



C/T/A/H/R
College of Tropical Agriculture and Human Resources
University of Hawai'i at Mānoa

Plan of Work

Annual Report of Accomplishments and Results

Federal Fiscal Year 2005

A handwritten signature in black ink, reading "A. G. Hashimoto".

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Dean and Director

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A. Planned Programs

National Goal #1:

An agricultural system that is highly competitive in the global economy.

Through research and education, empower the agricultural system with knowledge that will improve the competitiveness in domestic production, processing, and marketing.

OVERVIEW

CTAHR researchers, specialists, and county agents worked in tandem to help Hawaii farmers to be more competitive in the Global Economy. Areas of focus for the College were in: grass finished beef production, agriculture tourism, new and old diversified crops, invasive species, sustainable agriculture, ornamental and flower crops, integrated pest management, plant nutrient management, waste management, youth development, health and nutrition, and personal financial management.

The closing of sugar plantations in the 1990's made available large tracts of agricultural lands. CTAHR was depended on to play a pivotal role in revitalizing agriculture through diversification. CTAHR has been involved in identifying new crops, the most suitable varieties, production techniques, pest management, post harvest handling and treatment, marketing and many other areas. Surely, CTAHR cannot take all or even most of the credit for the success of

diversified agriculture in Hawaii. It is the partnership that CTAHR's researchers and extension workers have developed with other governmental agencies, farmers' organizations, individual farmers, and many others to make this happen. The 4 year increase in farm value based on most current data available, the value of diversified agriculture increased from \$342.8M in 1999 to \$402.8 in 2004 for a 17.5% increase. Noteworthy sectors were Vegetables and Melons \$44.9M in 2000 to \$54.3M in 2004 for a 21% increase; Tropical Specialty Fruits: \$1.3M in 2000 to \$2.1M in 2004 for a 62% increase; and Floriculture and Nursery \$75.7M in 1999 to \$94.5M in 2003 for a 24.8% increase. Not all sectors have fared as well due to continued impact by introduced insects, diseases and other pests as well as from foreign competition.

Research has been conducted to grow awa in a non-circulating hydroponic system. This system avoids nematodes which are one of the major problems with the crop. Since the roots are the part of the plant that is used for the beverage, the plants require minimal cleaning for use.

The annual "A Taste of the Hawaiian Range" and Agricultural Festival continues to grow with a record 2,250 people attending in 2005. The food show celebrates and focuses attention to the best of Hawaii's agriculture and is a forum to educate the culinary industry, food service buyers, general public and visitors about the diversity of quality products grown in Hawaii. Twenty-eight restaurants were represented at this 10th annual event, along with a record 37 food service vendors, vegetable and ranch industry promotional booths. According to local media, this food show is rated as one of the best in the State of Hawaii. Attendees came from 22 mainland states and eight foreign countries (15.2%), 9.6% were from neighbor islands and 24.8% were tourists and other visitors.

The ornamental/landscape/green industries are vital to diversified agriculture, tourism, and the overall economy of the State. Although a monetary value cannot be put on many aspects of the industry no one doubts their economic importance. Spending for landscape services is estimated to be worth \$490.2 M in 2002 while employing over 9500 full time and 1200 part time workers. The value of the services alone is close to the farm gate value of diversified agriculture in Hawaii.

Extension workers held 273 workshops, conferences, and educational sessions with 10,198 people attending. Three hundred sixty six volunteers provided 5700 hours of volunteer time worth (at \$17/hour value) \$96,900 towards accomplishing Goal 1.

CTAHR has 231 projects under the National Goal #1 in the CRIS database. We selected 8 projects from 7 key themes to highlight in this year's report. The major selection criteria are the quantifiable outcome and impact. We provide only the summary output data in this section, and will present outcome and impact information under individual key themes below.

Research results have been shared through refereed journal articles, abstracts, books and book chapters; theses, local, regional, national and international meetings, symposia and workshops; and an array of web pages. CTAHR faculty published 318 papers last year under goal 1.

Allocated Resources -- Goal 1:

Fiscal Year	Research Hatch Funds (\$)	Research State Funds (\$)	Research Other Fed & Non Fed Funds (\$)	Research Total Funds (\$)	Research Scientist Years (SY)
2005	421,561	6,480,945	414,126	7,524,792	35.91

Fiscal Year	Extension Smith-Lever Funds (\$)	Extension State Funds (\$)	Extension Other Funds (\$)	Extension Total Funds (\$)	Extension Faculty Years (FY)
2005	420,077	1,459,069	89,733	1,968,879	20.08

ASSESSMENT:

All units in the College of Tropical Agriculture and Human Resources are required to conduct regular performance evaluation of their faculty members. These reviews are conducted based on goals established during previous year's reviews. Since all faculty members with CTAHR research FTE are required to establish their Hatch projects, regular performance evaluation serves a good vehicle to assess our progress toward the goals in our plan of work. CTAHR has made good progress in meeting these goals.

KEY THEME: Adding Value to New and Old Agricultural Products

ISSUE OR PROBLEM (HAW00279-S)

We developed for Kilauea Agronomics a series of 100% fruit juices made from processed guava puree, processed orange concentrate, and processed passion fruit juices. These juices are sweetened with one or more of the following: pasteurized white grape juice concentrate, pear juice concentrate, apple juice concentrate, or apricot juice concentrate. From the large amount of data on the pasteurization times and temperatures cited in the scientific literature and on the information contained in Sections 5.1 and 5.2 of the Juice HACCP Hazards and Control Guidance regulation (FDA 2004), we have determined that the recommended time and temperature of 20 seconds at 82 degrees C for the pasteurization of 100% guava juices and 100% guava juice blends containing other fruit juices are more than adequate for processing locally since these values are several orders of magnitude above that recommended/required by FDA.

IMPACT

This project allowed a Hawaii-based food company to begin to process and sell 100% juices to customers in Hawaii and on the continental United States. Prior to this, there has not been 100% guava juice or guava juice blends developed and produced in the United States.

SCOPE OF IMPACT - State

SOURCE OF FUNDING – State funds, and Grants

KEY THEME: Aquaculture

ISSUE OR PROBLEM (HAW00081-G)

A study to evaluate the risk of ciguatera fish poisoning from consumption of reef fish grown at marine aquaculture facilities in Hawaii was conducted. Grow-out facilities for two commercial fish farms in Hawaii (Cates International and Kona Blue Water Farms) were surveyed for the presence of the marine dinoflagellate, *Gambierdinus toxicus*. No signs of the dinoflagellate were detected in the land based grow-out facilities at Kona Blue Water Farms. In contrast, *G. toxicus* could be found on all three submerged sea cages operated by Cates International and levels that ranged between 1 to 1,921 cells *G. toxicus*/gram algae. The major algal species that was growing on the cages and associated with *G. toxicus* was identified as *Tolypiocladia glomerulata*. The low levels of the dinoflagellate are consistent with number of cases (3.6 cases/100,000 population) reported for ciguatera poisonings in Hawaii. Fish specimens from these facilities were also tested using a membrane immunobead assay for detecting ciguatoxin and related polyethers directly from fish tissue. To date a total of 40 individual Pacific threadfin and 40 kahala intercepted through the normal marketing chain have been examined and none have been found to possess the ciguatoxin(s). These findings indicate that ciguatoxin(s) are prevented from entering the culture process for both *S. rivoliana* and *P. sexfilis* raised in aquaculture facilities even when *G. toxicus* is present. The results from the current investigation indicate that the technology for the artificial propagation of the kahala, and in particular, *S. rivoliana*, has broken the life cycle of this particular tapeworm and has eliminated its presence in the farmed product.

IMPACT

The investigations have provided an increase in consumer confidence that the Hawaii farm-raised fishes are safe to consume. Evidence of this growing confidence has resulted in a recent \$4 million dollar investment into Kona Blue Water Farms off shore cage culture operations that seeks to increase production of the amberjack (See <http://www.bizjournals.com/pacific/stories/2005/01/24/daily51.html>). Kona Blue Water Farms received the Hawaii Venture Capital Association's 2004 Venture Capital Deal of the Year award.

SCOPE OF IMPACT - State and regional

SOURCE OF FUNDING – State funds, Grants

KEY THEME: Diversified/Alternative Agriculture

ISSUE OR PROBLEM (18-816)

Kava (awa, *Piper methysticum*) is used to make a traditional Polynesian beverage used in ceremonies and a recreational drink with a calming and relaxing effect. Traditional methods of extraction resulted in a low percentage of active kavalactones extracted when preparing the beverage. Work was initiated to increase kavalactones through cultural methods, by increasing extraction efficiency during preparation, and to manage alkaloid toxicity and other food safety issues with the drink. Research continued and work was also undertaken to develop mechanized

pruning techniques for mechanically harvested coffee and to study the impact of shade on coffee quality. Work to improve cacao production methods and chocolate production systems continues.

IMPACT

The 2nd Hawaii Pacific Islands Kava Festival was held. A collection of selected Hawaiian and Pacific kava varieties was planted at Waimanalo Research Station in support of the kava beverage initiative. A method was developed that increased the extraction of kavalactones from about 7% to over 40%. All five kava bars in Hawaii have adopted most aspects of the high yield kava extraction method. Waialua Coffee (Dole) has rejuvenated its entire 150 acres using either the mechanized Beaumont-Fukunaga method or the CTAHR Hedge systems both developed by the College.

SCOPE OF IMPACT - State and Pacific islands

SOURCE OF FUNDING –Smith-Lever, State funds, Grants

KEY THEME: Invasive Species

ISSUE OR PROBLEM (HAW00923-M)

(1) Field studies in Hawaii and Japan with borate and other wood treatments demonstrated at least 8 years of efficacy of borate treatments against the Formosan subterranean termite. Laboratory studies of termite tunneling behavior revealed that termites learn to avoid the location of borate-treated wood. (2) Field tests across the State of Hawaii demonstrated greater than 9 years longevity for the soil termiticide fipronil. (3) Tests with various agricultural fibers and with naturally-durable woods demonstrated that fibers will require preservative treatment, but that the tropical woods bangkirai and merbau are quite termite resistant. (4) Injections of the low-toxicity insecticides sodium borate and spinosad proved effective in controlling drywood termites, but multiple injections were needed to reach all termite galleries. (5) A new method of identifying drywood termite species inside wood based on the chemical signature in their fecal pellets was developed. (6) In studies using microbes to control termites, nematodes (round worms) were removed rapidly from infected termites by their nestmates; but a novel method of using genetically modified gut bacteria for termite control was developed. (6) A curriculum and public education project in Hawaii public schools increased the termite prevention knowledge and awareness of residents in 22 communities. U.S. Patent No. 6,926,889, dated August 9, 2005.

IMPACT

We have demonstrated the long-term efficacy (minimum 9 years) of low-toxicity borate wood treatments to deter termite attack, and of the novel soil insecticide fipronil. Every year of efficacy equates to an annual \$27 million savings in termite control for the residents of Hawaii. As a result of this research, borate wood treatments are the most widely used treatments in Hawaii. We have also identified non-toxic naturally durable wood species, which are currently being used to construct model homes in Hawaii. Future efforts to survey termites in the Pacific will be enhanced by our new method of chemically identifying termite fecal pellets; and safer and more effective termite control baits are under development using our novel bacterial approach to control. Our educational project in 22 communities has increased public awareness

of termite control needs and options, and interest in this program is growing rapidly throughout the state.

SCOPE OF IMPACT – State, National, and International

SOURCE OF FUNDING – McIntire-Stennis, State, Grants

Key Theme: Invasive Species

ISSUE OR PROBLEM (HAW00992-1013S)

The Coqui Frog Working Group (CFWG) was organized in October 2002 by representatives from the University of Hawaii, state and federal Departments of Agriculture, the County of Hawaii, plant growers, and the community to address the coqui frog problem primarily on the Big Island. Under the advisement of the Coqui Frog Working Group, Mayor Harry Kim issued an Emergency Declaration against the coqui frog for the County of Hawaii on April 12, 2004, facilitating acquisition of state and federal funding. To estimate the economic impact of coqui frogs in Hawaii County, members of the Hawaii Island Board of Realtors were surveyed. More than 65% of 73 respondents were involved in real estate transactions affected by the coqui frog on the Big Island. Loss of sales was estimated to be at least \$11 million (approximately 250 properties) when buyers declined to close a deal after hearing the frogs on or near the properties. A trial was conducted at the University of Colorado, Boulder (Cynthia Carey, Department of Integrative Physiology) to determine the susceptibility of coqui frogs captured in Hawaii to *Batrachochytrium dendrobatidis*, which causes chytridiomycosis, a fungal disease suspected in a global decline of amphibians. All boreal toads (susceptible species used as controls) exposed to the fungal organism died within 31 days after exposure, while most of the coqui frogs survived the 103-day duration of the trial and did not test positive for *B. dendrobatidis* DNA. Dr. Lawrence Woolbright, Siena College, New York, NY, revisited coqui-infested sites on the Big Island to follow up on population surveys initiated during his visit a year ago. The SD of the mean of the adult counts from test plots at Lava Tree State Monument (Pahoa, HI, elevation 122m-152m, annual rainfall 200cm) ranged from 54.4 to 77.8 over three surveys. The high degree of variation may be due to extreme variation in forest plant communities within the plots. Increasing plot numbers or size, or the number of nights of surveying will also increase labor intensity. His conclusion, however, was larger-scale density estimates derived for areas of Hawaii that are formulated without such effort will likely be flawed and lack value. Requests for education and outreach prompted the production of a 21-minute video 'Coqui frog invasion in Hawaii', which covers biology and behavior of the frog, non-chemical methods of control, and the roles of communities and government in the eradication of the frog in Hawaii. Members of the Coqui Frog Working Group are encouraged to use the video as part of any presentations they are requested to do in communities and for civic and agricultural commodity associations. The video may also be viewed on the UH CTAHR Coqui frog website at <http://www.ctahr.hawaii.edu/coqui/gallery.asp>

IMPACT

Discussion and efforts initiated by members of the Coqui Frog Working Group directed the pursuit of an Emergency Declaration and securing of funds to establish an eradication program

on the Big Island that will serve as a model for the rest of the state. Since coqui frogs are not susceptible to infection or mortality by chytridiomycosis, the fungal pathogen will not be pursued as a potential biological control agent unless there is evidence of conditions under which the coqui frog becomes susceptible (environmental or physical stress). High, variable coqui frog populations found in Hawaii have implications for researchers attempting to accurately quantify densities over large areas. Improvements in sound pressure level (SPL) survey methods that do not provide actual numbers of frogs can be more fully utilized as a monitoring tool and serve as an independent measure for estimates derived from censuses. It may be possible to create a model that can estimate calling males within a population based on recorded SPL and other criteria. More than 1,000 DVDs and VHS videotapes of 'Coqui Frog Invasion in Hawaii' were distributed to public libraries, community associations, agricultural and landscaping organizations, agricultural support businesses, and schools and colleges in the state. The UH CTAHR's 'Control of Coqui Frogs in Hawaii' website <http://www.ctahr.hawaii.edu/coqui/> has been visited by over 32,000 people since its inception in 2003.

