacific, to train fire-fighting agencies in the use of fire models tuned to tropical, rather than temperate, conditions, and to increase collaboration and cooperation between managers and fire responders. Pacific-focused fire analysis expertise provided land managers with improved information, including the Hawaii statewide Carbon Assessment with the USGS, an improved fire danger rating system with US Forest Service and US Fish and Wildlife Service, and an NSF-funded project aimed at quantifying ecosystem services at the watershed scale in West Hawaii Island. A primary body for furthering the extension goals of the program is the Pacific Fire Exchange (PFX) is a partnership between CTAHR, the US Forest Service (USFS) and the Hawaii Wildfire Management Organization (HWMO). The PFX advisory panel includes representatives of the US Fish and Wildlife Service in Honolulu, the USDA National Resource Conservation Service in Guam, Kamehameha Schools (a native Hawaiian educational institute), the state Division of Forestry and Wildlife, 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

In FY2015, work continued on the use of the Green Progress Indicator (GPI) as an alternative to Gross Domestic Product (GDP) to assess the value of natural capital in Hawaii. As a follow-up to the pilot valuation study focused on the value of forests, land and water that was performed using GPI measures in FY2014, valuation methodology was piloted on Oahu this year to assess the economic cost of coastal water degradation.

Waste management and cleanup of environmental contaminants are serious issues in island ecosystems. In FY2015, a novel algal foam photobioreactor was developed and tested to support sustainable wastewater treatment, carbon dioxide capture, and biofuel production. Microalgae isolated from an aquaponics system grew rapidly in tiny aqueous foam bubbles (ca. 2 mm size), and provided high mass and light transfer in the novel bioreactor. In addition to biodiesel production, analysis of algal composition showed high potential for production of bio-oil and biochar; and results support further development as a cost-effective and sustainable bioprocess for wastewater treatment. In Livestock waste management, dry litter technology (DLT), a nutrient management system for small-scale hog operations for reducing pollution threats to water quality, has been adopted in nearly two-hundred installations of the DLT system in the western and south Pacific basin, including Hawaii, Territory of American Samoa and Guam, Commonwealth of the Northern Mariana Islands, Republic of Palau, Republic of the Marshall Islands and Federated States of Micronesia-Pohnpei State.

A citizen-science project to map the distribution of the indigenous Kamehameha butterfly throughout the state captured public interest and resulted in identification of this butterfly in previously unknown areas, such as several coastal areas on the island of Oahu. The University of Hawaii Insect Museum (UHIM) supported by CTAHR added 6,000 specimens in FY2014, and digitized an additional 32,000 specimens and associated data records to make approximately 85,000 specimens available online. The UHIM is an important extension resource, as well as a research collection, hosting over 500 visitors in FY2015, and increasing public knowledge of Hawaii's native, introduced, and invasive insect fauna.

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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	11993	111251	1608	100

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	17	56	73

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals submitted.

Year	Actual
2015	36

Output #2

Output Measure

- Presentations at international and national meetings.

Year	Actual
2015	39

Output #3

Output Measure

- Number of workshops and other educational activities held

Year	Actual

2015	0

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
2015	792

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	Pathogens and Nematodes Affecting Plants
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
2015	2632688

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	Pathogens and Nematodes Affecting Plants
403	Waste Disposal, Recycling, and Reuse
605	Natural Resource and Environmental Economics
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

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

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Hawaii's Diversified Tropical Crop Systems for Sustainability and Competitiveness

