2011 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) initiated new programs in 2010 with a new administrative team; and in 2011, sought to refine and solidify these new initiatives. CTAHR reshaped research and extension activities are encompassed in the ten program areas described in this Annual Report. These program areas include both the five national areas of activity prioritized by USDA NIFA, and programs to meet the unique needs of Hawaii as a tropical, Pacific basin, island state.

Within these ten program areas, CTAHR faculty continued their history of strong research and extension efforts to increase local agricultural productivity; further the cultivation and processing of specialty crops and products; manage Hawaii's land and water resources for a sustainable future; battle invasive pests; and promote physical, mental and economic health in Hawaii's citizens and their communities. For example, a series of new agricultural pests and diseases, such as the Coffee Berry Borer and Basil Downy Mildew, threatened to devastate Hawaii agricultural production and have required concerted attention by CTAHR.

Successes were achieved in engaging urban residents through a rapidly expanding Master Gardener program, and the 4H program, which underwent review and some restructuring to enhance staff and volunteer efforts. Efforts to develop sustainable energy production were strengthened by an increased focus on selection and economical processing of appropriate bioenergy plants for Hawaii's environment. With respect to health and nutrition, award of a NIFA CAP grant to combat childhood obesity in the Pacific region initiated strong new efforts by CTAHR with our partner institutions in other Pacific states and jurisdictions. Food safety was promoted through an active on-farm coaching program in good agricultural practices, and research on new and improved sensors suitable for use by agricultural producers and processors to detect food-borne pathogens

The leadership of CTAHR transitioned in 2010, with Dr. Sylvia Yuen appointed as Interim Dean, J. Kenneth Grace as Interim Associate Dean for Research, Carl Evensen as Interim Associate Dean for Extension, and Charles Kinoshita continuing as Associate Dean for Academic Affairs. In 2011, the CTAHR leadership team sought to build on the successes of the previous administration and also implemented new initiatives to strengthen college organization and funding capacity, enhance communication and college culture, increase the numbers of students served, foster collaboration within and beyond the college, and emphasize transparency and accountability. These efforts have promoted increased integration of research and extension programming through internal competitive funding opportunities that prioritize such integration, encourage multistate cooperation, and emphasize the five national program areas prioritized by NIFA.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	50.8	0.0	54.0	0.0
Actual	46.4	0.0	48.1	0.0

II. Merit Review Process

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

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

2. Brief Explanation

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

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

III. Stakeholder Input

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

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

- Survey of traditional stakeholder individuals

Brief explanation.

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

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

1. Method to identify individuals and groups

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

Brief explanation.

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

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

1. Methods for collecting Stakeholder Input

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

Brief explanation.

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

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

3. A statement of how the input will be considered

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

Brief explanation.

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

Brief Explanation of what you learned from your Stakeholders

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

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1319174	0	1605408	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1534437	0	1272156	0
Actual Matching	4058604	0	10363601	0
Actual All Other	1077964	0	4954588	0
Total Actual Expended	6671005	0	16590345	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

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	20%		12%	
111	Conservation and Efficient Use of Water	5%		8%	
112	Watershed Protection and Management	10%		6%	
121	Management of Range Resources	15%		0%	
123	Management and Sustainability of Forest Resources	10%		7%	
124	Urban Forestry	0%		3%	
125	Agroforestry	5%		3%	
133	Pollution Prevention and Mitigation	10%		12%	
135	Aquatic and Terrestrial Wildlife	0%		3%	
205	Plant Management Systems	15%		9%	
212	Pathogens and Nematodes Affecting Plants	0%		4%	
402	Engineering Systems and Equipment	0%		6%	
403	Waste Disposal, Recycling, and Reuse	5%		6%	
404	Instrumentation and Control Systems	0%		6%	
605	Natural Resource and Environmental Economics	5%		9%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		6%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	6.0	0.0
Actual Paid Professional	2.6	0.0	6.6	0.0
Actual Volunteer	2.6	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
448100	0	145395	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
324215	0	1545812	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
31098	0	781648	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

The forestry extension program made direct contacts with 459 forest landowners, managers, and professionalthrough email and telephone. Visits to the forestry extension websitewww.ctahr.hawaii.edu/forestry were up 30% from last year, reaching 43,000 visitors from 200 countries. A major forestry program effort of 2011 was the launching of the Tropical Hardwood Tree Improvement and Regeneration Center. The Center is a cooperative effort of the US Forest Service, Purdue University, and many Hawaii groups and agencies, including the University of Hawai'i, the Department of Hawaiian Homelands, the Hawai'i Division of Forestry and Wildlife, the Hawai'i Forest Industry Association, and private entities such as The Nature Conservancy Hawai'i and local consulting firms and nurseries. The goal is to improve management of Hawaii's trees, starting with koa. The Center was launched in October 2011 with a daylong meeting of over 50 stakeholders, both public and private. Over $400,000 has been committed to funding the Tropical Hardwood Tree Improvement and Regeneration Center, both from government agencies and private foundations.

The registration of pesticides used in minor crop production (USDA IR-4 program) has been a long-standing and important function of CTAHR, since almost all crops in Hawaii are considered "minor crops". Environmentally safe and efficacious pesticide labeling and use is conducted through on-farm efficacy and residue trials. Pesticide registration was facilitated in 2011 for banana, pineapple, guava, coffee, papaya and basil crops.

Now in its fourteenth year, Agriculture and Environmental Awareness Day has become a CTAHR tradition on the islands of Kauai, Oahu, and Maui. In February 2011, more than 1000 fifth and sixth graders participated in a voyage of discovery, investigating how agriculture and environmental science affect their life and can shape their future. One mission of awareness day is job creation, by introducing students to career opportunities in agriculture and environmental studies. Students examined important issues such as providing sufficient and safe food for Hawaii and the world, protecting Hawaii's fragile

ecosystems, and providing alternative sources of energy. They were also introduced to a broad spectrum of careers such as entomologist, biotechnologist, animal scientist, and nutritionist.