SCOPE OF IMPACT – State

SOURCE OF FUNDING – Smith-Lever, State funds, and Grants

KEY THEME: Ornamental/Green Agriculture

ISSUE OR PROBLEM (HAW00842-H)

Several categories of orchids have been successful for use as blooming potted plants. Dendrobium orchid is one such category, with increasing popularity in the international floricultural scene for use in offices and homes and for interiorscaping of hotels and restaurants. The main attraction of Dendrobium relative to other potted orchids was reviewed and includes their floriferous flower sprays, a wide range of colors, sizes and shapes, year-round availability, and long flowering life of several weeks to months. Two anthocyanin biosynthetic genes from Dendrobium orchid were characterized to assist in breeding strategies and their complete coding sequences published in GenBank. Virus resistance was identified by lack of foliar symptoms and lack of systemic spread, monitored by tissue blot ELISA, in plants bioengineered with a variant movement protein gene of Cymbidium mosaic virus.

IMPACT

Breeding of new varieties of Dendrobium orchid has progressed for both cut flower and potted plant use. The attribute of flower color is being defined at the molecular genetic level. Efforts to produce a virus-resistant dendrobium are progressing. We remain one of the few publicly funded flower breeding programs in the U.S. that fully integrates greenhouse-based hybridization with lab-based discovery research.

SCOPE OF IMPACT - State and regional

SOURCE OF FUNDING – Hatch, State funds, Local grower groups

KEY THEME: Plant Health

ISSUE OR PROBLEM (HAW00903-H)

The phytoplasma disease of watercress that has been affecting farms on Oahu since 2001 is under control. The incidence of the disease has decreased markedly over the last year, due to continued efforts by farmers to eliminate infected symptomatic plants, and to control populations of the insect vector, *Macrosteles* sp., in their fields. The watercress farmers on Oahu are aware of the problem this disease presents and of the most efficient ways to protect their farms from this threat. Further characterization of the phytoplasma infecting watercress in Hawaii has included the cloning and sequencing of the Rp and Tuf genes in addition to the cloning and sequencing of the 16S/SR/23S ribosomal DNA genes previously characterized. Sequence analysis of the Rp and Tuf genes has been used by many workers to further classify phytoplasmas of the Aster Yellows group. Our analyses of these genes has revealed that the watercress phytoplasma is probably most closely related to the Aster Yellows-type phytoplasma that causes Onion Yellows in Japan, and is less closely related to the phytoplasma that causes Severe Aster Yellows in western North America. We have completed work on the host range of the insect vector, *Macrosteles* sp., testing the suitability of selected vegetable and native Hawaiian plants as food sources and oviposition hosts for the insect. We are still conducting experiments using laboratory-reared *Macrosteles* sp. to transmit the phytoplasma to various hosts under controlled conditions in the laboratory, and to examine the effects of the phytoplasma on this insect vector.

IMPACT

We have identified the phytoplasma as an Aster Yellows strain most closely related to the Onion Yellows phytoplasma in Asia, but it is also closely related to the phytoplasma that causes Severe Aster Yellows in western North America. Our work has enabled the watercress farmers of Oahu to successfully manage the yellows disease of watercress caused by a phytoplasma newly introduced into the state. The incidence of yellows disease caused by this phytoplasma on watercress farms on Oahu has decreased markedly over the last year, due to continued efforts by farmers to rogue out infected, symptomatic plants, and to control the population of the insect vector, *Macrosteles* sp., in their fields. Our work on this disease, identifying the phytoplasma that causes it, and determining some of the transmission characteristics of the insect that is the vector of the phytoplasma has allowed us to make recommendations for disease control that have enabled watercress farmers to regain most of the production that was lost in the early stages of the watercress yellows epidemic on Oahu, and has prevented the spread of this pathogen to other islands in Hawaii.

SCOPE OF IMPACT – State and pacific islands

SOURCE OF FUNDING – Hatch, State, and Grants

KEY THEME: Tropical Agriculture

ISSUE OR PROBLEM (HAW00914-H)

A breeding program was initiated in 2001 to improve commercial taros by increasing resistance to pests such as taro leaf blight (TLB) and aphids, increasing plant vigor and yield, and developing new and exciting varieties for the restaurant and landscape trade. In this program,

Hawaiian taro cultivars were used to incorporate different corm colors, low acidity, soft rot tolerance, early maturation, and brilliant colors. Hawaiian taros have been previously found to be closely related genetically based on RAPD studies conducted in Hawaii, thereby limiting their usefulness for our breeding program. Therefore, introduced taro varieties from the center of genetic diversity were used. Introduced taro cultivars from Micronesia, Palau, Indonesia, Papua New Guinea, Thailand and Nepal were used to increase resistance to taro leaf blight. Our approach was to incorporate 2 to 3 different sources of resistance into our improved taros to increase the durability of resistance. Tolerance to aphids was also incorporated into commercial taros using cultivars from Micronesia that reduce the longevity of aphids or reduce the number of offspring and cultivars from Indonesia and Micronesia that reduce longevity and offspring. Two successful breeding strategies were used in the development of hybrids suitable for commercial food production. The first strategy employed genetic crosses between a polynesian commercial taro variety and TLB resistant wild type taros (variety 'Bangkok' from Thailand and variety 'PH15' from Papua New Guinea) characterized by long stolons, many side shoots, and small white-fleshed corms. This resulted in F1 hybrids that were not suitable for commercial production because of their small corm size and white color. A second modified backcross using another Hawaiian commercial variety resulted in hybrids that were suitable for commercial production. The second strategy employed genetic crosses between a Hawaiian commercial taro variety and TLB resistant introduced taro cultivars from Palau & Micronesia with large corms, few suckers and no or short stolons. Suitable commercial F1 hybrids were selected from the resulting progeny. Three 'backcrossed hybrids' have been selected from cooperator field trials that are suitable for commercial production on wetland farms using strategy 1. All three 'backcrossed hybrids' were generated by a genetic cross with variety 'Niue waula' from Polynesia and 'Bangkok', then a modified backcross between selected F1 hybrids and variety 'Maui Lehua' from Hawaii. All three were shown to be highly TLB resistant and out yielded the standard commercial variety ('Maui Lehua') by at least 30 percent. The three were found to be equal in color and taste when made into poi (a commercial food product). These three 'backcrossed hybrids' are currently being incorporated into several farms as a partial replacement for 'Maui Lehua'. Several possible commercial hybrids have been selected for upland production. Fourteen hybrids were selected using strategy 1 with 2 sources of resistance (Bangkok, PH15) and 14 hybrids have been selected using strategy 2 with 4 sources of resistance (Pwetepwet, Thailand, P20, Sushi).

IMPACT

Two breeding strategies using traditional cross pollination procedures have successfully been employed to develop high yielding, taro leaf blight resistant hybrids for commercial wetland and upland production farms in Hawaii. Three hybrids developed using a modified backcrossing procedure are being increased and grown by several growers on the islands of Kauai, Maui and Hawaii. There should be a significant increase in production in the coming years when these hybrids are planted by more growers statewide.

SCOPE OF IMPACT - State and Pacific Islands

SOURCE OF FUNDING – Hatch, State funds, Grants

National Goal #2:

A safe and secure food and fiber system. To ensure an adequate food and fiber supply and food safety through improved science-based detection, surveillance, prevention, and education.

A report for Goal 2 will not be provided. The Hawaii POW for Goal 2 contains the following statement: "Hawaii's program under Goal 2 will be the Smith-Lever 3d Targeted program in Food Quality and Safety."

National Goal #3:

A healthy, well-nourished population. Through research and education on nutrition and development of more nutritious foods, enable people to make health promoting choices.

OVERVIEW

The 2003 Hawaii health survey reveals that more than half of Hawaii's adults are overweight or obese. Young people in the islands are also at risk: in some Hawaii communities, the rate of obesity in children ages 6 to 11 is twice the national average. About three-quarters of Hawaii residents don't 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, this team of extension agents brings its varied expertise to a wide range of projects that promote healthy eating and exercise habits, encourage safe food handling practices, and improve the access of limited-income households to good nutrition. From diabetes screening to home gardening tips, money management training to youth development, NEW unites diverse outreach elements that can influence food choices. In addition to educational resources developed by members of the college, the NEW Web site provides extensive links to nutrition-related information available from government and nonprofit sources.

NEW's team approach has been spearheaded by extension faculty, but the program's project roster includes research and instruction components as well, such as materials developed for young athletes by food science and human nutrition students. The collaborative projects developed under the NEW umbrella reflect partnerships not only within CTAHR but also with colleagues at mainland universities and local, state, and federal agencies. By linking projects and pooling resources, NEW enables more efficient outreach to improve the health and well-being of Hawaii's people.

An estimated 60,000 people in Hawaii rely on rainwater catchment systems for their sole source of drinking water. CTAHR initiated a project to address the needs of these people on rainwater catchment systems to provide information and support on maintenance, decontamination, testing, and improvements. Resources and assistance have been requested from and provided to several U.S. territories in the Pacific.

Previously established research and extension programs in the area of calcium nutrition (project 14-221 is reported in the multi-state extension projects section) for pre-adolescents, diabetes education (projects 20-072 and 22-070 are reported in the multi-state extension projects section), and nutrition for athletes continue.

Extension workers held 185 workshops, conferences, and educational sessions with 5,260 people attending. Three hundred and ten volunteers provided 1640 hours of volunteer time worth (at \$17/hour) \$27,880 towards accomplishing Goal 3.

CTAHR has 19 projects under the National Goal #3 in the CRIS database. We selected 2 projects from 2 key themes to highlight in this year's report. The major selection criteria are the quantifiable outcome and impact. We provide only the summary output data in this section, and will present outcome and impact information under individual key themes below.

Research results have been shared through refereed journal articles, abstracts, books and book chapters; theses, local, regional, national and international meetings, symposia and workshops; and an array of web pages. CTAHR faculty published 78 papers last year under goal 3.

Allocated Resources -- Goal 3:

Fiscal Year	Research Hatch Funds (\$)	Research State Funds (\$)	Research Other Fed & Non Fed Funds (\$)	Research Total Funds (\$)	Research Scientist Years (SY)
2005	46,001	95,155	1,975	143,132	0.48

Fiscal Year	Extension Smith-Lever Funds (\$)	Extension State Funds (\$)	Extension Other Funds (\$)	Extension Total Funds (\$)	Extension Faculty Years (FY)
2005	61,231	144,051	160,819	366,101	1.83

ASSESSMENT:

All units in the College of Tropical Agriculture and Human Resources are required to conduct regular performance evaluation of their faculty members. These reviews are conducted based on goals established during previous year's reviews. Since all faculty members with CTAHR

research FTE are required to establish their Hatch projects, regular performance evaluation serves a good vehicle to assess our progress toward the goals in our plan of work. CTAHR has made good progress in meeting these goals.

KEY THEME: Human Health

ISSUE OR PROBLEM (365H, 22-047, 22-048, 22-049, 22-070)

A NEW (Nutrition Education for Wellness) project was established to coordinate the many individual nutrition projects that are being conducted in and to a degree, outside the College. A NEW web site (<http://www.ctahr.hawaii.edu/new>) has been built upon existing web resources and continues to evolve. The project provides lectures for classroom teaching in nutrition, food safety, food security, and health. The Team works with agricultural partners to promote the consumption of locally produced fruits and vegetables. Developed an educational food guide concept that includes materials and training curriculum and presented to about 100 agencies and 300 consumers where 55% agree that it simplifies the Dietary Guidelines 2005 and My Pyramid 2005 into a practical and do-able mode. This program has provided educational opportunities to seniors, recipients of food stamps, sight-impaired, youth, and others. \$50,000 in “donations” for the execution of the program was secured.

IMPACT

Approximately 50% of participants stated an intention to try a lower fat dip/dressing. Approximately 70% of agency participants stated an intention to include fruits/vegetables, dips and water at future meetings. Approximately 30% stated an intention to include physical activities at future meetings. Improvement or increase of between 25 and 60% after training in areas such as: consumption of fruits and vegetables, healthy snacks, and healthy eating on limited income families.

SCOPE OF IMPACT - State

SOURCE OF FUNDING – Hatch, Smith-Lever, State funds, and Grants

KEY THEME: Human Nutrition

ISSUE OR PROBLEM (HAW00212-G)

The Healthy Foods Hawaii (HFH) community-based intervention: Formative research was conducted and results shared with communities in Waianae (Oahu) and North Kohala (Hawaii-Big Island) during community workshops in Oct 2004 and Feb 2005 using an interactive format to elicit community input about food types and behaviors thought to be contributing to overweight in the community. Two reports were developed and copies were provided to communities to share these results. A series of six target behaviors and foods were identified for inclusion in the intervention: snacks for children, beverages, condiments, meal planning, cooking methods, healthier meats. Graphic materials for display in stores, health centers and community

locations are being developed and tested. Baseline (pre-HFH intervention) data collection started in August 2005. Data will be used both for evaluation of the HFH intervention and testing of the PacTrac software. 24-Hour Dietary recalls and Client Questionnaires are being collected for mother:child pairs in the selected communities. Children are between the ages of 8-11 yrs. 43 of a planned 260 participants pairs have been interviewed. Preliminary data have been reviewed to ensure that intervention materials are accurately targeting exhibited food purchasing, preparation and consumption patterns among the study population. The Pacific Tracker (PacTrac) Dietary Assessment Tool: The software was tested with children and parents. Entry by the participants themselves, particularly children, using laptops and the PacTrac software program was not adequate for the goal of obtaining research quality data. The large number of foods on the database was another barrier to effective use. To facilitate data entry the food list was streamlined. The original USDA Interactive Healthy Eating Index (IHEI) food list was replaced by the Cancer Research Center of Hawaii food list. Subsequent data collection will use an interviewer-administered multiple pass 24-hour dietary recall method, with the food list initially hand-written by the interviewer. The dietary data will then be entered by project staff. The initial version of the PacTrac software, with modifications to enable capture of dietary data, was tested in a survey in the Commonwealth of the Northern Mariana Islands (CNMI) in June/July 2005. Para-professionals utilizing the software reported very favorably on the user-friendliness of the program. Subsequently foods and recipes collected from 2 Pacific Islands (Guam and Commonwealth of the Northern Marianas) have been added to the database (Version 3). Five other Pacific Island sites are also collecting food and recipe information for possible inclusion in the PacTrac database (American Samoa, Federated States of Micronesia, Hawaii, Palau, and Republic of the Marshall Islands). Discussions are underway to add nutrient composition data for Pacific Island foods, obtained from a variety of published references, to the database. Version 3 of the PacTrac is currently being used to analyze dietary data from both the HFH baseline evaluation and the CNMI survey.