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	9%		5%	
124	Urban Forestry	2%		2%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		9%	
202	Plant Genetic Resources	5%		9%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		2%	
204	Plant Product Quality and Utility (Preharvest)	0%		9%	
205	Plant Management Systems	40%		13%	
206	Basic Plant Biology	0%		1%	
211	Insects, Mites, and Other Arthropods Affecting Plants	4%		1%	
212	Pathogens and Nematodes Affecting Plants	6%		12%	
213	Weeds Affecting Plants	2%		0%	
215	Biological Control of Pests Affecting Plants	0%		4%	
216	Integrated Pest Management Systems	22%		10%	
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%		5%	
604	Marketing and Distribution Practices	0%		3%	
903	Communication, Education, and Information Delivery	5%		4%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	9.0	0.0
Actual Paid	12.0	0.0	9.8	0.0
Actual Volunteer	126.9	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**
444665	0	462430	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1634055	0	4563994	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
343319	0	933631	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 F2015 continued to include 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, pesticide education, pesticide residue and registrations, 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, beef and livestock production, 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. Due to the cost of land and farming inputs in Hawaii, competition with imported produce and meat is stiff, and 88% of overall food consumed in Hawaii is imported. An hedonic price analysis for tomatoes in FY2015 found a 16.7% price premium for local grape and cherry tomatoes, but an 8.3% discount for other locally-grown tomatoes. Likewise, although consumers indicate a strong preference for local milk over that imported from the mainland, the price premium of 17.4% is substantially lower than previously thought. Conditions like this make diversified income sources of great value to Hawaii's small farmers, and a guide to successful development of an agritourism operation and navigation of the bureaucratic barriers was developed for Hawaii County, and made freely available on the CTAHR website.

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, Plant Doctor booths at Farmers Markets, School Garden Training and Mini-certification Programs, and Second Saturday at the Garden. In 2015, there were over 205 volunteers contributing over 12,000 hours of volunteer time and reaching 6,871 adults and 1,200 youth via direct contacts.

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. Selection and trials of taro hybrids with resistance to Taro Leaf Blight, a devastating fungal disease, continued in FY2015, and four cultivars were distributed to cooperators on four islands. In an effort to make pathogen-free germplasm available, five Hawaiian taro varieties were brought into tissue culture, and have undergone therapy for Taro vein chlorosis virus and Dasheen mosaic virus. CTAHR extension specialists continued to develop technology to assist growers and the public with release of the "Leaf Doctor" app for mobile phones, a tool for visual quantification of disease severity. CTAHR's digital outreach capabilities were further fortified by publishing several online Extension articles and new websites about anthurium blight and papaya ringspot. A Flickr gallery now houses more than 9,500 high-resolution photographs of plant pests, all of which are freely available. During this reporting period, 1.5 million views occurred for images in the Flickr gallery. Downloads of Extension-style articles exceeded 250,000.

Over the past decade, interest in Hawaii in cultivation and consumption of organically grown fruits and vegetables, and in traditional Hawaiian crop varieties has increased significantly. During this reporting period, CTAHR research and extension staff grew 46 traditional Hawaiian taro varieties, eight traditional sugarcane varieties, and thirteen sweet potato varieties, including traditional Hawaiian cultivars, under certified organic conditions for evaluation of yield, quality, and sugar content. Two certified organic papaya cultivars were produced and made available for seed through the CTAHR seed program.

2. Brief description of the target audience

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

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12499	161867	975	292

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

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	17	24	41

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, research/field day demonstrations conducted

Year	Actual
2015	194

Output #2

Output Measure

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

Year	Actual
2015	17

Output #3

Output Measure

- Presentations at international and national meetings

Year	Actual
2015	10

Output #4

Output Measure

- Number of grant proposals submitted.

Year	Actual
2015	34

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
2015	3811

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Increased awareness of best management practices to promote environmentally responsible agricultural and landscape management.

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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants

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
2015	895

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	Pathogens 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
2015	2875345

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

Extramural grants have been received and funding utilized in support of the program.

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	Pathogens 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
136	Conservation of Biological Diversity	0%		2%	
204	Plant Product Quality and Utility (Preharvest)	0%		5%	
205	Plant Management Systems	0%		2%	
211	Insects, Mites, and Other Arthropods Affecting Plants	11%		18%	
212	Pathogens and Nematodes Affecting Plants	0%		18%	
213	Weeds Affecting Plants	12%		16%	
215	Biological Control of Pests Affecting Plants	0%		17%	
216	Integrated Pest Management Systems	55%		7%	
312	External Parasites and Pests of Animals	0%		7%	
721	Insects and Other Pests Affecting Humans	0%		8%	
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: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	5.5	0.0
Actual Paid	3.0	0.0	2.8	0.0
Actual Volunteer	23.5	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**
52500	0	228555	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
378820	0	1149520	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
43870	0	1025901	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. In addition to their economic damages, invasives also threaten conservation efforts for native endangered plants and insects. CTAHR plays a significant role in developing and delivering information and technologies that minimize the impacts of invasive species.