Water management, waste management, soil remediation and improvement, protection of Hawaii's unique flora and fauna, and rapid detection of environmental pathogens were strong research themes in 2011. CTAHR participated in a $1 million competitive award funded by the University of Hawaii to link agriculture with sustainable energy production. Sensors were identified and calibrated to assess the impact of microirrigation as a water conservation measure, and a novel method of integrating EMMC (entrapped mixed microbial cell) with the typically used MBR (membrane bioreactor) method of wastewater treatment was found to reduce bio-fouling and achieve more efficient water treatment for effluent discharge or irrigation.

With respect to soil amendments, coconut fiber was found to be an adequate substitute for the non-renewable resource peat moss in orchid cultivation; and biochar was found to be effective in reducing the acidity of many Hawaii soils, and the impact of the rate of biochar application in different soil types on crop production was characterized and presented to organic farmers.

The University of Hawaii Insect Museum added 10,000 new specimens of both native and invasive insects, and this resource was used by 30 visiting scientists and professionals and over 85 students at all levels. In addition to discovering novel native insect species and assessing the need for conservation efforts, museum staff also demonstrated that Hawaii was not the source of the light brown apple moth invading California, and that lures used for pest fruitflies were not a threat to endangered insect species when used appropriately.

A research result of potential major impact was the development of a new probe technology (Assimilating Probe) for rapid detection in the field of multiple human and plant/animal pathogens. This hand-held technology essentially replaces a desktop PCR and computer system, promises to be inexpensive, and can provide real-time results in the field. Prototypes were designed and demonstrated in workshops with CTAHR faculty, staff and students; and in a national workshop attended by professionals from industry, government, and universities.

2. Brief description of the target audience

As intended by the Land Grant perspective, CTAHR's "targeted" clients for this program in **teaching** are the undergraduate and graduate students in agriculture and 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

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	6827	117302	333	0

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	3	34	37

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals submitted.

Year	Actual
2011	25

Output #2

Output Measure

- Presentations at international and national meetings.

Year	Actual
2011	43

Output #3

Output Measure

- Number of workshops and other educational activities held

Year	Actual
2011	28

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
2011	450

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
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
212	Pathogens and Nematodes Affecting Plants
403	Waste Disposal, Recycling, and Reuse
605	Natural Resource and Environmental Economics

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
2011	1697700

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

• Natural disasters such as hurricanes, typhoons, floods, fires, often are destructive to natural resources such as reefs, water quality, forests, indigenous species, research plots and equipment.
• When the economy is poor, public and private funding decreases and is more difficult to obtain.
• Current and new quarantine and inspection procedures for imported materials affect the rate of new introductions of invasive species into the State.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Hawaii's Diversified Tropical Crop Systems for Sustainability and Competitiveness

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	12%		10%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		6%	
202	Plant Genetic Resources	2%		7%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	3%		3%	
204	Plant Product Quality and Utility (Preharvest)	5%		7%	
205	Plant Management Systems	20%		18%	
206	Basic Plant Biology	0%		11%	
211	Insects, Mites, and Other Arthropods Affecting Plants	15%		5%	
212	Pathogens and Nematodes Affecting Plants	13%		13%	
213	Weeds Affecting Plants	6%		0%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	4%		0%	
216	Integrated Pest Management Systems	13%		3%	
511	New and Improved Non-Food Products and Processes	0%		8%	
604	Marketing and Distribution Practices	7%		9%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	19.0	0.0	13.0	0.0
Actual Paid Professional	10.8	0.0	8.3	0.0
Actual Volunteer	0.3	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**
289060	0	145978	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
992225	0	2293082	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
249651	0	510741	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

A fundamental responsibility of the College of Tropical Agriculture and Human Resources is promotion of crop production in the State. Since most food consumed in Hawaii is imported, an important goal is to encourage import replacement through increased commercial as well as backyard and urban agricultural production. Likewise, promotion of diversified cropping helps to diversify the state's economy in the wake of sugarcane and pineapple plantation closures over the past several decades. Linkages with programs in other states and island territories assist CTAHR in these efforts.

There is a tremendous shortage of agricultural labor in Hawaii. Many agricultural companies are recruiting agricultural laborers from countries outside of the United States. These growers have entered Hawaii's agriculture industry with little to no experience in diversified agriculture. Companies that employ workers are required by law to provide training programs in areas such as worker protection, farm safety, etc. To overcome these challenges, CTAHR extension faculty have teamed up with agricultural labor companies, and agricultural companies with laborers to increase awareness of human and food safety concerns. Introductory level workshops are offered to ensure farmers in the target group are sufficiently informed so as to have access to existing and emerging risk management tools such as crop production, crop insurance, crop protection tools, and funding resources.

An inaugural Landscape Management Conference with the Hawaii Island Landscape Association was held in Kona in 2011, with 121 participants. The focus of the conference was to provide practical management tools for professional landscape gardeners, property managers, ornamental nurserymen, and home gardeners throughout the Big Island. This conference, attended by 105 participants from all areas of Hawaii Island, marked the first conference of its kind on the island. In addition to providing useful, practical information to landscapers, the event provided re-certification units to restricted use pesticide applicators, ISA certified arborists, and Certified Landscape Technicians. Historically, it has been difficult for outer island residents to obtain the needed continuing education units to maintain the various certifications without traveling to Oahu-based events. Although initially planned as a biennial conference, due to the overwhelming success of the conference and feedback from evaluations the conference will be an annual event.

