

Annual Report of Accomplishments and Results
Fiscal Year 2003

College of Tropical Agriculture and Human Resources
University of Hawai`i at Manoa

Research and Extension Programs

GOAL 1: AN AGRICULTURAL SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY

Overview:

Agricultural competitiveness was advanced by a number of CTAHR projects this year. Researchers developed and promoted new and improved cultivars of taro, corn and tomato for commercial use; identified a pathogen associated with watercress yellow and disseminated recommendations for its control. Work was also done to lower costs and reduce the use of pesticides in a number of industries including golf courses and pineapple. Livestock was the focus of researchers who developed a method to reduce heat stress in dairy cows. A coffee dryer was developed that was adapted by several processors that reduce one-third of the current energy use. These projects, among many others, clearly demonstrate CTAHR's continued contribution to keeping Hawaii's agricultural industries competitive in the global economy.

A large-scale study showed irradiation to be the most efficient and effective quarantine treatment for various tropical fruits grown in Hawai'i. This study demonstrated that irradiation allows tropical fruits to retain nutrient and sensory qualities. A report is in progress, which will clearly identify the benefits of this quarantine treatment as well as outline the rules and regulations governing irradiation of fruits and vegetables. Another study in plant health found that sunflower oil is an environmentally friendly, economical and simple control substance for powdery mildew. The use of sunflower oil will not only greatly reduce the amount of fungicides used annually, it is ideal for both large-scale application as well as for use in home gardening and organic farming.

CTAHR researchers continued work with taro and corn this year. The patented taro cultivars, Pa'lehua, Pauakea and Pa'akala, have the potential to create a new industry in Hawai'i and two of these have been licensed to ten (10) Hawaiian taro growers. Another project on taro hybrids found that new taro hybrids with greater resistance to *Phytophthora* leaf blight will support taro production and enhance the profitability of the taro industry in Hawai'i. CTAHR corn hybrids have proven to perform better than their commercial competitors and can be grown pesticide-free. In addition, thirty (30) corn inbreds, which are resistant to virus will be released this winter and their use is being expanded in Mexico, the Philippines and Australia.

Plant production efficiency was also advanced by the results of a study that will encourage growers to use composted green waste as mulch to improve cut flower quality and yield of some *Anthurium andraeanum* cultivars. A technology developed in a study of weeds which effect golf courses was quickly adopted by golf course superintendents who are also utilizing the nonselective glyphosate application plus re-sodding treatment developed by this project.

Two studies on weed control offer pineapple growers a promising alternative to bare ground cultivation that can significantly reduce polluted run-off and reduce the need for harmful chemicals to control nematodes. The results of both of these projects will provide safer conditions for farmers, lessen pollution and lower costs for chemicals to keep Hawai'i grown pineapple competitive in the market. In addition to the control of nematodes through biotechnology, the results of another CTAHR study suggest that use of GMO plants could be combined with beneficial bacteria to provide durable protection against anthurium blight disease.

The work of CTAHR researchers contributed to the diversification of agriculture by generating parental lines for red beefsteak tomatoes. These tomatoes are resistant to multiple diseases and have an extended

shelf life, thus making them more desirable for the commercial market. Kava researchers and the kava industry will gain from the near-infrared spectroscopy (NIRS) method of quality control that was developed at CTAHR this year.

In collaboration with colleagues from Mississippi and Arizona, CTAHR scientists developed a cooling system and a temperature monitoring system for cows. The findings of this project will positively affect conception rates; increase milk production; and lower dairy operation costs by reducing heat stress in dairy cows.

Aquacultural research resulted in the creation of a tilapia farm on a Hawai'i farmer's front lawn and a koi farm on the roof of a Honolulu resident's garage. Not only is space saved from these efforts but the bioremediated tanks being used conserve water and add to the economic benefits to these farmers.

The management of invasive weeds that reduce pasture productivity and endanger natural ecosystems was forwarded by research by CTAHR researchers. The treatments used in the project are more economical than mechanical clearing of pastures and forestlands. The treatments are also safer to non-target plants than foliar applications to tall trees. Kokee State Park was inoculated with the biocontrol fungus, *Septoria sp.* The inoculations will significantly reduce the invasive bush lantana over the next three to five (3-5) years and save the Department of Land and Natural Resources millions of dollars in the process.

Hawaii's growers continue to look for niche markets. Wasabi, a condiment often referred to as Japanese horseradish, is now being grown in the Volcano area and marketed to major hotels in Kona, Hawaii. Efforts to increase kava (a traditional Hawaiian beverage) yields per acre and kavalactone content have met with some success as has efforts to plant unrooted cuttings. As a result of these early successes, two companies are planning to produce kava and a third is seeking an SBIR grant to do so.

Extension specialists worked with the swine industry, banks and government agencies to develop an acceptable business plan. The new slaughterhouse opened at the end of 2003. Hawaii's pork producers can now legally market their products.

Pasture weed management is difficult not only because of Hawaii's rugged terrain, but also because workers must often carry large amounts of water to mix with herbicides. The use of a helicopter to apply herbicides reduced the cost of applications per acre and eliminated one of the most difficult jobs faced by farm laborers.

Nematodes are serious pests of coffee. The discovery of a nematode resistant rootstock has resulted in an increase in grafting of coffee seedlings. At least five nurseries are now selling coffee plants grafted onto nematode resistant rootstock. The drought on Molokai has resulted in a "request" to reduce water use on sweet potato by 30%. By switching from sprinkler to drip irrigation, water use has been cut by 55%.

Milk production increases as cows are cooled during summer months. The use of fans, misters, drenches and sprinklers at "critical" areas in the dairy pen resulted in a 25% increase in milk production. The "right" combination of fans and water also reduced the amount of puddling in the pens with a resultant decrease in mastitis.

Hawaii is an increasingly urban state. Its retired population also continues to grow. Many retired persons completed a Master Gardener program. These volunteers are an important component of the

College's efforts to extend services to the community. They educate their neighbors about how to conserve water, control lawn and garden pests, and spot invasive species.

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)
2003	932,116	8,218,357	1,101,071	10,251,544	45.8

Fiscal Year	Extension Smith-Lever Funds (\$)	Extension State Funds (\$)	Extension Other Funds (\$)	Extension Total Funds (\$)	Extension Faculty Years (FY)
2003	478,200	1,726,987	71,579	2,276,766	23.6

Key Theme – Adding Value to New and Old Agricultural Products

- a. Description of activity. The objective of this project is to develop an efficient and effective coffee dryer and low-water mechanical demulciler. (530R)
- b. Impact/Accomplishment. The three-layer dryer was developed to be both effective and efficient. Energy use was reduced to one third of current drum dryers. Damage was reduced. Air temperature and humidity was maintained at levels that gave maximum energy efficiency while giving high quality green bean. Several processors in Hawaii have adopted the three-layer dryer. Several processors have begun to use the low-water mechanical demucilager. Because this system uses only 1/40 of the water of the fermentation method of demucilaging, substantially less water will be used and the mucilage and pulp can easily be composted and returned to coffee plantings. Everyone in the coffee growing area will benefit from the reduction in water use and reduced contamination of the environment.
- c. Source of Funding. Hatch, MRF, and State
- d. Scope of Impact. State

Key Theme – Adding Value to New and Old Agricultural Products

- a. Description of activity. For papaya: (1) develop varieties that possess slow ripening traits and have commercial potential, (2) determine the cell wall degrading enzymes in fruit softening during ripening, and (3) determine the pre-harvest factors that control fruit yield and harvest quality. (862H/660H)
- b. Impact/Accomplishment. For papaya softening, the better selections were identified that reached the edible soft stage about 21 days after skin color break, versus 10 to 12 days for the current commercial varieties. A delay of this magnitude in softening could alter both fruit susceptibility to fruit fly and disease and increase shelf life. This flexibility will allow growers to reduce harvest frequency from about twice a week to once a week, thus significantly reducing harvest cost. In addition, fruit allowed to stay on the plant for a longer period will accumulate more sugars and be

sweeter. Packers/shippers will have fruit that can be more accurately graded as to skin color, thereby avoiding the checkerboard pattern seen in cartons. Wholesalers and retailers will see more uniformly colored fruit with a longer retail shelf life. Consumers would therefore receive a higher quality product.