The Hawaii Department of Agriculture has reported the introduction of 28 new insect invaders each year. In FY2015, CTAHR research established the required trunk injection dosage and demonstrated the efficacy of imidacloprid for control of lobate lac scale on weeping banyans and Chinese banyans, and emamectin benzoate against Chinese banyan stem and leaf gall wasps. Studies were also initiated with two physical deterrents, sand and fish netting, to trap coconut rhinoceros beetles entering or exiting palm crowns and mulch piles. 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 to prevent movement of this pest into coffee on the island of Kauai.

Research results with these new invasive pests were extended to farmers, nursery owners, landscapers and turf managers through numerous workshops, field days, and training sessions across the state. Stakeholders are utilizing more Integrated Pest Management practices on their farms, in landscapes, and around homes due to Extension's widespread Farm Programs, Extension's Certified Landscape Technician Program, and Master Gardener Programs. Green industry personnel are more regularly attending CTAHR's Annual Landscape Management Conference as compared to just two years ago. There is an increased awareness of the monitoring, spread, and control of these invasive species, including Little Fire Ants, which represent a human health concern.

In FY2015, efforts to eliminate invasive weeds focused on precise delivery of the minimal amount of herbicide required, and improved monitoring of exact locations and amounts delivered. Research was initiated on a new metering and monitoring system, including both hardware and software, for aerial applications with Herbicide Ballistic Technology (HBT), a paintball gun technology for targeted applications of very small quantities of herbicide. For situations where hands-on herbicide applications by field crews are necessary, a basal incision point application (IPA) technique was developed, and a metered draw off syringe adopted to apply precise minute quantities of herbicide concentrate to the cambium. This technique eliminates the need for concentrate mixing, reducing both operator fatigue and the potential for error. For turfgrass weed control, a novel tank mix of post-emergence herbicides that included mesotrione and metribuzin was developed that achieved near 100% control of the hard to control goose grass and Carolina love grass. This new tank mix appears to offer a useful alternative to metribuzin tank mixes using monosodium methane arsenate (MSNA), a widely used herbicide discontinued by the EPA.

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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1128	190	5	0

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	4	14	18

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days, demonstrations held

Year	Actual
2015	35

Output #2

Output Measure

- Number of grant proposals submitted

Year	Actual
2015	35

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	30

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
136	Conservation of Biological Diversity
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

312 External Parasites and Pests of Animals

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
2015	35

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, resource managers 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
136	Conservation of Biological Diversity
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

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
2015	5547369

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
136	Conservation of Biological Diversity
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
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%		100%	
205	Plant Management Systems	5%		0%	
604	Marketing and Distribution Practices	3%		0%	
608	Community Resource Planning and Development	3%		0%	
801	Individual and Family Resource Management	12%		0%	
802	Human Development and Family Well-Being	35%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	6%		0%	
806	Youth Development	36%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	17.0	0.0	4.0	0.0
Actual Paid	0.0	0.0	0.0	0.0
Actual Volunteer	1905.3	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	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

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.

Work by Center on the Family researchers and CTAHR extension faculty focused on developing indicator briefs on topics relevant to the well-being of children and families in Hawaii, disseminating data and raising public awareness on the conditions and challenges of children and families in Hawaii for policy and program decision making affecting this population. A monthly e-bulletin, Hawaii Kids Count, provides 1,100 subscribers, including service providers, government agencies, and university faculty and students with useful data on youth. A data brief on the role of social capital in successful transition from the foster care system to adulthood was disseminated on the Center on the Family website, and accessed over 2,500 times within a six-month period during FY2015.

Child development and early childhood education continue to be important areas for CTAHR research 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. Efforts in FY2015 focused on evaluation of preschool children's early alphabet knowledge. The results indicate that focusing first on upper case letters, and teaching these letters in alphabetical order is a slow and inefficient method. In contrast, better results are achieved when teachers start with letters that are similar in both cases, visually distinctive, phonologically transparent, and are meaningful to children - such as letters that are in the names of many students in the class.