Transgenic papaya varieties make up more than 82% of the papaya acreage planted in 2010-2011. Thissuggests that the transgenic technology is well accepted and has been adopted by a large percentage of growers in Hawaii as the only practical way to deal with the ravages of Papaya Ringspot Virus (PRSV). This work to broaden PRSV transgenic resistance serves to mitigate the threat of exotic or foreign strains of PRSV that might be introduced in the state. Further, growers outside of Hawaii benefit from this

when germplasm is used in other papaya growing regions of the world. CTAHR faculty collaborated with USDA-ARS and the Hawaii Department of Agriculture to achieve deregulation of Hawaii-grown papaya in Japan in 2011, permitting export by Hawaii growers.

Information from past and recent research was synthesized to develop a report titled, "Hawaii Grown Tea: A Market Feasibility Study", which examines tea as a potential new crop for the islands. The report was a joint effort between CTAHR and the UH Shidler College of Business and 1) reviewed the viability of growing tea in Hawaii and examined how current producers are doing business, 2) identified the current and potential markets for tea, 3) identified obstacles in three developmental market stages and the possible strategies to overcome these constraints, and 4) offered policy, research, and extension education recommendations. Results of the study have been presented to producers, agencies, and policy makers with the message that, with proper marketing and development, tea could be a very profitable new industry for Hawaii.

Urban horticulture clientele and Master Gardener volunteers statewide increased awareness of resources available to home gardeners through CTAHR, including fruit fly suppression, general plant pest and disease control, plant propagation, nutrient management and environmentally sound gardening. Statewide Master Gardener programs expanded with over 125 new volunteers trained and assisting CTAHR in disseminating research-based information to the public through help-lines in all four counties, information booths at public events and peer-to-peer education within the community. A simple set of cards to enable both home gardeners and farmers to identify and conserve beneficial insects was developed and publically distributed by research and extension staff.

Vermicompost was found to be effective in promoting vegetable production both in soil and in water (aquaponics). Application methods/dosages were characterized and demonstrated to over 600 participants in workshops throughout the state. The aquaponics applications resulted in a major local lettuce grower achieving USDA certification for organic production; and has had the added benefit of aquaponics adoption by Hawaii mental health and human welfare agencies and nonprofits for urban gardening, and as a component of STEM curricula in public schools.

Banana bunchy top virus (BBTV) is a severe threat to banana production in Hawaii and the Pacific Basin. Transgenic banana lines have been developed and are under field evaluation, while simultaneous efforts are underway to evaluate selected non-transgenic banana clones from tissue culture for BBTV resistance. Similar transgenic and non-transgenic selection efforts were initiated with tomatoes to combat the threat of tomato spotted wilt virus (TSWV).

Cultivation of tropical ornamentals (orchids, plumeria, antherium, etc.) is a critical segment of the agricultural industry in Hawaii. Quantification of water and nutrient needs for anthurium and rhaphis palms grown under a variety of environmental conditions, and subsequent implementation of precise management methods was found to result in projected net revenue increases from $21,000 - $163,000 per acre per year under several crop/environment scenarios. A new bioreactor for Dracaena micropropagation was developed that reduces labor requirements by 50%. Forty-six anthurium lines were placed in tissue culture, including selections for testing with cooperators, and for triple-indexing to ensure that it is free of bacteria. Three new red anthurium cultivars were released to industry. In contrast, a novel screening method was used to demonstrate that two Dutch anthurium cultivars, previously characterized as bacteria resistant, are in fact attacked by bacterial blight. An insect pest, the anthurium whitefly, was found for the first time to be effectively controlled by use of either imidacloprid plus fertilizer, or the new systemic insecticide spirotetramat. Both approaches significantly decrease human and non-target exposure to broad spectrum organophosphate insecticides previously used on anthurium.

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

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	15757	203883	985	247

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	55	20	70

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, research/field day demonstrations conducted

Year **Actual**

2011	286

Output #2

Output Measure

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

Year	Actual
2011	71

Output #3

Output Measure

- Presentations at international and national meetings

Year	Actual
2011	16

Output #4

Output Measure

- Number of diagnostic samples analyzed
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Number of grant proposals submitted.

Year	Actual
2011	40

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increased awareness of best management practices to promote environmentally responsible agricultural and landscape management
2	Number of people who adopt one or more recommended practices
3	Total dollar value of grants and contracts obtained.

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	6469

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

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

214	Vertebrates, Mollusks, and Other Pests Affecting Plants
216	Integrated Pest Management Systems
604	Marketing and Distribution Practices

Outcome #2

1. Outcome Measures

Number of people who adopt one or more recommended practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	2146

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)

205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
216	Integrated Pest Management Systems
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
2011	6528800

3c. Qualitative Outcome or Impact Statement

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

What has been done
Grant funds have been received.

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
216	Integrated Pest Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

V(I). Planned Program (Evaluation Studies)

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

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%		7%	
205	Plant Management Systems	15%		13%	
211	Insects, Mites, and Other Arthropods Affecting Plants	20%		18%	
212	Pathogens and Nematodes Affecting Plants	15%		25%	
213	Weeds Affecting Plants	15%		10%	
215	Biological Control of Pests Affecting Plants	5%		17%	
216	Integrated Pest Management Systems	30%		7%	
312	External Parasites and Pests of Animals	0%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	6.0	0.0
Actual Paid Professional	3.1	0.0	5.8	0.0
Actual Volunteer	2.2	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
145439	0	236269	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
230555	0	1187446	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
27612	0	450199	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Pests threaten the quality of agricultural products, the health of farming businesses and the surrounding natural and urban ecosystems. Sound management of agroecosystems in Hawai'i depends on mitigating the effects of alien invasive species. Invasive species threaten our native plant heritage and economically important plants, pastures, rangelands, forests, and critical watersheds. CTAHR plays a significant role in developing and delivering information and technologies that minimize the negative impacts of invasive species.