IMPACT

Healthy Foods Hawaii: The development of the targeted food system intervention has used local artists, local designers and is guided by regular feedback from community members, ensuring that materials are culturally appropriate and address local concerns. The data collection efforts have also resulted in strengthened links between the project and local health care centers, who are involved in the recruitment and data collection activities. PacTrac: Pacific Islander users of the PacTrac, in its test format, have compared the program favorably with other dietary analysis software, particularly its potential nutrition education outputs for clients. With the modifications to the database and inclusion of additional island foods, the program is already able to provide more comprehensive dietary data analysis for Pacific Islander populations.

SCOPE OF IMPACT - State and national

SOURCE OF FUNDING – State funds, Grant

National Goal #4:

Greater harmony between agriculture and the environment. Enhance the quality of the environment through better understanding of and building on agriculture's and forestry's complex links with soil, water, air, and biotic resources.

OVERVIEW

Invasive species has been identified as the single greatest threat to Hawaii's economy and natural environment and to the health and lifestyle of Hawaii's people. Introduced pests already cause millions of dollars in crop losses, loss of potential production because of farmers' reluctance to plant certain crops, the extinction of native species, and the spread of diseases. Unwanted alien pests are entering Hawaii at an alarming rate—about 2 million times more rapid than the natural rate. Experts estimate that the economic impact of the brown tree snake if it becomes established in Hawaii is between \$400M and \$1.8B a year.

Some of the more recent or more noticeable invaders are the nettle caterpillar, coqui frog, erythrina gall wasp, little fire ant, and guava rust. CTAHR is cooperating with many agencies to deal with these species. One of the most obvious species is the Puerto Rican native, coqui tree frog. Though their impact on native insect species is still being debated, its greatest impact is its annoying night time mating call by the males. Because of the lack of natural enemies, and perhaps other reasons that are still being investigated, coqui frog populations in the dense subtropical forests are the highest found anywhere. CTAHR scientists have developed a hot water spray (115°F for 5 min) system that for both cut foliage and flowers and for potted plants that might be harboring the frogs or their eggs. Two functioning units have been built for use by commercial nurseries and several more are being built. This allows potted plants to be shipped interisland without having to individually inspecting each potted plant.

Research and extension efforts to promote harmony between agriculture and the environment continue to be a priority for CTAHR. Areas addressed by research and extension projects include: biological control of pests, integrated pest management, agricultural waste management, forest natural resource management, nutrient management, soil erosion, soil quality, handling hazardous materials, pesticide application, sustainable agriculture, and water quality.

As pesticides become more costly, increased concern for non-target impacts of pesticides, availability of better lures, traps and environmentally friendly pesticides, efforts to recycle, and other factors have created greater interest in IPM programs. The Hawaii Area-Wide Fruit Fly IPM program is beginning to wind down however, the program continues to expand to other islands (Molokai) and many other areas not in the original demonstration area. The USDA, however, is considering eliminating the sterile fruit fly male production in Hawaii and relocating it in California. If so, a major component of the program will be taken away. Innovative techniques, such as use of vermiculture as a means of disposing of dairy and cafeteria food wastes is being tested in Hawaii with excellent results.

Research and extension efforts into preserving, protecting, and renewing Hawaii's natural

resources continue to be an area of focus. Research into koa decline is being conducted to determine whether or not *Fusarium oxysporum* f.sp. *koa* is the fungus responsible for koa wilt which is a major component of this complex. Outreach efforts were made through an annual conference, demonstration sites, field days, printed materials, individual consultations, and a website (www.ctahr.hawaii.edu/forestry).

Extension workers held 64 workshops, conferences, and educational sessions with 780 people attending, towards accomplishing Goal 4. CTAHR has 85 projects under the National Goal #1 in the CRIS database. We selected 8 projects from 6 key themes to highlight in this year's report. The major selection criteria are the quantifiable outcome and impact. We provide only the summary output data in this section, and will present outcome and impact information under individual key themes below.

Research results have been shared through refereed journal articles, abstracts, books and book chapters; theses, local, regional, national and international meetings, symposia and workshops; and an array of web pages. CTAHR faculty published 168 papers last year under goal 4.

Allocated Resources -- Goal 4:

Fiscal Year	Research Hatch Funds (\$)	Research State Funds (\$)	Research Other Fed & Non Fed Funds (\$)	Research Total Funds (\$)	Research Scientist Years (SY)
2005	162,649	765,322	441,457	1,369,428	5.35

Fiscal Year	Extension Smith-Lever Funds (\$)	Extension State Funds (\$)	Extension Other Funds (\$)	Extension Total Funds (\$)	Extension Faculty Years (FY)
2005	78,689	668,600	602,499	1,349,787	8.09

ASSESSMENT:

All units in the College of Tropical Agriculture and Human Resources are required to conduct regular performance evaluation of their faculty members. These reviews are conducted based on goals established during previous year's reviews. Since all faculty members with CTAHR research FTE are required to establish their Hatch projects, regular performance evaluation serves a good vehicle to assess our progress toward the goals in our plan of work. CTAHR has made good progress in meeting these goals.

Key Theme: Agricultural Waste Management

ISSUE OR PROBLEM (HAW00513R, 12-503, 16-914)

Livestock operations add more pollutants to U.S. rivers, lakes, and coastal waters than any other activity. Waste from dairies represents a particular challenge because it contains milk fats that resist breakdown by biological treatment systems. In a separate project, Extension agents are involved in a demonstration vermiculture system to evaluate the feasibility of using worms to compost dairy cow manure. A large scale bin was purchased to demonstrate it on a farm scale level. The worm casts will later be used as an added value product (soil amendment) and as a potential control for root-knot and reniform nematode control. (513R, 12-503, 16-914)

IMPACT

Researchers have designed an innovative system to treat dairy wastes cheaply, quickly, and effectively. An energy-efficient demonstration system at CTAHR's Waialeale Research Station on Oahu's North Shore is four times faster than conventional treatment and removes 90 percent of dairy wastewater contaminants. The waste treatment system has a handful of advantageous traits that its creators refer to as "the five C's": clean water, clean air, clean energy, compact design, and cost-effectiveness. The system also excels at a sixth C, competition—the plan for the new technology has been recognized in national and international contests and was awarded Best Plan Overall in the 2005 Social and Environmental Technology Inventors Challenge. The vermiculture project is continuing and showed that one pound of worms increased to 500 pounds in 3 months. Because of the early success, other demonstration bins have been initiated at a slaughter house where the worms will be used to compost offal, and at a charter school where the worms are being used to compost school lunch wastes. The use of vermiculture was accepted by the Hawai'i State Department of Health, Vector Control Division, as a best management practice for fly prevention in island dairies.

SCOPE OF IMPACT – State, National and International

SOURCE OF FUNDING – Hatch, Smith-Lever, State funds, US EPA, and Grants

KEY THEME: Hazardous Materials

ISSUE OR PROBLEM (HAW00522-H)

Analytical procedures and mitigation technologies are important tools for emergency responses to intentional threatening, risk evaluation, and hazard mitigation and remediation. We have developed new extraction and analysis procedures of explosives, pesticides and persistent organic pollutants. We have also employed those procedures for various environmental monitoring applications. We have studied various remediation technologies, which include microbial degradation, zero-valent iron reduction and photolysis. The mechanisms by which oxidative enzymes may degrade chemicals have been extensively investigated. We continue to collaborate with HEER (Office of Hazard Evaluation and Emergency Response) personnel on emergency responses to cases that have occurred during the report period, including cases where possible weapons of mass destruction were suspected. A total of 157 samples were analyzed within the reporting period. We have improved the training course titled "All Hazards Field

Sampling and Categorization". A workshop (January 25-26, 2005) was conducted to train 30 personnel from Fire Department Hazardous Material Units in Maui on responses to a situation where chemical and biological weapons of mass destruction are suspected. The production of the training video is in progress with incorporation of hands-on exercises filmed in Hilo. We participated in the removal of the Hilo Burrito chemical contaminated site in Hilo, Hawaii.

IMPACT

New methods have been developed for rapid extraction and measurement of toxic chemicals in various matrices, and are useful for emergency responses, risk assessment and responses to threats. In addition to further understanding of bioremediation mechanisms, new abiotic and biotic mitigation technologies were developed for cleanup of contaminated sites. A workshop was conducted to train 30 personnel from Fire Department Hazardous Material Units in Maui on responses to a situation where chemical and biological weapons of mass destruction are suspected.

SCOPE OF IMPACT – Local, state, and national

SOURCE OF FUNDING - Hatch, State funds, and Grants

KEY THEME– Integrated Pest Management

ISSUE OR PROBLEM

The Hawaii Area-Wide Fruit Fly IPM program has focused on mitigating losses caused by fruit fly species for the past 5 years in selected demonstration areas on all major islands. By focusing efforts in a specific area and getting all those who farm within the area to adopt the IPM practices recommended the project has shown that fruit fly damage can be dramatically reduced. Through word-of-mouth of the success of the program, workshops, and displays at community events, many farmers and communities, and homeowners not included in the original demonstrations want to participate.

IMPACT

Over 300 cooperators, and growing, follow the recommendations of the Area-Wide Fruit Fly IPM program. Examples of economic impacts include: 1) Zucchini farmers increased their profitability between \$4,600 to \$6,300 per acre by adopting the program when considering increased production, expanded markets, lower cost of production and including the cost of implementing the program. 2) Cost-benefit analysis of persimmon farming estimated the net increase in income from an acre of persimmon to be about \$900 per acre. 3) A 110 acre citrus farm reduced his cost of insect control with insecticides from \$320,000 that resulted in a 5.5% fruit rejection rate from all causes to \$7,200 for his cost of lures, traps and servicing them that resulted in losses to fruit fly between 1 to 2 %. An added benefit for not using insecticides, biological control solved his other insect pest problems.

SCOPE OF IMPACT – State

SOURCE OF FUNDING - State funds, and Grants

KEY THEME – Integrated Pest Management

ISSUE OR PROBLEM (16-904, 16-905, 16-911, 16-914, 16-924, 16-928, 16-930, 16-931, 16-932, 16-933, 16-934, 22-052)

Year round growing conditions in Hawaii also make it ideal for pests of all kinds to be significant obstacles for agriculture and urban horticulture. Pests, especially new introductions, become established very quickly because of the lack of natural enemies and become serious problems. Activities include: Educational workshops, in-field demonstrations, 11 articles on a variety of pests of tropical fruits and nuts in Pacific Nut Producer, four extension bulletins, one combination poster, brochure, field guide on banana bunchy top virus, one newspaper article, 15 community workshops on controlling manure flies, banana bunchy top virus, and IPM training in urban horticulture. Diamondback moths (DBM) populations on Oahu, Maui, and Hawaii were monitored for resistance to emamectin, indoxacarb and spinosad. Most of the farms that grow cruciferous crops on the Big Island and Maui participate in and adhere to the Diamondback Moth Insecticide Resistance Management program. An annual State IPM workshop was held to bring the latest progress in IPM research and projects statewide.

IMPACT

The program on Maui and Hawaii (where populations are resistant to indoxacarb) has successfully avoided resistance to emamectin and spinosad. This kind of information is critical for DBM management by specific location. An “Integrated Pest Management Advisor” certificate program was developed on Maui for the landscape, golf course, and plant nursery industries that involved 30 hours of instruction. Through this instruction, knowledge on IPM principles increased by an average of 80% by the 24 individuals going through the program. A small group of farmers adopted the practice of picking and destroying pikake lei flowers infested with blossom midge and was able to reduce losses from as high as 100% to negligible losses without any insecticides. Twenty-five flower growers on Oahu have adopted one or more IPM practices recommended by their county agent. Growers have focused on monitoring, controlling weeds to eliminate reservoirs of many insect pests, pesticide rotation for those pesticides that they do spray, and replaced the use of broad spectrum insecticides with environmentally safe IGR’s. Participants in the BBTV workshops and Urban Horticulture IPM class series increased their level of IPM knowledge and awareness as a result of the training. Twenty-seven percent of home gardeners attended IPM classes used less toxic pesticides if that had to spray.

SCOPE OF IMPACT - State

SOURCE OF FUNDING – Smith-Lever, and State funds

KEY THEME – Integrated Pest Management

ISSUE OR PROBLEM (20-033)

Earlier research in which CTAHR had a major role in developing two cultivars of genetically engineered (GE) papayas, Rainbow and SunUp, which are resistant to the papaya ringspot virus. Japan, however does not currently accept GE produce. Kapoho Solo, which is not GE during the 2001 to 2005 period, would be totally diseased within 2 years of planting and would result in more than 50% reduction in yield for the duration of the orchard (typically 3 ½ years after planting) . A project in cooperation with the Hawaii Department of Agriculture funded by the State and Smith Lever funds established a “quarantine zone” of about 350 acres in which Kapoho Solo would be grown for the Japan market. The area surrounding it would be grown in GE papayas to serve as a buffer. Personnel monitored, and marked any PRSV infected plants within the zone for the grower to destroy.

IMPACT

For 4 years, papaya ringspot virus was kept to the minimum within the “quarantine zone” which allowed growers to continue to produce virus susceptible non-GE papayas for shipping to Japan. With this effort, a conservative estimate of \$7.1M of papaya exports to Japan was saved.

SCOPE OF IMPACT – Hawaii

SOURCE OF FUNDING - Smith Lever, State funds

KEY THEME – Pesticide Application

ISSUE OR PROBLEM (16-907, 16-921)

Sixteen and a half hours of classroom training were provided to 131 pesticide applicators statewide. Training was conducted on Kauai, Oahu, Molokai, Maui, and the Big Island. An unknown number of study packets or individual items were viewed or downloaded from the Pesticide Safety Education website. Pesticide safety topics were presented to 30 master gardeners and to agricultural trainees from the Philippines. Four quarterly issues of the Pesticide Label were published. Approximately 500 copies of the 12-20 page newsletters were sent to applicators. An unknown number of applicators accessed the newsletter via the Pesticide Safety Education website. Major revisions were made to two study guides: Pesticides and RCRA, the Resources Conservation and Recovery Act and the Pesticides and HEPCRA, the Hawaii Emergency Planning and Community Right-to-know Act. Eleven recertification articles were published in the Pesticide.