School engagement plays a positive role in academic achievement and prevention of school dropouts. In FY2015, a study of sibling relationship quality and school engagement indicated that getting along with teachers and other students or being happy at school were less important in explaining students' desire to pursue higher education than paying attention in school or feeling that one was part of the school. Interestingly, spending more time with a sibling, whether the interactions were viewed as positive or negative, was correlated with wanting to go to college more and believing that was likely.

The GENE-ius Day program is a partnership among CTAHR faculty in increase awareness of and knowledge about science, genetics and agricultural concepts in the community by targeting K-12 students, their teachers, and their parents. This program includes classroom curricula, a GENE-ius Day school field

trip program, and a year-long, family-based, Saturday GENE-ius Day series of classes. A new middle-school curriculum was developed in FY2015, and to encourage implementation in Hawaii schools was incorporated into the school field trip program. During this period, 21 schools and 1,380 students participated in this program. During this same period, 286 people (186 students and 95 parents) completed the year-long Saturday program. The GENE-ius Day program is extremely popular with students and families, and frequently profiled in local news media. Participants, and through them the community at large, gain a greater understanding of science and genetics, and a greater appreciation of the applications of biological science to agriculture, the benefits of agricultural science to society.

Through Hawaii's Extension programs including 4-H Youth Development, Family and Community Education (FCE), Aging and Intergenerational Program, Family & Consumer Sciences, and GENE-ius Day, a total of 13,327 adults and 7,990 youth have completed work successfully in these non-formal educational programs that improve leadership skills, increase civic engagement, lead to better financial resource management, and improve the lives of the young and old, while improving the community that surrounds them.

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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	16343	147078	17480	10887

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	23	5	28

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
2015	21317

Output #2

Output Measure

- Number of volunteer hours

Year	Actual
2015	82933

Output #3

Output Measure

- Presentations at international and national meetings.

Year	Actual
2015	19

Output #4

Output Measure

- Grant proposals submitted.

Year	Actual
2015	22

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	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
2015	5741

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

Outcome #2

1. Outcome Measures

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
2015	1162866

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
Extramural grants were received and funding utilized in support of the program.

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

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
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%		4%	
701	Nutrient Composition of Food	0%		8%	
702	Requirements and Function of Nutrients and Other Food Components	0%		19%	
703	Nutrition Education and Behavior	61%		9%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	24%		0%	
724	Healthy Lifestyle	0%		16%	
802	Human Development and Family Well-Being	0%		22%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		5%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	0%		11%	
806	Youth Development	0%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	5.0	0.0	4.0	0.0
Actual Paid	4.5	0.0	2.9	0.0
Actual Volunteer	80.1	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
74197	0	132300	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
585423	0	755134	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
395037	0	4506	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 including sleep disorders, and very likely generally escapes clinical diagnosis. Previous work focused on determining the bioavailability of iron in seaweed (limu), an under-utilized vegetable in Hawaii, and identified nori and sea lettuce as providing 3 and 5-fold more iron availability per gram dry matter than spinach. Shellfish are also commonly listed as good sources of heme iron, a form of iron found in beef, and known for high bioavailability in comparison to the non-heme forms found in plant-based foods. In FY2015, the mineral content was measured in samples of Manila clams, Blood clams, and Pacific Oysters from Honolulu markets, and quantified for heme and non-heme iron, in comparison to beef liver. There was wide variation among species, with Manila clams and Pacific oysters low in heme iron contend, while Blood clams were found to have higher heme iron content than beef liver.

Studies continued in FY2015 on the efficacy of bitter melon juice in reducing inflammation in adipose tissues and intestinal in mice fed a high-fat diet. Laboratory-prepared fermented noni juice was also found to be more potent in improving glucose metabolism than commercial noni juice. This research has high priority 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.