- c. Source of Funding. Hatch and State
- d. Scope of Impact. State

Key Theme – Adding Value to New or Old Agricultural Products

- a. Description of activity. The goal of this project is to produce value-added products on Molokai. (21-029)
- b. Impact/Accomplishment. It was determined that sweet potato, taro, papaya and awa have the greatest potential for development. Training activities have increased the capacity of clientele to produce value-added products. In June 2003, success was achieved in adding value to sweet potato by packaging them for a big box store. The value-added activity increased the value of the sweet potato by 30%. In 2002, the value of sweet potato statewide was \$989,000. This value-added activity will boost the value of sweet potato to nearly \$1.3 million.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Agricultural Competitiveness

- a. Description of activity. This objective of this project was to develop and implement educational programs on sustainable methods of food and non-food crop production, landscapes and home gardeners in Kona. (20-065)
- b. Impact/Accomplishment. A new “how to graft” coffee publication was completed. As a result, many growers are now grafting Guatemalan coffee onto nematode resistant rootstock. At least five nurseries are now selling grafted coffee plants. The use of genetically modified organisms has been a divisive issue on the Big Island. By working with various representatives of groups with differing viewpoints, the project leader was able to identify several points of agreement, thus defusing a situation that split the farm community.
- c. Source of Funding. Smith Lever and State
- d. Scope of Impact. State

Key Theme – Agriculture Competitiveness

- a. Description of activity. The goals of this project are to convert sweet potato irrigation practice from sprinkler to drip irrigation and to develop weed management alternatives for organically produced papaya. (21-031)
- b. Impact/Accomplishment. As a result of the sweet potato drip irrigation demonstration, more than

80% of Molokai sweet potato production has converted from sprinkler to drip irrigation. This has reduced the quantity of water required to produce sweet potato by 55% and has put sweet potato farmers in compliance with the goal of reducing irrigation requirements by 30% as requested by the Molokai Irrigation System. Organic papaya growers have adopted “shallow tillage” weed management techniques that allow them to manage weeds between rows with minimum physical damage to roots. Since the roots are not damaged, the plants are more productive, more resistant to pests and adverse environmental conditions.

c. Source of Funding. Smith Lever and State

d. Scope of Impact. State

Key Theme – Agricultural Profitability

a. Description of activity. Investigation of insect pests that affect macadamia and banana. (910H)

b. Impact/Accomplishment. Measurable yield losses over the past two years have identified the southern green stinkbug (*Nezara viridula*) as the most damaging pest for macadamia. Contrary to the previously accepted belief that the bulk of damage occurs on the ground, researchers found that substantial damage occurs in canopies. Furthermore, geographic study found that damage levels are higher in wetter areas. In addition, the project has begun to investigate augmentative biological control of the stinkbugs. Macadamia growers have recognized the importance of assessing green stinkbug numbers within the canopy of the trees, and in some cases, have adjusted their insecticide application approach accordingly.

c. Source of Funding. Hatch and State

d. Scope of Impact. State

Key Theme – Agricultural Profitability

a. Description of activity. The overall objective of this project was to extend cultural and management information on potted foliage and potted flowering plants for improved production in Hawaii. (20-025)

b. Impact/Accomplishment. One hundred thirty five free sample analyses were provided to 38 nurseries. The most common problem was disease diagnosis (45%) demonstrating the need for grower education. Seventeen growers changed their cultural practices based on the recommendations offered. The control measures recommended reduced losses by 5% or more for 12 or 14 growers. Five growers reported plant loss reductions of 60% or more. Three reduced their corrective grow-out period by more than one month. A new method of monitoring plant health by measuring pH and total soluble salts has been tested. Five cooperating growers have started to utilize hand-held meters for on site measurements. Three growers have already purchased their own meters underscoring that this method is an effective way to measure plant health.

c. Source of Funding. Smith Lever and State

d. Scope of Impact. State

Key Theme – Agricultural Productivity

- a. Description of activity. The objective of this project is to evaluate alternative farming practices and chemical weed control for pineapple and seed production of Hawaiian plants. (873H)
- b. Impact/Accomplishment. This project marks the first report of pineapple production in Hawaii under no-till conditions. Research found that Telone EC is effective in reducing reneform nematode counts when applied through a drip irrigation system. Further, Telone EC was found to be more effective in conjunction with the use of plastic mulch. The presence of living mulch as opposed to plastic mulch clearly reduced the size of plants and the size of individual fruit. This may be caused by the amount of water that living mulch takes up. Pineapple growers are offered a promising alternative to bare-ground cultivation in the conventional no-till and living mulch/plastic mulch combination that can significantly reduce polluted runoff. The enforcement of the Clean Water Act has caused the preservation of Hawaii's water quality to become an increasingly important consideration for commercial farmers. The development and implementation of production systems that minimize polluted run off are therefore imperative.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. State

Key Theme – Animal Health

- a. Description of activity. Hawaii's pork industry needed a slaughter facility to process their livestock. Without it they could not legally market their products. Pork producers also had to increase the genetic base of their swine. (14-211)
- b. Impact/Accomplishment. Construction of a slaughter facility was completed at the end of 2003. This will enable swine producers to legally market their product. Pork producers in Hawaii and throughout the Pacific were instructed in artificial insemination as a way of improving their herds. Producers' satisfaction with AI was generally high and AI-sired stock now commands a premium price on the local market.
- c. Source of Funding. Smith Lever and State
- d. Scope of Impact. State

Key Theme – Animal Production Efficiency

- a. Description of activity. The objectives of this project are to (1) identify appropriate measures of animal stress and well being and characterize factors affecting the biology of the stress response, and (2) evaluate management strategies that minimize the detrimental effects of animal stress. (257R/W-173)
- b. Impact/Accomplishment. Studies conducted in Arizona concentrated on the effect of solar radiation on dry cows utilizing the new environmental chambers at the University of Arizona at Tucson. These studies clearly demonstrated the ability of individual Holstein cows to sweat and that some cows are better able to adapt to high temperatures and solar assault than others. In Mississippi, the project studied the effectiveness of individual free-stall pen spraying to cool cows and increase lying

time. Cows that were cooled spent more time lying down than un-cooled cows and had lower respiration rates, lower rectal temperatures, and similar milk production. A system to monitor cow temperature continuously was also developed and evaluated. The critical temperature for heat stress was identified at 102F. These findings will positively affect conception rates, increase milk production, and lower dairy operation costs by reducing heat stress in dairy cows. The potential impact of these findings is great as they address animal rights concerns and assist in designing better housing for animals to minimize the effects of heat stress on cows. The availability of simple identification tools will allow the producer to make operational changes to ensure maximum cow comfort and increase production efficiency.

- c. Source of Funding. Hatch, MRF, and State
- d. Scope of Impact. State and Regional

Key Theme – Animal Production Efficiency

- a. Description of activity. Dairy cattle maintained in warm environments produce less milk. Fans, misters, drenches and sprinklers were used to cool cows in “critical” areas of the dairy pen. The right combination of fans and water had to be determined so as to prevent puddling within the feeding pen. Puddling is associated with udder infections. (14-208)
- b. Impact/Accomplishment. The addition of misters, drenches and sprinklers coupled with fans kept milking cows cooler resulting in a 25% increase in milk production. The fans also kept the ground drier reducing the incidence of udder infections. Calving and milk production went up and feeding costs went down. Cooled cows who had given birth returned to the milking string a minimum of 21 days sooner than non-cooled cows. This additional 21 days of milk production at \$3.40 per day for feed works out to be a \$74 savings per animal. Without this solution to a common problem in the tropics, Hawaii dairy industry would not be able to compete with Mainland bulk milk shippers.
- c. Source of Funding. Smith Lever and State
- d. Scope of Impact. State

Key Theme – Biotechnology

- a. Description of activity. The long-term goal of this project is to elucidate the biochemical mechanisms by which light quality changes gene expression in chloroplasts. (544H)
- b. Impact/Accomplishment. In the work on pineapple, researchers have cloned and characterized a genetic switch, termed a promoter that only activates genes in root tissue. The project has also cloned and characterized a gene for cystatins, which inhibit the digestive enzymes of nematodes. By inhibiting nematode feeding, Pineapple productivity can be increased without the use of pesticides. The work with pineapple will reduce the need for harmful chemicals to control nematodes and will provide safer conditions for farmers, less pollution, and lower production costs to keep Hawaii-grown pineapple competitive in the market.
- c. Source of Funding. Hatch, State, and Grants
- d. Scope of Impact. State

Key Theme – Biotechnology

- a. Description of activity. The objective of this project is to use bioengineering to assess anthurium blight resistance. (841H)
- b. Impact/Accomplishment. Two transgenic lines of anthurium 'Paradise Pink', engineered to produce the cecropin-like Shiva 1 lytic peptide, were able to significantly resist anthurium blight caused by *Xanthomonas campestris* pv. *dieffenbachiae* when compared to a standard resistant cultivar, 'Kalapana'. However, disease severity could be significantly increased as well using the same transgene approach in a different genotype, 'Tropic Flame'. These lines were shown to be compatible with beneficial leaf-associated bacteria that can aid in suppressing blight, suggesting that use of genetically engineered plants could be combined with beneficial bacteria to provide durable protection against anthurium blight disease.
- c. Source of Funding. Hatch, State and Grants
- d. Scope of Impact. State