Education on Hawaii's invasive termites was facilitated by implementation of a K-12 biology program focusing on these damaging pests, and effective management techniques. Over 11,000 public school students statewide have participated in this curriculum, and science teacher Tanya Ashimine of Kaiser High School (Honolulu) was awarded the national President's Prize for Outstanding Achievement in Secondary Education by the Entomological Society of America for her active participation in the program.

Coffee berry borer (CBB) is known to be the most devastating pest of coffee world-wide. Since its invasion into Kona and Kau regions on the island of Hawaii, coffee growers were trained both in CBB monitoring and in integrated pest management methods via workshops, fliers, and a new website. CTAHR researchers found that CBB was not yet infesting reported alternate host plants in Hawaii, and improved beetle trapping methods by identifying the most effective trap design, demonstrating that the ratio of ethanol:methanol in the trap is less critical than previously thought, and that isopropanol is not attractive to CBB. CTAHR also found that 50C for greater than 10 minutes will kill CBB, making heat an effective quarantine treatment. Evaluations of both microbial and chemical insecticides are in progress.

In 2011, a basil disease problem was detected in Waianae, Oahu. The basil industry in Hawaii is estimated to be worth $6.8 million and is run primarily by socially disadvantaged producers in Waianae, Kunia and Kahuku. Samples were submitted to the CTAHR Agricultural Diagnostic Service Center and identified as a new disease, Basil Downy Mildew; and CTAHR developed a Basil SWAT team to address this new problem. With support from agrochemical manufacturers and the Hawaii Department of Agriculture, CTAHR worked with basil growers to identify and implement best management practices, which included pesticide safety, chemical label comprehension, and correctly choosing approved crop protection chemicals. Due to the timeliness of the response, effective control of the pathogen was acheived.

Tomato yellow leaf curl virus (TYLCV) was first detected and identified in commercial tomato plantings on Oahu and Maui in 2009. Without proper control strategies,TYLCV can devastate statewide commercial tomato operations . CTAHR research and extension faculty worked to screen and identify

resistant varieties that can tolerate this new virus. Field day events were held to educate growers on the field symptoms and best management practices available to manage this new disease. Through this effort, we discovered another disease on tomatoes, identified as pepper mottle virus(PMV). Through a coordinated effort, we have been able to identify commercial varieties with putative resistance to TYLCV and PMV. Combined resistance from natural selection and an engineered line is under investigation.

Fireweed (Senecio madagascariensis) is the major weed problem facing ranchers in Hawaii today. Maui County has sponsored an herbicide prescription program conducted by CTAHR staff to suppress infestations in priority pastures. Cost effectiveness of herbicide application was improved by improved herbicide formulations and training on proper equipment calibration. Several field studies determined that Milestone ® at 7fl.oz. proved to be most effective in suppressing fireweed. In a complementary study, pasture recovery was identified as a sustainable long-term approach to mitigating fireweed incidence. In wet sites, one year after cage installation palatable forage increased ca. 20-fold and completely eliminated the presence of fireweed. In a drier site there was a 5-fold forage increase in forage, corresponding with a 4-fold decrease in fireweed.

To decrease the need for repeat applications of pesticides, CTAHR is working with growers through the Farm Doctor program to visually demonstrate the effect of different spray factors on crops in order to maximize efficacy and reduce unnecessary exposure. Growers were able to see first-hand (water sensitive paper, fluorescent dyes, etc) how adjustments in spray application affect spray coverage. Participants indicated these demonstrations help to minimize pesticide safety issues and increase effective pest control. Growers were also trained in use of proper worker protection equipment and calibration of spray equipment.

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

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3587	5095	1653	58

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

Patent Applications Submitted

Year: 2011
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	8	39	47

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days, demonstrations held

Year	Actual
2011	218

Output #2

Output Measure

- Number of grant proposals submitted

Year	Actual
2011	16

Output #3

Output Measure

- Presentations at international and national meetings

Year	Actual
2011	39

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

Awareness created

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1966

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

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	132

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Residents are unaware of how to control invasive species.

What has been done
Demonstration project have been installed.

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
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
2011	2030100

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
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

- Intentional introductions of invasive species
- Lack of funding/grant proposals don't come through.
- Other agencies and partners are not willing to partner and coordinate efforts

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Youth, Family and Community Development

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
724	Healthy Lifestyle	8%		2%	
801	Individual and Family Resource Management	6%		19%	
802	Human Development and Family Well-Being	35%		32%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	10%		14%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	2%		10%	
805	Community Institutions, Health, and Social Services	9%		5%	
806	Youth Development	30%		7%	
903	Communication, Education, and Information Delivery	0%		11%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	17.0	0.0	3.6	0.0
Actual Paid Professional	18.0	0.0	3.7	0.0
Actual Volunteer	38.3	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**
246166	0	96915	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1454809	0	459349	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
53040	0	1085596	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. Colleagues from UH community colleges, nonprofit organizations, and government agencies are partners on several CTAHR projects.

4-H is the major youth development program of the Cooperative Extension Service. This educational program provides hands-on learning experiences to help youth develop inquiring minds, learn practical skills, strengthen decision-making abilities, improve communication and interpersonal skills, and share their skills and experiences in leadership roles. An external review of the program was conducted in 2011, which found significant value, as well as problems of organizational structure, coordination and assessment which needed to be addressed. CTAHR is now working to implement program changes. The number of 4-H members have increased from 9,437 in 2009 to 11,744 in 2011 while the number of volunteers has increased by 185 during that same period. An increase in the number of members has increased the participation in the annual statewide youth conference (Ahaolelo) which had 47 participants in 2009 and 92 in 2011. We have increased the diversity of 4-H educational experiences exhibited at the State Farm Fair, and more than tripled the number members and leaders (to 400) participating from 2009 to 2011.