Management of psychological stress and substance abuse are as critical to society as health management. This is particularly important in a multicultural society like Hawaii, where individuals and families from diverse cultures, often with very different traditions and daily routines, live in close proximity and must work together to form functional communities. Research and extension efforts in FY2015 addressed aging, documenting the life-lessons in multiple domains of older adults as guides for life-planning in children and young adults. Paradigm shifts have enabled program participants to see their elders as individuals with needs and wants, feelings and emotions, and with respect and dignity. In other work with youth, mindfulness was provided to social service agencies dealing with at-risk youth, and to public school K-12 teachers and staff. This was coupled with a mixed-methods research study of the impact of mindfulness training on undergraduate students in improving attention, focus, self-regulation, and decreasing stress and maladaptive behaviors. A new project addressed the causes and impacts of appearance-related victimization in Hawaii. A state-wide Web-based Infrastructure for Treatment Services (WITS) system, for collecting and reporting enrollment and treatment outcome data was developed for

substance abuse treatment providers.

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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1839	22730	495	210

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	1	3	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of outreach activities and events conducted

Year	Actual
2015	42

Output #2

Output Measure

- Presentations at international and national meetings.

Year	Actual
2015	21

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2015	24

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of people who increased their knowledge in health and wellness through outreach activities
2	Total dollar value of grants and contracts obtained.

Outcome #1

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	345

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 #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
2015	1367574

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
Extramural grants were received and funding utilized in support of the program.

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
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%		2%	
102	Soil, Plant, Water, Nutrient Relationships	8%		6%	
121	Management of Range Resources	0%		3%	
131	Alternative Uses of Land	2%		1%	
205	Plant Management Systems	24%		0%	
212	Pathogens and Nematodes Affecting Plants	0%		18%	
216	Integrated Pest Management Systems	4%		5%	
301	Reproductive Performance of Animals	8%		2%	
305	Animal Physiological Processes	30%		20%	
306	Environmental Stress in Animals	0%		4%	
307	Animal Management Systems	0%		12%	
402	Engineering Systems and Equipment	0%		6%	
503	Quality Maintenance in Storing and Marketing Food Products	0%		5%	
511	New and Improved Non-Food Products and Processes	0%		6%	
601	Economics of Agricultural Production and Farm Management	4%		8%	
607	Consumer Economics	4%		0%	
608	Community Resource Planning and Development	8%		0%	
703	Nutrition Education and Behavior	8%		2%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890

Plan	8.0	0.0	13.0	0.0
Actual Paid	4.7	0.0	3.5	0.0
Actual Volunteer	353.0	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**
165446	0	357230	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
518208	0	919769	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
28032	0	728522	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 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 food products and processes for existing and expanded markets.

With virtually no local sources of animal feed, imported feed is extremely expensive due to transportation costs. 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. FY2015 livestock and feed efforts continued on cattle genetics and muscle development, biological indicators of stress, development of local animal feed sources, and best-management practices for drought-stricken pastures to assist the nascent grass-fed beef industry. Feed development requires characterization of the nutrient profiles of available local materials, and macadamia nut cake and cassava were added to the database during the current reporting period. Evaluations also continued of Napier grass / pearl millet hybrids for forage. Napier grass is a high yielding tropical forage, but temperature and drought stress limit its productivity. Pearl millet varieties have high drought tolerance, and crosses were found to out-perform Napier grass varieties for yield, nutritional content, and digestibility.

Fireweed poses a hazard to grazing livestock. Over the past two years, the imported biological control agent Secusio extensa was widely disseminated in Hawaii and Maui counties in collaboration with the Hawaii Department of Agriculture. Over 44,000 moth larvae were released with the collaboration of 35 ranchers and land owners. This moth feeds almost exclusively on fireweed and German ivy, both invasive weeds in Hawaii. In FY2015, Secusio extensa has established in both counties and become self-sustaining, and long-term monitoring is in place to measure the impact on these invasive weeds. Efforts to combat invasive weeds complement the many efforts of researchers and extension staff during FY2015 to control invasive insect pests such as coffee berry borer, and diseases such as basil downy mildew.

Aquaculture and aquaponics (integrating fish and vegetable production) have great potential in Hawaii, given the ocean environment and ability of soilless agricultural to maximize production where land is in limited supply. Yet, profitability is dependent upon the often high cost of nutritional inputs, and upon maintaining an adequate price structure. In FY2015, decision support software was developed for evaluation of potential aquaponics operations, and made available at no charge through the website of the

collaborating Center for Tropical and Subtropical Aquaculture. Due to their high price point, shellfish are currently of great interest as well, and a spreadsheet model was developed and tested to evaluate the production economics of oyster culture in a Hawaiian fish pond setting.