Key Theme – Diversified/Alternative Agriculture

- a. Description of activity. The objective of this project is to improve the analytical methods of physiologically active natural products in kava (*Piper methysticum*). (542H/616H)
- b. Impact/Accomplishment. Kava (*Piper methysticum*, Piperaceae) contains kavalactones in varying proportions depending on the variety, plant part, and developmental stages. The traditional method of evaluation of kavalactones in kava root and stump has been HPLC, which is expensive and tedious. A simple method of using near-infrared spectroscopy (NIRS) to evaluate kavalactones has been developed. Preliminary toxicology data suggest that alkaloids pose potential health hazards. The traditional HPLC method used for the quality control of kava has been found to be incapable of detecting kava alkaloids. A capillary GC method developed by the researchers offers an effective solution to this problem. The NIRS method of kavalactones evaluation and the GC method of alkaloid detection in kava will be useful for both kava researchers and the industry for quality control of kava raw material and products. The NIRS method that was developed is both less expensive and more efficient than the traditional HPLC method.
- c. Source of Funding. Hatch, State and Grants
- d. Scope of Impact. State

Key Theme – Diversified/Alternative Agriculture

- a. Description of activity. The objective of this project is to evaluate the physiology of flowering of tropical ornamentals. (856H)
- b. Impact/Accomplishment. *Leucospermum proteas* grown with daylength shortened by drawing a shade had shorter stems than those grown without the shading treatment. Heat trapped by the shade material caused flower bud abortion and delayed flower development until the shade treatment was no longer applied. Thus, flowering was 4-6 weeks later than for plants grown without shading. This

suggests that removal of flower buds can delay flowering in the spring for later spring markets such as Easter and Mother's Day. Three *Curcuma* cultivars selected for shorter stature as potted plants required 102–110 days from planting to flowering. Flower stalks averaged 62 cm in length in shade, versus 12 cm in full sun, thus demonstrating the significant effects of shading on extension growth. The findings of this project will allow growers to maintain flower production during normally low production periods in January and February. The three selected *Curcuma* cultivars can be flowered in 100–110 days from planting and have shorter stems. This will allow growers to choose varieties, which are better suited to 15-cm pots than the normal cut-flower type of *Curcuma alismatifolia*.

- c. Source of Funding. Hatch, State and Grant
- d. Scope of Impact. State

Key Theme – Diversified/Alternative Agriculture

- a. Description of activity. The objective of this project is the development of multiple disease-resistant commercial tomatoes. (926H)
- b. Impact/Accomplishment. Genetic crosses generated a multiple disease resistant red beefsteak tomato with increased shelf life. Several tomato growers on Maui, Kauai, and Hawaii are currently growing this hybrid for commercial tomato production.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. State

Key Theme – Diversified/Alternative Agriculture

- a. Description of activity. This project sought to provide leadership and technical support in the transfer of vegetable and herb information to industry groups and growers on the Big Island. (20-026)
- b. Impact/Accomplishment. A small wasabi grow out trial was established at the College's Mealani Research Station. Two growers have expressed interest in producing wasabi. One grower has successfully begun marketing product to major resort hotels in Kona, Hawaii.
- c. Source of Funding. Smith Lever and State
- d. Scope of Impact. State

Key Theme – Diversified/Alternative Agriculture

- a. Description of activity. This project seek to make kava a sustainable crop through a wide variety of work, from strategic planning to in-field testing of cultivars, planting techniques and water needs, to marketing and economic issues. (18-816)
- b. Impact/Accomplishment. Strategic planning sessions were completed, and experiments were conducted to increase levels of kavalactones, demonstrate efficacy of direct planting unrooted kava cuttings versus transplanting rooted cutting, and determine kava water use. Partly as a result of this

work, two businesses are planning to produce kava and a third is seeking an SBIR grant.

- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Invasive Species

- a. Description of activity. The objective of the project is to produce and distribute inoculum of *Septoria* sp. to different lantana-infested sites at Kokee, Kauai, and to monitor parasite-host interactions and quantitatively evaluate weed biomass reduction caused by *Septoria* sp. inoculations on bush lantana at selected forest sites. (968M)
- b. Impact/Accomplishment. *Septoria* leaf spot has significantly reduced the bush lantana weed population at Kokee State Park on Kauai. Bi-annual monitoring of seven sites showed lantana biomass reduction of >95% at three sites and >50% at the other sites. Microscopic observations of leaf lesions showed more than 98% of the pycnidia that are produced on the diseased leaves occur on the upper leaf surface. By producing its pycnidia on the upper leaf surface, *Septoria* sp. facilitates spore dispersal. The inoculation of Kokee State Park with the biocontrol fungus, *Septoria* sp., will reduce bush lantana infestation significantly in 3–5 years and will save the State Department of Land and Natural Resources from spending millions of dollars for control.
- c. Source of Funding. McIntire-Stennis and State
- d. Scope of Impact. State

Key Theme – Plant Health

- a. Description of activity. The overall objective of this research is to develop alternative, safe methods, such as edible oils, for controlling tomato powdery mildew. (959H)
- b. Impact/Accomplishment. When edible oils emulsified with Tween 80 were sprayed on tomato leaves, the severity of tomato powdery mildew caused by *Oidium neolycopersici* was reduced. In the water check treatment, 80% of the upper leaf surface was covered by powdery mildew. Leaves treated with edible oils showed only 13–37% surface infection. None of the oils tested showed any adverse effects on tomato seedlings. Sunflower oil was found to be most effective against tomato powdery mildew. The leaf area covered with powdery mildew decreased as the concentration of sunflower oil increased. Plant disorder caused by powdery mildew is a major global disease problem. Using sunflower oil to control powdery mildew will greatly reduce the amount of fungicide used annually. The use of sunflower oil to control powdery mildews is advantageous because it is economical, simple to prepare and use, and environmentally friendly, and it has no negative effect on human health. In addition to its potential for large-scale application to control powdery mildew in commercial farming, sunflower oil is also ideal for use in home gardening and organic farming.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. State and National

Key Theme – Plant Production Efficiency

- a. Description of activity. The objective of this study is to determine whether a new herbicide, foramsulfuron, controls annual bluegrass and goosegrass. (975H/802H)
- b. Impact/Accomplishment. Foramsulfuron provided excellent control of annual bluegrass as well as roughstalk bluegrass. Foramsulfuron was evaluated by itself as a sequential application and combined with various rates and timing of metribuzin on goosegrass. The study found that foramsulfuron was slow to act but provided excellent control of goosegrass without injury to bermudagrass. Data from extensive field studies conducted were reexamined to determine whether selective herbicide treatments had a residual effect on seashore paspalum when repeated every few months. The analysis showed that 12 weeks after the initial application cycle, residual control ranged from 0 to 12%. These results increased to more than 40% 12 weeks after the third or fourth application cycle, suggesting that prior applications had a residual effect. The technology that was developed was adopted rapidly and early by Hawaii's golf course superintendents. They are already using multiple applications of the selective treatments the project developed to prevent seashore paspalum from encroaching on their greens. Golf course superintendents are also utilizing the nonselective glyphosate application plus re-sodding treatment developed by this project. Foramsulfuron was registered for turf grass use in Hawaii in May 2003, and it is already being utilized by the industry. It is expected to be an important new tool for goosegrass and annual bluegrass control for Hawaii's golf course superintendents, particularly where goosegrass resistance to metribuzin is suspected.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. State and National

Key Theme – Plant Production Efficiency

- a. Description of activity. The objective of this project is to evaluate the cultural strategies to improve production of cut flower and potted flowering anthuriums. (851H)
- b. Impact/Accomplishment. *Anthurium andraeanum* cultivars were grown for two years in cinder beds with and without a cover layer of composted green waste mulch in a polyethylene covered greenhouse with 80% saran shade. The mulch did not affect 'Marian Seefurth' and 'Kalapana' plant yields. Stem lengths of both cultivars were longer on plants grown with the mulch layer; flower size of 'Marian Seefurth' was also greater with mulch than without. The study was repeated in an 80% shade saran house with no protection from rainfall. After one year 'Marian Seefurth' plants with the mulch layer had greater yield and larger flowers with longer stems than plants without mulch. No differences were observed with 'Kalapana' plants. Potted juvenile anthuriums were successfully inoculated with arbuscular mycorrhiza. Plants were successfully established in cinder beds. Uniconazol at 30 and 50 ppm decreased petiole (26% and 36%) and flower stem heights (29% and 54%). However up to 20% of flowers treated with uniconazole were deformed. Growers will be able to use composted green waste as a mulch to improve cut flower quality and yield of some *Anthurium andraeanum* cultivars.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. State