"Get Moving for Health" is a 4-H Healthy Living project to motivate youth to be more physically active. In partnership with adults, youth leaders planned programs to reach at least 100 youth and 50 adults in their community. Youths and adults partner to implement projects in their communities statewide which encourage healthy lifestyle choices and changes through daily physical activities. This program was funded by the Walmart Foundation to involve Hawaii 4-H members, leaders, parents, and community members to be active and exercise more frequently. Hawaii's program was recognized by the Walmart Foundation as one of 8 superior programs nationwide and was invited to submit a follow up proposal for a program to improve nutrition in young people. The "Get Fueling for Health" program was developed in Hawaii and awarded $55,000 to continue in 2012.

CTAHR extension staff worked with over 200 youth and adult leaders to partner in planning and implementing community service projects in West Hawaii County. Projects addressed the homeless and hungry, intergenerational connections, military deployment, healthy living and safe communities. For example, the youth with their adult partners raised more than $12,000 to benefit the Ronald McDonald House, the Food Basket, the Japan-Hawaii Relief Fund and the American Red Cross Hats Off Project. The

charities were thrilled with the support, and the youth gained experience in life skills such as communication, public speaking, decision making, empathy, working together and taking responsibility.

Youth development was further fostered by supplemental science activities and curricula developed and implemented in K-12 classrooms throughout Hawaii explaining biotechnology in a manner reflecting Hawaii's cultures and values; and by the "Kids Saving" project implemented in 24 public schools statewide to provide training in achieving financial security. This program was recognized by both Senator Daniel Akaka and the Hawaii State Legislature, and participating students have saved over $174,000 to date.

Over 78% of older adults who live in the community and need long term care services (transportation, bathing, eating, cleaning, shopping, etc) depend on family and friends. In Hawaii, there are 169,000 family caregivers who provide these critical services. These family caregivers have an increased risk of health problems, rate of depression and burnout, disruption of family relationships, and decreased effectiveness in the workplace. The professional caregiving infrastructure (home health aides, nursing homes, etc) is already stretched thin. As a result, the best option is to help family caregivers maintain their health, and manage caregiving responsibilities. To do this, Maui County introduced an evidence-based educational series that focuses on providing resources and educational support for the caregiver. This 6-week program is called Powerful Tools for Caregivers (PTC) and is utilized by Cooperative Extension systems across the nation. It has documented that participants increase their levels of self-care (exercise, eating right, stress management) and confidence in finding and accessing services.

2. Brief description of the target audience

- Academic researchers in the fields of family science, human development, sociology, economics, public policy, education, and social services.;
- Administrators of state and local nonprofit agencies relating to health, human services, education, and economic development.;
- Service providers and advocates who work with children, families, or the aging, especially those who work with at-risk groups; State legislators and policy makers;
- The general public

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	27466	181029	17211	14951

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

Year: 2011
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	49	10	59

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2011	16136

Output #2

Output Measure

- Number of volunteer hours

Year	Actual
2011	73550

Output #3

Output Measure

- Presentations at international and national meetings.

Year	Actual
2011	12

Output #4

Output Measure

- Grant proposals submitted.

Year	Actual
2011	14

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

Number of stakeholders who increased knowledge in at least one issue

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	16136

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
724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
806	Youth Development

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	16136

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Residents want a better quality of life.

What has been done
Workshops, demonstrations, presentations, website and publications gave residents the knowledge to have better skills on parenting, youth development and leadership.

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
806	Youth Development

Outcome #3

1. Outcome Measures

Total dollar value of grants and contracts obtained.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	3537800

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Resources are needed for research and extension programs to assist Hawaii's families and communities.

What has been done
Funds were obtained.

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
805	Community Institutions, Health, and Social Services
806	Youth Development
903	Communication, Education, and Information Delivery

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

The economic downturn and cuts in social services over the past several years have 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

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
607	Consumer Economics	5%		6%	
608	Community Resource Planning and Development	10%		3%	
701	Nutrient Composition of Food	8%		8%	
702	Requirements and Function of Nutrients and Other Food Components	5%		18%	
703	Nutrition Education and Behavior	15%		22%	
704	Nutrition and Hunger in the Population	2%		7%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	5%		0%	
723	Hazards to Human Health and Safety	5%		5%	
724	Healthy Lifestyle	22%		0%	
802	Human Development and Family Well-Being	10%		16%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	13%		10%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	0%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	6.0	0.0	3.0	0.0
Actual Paid Professional	3.8	0.0	4.7	0.0
Actual Volunteer	1.8	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
44196	0	209607	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
331496	0	566749	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
33728	0	206562	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

CTAHR surveyed relative omega-3 fatty acid content of Hawaii fish, and distributed consumer posters with this information. Research also continued on relative iron content and absorption from foods promoted as iron-rich, and clams were found to be a poor iron source (contrary to reputation), with iron absorption further inhibited by co-consumption of black tea. Of supposed iron-rich foods available in Hawaii markets, only soybeans and lentils were found to contain the minimum 1.8 mg iron/serving required of "good" iron sources by the FDA.

The Local Immigrant Farmer Education (LIFE) program is a risk management training program for limited resource and underserved Filipino, Southeast Asian and other minority growers in Hawaii, with the assistance of the USDA Risk Management Agency. The program has gained recognition for its grass roots efforts in reaching socially disadvantaged growers with small acreage and remote rural locations, such as recent Asian immigrants with limited English capabilities and little experience in diversified crop production. LIFE's educational program focuses on responsible farming, business management, and cost of production, risk management, and environmental stewardship. Information is delivered to growers in a

manner respectful of their diverse cultures and backgrounds. A total of 45 workshops/ field days were developed based on grower identified needs on the islands of Oahu, Maui, Molokai and Hawaii Island. During 2011, 1177 growers were reached through the workshops, and 224 one-on-one field consultations were made to help growers address these issues.