The Hawaii Expanded Food and Nutrition Education Program (EFNEP) collaborated with our Hawaii CES SNAP-Ed Program based on the national NIFA Community Nutrition Logic Model (community nutrition education for limited income audiences). This arrangement worked synergistically, producing significant improvements in food resource management, nutrition practices, and food safety practices as reported by stakeholders. The program reached a total of 644 program families and 361 youth directly, and 1798 adults and 1447 youths indirectly this year.

Extension efforts have also focused on agricultural sustainability with natural and organic farming systems due to the increasing interest in food security in our island state. Hawaii's Sustainable and Organic Agricultural Program (SOAP) is leading the way to provide in-service training to our government partnering agencies and to farmers by providing extensive educational programs in crop production and pest management, while exploring and adopting economically viable organic crop production methodologies, testing new potential crops, and protecting culturally important crops such as taro (Colocasia esculenta). Taro is thought to be a crop with significant value for local as well as global food production potential since it is productive and highly nutritious (a high protein staple crop with gluten free and highly digestible starch). CTAHR maintains taro germplasm collections on research stations on the islands of Kauai, Oahu, Molokai and Hawaii.

2. Brief description of the target audience

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

3. How was eXtension used?

Aquaculture 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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2425	5353	1145	1628

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	7	17	21

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days and demonstrations.

Year	Actual
2015	104

Output #2

Output Measure

- Presentations at international and national meetings

Year	Actual
2015	21

Output #3

Output Measure

- Grant proposals submitted

Year	Actual
2015	18

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
2015	1079

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 people?s 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
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
301	Reproductive Performance of Animals
305	Animal Physiological Processes

306	Environmental Stress in Animals
307	Animal Management Systems
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

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
2015	553184

3c. Qualitative Outcome or Impact Statement

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

What has been done
Extramural grants have been received and funding utilized in support of the program.

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
205	Plant Management Systems
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

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

Reason for not reporting

Due to retirements and personnel changes, there were no assigned FTE nor direct Hatch or Smith Lever program expenditures in this planned program in FY2015. To address this deficit, we have re-balanced our portfolio for FY2016 and emphasized programming in the national priority areas. However, in FY2015, faculty continued to pursue initiatives related to climate change under projects in related program areas, and with extramural funds. As part of USDA Regional Climate Hub activities, faculty participated in a western region climate change extension conference and a Pacific regional conference, and initiated a survey of extension staff and stakeholder education needs. Extramurally funded research projects included study of long-term seasonal phenology in Hawaii's forests, the impact of temperature increase on carbon pools and sequestration, and wildfire behavior under tropical conditions. The Pacific Fire eXchange (PFX) was active in extension programming with wildfire professionals. Evidence of increasing effort in this program area that will come to fruition in FY2016 was provided by submission of 18 extramural proposals, and success in obtaining $483,348 in extramural funds during this period. We anticipate inhanced program activity in subsequent years.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.0	0.0
Actual Paid	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Conduct a needs assessments as needed for stakeholders in urban and rural areas.
- Develop and deliver educational programs directed at catchment systems and urban horticulture in order to mitigate or prevent the negative effects of global warming.
- Develop and improve remote sensing methods and use of satellite imagery to model impacts of climate change and pollution on Pacific island land and coastal resources.
- Develop and extend mitigation measures for drought conditions (and other impacts of climate change) affecting livestock and agriculture in the Pacific, including identifying appropriate forage and soil amendments.
- Develop appropriate fuel load and wild fire management models for tropical conditions.

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

2015	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: 2015

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	2	5	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days, or demonstrations conducted

Year	Actual
2015	0

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2015	0

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

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
2015	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, range and pasture management, and wild fires.

What has been done
A domestic rainwater catchment program provides educational information to Hawaii residents statewide. Information on drought and pasture conditions are distributed annually to ranchers in each county, and forage evaluations are under way. Programs have been initiated to improve watershed and fire management.

Results
Rainwater catchment users have improved their domestic water quality. Ranchers are adopting drought management practices, and fire-fighting professionals are better prepared and more effective.