IMPACT

Applicators reported that they adopted 161 pesticide safety practices and intended to adopt another 40 safety practices. Evidence that the Pesticide Label is an important source of information for applicators was provided by the fact the HDOA reported that 109 applicators obtained over 233 recertification credits by taking quizzes based on articles in the newsletter.

SCOPE OF IMPACT - State

SOURCE OF FUNDING – Smith-Lever, and State funds

KEY THEME: Soil Quality

ISSUE OR PROBLEM (HAW00826-S)

In 1975 at the peak of the oil crisis, national economies worldwide contended with high costs of fossil fuels. The nitrogen-fixing symbiosis between legumes and rhizobia was recognized as an attractive, low-cost alternative to petroleum-based nitrogen fertilizers for increased crop production in the tropics. The United States Agency for International Development (USAID) drew on expertise in the University of Hawaii's College of Tropical Agriculture and Human Resources. NifTAL was dedicated to the application of technologies based on BNF to international development goals. NifTAL's ultimate purpose was to help farmers maximize BNF inputs to their cropping systems, and thereby increase the production and quality of high protein foods while reducing their dependence on expensive nitrogen fertilizers. NifTAL was designated a UN Microbiological Resource Center (MIRCEN); rhizobial germplasm resource was collected and tested for symbionts for 50 target legumes. A network of more than 200 collaborators participated in NifTAL's International Network of Legume Inoculation Trials (INLIT) to conduct standardized experiments in countries around the globe. This effort verified the benefits of legume inoculation in many parts of the tropics. From 1982 to 1986, NifTAL developed appropriate BNF technologies for tropical agriculture. Technology transfer and training activities increased, particularly those related to production and use of inoculants. In 1983, the BNF Resource Center (BNFRC) for South and Southeast Asia was established to extend NifTAL's efforts through a regional center. NifTAL also initiated WREN, the Worldwide Rhizobial Ecology Network of select researchers to conduct standardized field trials to link the response to inoculation to measurable environmental parameters. One of NifTAL's major accomplishments was the development of models to predict when, where, and to what extent legumes will respond to inoculation. NifTAL also strengthened its capacity to transfer BNF technology to extension personnel, and thereby forged another conduit through which NifTAL expertise can serve developing country farmers. NifTAL was instrumental in the establishment of inoculant production facilities throughout the tropics, and developed tools for more efficient and economic inoculant production and quality control. The Future. 1) A continued commitment to meeting the needs of the US and developing country inoculant production industry, with increased emphasis on serving the private sector through improved production, quality control, distribution, and promotion of inoculant products. 2) The integration of NifTAL's legume management research into information synthesis through simulation models and decision support systems. 3) Increased collaboration with CGIARs to provide regional BNF expertise and augment resources. 4) New training and communications efforts to meet a broader spectrum of clients in nutrient management, technology extension through private voluntary organizations and nongovernment organizations, and market and enterprise development. 5) Emphasis on assessments of the economic impacts of BNF technologies on national scales.

IMPACT

NifTAL programs had an impact in many places around the world. Below is an economic impact assessment from an integrated program of research, training and facilities development on the production of soybean in Zambia. This data is typical of NifTAL impact in other

locations. NifTAL's Zambia program was a joint effort with the University of Illinois ZAMARE Project (USAID/Zambia) consisting of four years of technical assistance, research, facilities design and inoculant market development. Results represent increases in farm income due to inoculation of soybean. Results calculated by average response to inoculation and yearly price data. Year Area Production Increased Value (ha) (90 kg bags) \$ U.S. 1984: 6,550 131,031; 1985: 7,069 141,386 532,005; 1986: 5,983 119,666 509,048; 1987: 9,542 190,848 993,937; 1988: 9,145 182,916 1,229,196; 1989: 11,906 238,134 2,639,054; 1990: 20,000 488,889 5,648,136; 1991: 22,786 455,716 5,756,412. TOTAL 92,981 1,948,558 \$37,248,652.

SCOPE OF IMPACT - State, National, and International

SOURCE OF FUNDING – State funds, U.S.AID.

KEY THEME – Sustainable Agriculture

ISSUE OR PROBLEM (18-805, 16-904)

Fertilizers are important for plant growth and insuring a profitable yield. However they are expensive and excessive use can cause plant injury and contaminate underground water sources, streams, and coastal zones. Farmers need to be educated on determining how much, what kind, and when to apply fertilizers. Workshops were conducted to train county agents, on farm demonstration trials (8) to evaluate current recommendation procedures, how to sample soil and plant tissue and how to interpret fertilizer recommendations.

IMPACT

Twenty-one county agents (of 23 agricultural county agents in Hawaii) were trained and increased their knowledge in soils and nutrient management. They have a better understanding of how soil type affects fertility and how different soil types determine the nutrient management strategy. Farmers who are cooperating with the on-farm demonstrations have seen, first-hand, that they can reduce fertilizer inputs and still maintain high yields if they base their fertilization on soil test results. By following our fertilizer recommendations, they increase profitability and reduce potential harm to the environment. The four largest growers of macadamia representing 70% of the macadamia orchards in Hawaii have adopted the use of soil and leaf tissue analysis to drive their fertilization program. Phosphorous induced iron toxicity and severe boron deficiency has been virtually eliminated by those using soil and tissue analyses to determine their fertilizer applications.

SCOPE OF IMPACT - Hawaii, Pacific Islands

SOURCE OF FUNDING – Smith-Lever, and State Funds

Goal 5:

Enhanced economic opportunity and quality of life for Americans. Empower people and communities, through research-based information and education, to address economic and social challenges facing our youth, families, and communities.

OVERVIEW

Hawaii is one of the most cosmopolitan states in the country with no single ethnic or national group making up a majority of the State's population. Although the largest groups have been traditionally Asian, Pacific Islanders, and Caucasians, there has been a recent influx of Latin Americans. Uniformed military personnel and their families make up about 10.6% of Hawaii's population. Hawaii's urban population, based on the 2000 Census, makes up 91.6% of the population as compared to the 79% for the United States. Research and extension efforts continued to provide economic, quality of life opportunities for the unique population characterized above. Programs targeted youth development, youth and families at-risk, family resource management, urban communities, and rural community sustainment.

Extension workers held 168 workshops, conferences, and educational sessions with 12,862 people attending. Eight hundred and ninety-nine volunteers provided 58,996 hours of volunteer time worth (at \$17/hour) \$1,002,932 towards accomplishing Goal 5. CTAHR has 21 projects under the National Goal #1 in the CRIS database. We selected 3 projects from 3 key themes to highlight in this year's report. The major selection criteria are the quantifiable outcome and impact. We provide only the summary output data in this section, and will present outcome and impact information under individual key themes below.

Research results have been shared through refereed journal articles, abstracts, books and book chapters; theses, local, regional, national and international meetings, symposia and workshops; and an array of web pages. CTAHR faculty published 25 papers last year under goal 5.

Allocated Resources -- Goal 5:

Fiscal Year	Research Hatch Funds (\$)	Research State Funds (\$)	Research Other Fed & Non Fed Funds (\$)	Research Total Funds (\$)	Research Scientist Years (SY)
2005	197,619	196,093	0	393,712	2.90

Fiscal Year	Extension Smith-Lever Funds (\$)	Extension State Funds (\$)	Extension Other Funds (\$)	Extension Total Funds (\$)	Extension Faculty Years (FY)
2005	259,185	1,244,471	13,481	1,517,137	17.30

ASSESSMENT:

All units in the College of Tropical Agriculture and Human Resources are required to conduct regular performance evaluation of their faculty members. These reviews are conducted based on goals established during previous year's reviews. Since all faculty members with CTAHR research FTE are required to establish their Hatch projects, regular performance evaluation serves a good vehicle to assess our progress toward the goals in our plan of work. CTAHR has made good progress in meeting these goals.

KEY THEME: Children, Youth & Families at Risk

ISSUE OR PROBLEM (HAW00372-H)

Women incarcerated in a community residential transition program were interviewed regarding their community and family backgrounds, developmental histories and experience with the criminal justice system. Data were analyzed to identify developmental risk factors and family/community resources that might be related to crime, incarceration, and recidivism. Various risk factors were found to be common in the developmental histories of the incarcerated women interviewed for this study. Many reported coming from families where other family members were involved in the criminal justice system. During their childhood (ages 1-12), most (over 50%) experienced violence in the home, had been sexually abused, had run away from home. The difficulties these women experienced in childhood tended to continue and appeared compounded by others in their teen years. During their teen years (ages 13-17), these women engaged in various risky behaviors: many dropped out of school; most used alcohol or other drugs, became pregnant in their teens, and experienced domestic violence. Other risk factors or difficulties were reported to be common in adulthood (ages 18 and older): many experienced being homeless; most reported illegal activities and loss of family members. Though still never-married, most of the women were already mothers of one or more children by/at the time of the interviews. Native Hawaiians tend to be over represented in the criminal justice system of Hawaii. This study found that while Native Hawaiians and non-Hawaiians reported similar risk factors, these negative life experiences generally occurred at an earlier age for Hawaiian than non-Hawaiian women. These incarcerated women reported use of various resources to improve their lives. Most had received professional counseling or therapy for emotional problems, participated in self-help groups, educational programs, or live-in drug treatment programs.

IMPACT

Preliminary findings describing Hawaii's incarcerated women were presented at a Kamehameha Schools Research Conference on Hawaiian Well-Being in Hilo, Hawaii, in October, 2004. This report was later included in the Conference Proceedings made available online. These reports are expected to increase the knowledge and understanding of educators, community/social service providers and policy makers in the State of Hawaii. Project findings on incarcerated women's

developmental risk factors and resources were presented at the Annual Conference of the American Association of Family and Consumer Sciences, in Minneapolis, June, 2005. This paper, entitled 'Incarcerated Women's Developmental Risk Factors and Resources', was accepted for future publication in the AAFCS Proceedings. These reports are expected to increase the knowledge and understanding of researchers, educators and policy makers at the national level. Project staff provided information and consultation to newspaper reporters (related to articles published in two newspapers), community/social service agency workers (e.g., Girl Scouts), and government representatives (e.g., Hawaii State Senator Brian Kanno). In partial recognition of expertise, contributions and potential impacts, one of the project investigators was appointed to serve on the Hawaii Task Force on Children of Incarcerated Parents which was established by the Hawaii Legislature (SCR128 SD1) in 2005.

SCOPE OF IMPACT - Local, State and National

SOURCE OF FUNDING – Hatch, State funds

KEY THEME – Community Development

ISSUE OR PROBLEM (22-040, 20-025, 20-063, 23-042)

CTAHR maintains active urban garden extension activities and Master Gardeners' (MG) program in all four counties. The island of Hawaii, because of its size maintains two MG program, one in Hilo and the other in Kona. The Pearl City Urban Garden Center (PCUGC) is the flagship of the College's urban horticulture effort with about 140 volunteer MG's. Active MG programs are also conducted on Maui and Kauai islands.

IMPACT

The PCUGC consistently draws over 12,000 contacts (garden visits, phone calls, garden clinics and workshops, classes, and letters) each year and is considered an important source of gardening information for all residents of Oahu. Many come to see the how ground covers, turf, and other plants look like and compare to help them make decisions on what to plant. The MG on Oahu volunteer over 12,000 man hours each year manning the Gardening Helpline, maintain the facilities, serve as hosts and guides for numerous class visits by school children, and other visitors, propagation and distribution of plant materials, hold classes for home gardeners, and many other activities. The MG's on Kauai, Maui, and Hawaii volunteer an additional 3,000 hours of time. This effort relieves county agents who otherwise would be responding to these urban gardening questions so they can utilize their time on other priority areas. This alone saves the College an estimated \$51,000 in county agent's time. The MG's also have plant sales to support their programs and support CTAHR's urban garden centers where they are located.

Scope of Impact - State

Source of Funding - Smith Lever, Private, State Funds

KEY THEME – Youth Development

ISSUE OR PROBLEM (06-363, 14-206, 20-038, 20-040, 20-045, 22-023)

Outreach efforts have been conducted to involve youth and volunteers in our 4-H Youth Development Program through the three basic delivery modes: Traditional 4-H club program; 4-H Special Interest programs; and 4-H School Enrichment programs. Total program outreach: 16,068 youth; 1,001 adult volunteers. To provide youth an opportunity to develop leadership skills, practice citizenship, and gain life skills, 4-H programs were implemented in all communities and counties throughout the islands. These included 4-H Demonstration/Speak Up Days; Fashion Revues; Christmas Parades; Community Service projects (Hero Packs); Community Fund-Raising projects; 4-H Recognition events for 4-H volunteer leaders and 4-Hers; County Fairs; Food Shows; Leadership Training Retreats; Record Keeping/4-H Portfolio workshops; State 4-H Ahaolelo Leadership Conference; State Youth/Adult Partnership Training; etc. Recruitment of new 4-H members is a continuous activity by all members, volunteers and staff. The 4-H Juried Curricula were used to strengthen the capacity of volunteer 4-H leaders in all counties/communities.

IMPACT

4-H Youth Development staff was able to secure a number of grants during the fiscal year totaling \$314,500 to support their many programs. Grants were for activities such as: Engaging Youth Serving Rural Communities, 4-H After School Grant, All Terrain Vehicle Safety Grant, Youth/Adult Partnerships, 4-H Military Grant, Networking, Collaborating, and Partnering for Effective Family and Community Programs, “KAMP” (Kindergartners Are Most Precious), National 4-H Congress – Scholarship, and Support for State Delegates to 2004 National 4-H Congress.

Kauai Great Weigh Out. Over 45 youth and 100 adult participants learned skills to incorporate more daily physical activity and consume more fruits and vegetables through classes and activities. 48% of participants in previous programs have indicated maintaining the program on their own, six months after the eight week period.

Operation Military Kids. Seventy-nine military kids (of civilian National Guard families deployed to Iraq) participated in 4-H youth development programs as a result of the mini-grants received by three 4-H groups on Kauai. A survey at the end of the project showed that they are now aware of what 4-H members learn in their projects. Some military youth expressed an interest in participating in 4-H programs in the future.

Engaging Youth Serving Communities 4-H After School Program: A staff person at Kalaheo School A Plus program with the assistance of two 4-H teens met weekly with 37 4th and 5th graders. By the end of the school year, all 4-H grade levels were providing some 4-H enrichment activities in their after school program. Kalaheo School After School program will continue to utilize the 4-H curriculum to enrich their programs. During the summer, a day camp was held utilizing the Fodos & Nutrition and Theatre Arts 4-H Juried Curriculum.