The native Hawaiian Homes Commission Act of 1920 created a homesteading program for native Hawaiians. Its mission is to place eligible native Hawaiians on 203,000 acres of land. The Hawaii Department of Hawaiian Homelands' mission is to: 1) manage the Hawaiian Home Lands trust effectively, 2) develop and deliver land to native Hawaiians, and 3) partner with others towards developing self-sufficient and healthy communities. CTAHR works to increase self-sufficiency and healthy living on Hawaiian Homestead farm lands. On the island of Molokai, a beginning farmers program for Hawaiian Homesteaders is in its second year of operation, having trained and mentored 22 new farmers since 2010. The program emphasizes hands-on coaching and implementation of a farming and marketing plan for produce, ranging from fruits, vegetables, and taro, to chicken, eggs and pork.

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

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12351	19949	2284	13821

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	43	12	55

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of outreach activities and events conducted

Year	Actual
2011	1039

Output #2

Output Measure

- Presentations at international and national meetings.

Year	Actual
2011	12

Output #3

Output Measure

- Grant proposals submitted.

Year	Actual
2011	11

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

Number of people trained and who receive their pesticide applicators license

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	149

3c. Qualitative Outcome or Impact Statement

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

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

Results
Residents use pesticide correctly and 207 people received training and new licenses or recertification.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of people who changed their behavior to better their health

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	3096

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
723	Hazards to Human Health and Safety
724	Healthy Lifestyle
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	4301

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
607	Consumer Economics
608	Community Resource Planning and Development
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
724	Healthy Lifestyle

Outcome #4

1. Outcome Measures

Total dollar value of grants and contracts obtained.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	5028869

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
723	Hazards to Human Health and Safety
724	Healthy Lifestyle

802 Human Development and Family Well-Being

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

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

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	18%		17%	
131	Alternative Uses of Land	5%		0%	
204	Plant Product Quality and Utility (Preharvest)	0%		5%	
205	Plant Management Systems	13%		12%	
212	Pathogens and Nematodes Affecting Plants	5%		9%	
301	Reproductive Performance of Animals	17%		0%	
305	Animal Physiological Processes	10%		10%	
306	Environmental Stress in Animals	8%		5%	
307	Animal Management Systems	12%		7%	
502	New and Improved Food Products	2%		8%	
511	New and Improved Non-Food Products and Processes	0%		12%	
601	Economics of Agricultural Production and Farm Management	4%		7%	
607	Consumer Economics	3%		5%	
608	Community Resource Planning and Development	3%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	5.5	0.0	28.0	0.0
Actual Paid Professional	6.7	0.0	15.7	0.0
Actual Volunteer	7.6	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**
333132	0	325107	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
515269	0	3673747	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
497914	0	501472	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

Hawaii aquaculture researchers and extension specialists have developed educational opportunities in the area of aquaponics, the production of hydroponic crops using fish effluent. Through this partnership, growers obtain access to starter fish and educational resources to produce fish and edible crops successfully in a safe and cost effective manner. Economic analysis was conducted to identify key factors impacting long-term viability and profitability, and preliminary results indicated a wide variation in performance of individual farms. Educational workshops were held to educate growers about aquaponics and the benefits of creating a sustainable systemto produce fish and edible crops successfully in a safe and cost effective manner. Workshops were hands-on grower field days to show interested growers how to set up an aquaponic system using local sources of materials and supplies. Aquaponics utilizes the waste from the fish to supplement the nutritional needs of the plants. Participants were able to see the parts, plumbing, pumps, and other supplies needed to get started in aquaponics, and assemble grow beds.

The potential of aquaponics in commercial production is illustrated by Maris Garden on Oahu. The owner,a landscape contractor,was at first only interested in using water from his aquaculture tanks to irrigate his nursery. After participating in a CTAHR workshop held during November 2009,he has transformed one acre of his landscape nursery into the largest aquaponic operation in the state. http://www.marisgardens.com/aquaponics-gallery/aquaponics/ Current outputs are approximately 20,000 heads of lettuce and 100-200 pounds of fish a month. We are currently working with him to address the new challenges regarding food safety certification that this emerging technology will require if it is to become a commercially viable enterprise. CTAHR is also helping Maris Gardens to become a certified organic producer by studying the use of vermicompost as a nutrient source for the operation.

Aquaculture (fish cultivation) is also being furthered in Hawaii by CTAHR research on improved shrimp propagation and diet, and identification of genetic markers for tilapia lines and other commercial fish. In land-based agriculture, cover crops and "green manures" were assessed, with sunn hemp demonstrating superior properties; and vermicaste, charr, and other soil amendments were evaluated, with research continuing to define quality control and impacts.

The "Natural Farming" waste management concept from Korea incorporates indigenous micro-organisms (IMO), use of natural ventilation and solar positioning for cooling and drying within livestock housing. A maintenance-free green waste bedding system, mitigating nuisance flies and odors, eliminates the need for manure handling. Within a year, five piggeries implementing these concepts have been constructed in the Hawaii. The natural farming concepts have also been adapted to poultry production. Twenty-one stand-alone poultry housing structures ("Hubbell Bubble") have been constructed in East Hawaii Island, five of which are being monitored as part of a demonstration project. Nuisance fly and odor levels and egg and chick predation by mongoose and rodents have been significantly reduced in backyard and small scale commercial poultry operations. Three workshops were held (50 participants) at the demonstration farms and covered construction, microbe collection, waste management, and mongoose control. While the current implementation of 'Natural Farming' using indigenous micro-organisms (IMO) and natural ventilation is for backyard and small-scale production, at least two commercial farms are in the process of adapting the plans for large-scale operations, which will support efforts for increasing food sustainability for the state, without contributing to waste accumulation and nutrient runoff liabilities.

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

2. Brief description of the target audience

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

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	8655	43817	1305	3354

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

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	27	34	61

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days and demonstrations.