4. Associated Knowledge Areas

KA Code	Knowledge Area
{No Data}	null

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
2015	0

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, and used in support of the program.

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
{No Data}	null

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%	
402	Engineering Systems and Equipment	0%		17%	
404	Instrumentation and Control Systems	0%		17%	
501	New and Improved Food Processing Technologies	0%		20%	
502	New and Improved Food Products	0%		13%	
511	New and Improved Non-Food Products and Processes	0%		17%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.0	0.0
Actual Paid	0.0	0.0	1.3	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	126390	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	302800	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	280982	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 / pearl millet crosses were found to have both drought resistance and high biomass yield. Work continued in FY2015 to develop one of these crosses as nutritious animal forage, supporting synergy of biofuel and forage production in Hawaii.

Research in FY2015 focused on conversion technology. A series of experiments were conducted to investigate methane yield using lignocellulosic biomass under mesophilic conditions via anaerobic digestion (AD). Napier grass, purple banagrass and energy cane were used as substrates, and cattle manure as inoculum; and microbial community analyses were also conducted. A mixture of rumen content and cow manure with Napier grass exhibited the highest archeaea/bacteria diversity, and could enhance biodegradation through the synergetic action of the mixed microbial population, although the startup period should be closely monitored and a co-substrate with high buffering capacity incorporated.

An additional sustainable energy project in CTAHR is the development of a photovoltaic solar dryer as an economical tool for drying taro, breadfruit and sweet potato. In FY2015, a 20-foot freight container was outfitted with five photovoltaic panels at a capacity of 1.5 kw, and was able to dry 150 lb of sweet potato, after the tubers were reduced with a food chopper to grits of ½ inch in diameter. It was also found it was necessary to decrease moisture content to 5% in sweet potato and breadfruit to lower water activity to the microbial safe threshold of 0.40 for these starchy materials. Public demonstrations were performed and filmed showing the feasibility of drying then pulverizing the grits into a shelf-stable flour for baking and pasta making.

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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	1000	2	0

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	3	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals submitted

Year	Actual
2015	8

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2015	7

Output #3

Output Measure

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

Year	Actual

2015 5

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
2015	0

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. Three candidate biofeedstocks were evaluated for methane yield via anaerobic digestion, and microbial community analyses conducted to evaluate their synergetic action in biodegradation. Additonally, a project utilizing soldier blackfly larvae for biodiesel production from food waste was initiated.

Results
It was found that Napier grass cellulose content does not change with age. Inoculation of bioreactors with rumen content for co-digestion of Napier grass and cow manure produced high archaea/bacteria diversity and could enhance biodegradation of Napier grass.

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
2015	97273

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
Extramural grants were received and funds utilized in support of the program.

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 FY 2010.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Childhood Obesity

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	50%		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: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.0	0.0
Actual Paid	0.4	0.0	0.2	0.0
Actual Volunteer	0.6	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
3649	0	33468	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
41661	0	59805	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
16601	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 Children's 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 FY2015, the final year of the five-year project (although an extension through FY2016 has been granted), analyses were initiated of treatment (intervention) and control communities. This large-scale project includes 990 children (aged 2-8 years) in Hawaii, and 5,200 children across all Pacific locations. In Hawaii, with a 28% native Hawaiian population, overweight and obesity (OWOB) prevalence increased from 20% at age 2 to 35% at age 8, with a marked increase at age 5. Since fruit juice was identified as a major source of calories due to added sugar, CHL Hawaii worked with Head Start programs to revise the meal vendor contract to replace fruit juice with fruit; limit number of fatty meats served per week; serve family style meals; and have the vendor provide portion size training to teachers and parents. CHL Hawaii transitioned the US Affiliated Pacific Food Guide: A Children's Healthy Living Program Resource for Nutrition from a pdf into a website: http://manoa.hawaii.edu/ctahr/pacificfoodguide. This resource was previously developed for instructional purposes but can now be used as an extension resource since it provides freely accessible nutrition and contextual information on the wide range of fruits, vegetables, seafood, and other meat sources available and specific to the region. This resource is complementary to other online resources on regional foods. In this final year of the project, efforts also focused on capacity building as a means of encouraging community partners to collaborate with each other and continue obesity-mitigation efforts in each community.