Key Theme – Plant Production Efficiency

- a. Description of activity. The objective of this project is to identify, evaluate and make available to Hawaiian and American Pacific taro farmers new taro cultivars that are resistant to taro leaf blight and pocket rot. (973H/711H)
- b. Impact/Accomplishment. This study found that 11 months after planting the patented taro cultivars ‘Pa’akala’ and ‘Pauakea’, taro corm yields were 97,000 and 67,000 lb/acre, respectively. ‘Pa’lehua’ produced 37,000 lb/acre 8 months after planting. A minimum of 6 hours of drip irrigation was required for normal crop growth. Planting material (huli) of the patented cultivars ‘Pa’lehua’, ‘Pauakea’, and ‘Pa’akala’ were licensed to 10 Hawaii taro growers. ‘Pa’akala’ and ‘Pauakea’ produce high yield of carbohydrate-rich corms suitable for taro flour manufacture and have the potential to create a new industry in Hawaii.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. State and the American Pacific Region

Key Theme – Plant Production Efficiency

- a. Description of activity. The objective of the project is the molecular detection, characterization, and management of a phytoplasma associated with watercress yellows. (903H)
- b. Impact/Accomplishment. Researchers used polymerase chain reaction assays (PCR) to identify a pathogen that is consistently associated with watercress yellows on all the watercress farms on Oahu. Sequence analysis of the cloned PCR products has confirmed the identity of the phytoplasma as the severe strain of western North American aster yellows (SAY). The project conducted surveys of the incidence of watercress yellows every two weeks for the six months on the largest watercress farm on Oahu. During the period from May 1 to July 1, 2003, the incidence of SAY on this farm increased to levels as high as 50–75% in some plots. During this period, populations of the most-likely vector, *Macrostelus* sp. nr. *severini*, a leafhopper, were very high on this farm and contributed to the rapid spread of this disease within the farm. The identification of the causal agent of watercress yellows has been the major step in devising control strategies to limit the spread of this disease on watercress farms in Hawaii. As a result, the watercress farmers on Oahu are now aware of the pathogen that causes the yellows disease of watercress and the importance of controlling both the incidence of disease in their crop and the leafhopper that is the vector of the pathogen that causes this disease. The information provided to the watercress farmers and the recommendations for controlling the disease have given watercress farmers the ability to control the incidence of SAY in their crop.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. State and National

Key Theme – Plant Production Efficiency

- a. Description of activity. The objective of this project is the preservation, characterization, and genetic improvement of Hawaiian taro. (914H)

- b. Impact/Accomplishment. Three out of nine taro hybrids developed in 1999 were evaluated in October 2002 on Kauai under wetland conditions and were found to be equal or better than the poi industry standard variety ('Maui Lehua') in both taste and color. In addition, two of the three hybrids out-yielded 'Maui Lehua' in weight. The three taro hybrids were evaluated by a commercial poi miller. The poi obtained from each of them was found to be as good or better in color, starch, and gum attributes than that of 'Maui Lehua'. There is a growing commercial market for ornamental taros for use in landscapes and water-gardens in the southeastern US. A major plant propagation business in Florida and a major nursery operation in North Carolina have expressed interest in commercializing the ornamental taro varieties.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. State and National

Key Theme – Plant Production Efficiency

- a. Description of activity. The objective of this project is genetic improvement of tropical field corn. (866H)
- b. Impact/Accomplishment. Thirty field corn inbreds with virus resistance will soon be released. Silage production appears to be well on its way to becoming a significant agricultural activity. The development of silage production is partly aided by the development of the CTAHR hybrids. The hybrids bred for both lowland and upland conditions have superior performance to any other commercial competitors and can be grown pesticide-free.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. State and National

Key Theme – Rangeland/Pasture Management

- a. Description of activity. The objective of the project is to evaluate weed management strategies for noxious weeds of pastures and forests and, specifically, to evaluate the efficacy of very-low-volume basal bark treatments and to evaluate the efficacy of tebuthiuron. (130H)
- b. Impact/Accomplishment. Large *Psidium guajava* and *Bocconia frutescens* trees were susceptible to very-low-volume basal bark applications of triclopyr. Soil applications of tebuthiuron severely injured *Psidium cattleianum* and *P. guajava* plants even at 30 months after application. Invasive weeds reduce pasture productivity and endanger natural ecosystems. The treatments used in this project are more economical than mechanical clearing of pasture and forests lands and are safer on non-target plants than foliar applications to tall trees.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. State and Regional

Key Theme – Rangeland/Pasture Management

- a. Description of activity. One of the goals of this project was to develop pasture weed management strategies applicable to a wide variety of situations, e.g., weeds found in close proximity to native species or other desirable plants. A second goal was to work with cattle producers on grazing cycles, nutrient management, multi-species grazing and legume management. (21-060)
- b. Impact/Accomplishment. Herbicides were applied by helicopter to over 1,250 acres to control gorse, Christmas berry, shoebutton arisia, guava, miconia, banana poka and/or blackberry. Weed control is one of the most challenging practices of rangeland pasture stewards. Changes in age and health care requirements for farm laborers were enough to convince most to adopt the practice of aerial application of herbicides. Application of 2,000 gallons of mix in a single day is from 25-50% cheaper than applying the same amount by backpack over several months. Using helicopters for gorse control reduced costs by 50%. Twenty-five volunteers contributed approximately \$50,000 in time to this project. In addition, \$3,500 was contributed as in-kind material.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Urban Gardening

- a. Description of activity. The purpose of this project was to develop an urban garden program on Maui to help gardeners with their plant problems by emphasizing sustainable growing practices and water management. (21-020)
- b. Impact/Accomplishment. Of the 31 participants who attended the Organic/Sustainable Plant Conference, 17 of 30 said they will use information presented within one month, 5 of 30 said they will use the information within 6 months, and 7 of 30 said they will use the information within a year. The remaining respondent said they would use the information “sometime.” Thirty-six people completed the “Controlling Plant Diseases with Compost with 8 of 10 saying they will put their new knowledge to work immediately. Twenty-two people stated they would be better at managing their water usage. Sixteen people said they felt they could conserve water usage by an average of 43%. Seventeen volunteers contributed over \$17,000 in time.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Urban Gardening

- a. Description of activity. The goals of this project were to provide a foundation for home gardening and lawn maintenance and to stimulate learning science among school age children using garden activities on Kauai. (23-042)
- b. Impact/Accomplishment. The Agriculture in the Classroom program provided 325 students with hands-on experience in gardening. Eleven out of sixteen students improved their knowledge in a pre and post-test. Students wrote in their journals that they: 1) doing hands-on lessons helped them relate to what was being taught in class, 2) learned responsibility and team building when working in

groups and caring for plants, 3) shared with and taught the younger students, 4) learned to appreciate nature and environmental stewardship, 5) gained physical exercise, 6) had fun learning in the garden and (7) expected to be able to use what they learned in the garden as adults. The Agriculture in the Classroom lessons helped teachers address some of the science requirements for the Hawaii State Department of Education Hawaii Content and Performance Standards that all students are expected to achieve. Two thousand people were served through the urban horticulture program. The average monthly yard service for homes on Kauai costs between \$20 and \$40. As a group, the participants could save between \$480,000 and \$960,000 per year by maintaining their own yard.

- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Urban Gardening

- a. Description of activity. The Urban Garden Center offers a unique opportunity for many urban residents to learn about gardening, landscaping and turf management. The UGC offered a wide variety of activities for children, Master Gardeners, homeowners and others. (22-040)
- b. Impact/Accomplishment. At least 450 people attended one or more of the 33 different classes conducted at the Urban Center. Master Gardeners helped distribute fruit fly lures to 52 people. Eliminating fruit flies in their neighborhood allows them to grow fruits and vegetables that they would otherwise be unable to grow because of these pests. Several of the new gardens were made wheel chair accessible. A new gate allowed access for The Bus passengers, making it easier for them to visit the gardens. More than 13,000 contacts were made during the year. The 133 volunteers provided over 11,000 hours (= \$110,000) to plan, develop, maintain, and participate in gardening activities. In-kind and monetary contributions were estimated to be \$54,500.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

GOAL 2: A SAFE AND SECURE FOOD AND FIBER SYSTEM

Overview:

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

GOAL 3: A HEALTHY, WELL-NOURISHED POPULATION

Overview:

Progress in health and nutrition research focused upon the prevention of osteoporosis in U.S. adults. Behavioral research has led to the development of a plan for educational intervention to encourage calcium intake in adolescents. This intervention will promote the accretion of bone mass in youth, which research has shown prevents bone mass loss in adulthood. The behavioral intervention will promote good bone health and therefore lead to a greater quality of life for U.S. adults in the future.

Diabetes is an important disease among many Hawaiians and other Pacific Islanders. A project was initiated that helps populations with historically high incidences of diabetes to become aware of the disease. The project also provides educational programs (e.g., cooking classes) to help those affected to manage and live with the disease.