Scope of Impact - State

Source of Funding – Smith-Lever, State, Grants

B. Stakeholder Input Process

CTAHR did not make any major changes to its method of seeking stakeholder input since 2002. Stakeholder input is vital to enable CTAHR to meet its land grant mission.

Actions Taken to Seek Stakeholder Input and Encourage Their Participation. Research, extension and education faculty within the College of Tropical Agriculture and Human Resources (CTAHR) represent a wide array of disciplines at University of Hawaii at Manoa (UHM). Their scope of impact reaches stakeholders at the local, state and national levels. In an effort to solicit input from these stakeholders, there are several levels of participation which directly result in opportunities for discussion necessary for continual advancement toward recommended program goals. CTAHR has a Board of Advisors, chosen from various stakeholder groups and appointed by Dean for five-year term, which provides inputs on strategic issues facing our college. Each department, and county has its own advisory board to address local issues. To establish Hatch or extension projects, our faculty member must identify stakeholders their projects are serving, and how inputs are solicited from these stakeholders. Inputs from stakeholders were used to formulate and implement research and extension projects.

Process Used for Identifying Stakeholders and Approach Used to Collect Input from These Groups: Hawaii has approximately 30 statutorily appointed commodity commissions and grower organizations. Most of these have research committees. The membership of these groups provides a rich source of engaged individuals from the natural resources community. Hawaii has active environmental, consumer, and community organizations. These organizations provide a broad perspective for input to the management of the college.

How Input Was Considered: Pertinent feedback is received from various stakeholders on a wide range of research and extension program initiatives which are currently in progress. As a result of the input received, CTAHR faculty modify work plans to improve the design of research projects and provide specific opportunities for continued feedback. Information is disseminated to communities through newsletters, local newspaper coverage, and radio programs. Administrators and faculty use input to prioritize resource allocations, inform other researchers and policy makers of trends and concerns. Recommendations from various advisory boards represent key constituent views, and are useful in the developing research and extension programs which reach the communities we serve. Input from the CTAHR Board of Advisors is considered at the strategic level. In 2005, the Board's input helped shape the new 2005-2010 Strategic Plan for CTAHR.

Examples of research and extension projects that were recently initiated are provided below.

- The Hawaii Caregiver Coalition, a cooperative agreement between AARP Hawaii Chapter and the U.S. Administration on Aging, and the Cooperative Extension System have identified the needs of grandparents caregivers a priority. As a result, the Integrated Project HAW00359-H entitled "Examination of Cultural Contexts of Grandparents Raising Grandchildren" was developed.
- Surveys of high school and college students indicated that only 10% received any formal financial education and that a significant percentage reported significant financial problems

related to education-related debt. As a result, the Integrated Project HAW00362-H (Peer-Education Financial Literacy Project) was initiated to identify a more in-depth financial education needs of college students to develop a follow-on financial education program for college students.

- A group of parent educators, counselors and family therapists from Kaiser Permanente, The Family Education Centers of Hawaii, psychology private practices and the University of Hawaii met to discuss the needs of the large numbers of dual worker, time-pressed, multi-ethnic and military families in Hawaii, who are dealing with these stresses. This resulted in the Integrated Project HAW00377H (Development and Evaluation of a Family Education and Conflict Resolution Program Target at Deployed Military and Other At-Risk Families).
- The Sustainable Farming Group, a loosely formed network of farmers and others interested in organic and sustainable farming systems, has been asking for greater CTAHR research and development of sustainable practices suitable for Hawaii growing conditions. This resulted in Extension project 18-818 (Organic Amendment Experiments to Improve Nutrient and Biological Cycles in Vegetable Farms) being initiated.

C. Program Review Process

There have been no significant changes in our program review processes since our 2004 Plan of Work Annual Report was submitted.

D. Evaluation of the Success of Multi and Joint Activities

The UHM currently has 30 scientists who contribute to 27 multistate projects under the five National Goals. Each multistate project submits an annual report on the group's activities, accomplishments and plans for the future. CTAHR makes no attempt to evaluate any of the multistate research activities as that is accomplished through the efforts of the scientists and administrative advisors in each of those programs. The Western Research Coordination and Implementation Committee is responsible for evaluating each new or revised proposal for projects, and the AES directors approve or disapprove of them based on recommendations from the RCIC.

The College of Tropical Agriculture and Human Resources contributes to 27 multistate projects:

- National Goal #1 (NC-1131, NE-1008, NRSP-8, S-9, SCC-80, W-6, W-112, W-173, W-1004, W-1185, W-1186, WERA-20, WERA-1004, W_TEMP1621, W_TEMP1622)
- National Goal #2 (S-1007, W-1045)
- National Goal #3 (W-1003)
- National Goal #4 (S-1000, W-1128, W-1170, W-1190, WERA-103, WERA_TEMP1841)
- National Goal #5 (NC-1030, NE-167, WERA_TEMP1081)

CTAHR is actively encouraging our scientists to participate in multistate activities. We continue

to monitor our progress.

Strategic Issues Addressed:

The multi and joint activities have successfully addressed CTAHR's strategic goals of promoting diversified agriculture, sustaining Hawaii's natural resources and environment, and strengthening communities. CTAHR's strategic goals are directly related to National Goals 1, 3, 4, and 5. We have initiated several new projects, including blueberry production, tea production, and biomass energy program. The first two projects are aiming to develop new industry to boost local agricultural industry, and the biomass energy program intends to utilize under-utilized farm land to solve local energy need.

Underserved and Underrepresented Populations Served:

CTAHR's integrated projects have made significant progress in serving ethnic groups and cultures that often are not sufficiently served by most federal programs. One example is highlighted below:

A farm safety program specifically targeting underserved farmers (immigrant farmers from countries such as the Philippines, Laos, Cambodia, Korea, and Tonga) is being conducted statewide. It was recognized that many immigrant farmers speak varying amounts of English as their second language and are at risk, especially in the area of pesticide safety. Outreach is conducted through a variety of methods such as small group meetings, individual on-farm consultations and assistance, bilingual training materials in their native language, and workshops on IPM, pesticide use, handling and storage, how to recognize common pests of the crops they grow.

Program Outcomes and Impacts Achieved:

Overall, our programs are producing valuable outcomes and impacts for our stakeholders and represent sound investments of federal appropriation. We were able to obtain additional funding from non-federal sources to support our programs. This is a reflection of the credibility and productivity of our programs.

Improvements in Program Effectiveness and Efficiency:

The brief descriptions of the integrated projects above highlight how our programs address our strategic issues, serve underserved and underrepresented populations, and impact our stakeholders. Furthermore, our programs increase their efficiency and effectiveness, which ultimately results in profitable and sustainable agriculture and strengthened rural communities.

E. Multistate Extension Activities

Form CSREES-REPT (09/04) – See Below

The College of Tropical Agriculture and Human Resources (CTAHR) received an exemption

from meeting mandated multistate extension requirements provided under Section 105 of the Agricultural Research, Extension, and Education Reform Act of 1998 (AREERA) for FY2002 through 2004 on November 15, 2005. CTAHR was encouraged to show “good faith” efforts to comply with the law in the future. Although the exemption was received after the close of FY2005, the College has several examples of multistate extension activities to report for this period. The administration is taking this matter seriously and working towards involving more extension specialists in multistate research projects with the objective of expanding the extension component to these research efforts.

The College is also involved in many other “unofficial” multistate extension activities. These include exchange of faculty, resources, informal meetings, attendance of workshop and other activities where a formal agreement is not in place. We are working towards formalizing some of these activities. We are also expanding our efforts to collaborate with our Pacific island partners and share our expertise in many areas. Much of this already is taking place.

F. Integrated Research and Extension Activities

Form CSREES-REPT (09/04) – See Below

University of Hawaii at Manoa has a unique organizational approach that integrates research, extension and credit education programs. All faculty in the statewide branch stations and extension offices have an academic home in a campus department. They are full members of the department faculty and are fully enfranchised in the departments, colleges and university. For example, extension faculty who are stationed in a county hold an academic appointment in a department and fully participate in promotion and tenure activities of the department. They hold tenure track and professorial positions. They are fully represented in the Faculty Senate of the university. They plan and implement education (both academic and extension) and research programs in a fully integrated fashion.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Actual Expenditures of Federal Funding for Multistate Extension and Integrated Activities

(Attach Brief Summaries)

Fiscal Year: 2005

Select One: Interim Final

Institution: University of Hawaii, Manoa

State: Hawaii

	Integrated Activities (Hatch)	%	Multistate Extension Activities (Smith-Lever)	%	Integrated Activities (Smith-Lever)	%
<i>Established Target %</i>	18	%	4	%	8	%
<i>This FY Allocation (from 1088)</i>	1,227,269		1,203,217		1,203,217	
<i>This FY Target Amount</i>	215,999		48,129		91,444	
Title of Planned Program Activity						
111H Community Business Matching	\$27,955					
228R Parent & Household Influences on Calcium Intake Among Preadolescents	1,861					
257R Stress Factors of Farm Animals & Their Effects on Performance	6,672					
266H Best Management Practices for the Sustainable Productivity of Hawaii's Range & Pasture Lands	8,228				18,989	
353H Curriculum Innovations for At-Risk Preschoolers	18,819					
356H Nutrition Education for Wellness (N.E.W.): Models for Promoting Healthy Behaviors	7,275					
359H Examination of Cultural Contexts of Grandparents Raising Grandchildren	11,294					
362H Peer-Education Financial Literacy Project	5,514					
372H Incarcerated Parents: Adjustment of Their Children & Families	58,192				5,318	
373H Understanding the Well-Being of Hawaii's Families	3,781					
377H Resolution Program Targeted at Deployed Military & Other At-Risk Families	11,437					
378R Family Business Viability in Economically Vulnerable Communities	23,077					
512H Biotreatability Studies for the Application of Bioremediation to Hydrocarbon Contaminated Soils	8,263					

U.S. Department of Agriculture
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Fiscal Year: 2005

Select One: Interim Final

Institution: University of Hawaii, Manoa

State: Hawaii

		Integrated Activities (Hatch)	%	Multistate Extension Activities (Smith-Lever)	%	Integrated Activities (Smith-Lever)	%
<i>Established Target %</i>			%		%		
<i>This FY Allocation (from 1088)</i>							
<i>This FY Target Amount</i>							
Title of Planned Program Activity							
513R	Animal Manure & Waste Utilization, Treatment and Nuisance avoidance for a Sustainable Agriculture	18,794					
522H	Identification & Remediation of Hazardous Substances to Safeguard Human & Environmental Health	0				4,537	
822H	Weed Management in Sustainable Tropical Cropping Systems	29,163				19,785	
833H	Optimizing the Soil Environment for Diversified Crops in Hawaii	16,830				24	
863H	Optimizing Nutrition from Animal Manures for Hawaii Vegetable Farms	4,143				5,015	
874H	Developing Taro as an Alternative Food & Ornamental Crop	10,825				2,241	
886H	Light Manipulation for Flowering of Orchids	4,816					
903H	Molecular Detection, Characterization, & Management of Phytoplasma Associated with Watercress Yellows	4,779					
908H	New Production Practices for Anthurium	\$11,700					
910H	Pests of Tropical Fruit & Nut Crops: Integrated Pest Management	9,829					
914H	Preservation, Characterization & Genetic Improvement of Hawaiian Taro	17,669					
935H	Biology & Management of Invasive Ants in Hawaii	23,952					

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Fiscal Year: 2005

Select One: Interim Final

Institution: University of Hawaii, Manoa

State: Hawaii

		Integrated Activities (Hatch)	%	Multistate Extension Activities (Smith-Lever)	%	Integrated Activities (Smith-Lever)	%
<i>Established Target %</i>							
<i>This FY Allocation (from 1088)</i>							
<i>This FY Target Amount</i>							
Title of Planned Program Activity							
943H	Pineapple Cultivation & Production in Hawaii	15,757					
947H	Etiology & Management of Coffee Anthracnose in Hawaii	4,437					
969H	Determining the Technical & Economic Feasibility of Incorporating Microbial Treatments into Current Anthurium Production Systems	11,946					
12-503	Polluted Runoff Control for Waialeale Livestock Farm					1,458	
14-202	Enhancing Conception Rates in Dairy Cows Under Heat Stress Conditions by Determining the Chemical Constituents of Cervical Mucus at Estrus			12,056			
14-204	Best Management Practices for the Sustainable Productivity of Hawaii's Range and Pasture Lands					2,974	
14-221	Parent & Household Influences on Calcium Intake Among Preadolescents			1,355			
16-902	Developing Insect Identification Guides & On-Farm IPM Training for Banana & Papaya Growers					25,654	
16-916	Etiology & Control of Fungal Diseases & Education Program for Local Growers					15,937	

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(Attach Brief Summaries)
Fiscal Year: 2005

Select One: **Interim** **Final**
Institution: University of Hawaii, Manoa
State: Hawaii

		Integrated Activities (Hatch)	Multistate Extension Activities (Smith-Lever)	Integrated Activities (Smith-Lever)
		%	%	%
<i>Established Target %</i>				
<i>This FY Allocation (from 1088)</i>				
<i>This FY Target Amount</i>				
Title of Planned Program Activity				
16-920	Support Pesticide Registration for Use in Hawaii's Crops			
18-803	Controlling Plant Growth with Photosensitive Plastic Film & Photosensitive Shadecloth			1,270
18-805	Extension Strategies for Improved Soil Nutrient Management in Hawaii			7,176
20-024	Production, Postharvest Handling & Marketing Education Program for Cut Flowers			4,686
20-025	Foliage Production & Nursery Management Program for Hawaii County			29,606
20-028	New Rootstocks for Kona Coffee			25,959
20-072	Diabetes Awareness, Education & Screening Project		37,748	
21-016	Intergenerational Programs			
21-080	Grandparents Raising Grandchildren		5,320	
22-034	Aster Yellow's Disease: A New Threat to Many Crops in Hawaii			\$31,544
22-070	Nutrition Education for Wellness (N.E.W.)			

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Fiscal Year: 2005

Select One: Interim Final
Institution: University of Hawaii, Manoa
State: Hawaii

	Integrated Activities (Hatch)	%	Multistate Extension Activities (Smith-Lever)	%	Integrated Activities (Smith-Lever)	%
<i>Established Target %</i>						
<i>This FY Allocation (from 1088)</i>						
<i>This FY Target Amount</i>						
Title of Planned Program Activity						
23-040 Development & Enhancement of Ornamental Crops/Commodities					7,200	
Total	\$377,008		\$56,479		\$209,373	
Carryover	0		0		0	

Certification: I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays represented here accurately reflect allowable expenditures of Federal funds only in satisfying AREERA requirements.