Year	Actual
2011	183

Output #2

Output Measure

- Presentations at international and national meetings

Year	Actual
2011	28

Output #3

Output Measure

- Grant proposals submitted

Year	Actual
2011	67

Output #4

Output Measure

- Number of workshops, conferences and other outreach events

Year	Actual
2011	220

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

Number of people that adopt one or more recommended practices.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	911

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
131	Alternative Uses of Land
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
301	Reproductive Performance of Animals
305	Animal Physiological Processes

306	Environmental Stress in Animals
307	Animal Management Systems
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
2011	3608100

3c. Qualitative Outcome or Impact Statement

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

What has been done
Grant funds have been received.

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
131	Alternative Uses of Land
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
305	Animal Physiological Processes

307	Animal Management Systems
502	New and Improved Food Products
601	Economics of Agricultural Production and Farm Management
607	Consumer Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Climate Change

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
104	Protect Soil from Harmful Effects of Natural Elements	0%		15%	
111	Conservation and Efficient Use of Water	60%		0%	
112	Watershed Protection and Management	20%		20%	
122	Management and Control of Forest and Range Fires	10%		0%	
123	Management and Sustainability of Forest Resources	0%		30%	
132	Weather and Climate	0%		10%	
133	Pollution Prevention and Mitigation	10%		15%	
136	Conservation of Biological Diversity	0%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	0.0	0.0
Actual Paid Professional	0.1	0.0	0.6	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
16627	0	66281	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
57681	0	94390	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
88774	0	132254	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

Methodology was developed to calibrate and integrate satellite data from multiple sources on vegetation cover, temperature and rainfall; resulting in higher resolution needed for examination of the impact at a local level of climate change on island ecosystems. Evaluation of the impact of temperature on carbon (C) levels in forest soils led to development and implementation of a high-school curriculum exploring the impact of climate change on native forests. Research results demonstrating that models of wildfire behavior developed in temperate regions do not apply on tropical islands were reported to the USDA Forest Service, and a collaborative grant submitted to extend the improved models of this behavior to fire-fighters statewide.

A series of workshops were conducted throughout the Pacific Islands addressing topics in soil fertility, soil diversity, nutrient management, soil quality, and organic farming. The target audiences included Master Gardner training sessions (Kona, Oahu), New Farmer trainings (Hamakua, Maui), Kauai Taro Growers Association (Kauai), Waianae High School Agriculture program (Oahu), MA`O organic farm interns (Oahu), and ranchers, farmers and agricultural professionals in Guam, the Northern Marianas Islands, Palau, and Pohnpei. Soil analysis of demonstration plots established on four ranches on Guam, Rota, Tinian, and Saipan showed that improved forage grasses increase soil organic carbon (C) stocks. Preliminary results suggest that in addition to improving cattle nutrition with higher quality forages, the improved grasses provide other ecosystem services such as enhanced soil quality and the potential to increase C sequestration.

The Rainwater Catchment Education and Research program in Hawaii focuses on both improving water quality for domestic use catchment systems and mitigating the effects of variable rainfall through conservation activities. The program maintains a website (http://www.ctahr.hawaii.

edu/hawaiirain/) providing information on system design, maintenance and safety. Testing supplies and kits are also distributed. In 2011, the program developed significant national and international collaborations with other rainwater catchment associations in Taiwan, China, Europe, Australia and the continental USA. Collaboration with these international groups will facilitate sharing of information on safe and efficient rainwater harvesting methods.

2. Brief description of the target audience

The rainwater catchment program and the urban forestry program 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, 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

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1027	22891	0	0

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	10	10

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days, or demonstrations conducted

Year	Actual
2011	4

Output #2

Output Measure

- Presentations at international or national meetings

Year	Actual
2011	7

Output #3

Output Measure

- Number of grant applications submitted

Year	Actual
2011	4

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

Number of people that adopt one or more recommended practice.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	225

3c. Qualitative Outcome or Impact Statement

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

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

Results
Rainwater catchment users have improved their domestic water quality.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Total 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
2011	558868

3c. Qualitative Outcome or Impact Statement

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

What has been done
Funds were solicited from extramural agencies.

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
132	Weather and Climate
133	Pollution Prevention and Mitigation
136	Conservation of Biological Diversity

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Sustainable Energy

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
511	New and Improved Non-Food Products and Processes	0%		100%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.7	0.0
Actual Paid Professional	0.0	0.0	1.2	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	4019	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	319905	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	1286116	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The state of Hawai'i depends heavily upon imported fossil fuels for power and transportation. The ultimate goals of this program are to efficiently grow perennial crops on marginal lands as feedstock for biofuels and to develop and promote the use of these locally produced biofuels as alternatives to imported fossil fuels. The objectives of this program are to demonstrate the technical and economic feasibility of (1)

producing ethanol from lignocellulosic biomass, (2) producing vegetable oil for biodiesel production, and (3) producing charcoal from bioresidue generated in the course of producing ethanol and biodiesel. Planned activities are to (1) determine the optimal yield and quality of napier and guinea grass, and energy cane and sugar cane for conversion as a function of harvesting frequency, irrigation, and fertilizer treatments; (2) conduct field experiments with Jatropha curcas, a tree that produces a nut with great potential as a source of oil for conversion into biodiesel; and (3) develop and demonstrate the use of dried guinea grass and the shell and husk of jatropha nuts as feedstock for conversion into charcoal using flash carbonization.

Energy grass field plots (napier, energy cane, sugar cane, sweet sorghum) were established and fully instrumented, and research advanced on conversion of jatropha oil to biodiesel. Conversion of biomass to liquid fuel remains a limiting step, and efforts were intensified to optimize fermentation conditions and develop value-added co-products from fermentation, such as fish/animal feeds, or potential sources of human nutrition. DNA studies focused on understanding the genetic diversity of napier grass in the Hawaiian Islands. CTAHR participated successfully in a $1 million competitive award from the University of Hawaii to advance sustainable energy production.