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)
2003	24,897	234,167	109,927	368,991	1.6

Fiscal Year	Extension Smith-Lever Funds (\$)	Extension State Funds (\$)	Extension Other Funds (\$)	Extension Total Funds (\$)	Extension Faculty Years (FY)
2003	16,514	65,734	121,473	203,721	1.2

Key Theme – Human Health

- a. Description of activity. The objective of this project is to develop a behavioral approach that will increase bone health in Asian, white Hispanic, and Caucasian adolescents and to develop outreach programs that will utilize this approach to improve the health of the U.S. population. (211H)
- b. Impact/Accomplishment. Current research indicates that greater accretion of bone mass prior to the period of bone loss (adulthood, particularly the later years) lowers the incidence of osteoporosis. Peak bone mass is in part affected by calcium intake in childhood, adolescence, and early adulthood. Unfortunately, calcium intake actually declines during adolescence, particularly in young women. Therefore, there is a pressing need to develop behaviorally based interventions for the youth of the United States. This intervention can assist youth to consume more calcium and improve bone health, averting costs associated with osteoporosis and associated poor quality of life.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. State and National

Key Theme – Human Health

- a. Description of activity. The focus of this project is on diabetes awareness, education, and screening. (20-072)
- b. Impact/Accomplishment. As a result of 23 screening and educational sessions, 79 adults with diabetes were identified. Over 90% of the participants completed a follow-up questionnaire 3 months after their initial enrollment. Weekly “Healthy Cooking ‘Local Style’” classes attracted 25-30 participants. About 80% were repeat attendees. The outreach portion of this project has led to growing awareness of diabetes, including risk factors, related health issues, and learning how to manage and live with diabetes.

c. Source of Funding. Smith-Lever and State

d. Scope of Impact. State

GOAL 4: GREATER HARMONY BETWEEN AGRICULTURE AND THE ENVIRONMENT

Overview:

The harmony between agriculture and the environment was promoted forwarded this year through projects that included significant work with pesticides, wastewater management, identification and management of explosives found in soils, research into the management and beneficial applications of animal waste products, and development of methods to utilize waste wood products.

Significant strides were made in the rapid extraction and measurement of explosives found in soil. These new methods are valuable for emergency responses, risk assessment and responses to terrorist threats. Workshops conducted with the Fire Department Hazardous Material Units of Oahu trained participants in hands-on approaches for situations in which chemical and biological weapons of mass destruction may be involved.

Waste wood from the timber industry in Hawaii has proven to provide an effective and economical supply of substrate for mushroom growth. Wood chips from five tree species that are commonly found in Hawaii appear to be suitable substrate material. This project not only suggests new ways of utilizing waste wood, but the edible mushroom production made possible by this research has the potential to create a new industry for the local economy.

The nursery industry and other tree seedling producers will benefit from the research done at CTAHR on the development of the fungi Arbuscular mycorrhizal (AM). AM has positive effects on tree nutrition and health. This project developed a standardized procedure for the production of AM on seedlings, which has been adopted by one significant nature farming organization and has garnered interest from at least three other organizations.

Pest management is a constant year-around problem in Hawaii because of our tropical and subtropical weather, plant diversity, and lack of natural parasite and predators of many of the pests. While chemical pest management will always be an important component of any integrated pest management program, the emphasis on non-chemical methods and the use of “softer” or environmentally friendly chemicals remained the focus of much of the pest management efforts. By using EPA’s crop grouping scheme product labels could be expanded to cover a multitude of tropical fruits. Area-wide IPM programs have resulted in decreasing melon fly infestation rates from 30-60% to less than 1% with a corresponding 90% reduction in use of organophosphate insecticides.

USDA and EPA are funding high priority pest management research projects based on Pest Management Strategic Plans (PMSPs) that require extensive stakeholder and faculty involvement to develop. The PMSP identifies and prioritizes pest management issues. A PMSP for bananas was developed last year and based on the success of that project two more are planned for FY04.

The lack of suitable pest management strategies for some pests has resulted in the overuse of certain pesticides and the development of resistance to whole classes of chemicals. By getting growers to

coordinate their spraying and use of different classes of insecticides, resistance can be successfully mitigated.

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)
2003	176,479	700,989	458,551	1,336,019	5.2

Fiscal Year	Extension Smith-Lever Funds (\$)	Extension State Funds (\$)	Extension Other Funds (\$)	Extension Total Funds (\$)	Extension Faculty Years (FY)
2003	96,165	389,843	66,809	552,817	6.6

Key Theme – Forest Crops

- a. Description of activity. The objective of this project is to develop a protocol for raising mycorrhizal seedlings in containerized nursery production systems. (812M/124M)
- b. Impact/Accomplishment. Findings of the project will enable the nursery industry and other tree seedling producers to benefit from the effects the fungi have on tree nutrition and tree health. The current containerized nursery tree seedling production practice is not effective for the development of AM fungi on roots of tree seedlings. Research showed that the slow-release fertilizer Osmocote was the user-friendliest, followed by Miracle-Gro and Hoagland’s solution. The mycorrhization medium that was developed using Osmocote can be used for any tree species by varying the quantity of soil to be mixed with peat or increasing soil P buffer capacity. Research has also demonstrated that the density of infective propagules of AM fungi used to inoculate seedlings is one of the variables that will determine the success or failure of a mycorrhizal seedling production program. By far the greatest importance of this work lies in the development of a standard approach for mycorrhization of tree seedlings that is now accessible to all nursery operations. One significant nature farming organization has adopted the procedure, and at least three other organizations have expressed interest.
- c. Source of Funding. McIntire-Stennis, and State
- d. Scope of Impact. State and National

Key Theme – Forest Resource Management

- a. Description of activity. The overall objectives of this project are to utilize wood and other forest products and to obtain the fullest and most effective use of forest resources. (811M)
- b. Impact/Accomplishment. Wood chips from five tree species that are commonly found in Hawaii appear to be suitable substrate material for mushroom production. These trees are *Eucalyptus grandis* (eucalyptus), *Casuarina equisetifolia* (common ironwood), *Paraserianthes falcataria* (albizia), *Trema orientalis* (gunpowder tree), and *Psidium cattleianum* (strawberry guava). Tropical

oyster mushrooms (*Pleurotus* sp.) were successfully cultivated on eucalyptus, ironwood, and albizia. Wood ear mushrooms (*Auricularia polytricha*) successfully grew on gunpowder tree, strawberry guava, and albizia. Preliminary experiments for all wood types showed approximate yields of 0.25 kilograms of fresh mushrooms per 3.5 kilograms of substrate. Both mushroom varieties were successfully induced to fruit with added moisture at the environmental temperatures at Hilo, Hawaii, thus eliminating temperature control costs. Given the growing popularity of the gourmet market in large hotels, cruise ships, and restaurants, local production of edible mushrooms has great economic potential. Successful mushroom production in Hawaii will provide a sustainable, alternate use for waste wood. In addition, edible mushroom production will create another Hawaii-grown product and provide an opportunity for development of a new industry for the local economy.

- c. Source of Funding. McIntire-Stennis and State
- d. Scope of Impact. State and National

Key Theme – Forest Resource Management

- a. Description of activity. The objective of this project is to evaluate effective and least-toxic termite management methods for Hawaii. (923M)
- b. Impact/Accomplishment. Project findings that the soil insecticide fipronil remains effective against formosan subterranean termites (*Cryptotermes formosanus*) for six (6) years have been demonstrated and presented to the pest control industry. The longevity of this soil insecticide will translate to approximately \$27 million annual savings to the state for every year that a termite treatment does not have to be performed. Further, field studies confirmed that the new bait toxicant noviflumuron acts faster in some cases to eliminate termites than its predecessor, hexaflumuron. Since the total annual cost of termite damage in Hawaii has been estimated at approximately \$100 million, even a 10 percent increase in speed of control could equate to a \$10 million annual savings for residents of the state. The UH patented (pending) method of microbial termite control is expected to have great environmental benefits by providing an effective alternative to the use of synthetic insecticides for termite control.
- c. Source of Funding. McIntire-Stennis and State
- d. Scope of Impact. State and National

Key Theme – Hazardous Materials

- a. Description of activity. The objective of the project is to develop new methods for analysis of explosives, to elucidate bioremediation mechanisms at a molecular level, and to conduct bioremediation technology demonstration and biotechnology workshops. (522H)
- b. Impact/Accomplishment. A new method was developed for trace analysis of eight explosives in soil using pressurized fluid extraction and gas and liquid chromatography mass spectrometry. Unlike the standard U.S. Environmental Protection Agency method, SW-846 8330, this new method provides mass spectral confirmation of the analytes. Further, the extraction requires approximately 15 minutes, compared to the 18 hours needed for the EPA method. Workshops were conducted to train 60 personnel from Fire Department Hazardous Material Units in all counties of Hawaii. These workshops trained participants in responses to situations in which chemical and biological weapons

of mass destruction (WMD) may be involved. Another workshop offers lectures about chemical and biological WMD, field sampling techniques, and field characterization of unknown elements. Attendees practiced hands-on scenarios using techniques demonstrated in the lectures.