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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	41	1162	39	47

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	1	3	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2015	11

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2015	2

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual

2015 9

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	Dollar value of grants and contracts obtained.

Outcome #1

1. Outcome Measures

Number of stakeholders who increased knowledge in at least one issue.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	15

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

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
2015	99953

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
Extramural resources were solicited to promote healthy living and develop and implement methods and tools to combat childhood obesity.

Results
Resources were obtained, including extension of 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, and requires developing relationships with community-based organizations. 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%		7%	
501	New and Improved Food Processing Technologies	0%		36%	
511	New and Improved Non-Food Products and Processes	0%		7%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		7%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%		36%	
723	Hazards to Human Health and Safety	0%		7%	
724	Healthy Lifestyle	100%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	1.5	0.0	1.0	0.0
Actual Paid	1.8	0.0	1.1	0.0
Actual Volunteer	17.0	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**
10979	0	476050	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
295976	0	361462	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
35169	0	238956	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Policies on Good Agricultural Practices and Good Handling Practices (GAP & GHP) have been developed to minimize the risk of food borne illnesses and insure a safe food supply. Pending implementation of the Food Safety Modernization Act (FSMA) is putting edible crop producers' agricultural practices under close scrutiny, and raising anxiety among producers over the costs associated with implementation. Increased food safety measures may minimize hazards related to microbial food borne illnesses and increase consumer confidence in the safety of locally produced fruits and vegetables, but producers and processors are in need of training and assistance to bear the requirements and costs of improved practices and navigate the regulations.

In FY2015, with the pending finalization of the Food Safety Modernization Act and resulting increase in demand for certification courses, CTAHR intensified efforts to educate growers about food safety practices on farm and in packing areas with educational workshops and continued improvements to a comprehensive food safety website with a pre-audit checklist. In addition, CTAHR extension faculty offered workshops for socially disadvantaged producers on risk management, correct handling and application of pesticides, fertilizer/pesticide monitoring and record keeping, and sanitation requirements to reduce the 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. Multistate activities included developing Extension food policy and food safety courses for food inspectors for Temporary Food Establishment Food Safety. Ethnic Foods Safety course materials were initiated this year.

Research efforts focused on detection of contaminants and pathogens in fresh produce, and improved/alternative methods of sterilization processing. Wheat is a major crop worldwide, and can accumulate much higher amounts of cadmium ion (Cd2+) than other crops. An immunohistochemical (IHC) imaging method for cadmium ions was developed for wheat for the first time. Work on biosynthesized protein nano-assemblies investigated nano-oleosomes for pathogen detection. Risks to consumers from pesticide contamination were addressed in pesticide residue evaluations under the IR-4 program to establish guidelines for pesticide registrations for use in minor crops.

Postharvest methods for decontamination of fresh produce are limited, and chemical treatments raises concerns over toxic residues. A method for post-harvest microbial decontamination of fresh produce surfaces was developed using a pulsed carbon dioxide laser in combination with conjugated gold nanoparticles applied to the fruit surface. This method selectively heats a localized area around the targeted bacteria, making it applicable for heat-sensitive foods such as fruits and leafy greens. Post-treatment SEM analysis demonstrated structural damage and inactivation of the targeted bacteria, with minimal damage to the fruit surface. In other work, Wuweizi (Schisandra chinensis) extracts were found to be highly antimicrobial, most likely due to the high content of organic acids and phenolic compounds. Antimicrobial fruit extracts offer a least-toxic method of controlling the major pathogenic bacteria on fresh cut lettuce and alfalfa sprouts.

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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2703	3113	1905	600

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	1	27	28

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days and demonstrations

Year	Actual
2015	34

Output #2

Output Measure

- Presentations at national and international meetings.

Year	Actual
2015	23

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2015	4

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
2015	1335

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. The need for research and training has been increased by adoption of the Food Safety Modernization Act (FSMA). 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

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
2015	156901

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 in support of research and educational programs in food safety.

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

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 due to the costs associated with food safety certification compliance. Food safety regulations and buyer expectations are changing over time. Thus, extramural funding in support of 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)	
0	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	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)	
1	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.