Director

4/28/2006
Date

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and
Multistate Extension and Integrated Activities
Brief Summaries
Fiscal Year: 2005

Institution: College of Tropical Agriculture and Human Resources
State: Hawaii

111H Community Business Matching (Goal 5).

Progress/Accomplishments: Communities will be able to determine which businesses are consistent with their goals. At the same time, the needs of the businesses can be identified. The community may need to develop additional assets to attract various businesses.

228R Parent & Household Influences on Calcium Intake Among Preadolescents (Goal 3)

Progress/Accomplishments: This multistate project involving 13 states is actively examining parental factors such as knowledge, attitudes, behaviors, and environment and their influence on calcium intake of children in early adolescence (10-13 years old) from race/ethnic groups most at risk for osteoporosis. During the past year, a questionnaire was drafted to assess parental influences on the calcium intake of their pre-adolescent children and validated. Sixteen parent/child interviews were conducted in Hawaii recruiting Asian and White parents (six pairs for each ethnic group). Principal component analysis will be completed to assess the internal validity of the psychosocial scales identified by the parental questionnaire. Construct validity will be performed where experts on this topic will be asked to respond to a questionnaire on this topic. Based on the results of the pilot testing, the design of the final survey implementation will be developed. The development of a parent motivator-barrier questionnaire would impact and enhance research from other institutions. The project also will increase our knowledge about factors that influence the calcium consumption of early adolescents. The information can be used to design effective, tailored nutrition intervention for early adolescents and their parents. The improvement in calcium intake among early adolescents may reduce the burden of osteoporosis in the future. The information on parental factors influencing food intakes of their children is likely applicable to other health-related behaviors such as the development of obesity.

257R Stress Factors of Farm Animals & Their Effects on Performance (Goal 1)

Progress and Accomplishments: This collaborative project was with peers in USDA/MARC, NB and Cornell University, NY. Beef cattle (heifers) in the feedlot were used in a study to quantify the effect of hair coat on thermal regulation under heat stress conditions. Four colors of hair coat (black, white, light red and deep red) were studied. Preliminary data from hair coat length and thickness with respect to environmental data (wind speed, solar load, temperature and humidity) were used to develop a model to predict animal response to changes in ambient environment. The hide samples were used to study absorbance and reflectance of solar wave length. These data were then used in the development of the model. Animals with dark hair coat would seek shade more often when ambient temperature rises to avoid heat stress. Modeling data suggest that these

animals would benefit most when provided with shade in event of heat waves.

266H Best Management Practices for the Sustainable Productivity of Hawaii's Range & Pasture Lands (Goal 4)

Progress/Accomplishments: Pasture trials were established to find an economical series of management practices to control goosegrass. Adequate soil fertility allows the rapidly growing guineagrass to overgrow the shade intolerant tufted beardgrass. Under a management program that incorporates well timed pasture mowing, light applications of N and lime, and timely grazing rotations tufted beardgrass can be eliminated from pastures on Kauai. On Hawaii island several trials were established using different varieties of forage species including green panic, signal grass, and perennial peanut in combination with low application rates of N and lime to adjust low soil pH levels. Thus far, forage production in these pastures has nearly doubled over untreated areas. In addition, forage quality is higher than in untreated areas. Results of initial samples of fireweed from Maui and Hawaii suggest that the alkaloid content of fireweed may be dependent on soil N levels, and there is a strong correlation between alkaloid content and elevation. Research plots are being established in pastures on Kauai, Maui, and Hawaii to further investigate economical and sustainable application rates of N and lime to former sugarcane and pineapple lands. The results of this project will provide producers with management practices that will help them successfully convert former sugarcane and/or pineapple lands into sustainable forage production systems.

353H Curriculum Innovations for At-Risk Preschoolers (Goal 5).

Progress/Accomplishments: Learning Connections is the first empirically-validated literacy and mathematics curriculum designed for Hawaii's multicultural preschoolers. The curriculum manuals and classroom materials have now been professionally designed and printed and made available to 50 Head Start classrooms. Teachers will be able to use these materials and integrate this effective enrichment curriculum into their more holistic core curriculum. This should result in improved learning in the areas of oral language, literacy, and math. There is also interest in Learning Connections on the mainland U.S. We presented a workshop last fall at the annual meeting of the National Association for the Education of Young Children. While we planned for 50 attendees, over 300 came to our session. This indicates a high level of interest in the field for a validated enrichment curriculum such as ours. Our early childhood literacy rubric is now available at a national level, via the well-known curriculum publisher, Pearson Education. The rubric may be used by preschool teachers to rate children's progress on key emergent literacy skills. Because the skills are developmentally sequenced, teachers can use the results for curriculum planning, to individualize their lessons to address each child's unique needs, and to document the progress of individual children and/or classrooms. The rubric is being used in all preschool classrooms in the Charlotte-Meklenburg public school system in Charlotte, NC.

356H Nutrition Education for Wellness (N.E.W.): Models for Promoting Healthy Behaviors (Goal 3)

Progress/Accomplishments: Permission to conduct the study was received from the University Institutional Review Board. Existing groups within the College were randomly assigned to participate in either an on-line intervention or an enriched intervention. We developed the intervention content which includes (a) web-based instructional materials on healthful meetings, (b) a meeting well workshop, (c) email reminders about recordkeeping and tips for implementing

healthful nutrition behaviors in the workplace, and (d) procedures for requesting on-line advice and assistance from team members with qualifications in dietetics. We also developed a recruitment and orientation script, created an on-line video version, for participants who are unable to attend the scheduled orientation meetings. We developed a primary outcome measure and a feedback survey. An orientation session was conducted for the pilot group on September 30, 2005 and orientation videos were concurrently posted on the web for faculty members unable to attend the session. A follow-up survey was conducted to collect information on reasons for non-participation which will be utilized to re-design promotion and recruitment efforts.

359H Examination of Cultural Contexts of Grandparents Raising Grandchildren (Goal 5)

Progress/Accomplishments: This project was operating for two months during the reporting period. During this time, we contacted approximately 15 local support group leaders for grandparents raising grandchildren and surveyed them on what topics are important to the people with whom they work. They rated resources, addiction, managing grandchildren problem behavior, and stress management as grandparents most important concerns. Based on their input, we developed draft copies of four brochures on issues that are important to local grandparents. This project has not been in progress long enough to have an impact. However, we anticipate that distribution of the brochures will empower local grandparents raising grandchildren to access the community resources available to them.

362H Peer-Education Financial Literacy Project (Goal 5)

Progress/Accomplishments: A preliminary review was conducted of financial education curricula potentially adoptable or adaptable for a financial education program taught by peer-educators at UHM. Summaries of six financial education curricula were summarized in detail as a primary focus and information on six secondary sources were also provided. A site visitation was made to the University of Arizona's (UA) successful program in personal financial education conducted through a student organization called, Credit-wise Cats. Interviews were conducted of the part-time project director, graduate student project trainer, students, and evaluator. A student colloquium that included presentations on the project and a Credit-Wise Cats meeting were attended. Educational materials utilized in the project were obtained for the training of student leaders as well as a copy of the project organizational handbook. After pilot-testing two 30-question survey instruments, 45 surveys were distributed to faculty/staff and 400 surveys were conducted in person with students. The data have been coded and are being analyzed. The project has generated interest by community organizations, USA Funds, the Hawaii Credit Union League, and the UHM Career and Technical Education. A product donation (pens and post-its) by USA Funds, a designated guarantor of student loans was received and distributed to those who completed a survey.

372H Incarcerated Parents: Adjustment of Their Children and Families (Goal 5).

Progress/Accomplishments: Preliminary findings describing Hawaii's incarcerated women were presented at a Kamehameha Schools Research Conference on Hawaiian Well-Being in Hilo, Hawaii, in October, 2004. This report was later included in the Conference Proceedings made available online. These reports are expected to increase the knowledge and understanding of educators, community/social service providers, and policy makers in the State of Hawaii, and national level. Project findings on incarcerated women's developmental risk factors and resources were presented at the Annual Conference of the American Association of Family and Consumer

Sciences, in Minneapolis, June, 2005. Project staff provided information and consultation to newspaper reporters (related to articles published in two newspapers), community/social service agency workers (e.g., Girl Scouts), and government representatives).

373H Human Development and Family Well-Being Understanding the Well-Being of Hawaii's Families (Goal 5)

Progress/Accomplishments: SMS was contracted to do a 6,000 family survey encompassing health and wellbeing information and data linking to Center on the Family major projects on touchstone and resilience. Data expected in February 2006. Completed Literature review on multiethnic families was completed; The public policy ramifications for the well-being of multiethnic families have become part of the national debate and of considerable importance to the native Hawaiian legislation before the United States Congress. The theory building on family research has advanced but remains at an embryonic state. It is expected that the COF initiative will foster a major shift in the study of race and ethnicity in the United States.

377H Development and Evaluation of a Family Education and Conflict Resolution Program Targeted at Deployed Military & Other At-Risk Families (Goal5)

Progress/Accomplishments: The UH Family Strengthening Model at the Family Education Center of Manoa was implemented with 15 families and 20 youth attending. Evaluation measures for these programs were developed and tested. Tripler Army Medical Center, the Coast Guard family service center, Waialae Elementary School and Hale Olu High School (Child and Family Services) have been contacted for future implementation of the model. A parent educator certification program for the University of Hawaii, through which the model will be disseminated was established. To broaden and strengthen our model project personnel visited with two prominent minority serving family education programs (University of Waikato and ParentingWorx) in New Zealand. Potential impacts include reduction in family discord, increased positive communication and cooperation, and improved social and conflict resolution skills in children in the served families, as well as increased skills in family education by our 18 trainees. We will increase the knowledge and skills of the family educators we train, which will, in turn, improve their provided services to military and other at-risk families in Hawaii. The indirect impacts will be improved functioning in military families, including those of deployed and returning combat veterans, reduction in abuse, divorce and family stress impediments to job effectiveness.

378R Family Business Viability in Economically Vulnerable Communities (Goal 5).

Progress/Accomplishments: Results from this study compared business success of family businesses in more versus less vulnerable counties provide empirically based findings that business and community development specialists can be used in several ways: (1) to develop decision-making tools that will help to improve the viability of businesses, even if they are located in more vulnerable counties, and (2) to identify public policy initiatives that can promote economic development in the more vulnerable counties across the U.S. Findings from the study of factors that influence the survival of family owned businesses provide small business owners with research based findings that can be used to increase the viability of their enterprises. Practitioners such as business and community development specialists can use the findings to help clients develop strategies that can stimulate business start-ups and minimize business closures. Of note for policy makers is the need for legislation aimed at reducing the barriers

faced by females and young manager-owners with respect to business survival. The research results were shared with approximately 49 participants at the Asian Consumer & Family Economics Association conference in Sacramento, California. Attendees included academic and business professionals from the U.S., Japan, Taiwan, mainland China, and Malaysia, who work with financial counselors and community outreach practitioners in their respective countries.

512H Biotreatability Studies for the Application of Bioremediation to Hydrocarbon Contaminated Soils. (Goal 4)

Progress/Accomplishments: A lab scale biotreatability testing protocol that can assist with designing successful bioremediation treatments for different sites has been developed. Experiments performed throughout this project have demonstrated that respirometry can be useful in assessing microbial activity in relation to biodegradation at both the bench-scale and pilot scale, and for assessing toxicity effects on microorganisms and their activity. More recently, we have observed that the biofilms, which are formed by the microorganisms as they attach to a solid substrate vary in composition and structure in response to variables such as the type of substrate and the chemical environment in which the microorganisms grow. This in turn will affect the uptake and ultimately the biodegradation of organic contaminants. The use of respirometry in lab scale biotreatability testing will allow faster and more cost effective testing and as effective or even more effective than plate counts in assessing microbial activity. This will allow environmental services companies to design an efficient bioremediation treatment train for contaminated sites.

513R Animal Manure and Waste Utilization, Treatment and Nuisance Avoidance for a Sustainable Agriculture (Goal 4).

Progress/Accomplishments: The improvement of the wastewater treatment process, and in particular dairy and agricultural wastewater treatment, is an important goal. This is particularly important since the U.S. EPA (Environmental Protection Agency) is putting new rules into place regarding agricultural waste. All large Concentrated Animal Feeding Operations (CAFOs) will soon be required to obtain permits that will ensure they protect America's water by keeping wastewater and manure out of the nation's water ways. This new method for cleaning the pollutants can be effective for agricultural facilities to be compliant with the new ruling.

522H Identification & Remediation of Hazardous Substances to Safeguard Human & Environmental Health. (Goal 4)

Progress/Accomplishments: New extraction and analysis procedures for explosives, pesticides and persistent organic pollutants have been developed. We continue to collaborate with Hawaii HEER (Office of Hazard Evaluation and Emergency Response) personnel on emergency responses to cases that have occurred during the report period, including cases where possible weapons of mass destruction were suspected. A total of 157 samples were analyzed within the reporting period. A workshop (January 25-26, 2005) was conducted to train 30 personnel from Fire Department Hazardous Material Units in Maui on responses to a situation where chemical and biological weapons of mass destruction are suspected. The production of the training video is in progress with incorporation of hands-on exercises filmed in Hilo. New methods have been developed for rapid extraction and measurement of toxic chemicals in various matrices, which are useful for emergency responses, risk assessment and responses to threats. In addition to further understand bioremediation mechanisms, new abiotic and biotic mitigation technologies

were developed for cleanup of contaminated sites. A workshop was conducted to train 30 personnel from Fire Department Hazardous Material Units in Maui on responses to a situation where chemical and biological weapons of mass destruction are suspected.

822H Weed Management in sustainable Tropical Cropping Systems. (Goal 1)

Progress/Accomplishments: A strategy to improve effectiveness of foramsulfuron on goosegrass was developed: At 14 days after foramsulfuron treatment, apply herbicides that have the ability to block the establishment of new goosegrass roots such as the dinitroaniline herbicides (benefin, ethalfluralin, oryzalin, pendimethalin, prodiamine), or pyridazine herbicides (dithiopyr and thiazopyr). At 20-40 days after the first foramsulfuron application, a second is applied to insure the kill of larger clumps with living tissue at the outer edges. Fortified coir (herbicide in 1% latex surfactant applied to pots as a surface mulch) doubled the period of weed control over spray applications and will help growers maximize the effectiveness of their pesticides while minimizing nonpoint source pollution due to leaching of pots and subsequent runoff from production sites.

833H Optimizing the Soil Environment for Diversified Crops in Hawaii (Goal 4).