c. Source of Funding. Hatch and State

d. Scope of Impact. State and National

Key Theme – Integrated Pest Management

a. Description of activity. Before pesticides can be applied to food crops they must be registered with the Environmental Protection Agency. Generally, the registration process takes 3-5 years to collect field and residue data. Since few pesticide manufacturers are willing to pay for the cost of registering products for minor crops (all crops in Hawaii are by definition minor crops), data generated by Interregional Research project 4 (IR-4) is absolutely critical. (16-920)

b. Impact/Accomplishment. As a result of IR-4 work, an insecticide (imidacloprid) was labeled on several tropical fruits including acerola, jaboticaba, guava, papaya, mango, passion fruit, persimmon, and star fruit. The registration of Amdro© hyrdamethylnon was finalized by EPA. After 20 years pineapple growers now have a product for in-field use and more importantly an opportunity to evaluate alternative ant control products. Hydramethylnon was also registered for use on tropical fruits for ants meaning that “softer” chemicals may be used to control sucking insects previously protected by ants from their natural enemies. Foramsulfuron was labeled for turf providing the first effective method to control goosegrass, a major pest on Hawaii’s golf courses.

c. Source of Funding. Smith-Lever, State, and Grants

d. Scope of Impact. State

Key Theme – Integrated Pest Management

a. Description of activity. Develop and promote new crops or new uses for existing crops. Develop production and pest management strategies for growers. (22-016)

b. Impact/Accomplishment. Papaya nitrogen calibration trials were completed. Growers now have information needed to achieve economic papaya yields. New varieties of taro were evaluated for high starch content suitable for export. Taro starch represents another value-added product for producers. Three area-wide suppression tactics for fruit flies resulted in melon fly infestation rates in Central Oahu dropping from 30-60% to less than 1% with a corresponding 90% reduction in organophosphate pesticide usage. Melon fly infestation rates in Waimea, Hawaii dropped from 20% to less than 2% and Oriental fruit fly populations dropped from more than 15 flies per trap day to less than 0.45 flies per trap day. There was a corresponding 100% reduction in the use of organophosphate insecticides. A total of 186 growers were involved in the two area-wide programs.

c. Source of Funding. Smith-Lever and State

d. Scope of Impact. State

Key Theme – Integrated Pest Management

- a. Description of activity. Pest management problems and strategies in the American Pacific are unique and as such require a coordinated effort to address. The objective of this project was to develop and update crop profiles and pest management strategic plans for commodities important to the American Pacific. This project is multi-institutional, involving all the land grants in the American Pacific. (16-917)
- b. Impact/Accomplishment. A regional crop profile (production practices, pest management strategies, uses, cultural importance, and economics) was completed for banana. Subsequently a pest management strategic plan (PMSP) was developed for banana grown in Hawaii. Development of the PMSP required the active participation of growers (conventional and organic), researchers, specialists, county agents and a consultant. Completion of the banana PMSP means that the industry, EPA and USDA now have a document that prioritizes pest management issues. A crop profile for papaya was completed. Data used from these documents and pesticide use surveys have been used by EPA to make pesticide regulatory decisions. PMSPs are used to establish funding priorities for several CSREES funded programs, e.g., CAR, RAMP, RIPM Centers. The Hawaii Pesticide Information Retrieval System has been linked to the National Pesticide Information Retrieval System meaning that errors in the database are minimized, data is current, and the database can be searched in more sophisticated ways.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State and Regional

Key Theme – Integrated Pest Management

- a. Description of activity. Educational activities were conducted to encourage 75% of the macadamia nut farmers to adopt integrated pest management practices. (16-911)
- b. Impact/Accomplishment. The largest macadamia nut grower/manager is now using a crop log system as part of the Nutrient Management section of the Macadamia Nut IPM Protocol. Crop logs revealed that lower amounts of N-P-K were needed in some years to maintain adequate tissue levels, which led to significant saving in fertilizer costs. Growers learned how to manage habitat and use bait stations to reduce damage from rats. Hawaii's largest macadamia nut grower met the verification requirements for implementation of IPM practices. Eight volunteers provided over \$3,000 worth of time to the project.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Integrated Pest Management

- a. Description of activity. The objective of this program is to have cabbage growers adopt integrated pest management practices on 75% of their crop acres. The major pest of cabbage is the Diamondback Moth (DBM). Because it has become resistant to most classes of insecticides a resistance management program was initiated. (16-909)

- b. Impact/Accomplishment. The key component of the DBM resistant management effort centered on using new, more environmentally friendly insecticides in monthly rotation and by getting growers to share information on DBM infestation levels. A new “IPM for Cole Crops and Lettuce” from the University of California was given to growers. Farmers were able to effectively maintain an area-wide resistance management program for over two years. No major damage due to DBM has been reported.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Integrated Pest Management

- a. Description of activity. Area-wide pest management programs cannot be successful in urban/rural locations without involving homeowners, backyard gardeners and commercial growers. This project involved developing and conducting a comprehensive extension education program at three different locations to encourage commercial and non-commercial growers to adopt fruit fly management techniques on an area-wide basis. (16-924)
- b. Impact/Accomplishment. This project was an important component of a larger ARS supported area-wide fruit fly management program involving five suppression techniques. Demonstration sites were established on three islands (Hawaii, Maui, and Oahu). By involving the broader community in the project, melon fly infestation rates in persimmon dropped from 87.5% to less than 5%. The number of flies trapped per day dropped 95-98%. Farmers reduced their use of organophosphates by 40%. Melon fly infestation rates on farms on Oahu dropped to less than 1%. Organophosphate usage for melon flies decreased by 90%. Commercial growers were able to greatly increase persimmon, cucurbit and melon yields by using ecologically friendly techniques applied area-wide.
- c. Source of Funding. Smith-Lever, State, and Grants
- d. Scope of Impact. State

Key Theme – Integrated Pest Management

- a. Description of activity. The goals of this project were to (1) develop a fact sheet for the producer on fly identification, life cycle, and current control methods, (2) implement IPM strategies on cooperator farms, and (3) coordinate and conduct producer workshops on the findings of the project. (16-919)
- b. Impact/Accomplishment. A total of 11 fact sheets on different livestock fly pests were published or are in press. The on-farm HACCP best management practices program has been implemented on 8 poultry farms across the state to improve trace-back procedures in cases of contamination by Salmonella enteritidis in local eggs. The program has brought together the industry, Food and Drug Administration, Department of Health, Department of Agriculture, and the CTAHR to develop an on-farm sanitation recordkeeping program to prevent the spread of Salmonella and individual farm trace-back mechanisms if one should occur. There has not been a single reoccurrence of the disease since the program was implemented.

- c. Source of Funding. Smith-Lever 3(d) and State
- d. Scope of Impact. State

Key Theme – Integrated Pest Management

- a. Description of activity. One of the objectives of this project was to (1) educate and assist papaya farmers with papaya production and to identify and control arthropod and plant disease pests, (2) collaborate with the Hawaii banana IPM certification program on Kauai and (3) provide educational assistance to tropical fruit and coffee growers on Kauai. (23-043)
- b. Impact/Accomplishment. The United States Department of Agriculture and CTAHR are cooperating in a Hawaii Area Wide Fruit Fly Integrated Pest Management program (HAWFLYLPM) to reduce fruit fly populations across the state of Hawaii. Kauai tropical fruit growers with 56 acres planted with mango, lychee, citrus and other fruits participated in field trials using the techniques developed by the HAWFLYLPM program to reduce fruit fly infestations. Participants of the field trials reduced fruit damage by fruit flies by an average of 30%. Participants' reported that their pesticide usage was reduced from an average 5 applications per year to less than one application (average of 0.3). Growers increased their knowledge of fruit fly identification, life cycle and fruit fly suppression techniques from poor to fair or better. Grower confidence in the suppression techniques improved from non-confident to confident, and not satisfied to satisfied, and they were all willing to continue the program.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Natural Resource Management

- a. Description of activity. The project studied different aspects of the evolution, structure, and performance of water institutions in Hawaii and compared and contrasted them with the experiences of other states in the western United States. (106R)
- b. Impact/Accomplishment. The overall conclusion was that Hawaii's water institutions, as presently conceived, need drastic revamping to render them effective and efficient in the optimal allocation of the state's diminishing freshwater supply among competing and newly emerging uses and users. The findings from this study will have an important impact in designing institutions for the optimal allocation and management of Hawaii's water. The study identified several aspects of Hawaii's water institutions that needed to be modified in order to improve their ability to optimally allocate the state's fresh water supply. These include changes in the legal doctrine currently governing water allocation and transfer in Hawaii (from a variant of the Doctrine of Prior Appropriation to the Public Trust Doctrine), specific mechanisms to resolve increasingly recurring conflicts among water uses and users, the incorporation of water banking features to effectively address drought conditions, effective incentives for water conservation (monetary and nonmonetary), and provision of mechanisms to safeguard Native Hawaiian water rights. Many of these issues parallel the concerns of other member states of the W-190 technical committee (e.g., Native American water rights in Colorado, Arizona, Washington, and Idaho), shift in water demand from agricultural use to newly-emerging uses (e.g., visitor industry demand in Nevada, municipal and industrial uses in California, and environmental/in-stream uses in Colorado and Oregon), and the growing need to address water

demand in times of drought (e.g., California and Nevada). Thus the lessons learned and the insights gained from other states are central to the fashioning of robust water institutions in Hawaii.

c. Source of Funding. Hatch and State

d. Scope of Impact. State and National

GOAL 5: ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS

Overview:

A conference entitled “A Toolkit for Entrepreneurs” was presented in collaboration with the Lawrence N. Field Center for Entrepreneurship and Small Business at Baruch College in New York. The “Success Estimator Tool” developed by Hawaii’s researchers for the conference is currently being used by Field Center councilors and is now available to the public at CTAHR’s Entrepreneur’s Toolbox website.