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

2011	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: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Publications

Year	Actual
2011	0

Output #2

Output Measure

- Grant proposals submitted

Year	Actual
2011	3

Output #3

Output Measure

- Presentations at international or national meetings

Year	Actual
2011	2

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

Identified types of bioenergy crops suitable for Hawaii enviernment.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Dollar value of grants and contracts received

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	7487250

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Childhood Obesity

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

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

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	1.0	0.0
Actual Paid Professional	0.3	0.0	0.0	0.0
Actual Volunteer	0.5	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
1792	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
29230	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

Health and wellness have long been issues for Hawai'i's communities. The high cost of living in Hawai'i and the resulting need for multiple incomes in the household reduce time and energy available for

food preparation, leading to greater consumption of fast food. In addition, cultural practices in Hawai'i place emphasis on food consumption as a part of virtually all social activities, and the local diet is high in starch (e.g., white rice, macaroni salad) and fat (e.g., processed meat products, fried items). Although traditional health and wellness programming in CTAHR has focused on adults, growing concern over childhood obesity has shifted the focus to youth in the past few years. For example, the rate of obesity in children in Hawai'i ages 6 to 11 is twice the national average.

Nutrition education for prevention of childhood obesity was accomplished through multiple college programs, including 4-H (such as "Get Moving for Health" and "Get Fueling for Health" Projects), the Nutrition Education for Wellness program (NEW), as well as the extramurally funded programs EFNEP (Expanded Food and Nutrition Education Program) and SNAP-Ed (Supplemental Nutrition Assistance Program-Education). College nutrition educators report directly educating 617 families, which included 2865 adults and 1302 children. Through these contacts 75% of participants reported improvement in one or more food resource management practices, 83% reporting improvement in one or more nutrition practices, 58% reporting improvement in one or more of the food safety practices, 93% reporting positive change in any food group at exit, and 30% reporting positive change in physical activity.

The USDA child obesity prevention CAP grant ($25 million over 5 years) was awarded to the University of Hawaii in April 2011, to develop an integrated multistate (and multi-territory) childrens' healthy living (CHL) program across the Pacific Region. This major step to integrate research on Pacific populations with preventative extension efforts includes training and strengthening of local expertise in all partner jurisdictions (American Samoa, Saipan, Micronesia, etc.).

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. Target audiences also include at-risk families and children 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

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	837	2277	562	1239

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	1	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2011	55

Output #2

Output Measure

- Number of grant applications submitted

Year	Actual
2011	1

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 received

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
2011	412

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 received

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	5000000

3c. Qualitative Outcome or Impact Statement

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

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

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

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Food Safety

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
402	Engineering Systems and Equipment	0%		6%	
404	Instrumentation and Control Systems	0%		6%	
501	New and Improved Food Processing Technologies	25%		48%	
502	New and Improved Food Products	10%		0%	
503	Quality Maintenance in Storing and Marketing Food Products	30%		0%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	15%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	20%		40%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.8	0.0
Actual Paid Professional	1.0	0.0	1.6	0.0
Actual Volunteer	0.4	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
9925	0	42585	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
123124	0	223121	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
96147	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Stakeholders have a variety of concerns relative to bioterrorism (of increasing importance); good agricultural practices (in order to avoid bacterial or other contamination of produce); food allergen control; and general food safety (e.g., food additives). In response to these needs, CTAHR has developed and maintained a strong food safety program targeted at food processors for over 20 years. Certification of agricultural producers in their use of good agricultural practices is a clear trend and is challenging for many of Hawai'i's small farms, many of which are operated by recent immigrants with limited English language skills. As a result of these concerns, CTAHR maintains an active coaching program for farms targeting good agricultural practices and certification.

New standards developed by agencies such as the Environmental Protection Agency (EPA), USDA, and US Food and Drug Administration are putting agricultural practices under close scrutiny. In Hawaii, some socially disadvantaged producers have been fined for the lack of worker protection equipment. A task for the Local Immigrant Farmer Education (LIFE) program was to advance food safety by providing education to minimize risk due to food borne illnesses, correct application of pesticides, using reduced risk measures, nutrient/ pesticide record keeping and monitoring. During 2011, four grower workshops were conducted; and LIFE worked with the Hawaii Department of Agriculture to conduct worker protection workshops on farms to address food safety issues regarding misuse of pesticides, over application, and safe pesticide handling (in growers' native languages). Food safety education was conducted in collaboration with CTAHR's food safety team. Through the Farm Doctor program, LIFE works with growers one-on-one to minimize risks that could result in food safety concerns/ violations. Adoption of risk mitigation recommendations were most successful in conjunction with Farm Doctor visits.

Corresponding research efforts emphasized improved detection of pathogens, and improved/alternative methods of food preservation and pasteurization. A novel microwire sensor was developed and demonstrated to be a promising alternative to current fluorescence intensity measurement methods of detecting bacterial pathogens such as E. coli. A pulsed laser treatment was found to be effective for surface sterilization of foods and packaging, as an alternative to chemical additives. As a further alternative to additives that are not readily accepted by consumers, juice of the Noni fruit (Morinda citrifolia) widely grown in the Pacific islands was found to inactivate Salmonella under a variety of trial conditions, and holds promise as a potential natural food preservative.

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

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	519	10596	109	1144

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	22	3	25

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of workshops, field days and demonstrations

Year	Actual
2011	34

Output #2

Output Measure

- Presentations at international or national meetings

Year	Actual
2011	2

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of producers/processors who increase their knowledge or complete non-formal programs on food safety.

Outcome #1

1. Outcome Measures

Number of producers/processors who increase their knowledge or complete non-formal programs on food safety.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	280

3c. Qualitative Outcome or Impact Statement

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

What has been done
Various stakeholders were educated about improving food safety through workshops, extension publications, websites and non-formal educational activities.

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Key Items of Evaluation

None.