Progress/Accomplishments: The Diagnosis and Recommendation Intergrated System (DRIS) computer program was modified meet local needs and conditions. The original program was developed by Dr. M. Sumner from Natal, South Africa, and later from the Univ. Georgia (when Dr. Sumner moved there). We focused on taro, tomato and Chinese cabbage. Other data on S, gorse and kikuyi grass have been published. A second test with better control for wild pigs on the cabbages is in progress. The work on gorse infestation as a function of soil nutritional conditions is in progress. The work here will help to show how Hawaii can manage diverse crops more effectively.

863H Optimizing Nutrition from Animal Manures for Hawaii Vegetable Farms (Goal 1)

Progress/Accomplishments: A laboratory incubation experiment consisting of five soils and three local manures (poultry, swine, and dairy) was initiated in April 2005. At 18 weeks the infertile Oxisol and Andisol had mineralized similar quantities of N (approx. 32 mg/kg) whereas the more fertile Oxisol had mineralized approximately 42 mg N/kg. The mollisol had mineralized about 70 mg N/kg, and the fertile Andisol had mineralized the most N at about 142 mg/kg. Swine manure showed the highest mineralization rate in the fertile Oxisol, the infertile Andisol, and in the Mollisol. In the infertile Oxisol, swine manure and dairy manure showed similar N mineralization rates. Chicken manure and dairy manure showed similar N mineralization rates in the Mollisol, fertile Oxisol, and infertile Andisol. The N mineralization rates of the manures added to the fertile Andisol showed no difference from the soil alone suggesting that the soil alone had sufficient substrate for the microbial community. In addition, we will have characterized N mineralization for 3 manures added to these soils. These data help us understand the interaction of soil mineralogy on N mineralization and will help us provide appropriate recommendations for our clients who are interested in using manure as an N source.

874H Developing Taro as an Alternative Food and Ornamental Crop. (Goal 1)

Progress/Accomplishments: To evaluate newly introduced blight-resistant taro hybrids, nine taro cultivars were grown under dryland conditions and harvested after 9 months during January 2005. The two highest yielding taro cultivars were the UH patented Paakala (64,160 kg per ha),

and Pauakea (43,980 kg per ha), however, their poi rating was below acceptable (2.8 and 2.9, respectively, out of 5.0). The third highest yielding taro cultivar was the Palauan taro cultivar Dirratengadik (34,630 kg per ha) with an acceptable poi taro rating (3.3). The fourth highest yielding taro variety was the UH patented taro cultivar Palehua (34,380 kg per ha); it had the second highest poi rating (3.6). However, it had among the highest percent corm rots (14 percent), and the flavor of the apparently healthy portions of the corm was affected adversely by the presence of rot. In comparison, the widely used commercial poi cultivar Maui Lehua had yields of only 19,470 kg per ha, with acceptable poi and table taro ratings (3.2). Two taro taste tests of 32 cultivars were held and the results are being compiled. Ten Hawaiian ornamental taro varieties have been obtained and are being multiplied for studies. Impact of this project will be evaluated by: a) adoption of optimal fertilization or irrigation practices; b) adoption of new blight-resistant taro varieties; c) increased use of taro in landscapes, interior-scapes and water gardens; and d) increased exposure of young people to taro food products.

886H Light Manipulation for Flowering of Orchids. (Goal 1)

Progress/Accomplishments: A study was conducted at a cooperating commercial orchid grower in Waianae and at the Magoon Facility, University of Hawaii campus. Red, blue, and gray shade cloths were compared to the standard black shade cloths for their effect on height growth, number of leaves, buds, shoots, and flowers. Different cultivars reacted differently in height growth and number of leaves to colored shade cloths. The red and black shade cloths had the greatest number of buds. The number of new shoots was similar among the shade cloths. For M-10973, the black and red shade cloths resulted in the plants having the greatest number of spikes, number of flowers, and number of buds. Black, red, and gray shade cloths had similar initial flowering peaks and peaks of bud production. Delayed flowering occurred with the blue shade cloth. Potential impact is that photoselective shade cloths may provide a means of increasing flowering during low production periods or producing flowers year round, especially in the off-season. This will help orchid growers with more consistent production, and thus growers will be more competitive with foreign producers. It is anticipated that photoselective shade cloths could be an alternative to or supplement the use of growth regulators and/or artificial lighting in manipulating growth and flowering patterns.

903H Molecular Detection, Characterization and Management of a Phytoplasma Associated with Watercress Yellows (Goal 1).

Progress/Accomplishments: We have identified the phytoplasma as an Aster Yellows strain most closely related to the Onion Yellows phytoplasma in Asia, but it is also closely related to the phytoplasma that causes Severe Aster Yellows in western North America. Our work has enabled the watercress farmers of Oahu to successfully manage the yellows disease of watercress caused by a phytoplasma newly introduced into the state. The incidence of yellows disease caused by this phytoplasma on watercress farms on Oahu has decreased markedly over the last year, due to continued efforts by farmers to rogue out infected, symptomatic plants, and to control the population of the insect vector, *Macrosteles* sp., in their fields. Our work on this disease, identifying the phytoplasma that causes it, and determining some of the transmission characteristics of the insect that is the vector of the phytoplasma has allowed us to make recommendations for disease control that have enabled watercress farmers to regain most of the production that was lost in the early stages of the watercress yellows epidemic on Oahu, and has prevented the spread of this pathogen to other islands in Hawaii.

908H New Production Practices for Anthurium (Goal 1).

Progress/Accomplishments: Bioprotection and growth stimulation of anthurium plants are desirable characteristics attainable through application of beneficial bacteria to anthuriums. The challenge of biological control research is to translate successful laboratory and greenhouse studies into a biological control practice which is successful in the field. This project is laying the groundwork for field applications of a biocontrol agent leading to an effective biocontrol management practice. Evaluating the metabolic properties of the beneficial strains as well as the disease organism generates the basic information needed to enhance colonization of plants by beneficial bacteria, which are subsequently needed for protection of anthurium plants from infection by the pathogen. Practical application of the beneficial bacteria to the industry allows growers a safe alternative for the management of anthurium blight.

910H Pests of Tropical Fruit and Nut Crops Integrated Pest Management (Goal 1).

Progress/Accomplishments: Coconut scale management should be enhanced using the data obtained by this work. The control of the macadamia felted coccid is considered to be a very valuable contribution to the macadamia nut industry.

914H Preservation, Characterization and Genetic Improvement of Hawaiian Taro (Goal 1).

Progress/Accomplishments: Two breeding strategies using traditional cross pollination procedures have successfully been employed to develop high yielding, taro leaf blight resistant hybrids for commercial wetland and upland production farms in Hawaii. Three hybrids developed using a modified backcrossing procedure are being increased and grown by several growers on the islands of Kauai, Maui and Hawaii. There should be a significant increase in production in the coming years when these hybrids are planted by more growers statewide.

935H Biology & Management of Invasive Ants in Hawaii (Goal 3)

Progress/Accomplishments: Working with other agencies, we are providing the tools necessary for the public to assist in containing the spread of the little fire ant in Hawaii. Our studies of the interactions of the little fire ant with other insects in its habitat are necessary to identify natural enemies of this ant that might be used in control efforts.

943H Pineapple Cultivation & Production in Hawaii (Goal 1)

Progress/Accomplishments: Pineapple remains Hawaii's major agricultural product and pests cause major reductions in yield. Controls that have historically been employed are often unacceptable or banned. Consequently, efforts are directed at finding replacement products or practices that are socially and economically acceptable today. The project has begun to identify alternative methods to control ants, nematodes, and fungal diseases in pineapple. In addition to identifying alternatives, the project has taken and shared these alternatives to growers encouraging their adoption. The project helps to maintain profitable pineapple production in the state.

947H Etiology & Management of Coffee Anthracnose in Hawaii (Goal 1)

Progress/Accomplishments: This project demonstrated to Kona farmers the correct name and etiology of the disease they were contending with. It was berry blotch (caused by *Cercospora coffeicola*), not anthracnose (caused by a *Colletotrichum* sp.) as some were referring to it. This

was not a new epidemic caused by a new pathogen. We found no evidence in Kona of the "coffee berry disease" caused by *Colletotrichum* elsewhere in the world. This knowledge seemed to ease fears in the coffee industry organizations of a new epidemic developing and clarified disease control recommendations somewhat. *Cercospora* leaf spot and berry blotch were widely distributed throughout the Kona coffee growing region; however, disease incidence and severity increased with altitude and rainfall. Thus, *Cercospora* leaf spot was very common and usually severe in coffee nurseries. Disease in nurseries is associated with sprinkler irrigation, over-crowding, and poor plant nutrition. The project confirmed the importance of good plant nutrition and low plant stress as primary factors in achieving good disease management. By using fertilizers instead of fungicides, in other words, we think this disease can be adequately controlled in some areas. And, by avoiding certain planting locations, plant stress and nutrition can be improved, resulting in fewer fungicide applications, better disease control, diminished crop losses, and a potentially healthier (through fewer pesticides in the ground and water) Hawaiian environment.

969H Anthurium Production Systems. (Goal 1)

Progress/Accomplishments: Using combined data from approximately 40 greenhouse experiments, it was repeatedly demonstrated that applications of a consortium of four species of epiphytic bacteria, originally isolated from susceptible anthurium plants in Hawaii, would reduce infection (as much as 45%) by the anthurium blight pathogen, *Xanthomonas axonopodis* pv. *dieffenbachiae*. Studies were undertaken to increase the survival of the beneficial bacteria on waxy anthurium leaves and methods for growing large volumes of beneficial bacteria. This year we have established two additional field experiments on the farm of a local anthurium grower on the island of Hawaii. Data for three phases of disease management are being collected, i) cost of producing pathogen-free anthuriums in vitro, ii) cost of producing inoculum and growth media for beneficial bacteria, and iii) cost of application to field plants. In this integrated project, we seek to make a successful transition from greenhouse to field using repeated applications of beneficial bacteria to reduce crop losses due to anthurium blight. The economic analysis that will accompany the presentation of results should help growers evaluate whether or not beneficial bacterial can be successfully applied in Hawaii under local environmental conditions at a reasonable cost.

12-503 Polluted Runoff control for Waialeale Livestock Farm. (Goal 4)

Progress/Accomplishments: A two stage wastewater treatment system was completed that is energy efficient and four times faster than conventional treatment and removes 90 percent of dairy wastewater contaminants. Information on the technology is being disseminated through educational meetings, video presentation, demonstration/field days, conferences and other means. Two patents have been applied for and are pending. Further modifications are being planned which will capture methane produced by the system and used as a source of energy to power the system.

14-202 Enhancing Conception Rates in Dairy Cows Under Heat Stress Conditions by Determining the Chemical Constituents of Cervical Mucus at Estrus (Goal 1).

Progress/Accomplishments: Research is still continuing and is now focusing on minerals (Ca⁺⁺, Mn and Fe) that differ between pregnant and non-pregnant cows. The outcome of this work is to develop rapid, field tests (litmus tests) to aid a technician in artificial insemination to decide: a)

whether or not to breed a cow, or b) the quality and cost of semen to use, based on potential conception rates. (also reported as Integrated Project.)

14-204 Best Management Practices for the Sustainable Productivity of Hawaii's Range and Pasture Lands. (Goal 4)

Progress/Accomplishments: Numerous individuals and organizations, such as the West Hawaii Wildfire Management Organization, Puu Waawaa Advisory Council, the State Department of Land and Natural Resources Division of Forestry and Wildlife Management, NRCS, Farm Service Agency, Department of Hawaiian Homelands and Hawaiian Homesteaders, US Fish and Wildlife Service, were provided with information relating to the many aspects of range management. Topics included recommendations for liming, fertilization levels, and seeding grass and legumes, invasive species management, fire prevention, forage monitoring on Kauai, Maui, and Hawaii islands through individual consultations, meetings, workshops, printed literature, farm and ranch visits, and many more. The Hawaii Grazing Lands Conservation Coalition was formed. Through these efforts, Hawaii livestock producers have been helped to become more productive by increasing the efficiency of their operations. Analyses, consultation, and recommendations given to individual producers were often incorporated into EQIP contracts with the NRCS and helped increase the quantity and quality of forage in their pastures. These activities led to new opportunities for livestock producers in the areas of state land leases, contract grazing, and national recognition through the Grazing Lands Conservation Initiative. All these outcomes help insure the sustainability of the livestock industry in Hawaii.

14-221 Parent and Household influences on Calcium Intake Among Preadolescents. (Goal 3). This project is the extension component of regional research project 228R that involves Colorado State University, Michigan State University, New Mexico State University, Purdue University, University of Arizona, University of California at Davis, University of Minnesota, University of Wyoming, Washington State University and the University of Hawaii.

Progress/Accomplishments: Qualitative data obtained from 206 parents were analyzed. Findings revealed differences between Asians, Hispanics and Whites in the availability of calcium rich foods in the home and different parental modeling of intake. Parents modeling, encouragement and preparing of preferred foods were identified as important factors influencing calcium intake. However, there was no difference in parent-child conversations about food and health by ethnic group. The conversations focused on the need to moderate or increase intake of specific foods. The findings increased our understanding of the impact of parent modeling, knowledge, attitude and behavior on pre-adolescent calcium intake among three ethnic groups (Whites, Asians, Hispanics). There is a need to develop interventions including parents and children and focusing on specific strategies to ensure adequate calcium intake.

16-902 Developing Insect Identification Guides and On-Farm IPM Training for Banana and Papaya Growers (Goal 1).

Progress/Accomplishments: A substantial amount of information and images have been collected for this project. The final products can be prepared now. A minor setback in this regard was the lack of information on certain pests, and this has been addressed in most cases (e.g. see Wright, M.G. & Diez, J.M. 2005. Coconut scale (*Aspidiotus destructor*: Diaspididae) seasonal occurrence, dispersion and sampling on banana in Hawai'i. International Journal of Tropical Insect Science 25: 80-85). Improved scouting capacity and IPM in tropical fruit crops. Presented

workshops on pests (Kona area) on two occasions). Presentations on white peach scale (papaya pest) at the Annual Hawaii Papaya Industry Association meetings.

16-916 Etiology & Control of Fungal Diseases and Education Program for Local Growers (Goal 4).