The “Children of Prisoners, Children of Promise” video conference was also a great success. Attendees, who included personnel from various state agencies and community service organizations as well as incarcerated parents, identified and discussed strategies for support of children and families affected by incarceration. The success of this conference has led Child and Family Services of Hawaii and the Child Welfare League of America to invite a project member to help develop another conference.

Tourism is the major industry in Hawaii. Efforts to link tourism with Hawaii’s agriculture resulted in a hugely successful event. Thirty-four restaurants representing some of the largest hotels in Kona participated in the annual “Taste of the Hawaiian Range” food festival. Over 1,800 people attended the sold out event. Sixteen percent of the participants were from the mainland or Japan. This event was clearly one of the best food shows in Hawaii and plans are being made to move it to a larger facility next year.

Building stronger communities can be achieved in many ways. Extension courses in financial management were developed for students, low-income families, entrepreneurs, financial counselors and financial institutions. As a result participants demonstrated that they could make financial decisions regarding goal setting, managing debt, and saving money.

4-H faculty teamed up with the Army and Air Force bases to reach children of military members. The faculty developed “4-H 101” training materials to assist installation staff to organize 4-H clubs. As a result nearly 300 youth are now enrolled in 4-H programs. The project leader for this project was presented with the Regional and National “Salute Award” in recognition of her successful efforts to build a strong partnership with Army bases in Hawaii and Japan.

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)
2003	79,424	190,704	100,402	370,530	2.4

Fiscal Year	Extension Smith-Lever Funds (\$)	Extension State Funds (\$)	Extension Other Funds (\$)	Extension Total Funds (\$)	Extension Faculty Years (FY)
2003	244,881	1,126,844	30,821	1,402,546	16.6

Key Theme – Children, Youth and Families at Risk

- a. Description of activity. The goal of this project is to increase knowledge and understanding of the impact on children and families when parents are incarcerated. (372H)
- b. Impact/Accomplishment. A video conference titled “Children of Prisoners, Children of Promise” was organized and held in June 2003. Over 60 participants representing various state agencies and community service organizations as well as incarcerated parents attended the conference. Participant working groups identified numerous problems and issues faced by children and families affected by incarceration in Hawaii. These issues include childcare, visitation, economics, mental health, parental rights, and correctional facility and public policy. Participant working groups also identified and discussed possible strategies for the support of children and families affected by incarceration. These strategies have implications for resource allocation, transitional release programs, collaboration among agencies, and legislation. The “Children of Prisoners, Children of Promise” conference was rated by participants as “Very Good” on a 5-point scale ranging from “Poor” to “Excellent.” Increased awareness and understanding of incarceration from a child’s perspective and opportunities for networking and collaboration between organization and agency representatives, and between service providers and ex-convicts, were rated highly by participants. Participants indicated that they would have liked more data and information on children of incarcerated parents in Hawaii as opposed to data from other states.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. State

Key Theme – Children, Youth and Families at Risk

- a. Description of activity. The objective of this project was to collect data and information on homeless families and children in Hawaii. This data is needed by policy and decision makers to develop programs and make resource allocations addressing the causes and consequences of homeless. (06-032)
- b. Impact/Accomplishment. The project leader worked with clientele organizations to revise and add new items to the intake form used by the Housing Community Development Corporation of Hawaii, the agency that oversees all emergency and transitional shelters serving the homeless in Hawaii. The

revised form will improve and increase the data collected improving our understanding of this population. Eighteen transitional shelters, six emergency shelters and one agency offering both transitional and emergency shelter agreed to administer the new intake form this year. In total it is anticipated that this new form will be administered to 5,000 individuals and families in shelters. The new intake form will also be used to collect information on an estimated 5,800 unsheltered (living on beaches and in parks) individuals and families. This baseline data, when tracked over time, will be valuable in assessing changes in the well being of Hawaii's most vulnerable people.

c. Source of Funding. Smith-Lever

d. Scope of Impact. State

Key Theme – Family Resource Management

a. Description of activity. The goal of this project was to increase the personal financial planning knowledge of program participants and have 50% of them (1) adopt at least one recommended financial management skill, and (2) learn techniques in resource management that will result in improved utilization of their available resources. (22-083)

b. Impact/Accomplishment. The course was taught through a series of workshops often in conjunction with the EFNEP program. Post-training evaluations suggested that clientele gained an understanding of many different aspects of money management, e.g., how to budget money and how to set goals. Consistently, nearly 80% of those completing the series made at least one improvement in food resource management. Post-training evaluations showed that participants gained the most in the following areas: identifying problem areas, setting financial goals, organizing finances, limiting expenses, and saving money.

c. Source of Funding. Smith-Lever and State

d. Scope of Impact. State

Key Theme – Family Resource Management

a. Description of activity. The objective of this project was to increase the capacity of communities, families and individuals to improve their own quality of life. (22-084)

b. Impact/Accomplishment. The objective of the project was achieved through building competencies in facilitating meetings, team building, communication skills, delegation, group organization, conflict and management. The project supported Family and Community Education (FEC) councils on Oahu. Three leadership-training workshops for the Oahu Councils were completed. Eleven of the 36 volunteer leaders who participated took on leadership roles at the Council and State levels. Leaders appeared to be more self-confident, to have increased self-esteem and ability to facilitate meetings. Council members who received training reported that they shared information they learned with over 4,500 family members and friends. The Councils had a leadership role in passing the "Na Tutu" bill allowing grandparents raising grandchildren to enroll them in the school district in which they lived. After four years of working on the legislation the Governor signed it into law. Na Tutu Coalition will continue to work to gain medical consent for grandparents raising their grandchildren full time. Volunteers contributed over \$48,000 in time in addition to \$6,500 in monetary contributions.

- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Family Resource Management (and Food Safety)

- a. Description of activity. Many consumers are now using the Internet to obtain information about food safety. The objective of this project was to develop and implement programs in family resource management particularly as they relate to food safety, foods and nutrition. (21-092)
- b. Impact/Accomplishment. Training and reference materials developed by this project were added to the Life Skills in Food Education and the Hawaii Food Safety websites. A new initiative, Germ City, has been developed to enhance awareness of the importance of hand washing. The program has been presented to 1,500 students in six elementary schools and to over 250 pre-school children and staff at limited resources families or native Hawaiians. School staff responded by removing barriers to hand washing, e.g., mounting the soap dispenser near the hand washing area during school hours but hidden during non-school hours, using classroom sinks and soap when available, and lowering paper towel dispensers making it easier for shorter students to reach. Students reported washing longer and washing their hands more than once to remove remaining “pretend germs.” After food and nutrition presentations, community groups have reported replacing candy with gift certificates for smoothies or switching from sweet snacks to serving water, fruit, low-fat crackers and yogurt at their refreshment breaks.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Home Safety

- a. Description of activity. Many farms are not on community water systems and must depend on rainwater catchment systems for most of their needs. The first year of this project focused on developing testing kits to monitor and evaluate catchment systems. The second year focused on writing a guideline for constructing and monitoring rainwater catchment system and on community outreach on the Big Island (Hawaii). The primary objective of the third year (FY03) was to make the guidelines and technology available nationally and internationally. (13-124)
- b. Impact/Accomplishment. The guidelines developed by this project are now being distributed through county planning departments, health clinics, community activities, community associations and the State Department of Health. Over 2,500 copies were distributed. One hundred percent of the respondents who answered a survey after reading the guidelines said they will change the way they maintain their water system. Ninety percent said they would improve their water catchment systems as a result of reading the guidelines. The importance of the work attracted the attention of international rural health organizations and, partly as a result, the monitoring and testing techniques have been presented at international conferences in Kyoto (Japan), Mexico City (Mexico) and Austin (Texas). Expressions of interest in the system have been received from many Pacific island nations, rural communities, environmental groups, builders, and other extension services. The project attracted a private grant of \$20,000 to expand its community education activities.