Progress/Accomplishments: A taro field trial testing the effect of Sunn Hemp as a green manure added to soil and rates of organic fertilizer was harvested in January of 2005. Overall, the higher rates of organic fertilizer had higher yields and disease levels were low. A number of reduced risk fungicides were tested for greenhouse efficacy trials for control of diseases on papaya, orchids, plumeria, palms, and rose periwinkle. A survey of commercial orchid nurseries in Hawaii has been started to focus on the incidence of *Fusarium proliferatum* and other *Fusarium* species. Thus far, *F. proliferatum* has been found at three of the nurseries, *F. solani* was found at two nurseries, *F. oxysporum* was found at all nurseries but at low levels, and an unidentified *Fusarium* species was found at all nurseries with extremely high levels at the nursery that did not have *F. proliferatum*. *F. proliferatum* causes leaf flecks to blights, frequently kills the youngest leaf on dendrobium shoots, causes a lot of blemishes on leaves, sheath rots of dendrobiums, cattleya and many intergeneric hybrids, flower shoots on dendrobium, shoot kill of many orchids, root rots, and damping off of young plants. Thus far, *F. solani* and *F. oxysporum* have caused leaf flecks and spots. Evaluations of three more commercial nurseries are in progress. The genera of orchids from which *Fusarium* has been isolated include *Dendrobium*, *Vanilla*, *Cattleya*, *Ascocentrum*, *Epidendrum*, *Laeliocattleya*, *Brassolaeliocattleya*, and many others. In April 2005 a new rust caused by *Puccinia psidii* was discovered on potted native ohia plants (*Metrosideros polymorpha*) on Oahu and subsequently on all major islands. It can potentially be a major problem to the dominant ohia trees in the native forests and has been found on a number of common trees belonging to the family Myrtaceae. Seven presentations were made at local conferences to share the research and extension knowledge with growers, agents, and other members of the agricultural industry. Rapid identification of new diseases assisted local regulatory agencies on minimizing its spread. Chemical tools are always in need by producers to manage their pest problems.

16-920 Supporting Pesticide Registration for Use in Hawaii's Crops (Goal 4).

Progress/Accomplishments: Field pesticide residue trials were completed for buprofezin in coffee, and oxyfluorfen in ti. Ongoing residue trials include imidacloprid in papaya, fenprothrin in tropical fruits, and triflumizole in papaya. In addition, field pesticide efficacy trials were conducted on persimmon (pyraclostrobin, and pyraclostrobin + boscalid, watercress (dinotefuran (watercress), banana, papaya (oils, malathion, and pyriproxyfen; mancozeb, pyraclostrobin, pyraclostrobin + boscalid, and cyprodinil + fludioxonil for anthracnose control; and carfentrazone, pyraflufen, and glufosinate for weed control), coffee (glufosinate for weed control), and taro (carfentrazone, pyraflufen, and glufosinate for weed control). The following studies are being conducted by the analytical laboratory under Dr. Li's direction: oxyfluorfen in ti, spinosad in pineapple (completed), spinosad in almonds, buprofezin in coffee, triflumizole in pineapple, imidacloprid in papaya, and triflumizole in papaya. Considerable effort was put into demonstrating that some of the insecticides, mainly malathion and oils (BioCover), already cleared for use in papaya, were effective against the white peach scale. Growers were skeptical of the efficacy of malathion or oils, however, through our efforts, we are hearing that growers are now using these products to control the white peach scale. Actual use information is difficult to

obtain because growers do not like to disclose pesticide use information, so just hearing that some growers are using registered insecticide products for white peach scale control suggests that we've made impact. One key factor involved presenting data that showed that the white peach scales did not have to fall off the tree to be dead; and, that repeated spraying is necessary to reduce the population and spread. Because the white peach scale is a quarantine pest, its control is especially significant for the export papaya market.

18-803 Controlling Plant Growth with Photosensitive Plastic Film and Photosensitive Shade cloth (Goal 1)

Progress/Accomplishments: Colored shade cloth and photo selective film were used in studies to determine their effect on plant growth and flowering on potted chrysanthemum 'Azeno'. The red, blue, and gray shade cloths in that order had the greatest effect on early flowering, number of flowers per plant, and flower dry weight. Red, blue, and gray colored shade cloths, in that order, also resulted in shorter potted 'Nellie White' Easter Lily. Photosensitive film did not have any effect on growth of potted 'Freedom Red' poinsettias and number of 'Nellie White' Easter Lily flowers. The use of photosensitive plastic films and photosensitive shade cloths may offer an alternative or supplement to the use of chemical growth regulators to control the height and growth of ornamentals. Their manipulation of light quality could help reduce the use of chemicals, thus reducing their impact on the environment.

18-805 Extension Strategies for Improved Soil Nutrient Management in Hawaii. (Goal 1)

Progress/Accomplishments: A two day workshop on soil nutrient management in Hawaii was organized and conducted for county agricultural extension agents. The workshop covered the following topics 1) Agent sharing, 2) Basic Concepts in Soil Fertility, 3) Fertilizer Calculations, 4) Fertility Categories for Hawaii's Agricultural Soils, 5) The Phosphorus Problem, 6) Use of Tissue Analysis and Soil Tests for Nutrient Management in Perennial Cropping Systems, and 7) Soil Nutrient Management in Organic Agriculture. A soil nutrient management program was initiated to train and assist farmers in using soil and tissue testing to reduce fertilizer inputs. A computerized fertilizer recommendation procedures used by the Agricultural Diagnostic Service Center (ADSC) at the University of Hawaii was upgraded in conjunction with on-farm field trials to evaluate current recommendation procedures. All 21 of the county extension agents who attended the workshop increased their knowledge and have a better understanding of how soil type affects nutrient management and are better equipped to serve our clients by providing accurate advice on soils and nutrient management. The on-farm field trials have shown that our soil test is accurate and reliable. The cooperating farmers have seen, first-hand, that they can reduce fertilizer inputs and still maintain high yields if they base their fertilization on soil test results. By following our fertilizer recommendations they increase profitability and reduce potential harm to the environment.

20-024 Production, Postharvest Handling and Marketing Education Program for Cut Flowers. (Goal 1)

Progress/Accomplishments: This project provided numerous educational workshops and meetings to the Cut Flower industry to disseminate research results in production, postharvest, and marketing information to flower growers and shippers based on their stated needs. During the year 16 educational sessions were organized with 506 stakeholders attending. In addition, the project coordinated on-farm research trials for nematode control, coqui from studies, export

quarantine requirements and insect and disease control studies. Many growers were also provided individual technical assistance upon request. Technical assistance was provided through more than 900 contacts. This allowed effective one-to-one assistance on a grower's particular problem.

The earlier success under the California/Hawaii Origin Inspection Program continued with 14 Hawaii County flower shippers exported 4,484 lots (shipments) containing 7,398 parcels (boxes) with no rejections. The continued success of this Origin Inspection Program allows approved shipments to be exported with minimal inspection, provides expeditious movement of products to consumers, and offers a higher standard of cleanliness of products by Hawaii's shippers. This creates a win-win situation for everyone involved while providing national security for the possible introduction of unwanted quarantine action pests.

20-025 Foliage Production and Nursery Management Program for Hawaii County. (Goal 1)

Progress/Accomplishments: This project provided clientele with research based agricultural information through various methods such as, nursery visitations, classes, workshops, informational meetings, on-farm demonstrations, poster presentations, mass mailing of publications or newsletter articles, and individual and group consulting. The project also coordinated research and educational activities with specialists and researchers in plant physiology, soils, entomology, plant pathology, nursery management and agricultural economics. Over 726 individual consultations were done.

20-028 New Rootstocks for Kona Coffee (Goal 1)

Progress/Accomplishments: The new species of root-knot nematode identified affecting coffee plants in Kona infests over 80% of farms. Although the CTAHR released seeds of a resistant rootstock to the growers in 2001, seed supplies are short. Based on coffee plants in the arboretum at the Kona Research Station, several other selections appear to show resistance to the nematode. A trial to evaluate the resistance of these selections used as rootstocks will be conducted. Plants of *Coffea liberica* 'Aabeokutae', *C. liberica* 'Arnoldiana', *C. congensis*, *C. canephora*, and *C. purpurea* have been grafted and will be planted soon at the Kona Research Station in a nematode infested field. In addition to nematode resistance, "beans" will be evaluated for cupping qualities.

20-072 Diabetes Awareness, Education and Screening (Goal 3).

Progress/Accomplishments: Project partners include CES at Washington State University, New Mexico State University, West Virginia State University and Pennsylvania State University. This past year involved a more intensive screening and education sessions, more effort was put into conducting diabetes screening throughout Hawaii County. Sixteen (16) screening events were held for the public, employee groups, and college students at health fairs, shopping centers, grocery stores, parks, and worksites. Printed materials on diabetes as well as trained staff provided information for screening participants. Project staff conducted sessions on nutrition and management of diabetes for various community groups. Adults (1,017) were screened for hemoglobin A1c, an indicator of one's blood glucose level and risk for diabetes, using one-time use cartridges (A1cNow) and a fingerstick blood sample. Health education was brought to the classroom and the students developed a website called "*Produce an Athlete*" that contained nutrition information important for athletes. The community-based diabetes center in Hilo closed and merged with the Area Health Education Center Ke Anuenue in Hilo for greater collaboration.

Of 1017 adults screened, 227 (22%) had an A1c at or above 6.0, which may indicate a high risk for diabetes. We also conducted eight follow-up screenings to measure fasting blood sugar for those with an A1c at or above 6.0. Sixty seven people were re-screened, and 22 (33%) had an FBS above 126, which gave another indication of diabetes. Participants were strongly encouraged to seek medical care and further testing and treatment for diabetes.

21-016 Intergenerational Programs (Goal 5)

Progress/Accomplishments. After the success of last years collaboration with Maui County's the PALS program that addresses the physical, social, cultural, and educational needs of about 3000 youth during summer and intersession breaks, supplemental educational materials (Intergenerational Activities) were developed to enhance their 2005 recreational summer program. Educational materials developed in 2004 for the Alu Like Elderly division and Kamehameha Preschools in Paukukalo Program, Keiki and Kupuna Activities, were integrated into part of the kupuna and preschool children program. Project R.I.S.E. – "Reaching Individual Success through Empowerment." was a collaborative effort between the Hawaii Association of Family and Community Education, the Extension Agents in the Family and Community Leadership and Adult Programs. Though their combined efforts statewide workshops were developed and conducted on the islands of Hawaii, Oahu, Maui, and Kauai in response to safety, security, and well-being. Maui District Parent Conference – "Parents as Partners in Learning." Was held to strengthen and build partnerships between parents, schools, and communities to help the children of Maui County succeed. This conference provided the opportunity for parents and educators to learn about best practices, various educational programs, socialize with one another, and address the needs children have at home and at school. Cooperative Extension participated by providing educational materials, information, and support to help strengthen intergenerational relationships of parents and children. These programs increased awareness of the need for intergenerational programs and practices among the many agencies involved in youth, adults, and the elderly. Greater knowledge of shared talents through intergenerational activities with old and young was developed. There was also an increased awareness for safety, security, and well-being and many learned the best practices that will help children succeed in schools through skills applied in the home.

21-080 (Extension companion to 357H) Grandparents Raising Grandchildren. (Goal 5)

Progress/Accomplishments: CES is leading a coalition of 10 agencies for grandparents raising grandchildren in Maui County. CES is providing educational materials, curriculum, literature, policies, procedures, training, link to researchers at the University of Hawaii and other land grant institutions, and to the rest of the State of Hawaii. A survey on needs of grandparents raising grandchildren has been completed. Their efforts led to the passage of a bill on care giving and several resolutions by the State Legislature.

22-034 Aster Yellows Disease (AYD): A New Threat to Many Crops in Hawaii (Goal 1)

Progress/Accomplishments: Completed and distributed a color poster to watercress stakeholders titled "How to Recognize Symptoms of Aster Yellows in Watercress". The poster contains pictures of vectors and symptoms and "Best Management Practices" for watercress growers to best manage the disease. Aster yellows phytoplasma appears to be sensitive to high temperature. We have successfully completed our initial efficacy screening of an effective insecticide for the control the leafhopper vector. The results have been submitted for review and

we are anxiously awaiting the green light for the residual work phase. The disease is now known to have been in Hawaii for about 5 years but the insect vector and disease have not moved beyond the original geographic area it was found in. Continued aggressive best management education during the last 5 years may be the reason for this disease being in check. In the mean time, the watercress industry have recovered and stabilized by strictly following CTAHR's "Best Management Practices" for management of aster yellows phytoplasma in watercress. A web site is being developed to further educate and inform the general public about this disease and to prevent its spread to the neighbor islands. By quick action, CTAHR played a major part in saving this small but important industry worth about \$1M annually from devastation by this disease.

22-070 Nutrition Education for Wellness (N.E.W.) (Goal 3)

Progress/Accomplishments. A NEW web site has been built upon existing web resources and continues to evolve. Team NEW members participated in Buy Fresh, Buy Local, a partnership project with Hawaii Dept. of Agriculture, Hawaii Farm Bureau Federation, Hawaii Food Industry Association, Hawaii 5 A Day, and CTAHR to promote local agriculture products. A "donation" of \$50,000 has been secured in cooperation with UH Foundation. Team NEW members have developed the Hawaii 5 A Day web site, a Food Safety website, collaborated to develop and pilot "Produce A Plate," an education food guide concept that includes materials and a training curriculum; made presentations to nearly 300 consumers and 100 agencies involved in health education. Approximately 55% of participants agree that this is a simple method that translates the Dietary Guidelines 2005 and MyPyramid 2005 into a practical and do-able mode. The project focuses on helping children, youth, adults, and older adults achieve and maintain healthy eating patterns using the Dietary Guidelines 2005 and MyPyramid 2005. Eighteen workshop presentations focusing on NEW's Healthy Meetings Checklist were conducted for approximately 300 consumers/agency staff/youth. Approximately 50% of participants stated an intention to try a lower fat dip/dressing. Approximately 70% of agency participants stated an intention to include fruits/vegetables, dips and water at future meetings. Approximately 30% stated an intention to include physical activities at future meetings.

23-040 Improved Cultural Management of Ornamental, Nursery, Landscape and Turf (Goal 1).

Progress/Accomplishments: Obtained and released six new Darwin (Australia) Alpinia ornamental ginger hybrid cultivars to commercial growers. Work to propagate, evaluate and distribute planting material of clonal seedling accessions of *Heliconia orthotricha* accessed from Ecuador; propagate and distribute six hybrid Darwin gingers; and procure, propagate, evaluate and distribute new tropical ornamental planting material from Thailand and Costa Rica. Educational presentations to stakeholders, and individual consultations to stakeholders were conducted. A list of new tropical ornamentals that have been developed from and for HTFFA, Kauai Chapter and purchase is pending. These new cultivars will increase market product line and market share for commercial grower/shipper clientele. Provided 1,583 group and individual consultations through meetings, phone calls, office visits, on-line to commercial and urban clientele on research based agricultural information, knowledge, skills, practices and technology transfer to increase productivity, growth of industry and agricultural development of the community.