- c. Source of Funding. Smith-Lever (RREA) and State
- d. Scope of Impact. State and National

Key Theme – Youth Development/4-H

- a. Description of activity. The goal of this project is to implement non-formal collaborative youth development educational programs with military and other organizations serving youth. Non-formal educational programs utilize juried, i.e., science based 4-H curriculum. (22-021)
- b. Impact/Accomplishment. This project is a joint effort involving the College's 4-H program, the Army and Air Force, and more recently the facility in Kwajalein. The USDA/military partnership resulted in the developed of "4-H 101" training materials to assist military installation staff to organize 4-H clubs. 4-H 101 graduates returned to their installations to train their staff. As a result approximately 300 youth are enrolled in 4-H programs. The project leader for this project was presented with the Regional and National "Salute Award" in recognition of her successful efforts to build a strong partnership with Army bases in Hawaii and Japan. Volunteers contributed about \$15,000 in time to this project.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State and Regional

Key Theme – Youth Development/4-H

- a. Description of activity. The objective of this project is to teach young people life skills that will enable them to be more self-confident and to think independently and interdependently as they accept responsibilities for social roles, and to build the volunteer ethic in communities, particularly among youth with higher risk factors. (22-022)
- b. Impact/Accomplishment. Workshops on implementing service learning in youth programs were presented to club leaders of the Army 4-H clubs. As a result, 5 clubs applied for and received mini-grant funds (from DOE) to carry out club-based service learning projects. A county-based service-learning project "Hands to Larger Service" resulted in 80 4-Hers and adults participating in cleaning up the Urban Garden Center facility. New working relationships with the Girl Scouts and VISTA resulted in 458 youth between 10-17 under the direction of 35 adults (representing 17 different groups) participating in the "Read to Me" program. Participants reported that as a result of their participation they were able to develop relationships with other team members, acquire responsibility and leaderships skills, gain understanding of community needs and acquire the sense that they could make a difference in their community. 85% of the participants indicated they plan to continue their volunteerism. Over 580 participants volunteered \$54,000 worth of time to this project. In addition, the project received \$500 in in-kind material and \$1,300 in donations.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Youth Development/4-H

- a. Description of activity. The objectives of this project were to (1) use 4-H educational programs to help youth become productive citizens and catalysts for positive change, (2) create positive relationships with youth and deliver programs designed to increase their knowledge, develop their leadership skills and promote positive attitudes, and (3) partner with schools and youth programs to involve youth in 4-H. (20-043)
- b. Impact/Accomplishment. A new community's grant for \$750,000 (\$150,000 per year for five years) was obtained to work with the following community programs: Queen Liliuokalani Children's Center, Parents and Children Together and the Waianae Boys and Girls Club of Hawaii. The initial orientation and training for the new partners were completed. More than 200 youth and adults were involved in a community service learning project to collect food for the local food bank, prepare food baskets and gifts for people in need, entertain patients at convalescent homes, clean up beaches and pick up trash along the highway. Eighty youth developed their communication skills and self-confidence by making public presentations. Forty others attended leadership camps. Finally, 11 youth received a grant to create an innovative literacy project called "CRIB," Creating Readers in Babies. In partnership with Kona Community Hospital they sewed and delivered more than 500 books and burp pads to newborn babies and their mothers to promote the benefits of reading aloud to children. The book company was so impressed with the 4-Hers that they donated several hundred books. These were passed out at the annual Christmas parade instead of candy. This worthy project was showcased at a local reading conference to illustrate the significance of reading aloud to children. The value of volunteer contributions from just the community service project was estimated to be \$44,490.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Youth Development/4-H

- a. Description of activity. The goal of this project was to promote sustainable agriculture and environmental stewardship education for youth. Youth are expected to put their knowledge to use through practical action, using leadership, communication and group process skills. (13-110)
- b. Impact/Accomplishment. Research-based natural resource/environmental science curricula were used to train 4-H staff and collaborators and youth educators. Youth, teachers, and community organizations used juried 4-H materials to enhance their knowledge of sustainable agriculture (horticulture, gardening, composting, forestry) and environmental issues (e.g., recycling, watershed management, invasive species, endangered species). Using teachers as multipliers, over 1,100 public school students benefited from this training. Through various 4-H club activities, over 500 youth had an opportunity to develop their leadership, fundraising, and organizational and public speaking skills. They also learned the value of giving back to the community by participating in public service projects (e.g., Read to Me, planting native vegetation, cleaning up public parks, setting up a composting and recycling facility, measuring impact of invasive species, and cleaning anchaline ponds). As a result of their involvement in these activities 4-Hers were picked to attend the National 4-H Congress, the Western Regional Leaders Forum, and Ahaolelo. One 4-H club received a Hawaii Service Learning award for outreach to the Puna Community and other club was awarded 4th place in the national Colgate Award for community service. A total of 63 volunteer

4-H leaders, 52 teachers, 45 college students and nearly 100 families took part in educational workshops designed to introduce the juried 4-H curricula.

- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Youth Development/4-H

- a. Description of activity. One of the objectives of this project was to develop scientifically competent youth using agricultural and environmental programs. The project sponsors an annual Water Fest to support this objective. (22-026)
- b. Impact/Accomplishment. This year 483 fifth graders and their teachers participated in the Water Fest held at Hawaii Plantation Village. Representatives from various organizations sponsored 15 different agricultural and environmental workshops. Eight-five percent of the teachers evaluated the program as outstanding in terms of meeting its objective of stimulating the children to participate, particularly in the hands-on learning experiences. The experience was supportive of material they were learning in the classroom. As a result, youth have a better understanding of how agriculture affects the environment and vice-versa.
- c. Source of Funding. Smith-Lever (RREA) and State
- d. Scope of Impact. State

Key Theme – Youth Development/4-H

- a. Description of activity. The goal of this project was to teach entrepreneurship to youth by incorporating Mini-Society into existing programs such as 4-H. (06-361)
- b. Impact/Accomplishment. 195 youth from 8 groups received training in entrepreneurship. The 4-Hers learned how to set up a business, market and price their product, do a feasibility test on their product and actually produce and sell the product. Last year 341 youth were trained on Molokai, Lanai, and Maui. The Maui 4-H club is known for making and selling their pizelles. Last year, they made over \$1,000. The skills they learned helped them to price, package, and present their product and how to determine their profit.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Other (Agriculture Tourism)

- a. Description of activity. Plan, coordinate and implement two promotional activities for the cattle industry each year in conjunction with established industry associations and other agencies. (20-049)
- b. Impact/Accomplishment. The 2003 “A Taste of the Hawaiian Range” food festival celebrated the best of Hawaii’s agriculture and is a forum for educating the culinary industry, food service buyers,

general public and visitors about the diversity of quality products grown in Hawaii. According to the local media the food show was rated as one of the best food shows in Hawaii. Thirty-four restaurants representing some of the finest hotels in Kona and elsewhere in Hawaii participated. Over 1,800 people (sold out) attended the event. Sixteen percent of the participants were from mainland states or Japan. Many producers have developed brand identification via the food festival and now Hawaii's forage finished beef is regularly featured on the menu of an up-scale restaurant in Las Vegas and in many similar restaurants throughout Hawaii. This project addressed CTAHR's goal of revitalizing the State's economy by strengthening communities and creating value-added marketing opportunities for farmers and ranchers in partnership with the food service industry. Sixty volunteers contributed nearly \$6,000 worth of time and 40 donors contributed nearly \$47,000 in goods and services.

- c. Source of Funding. Smith-Lever, State and Grant
- d. Scope of Impact. State

Key Theme – Other (Family Business)

- a. Description of activity. The objective of this project is to compare the interaction of family and business systems in economically vulnerable and non-vulnerable communities. (378R) (NE-167)
- b. Impact/Accomplishment. NE-167 researchers collaborated with the Lawrence N. Field Center for Entrepreneurship and Small Business at Baruch College in New York to present a Spring 2003 conference, "A Toolkit for Entrepreneurs." The conference reached approximately 100 attendees, including 10 Field Center counselors, interns, fellows, and mentors. The conference was designed for entrepreneurs and family business owners to provide them with pre-published conference proceedings and hands-on experience with a set of tools they can use to evaluate aspects of their family and business lives that affect success. Hawaii's researchers contributed a tool that allows business-owning families to estimate business and family success scores based on factors that have been shown to influence perception of success. The success estimator tool was subsequently developed into a Web-based resource that is available to the public through CTAHR's Entrepreneur's Toolbox. Hawaii researchers contributed to the development of a socioeconomic vulnerability scale that will differentiate vulnerable from non-vulnerable communities across the nation. This tool can be used as a decision-making tool by bankers and policy makers who draft policies concerned with commercial lending and government support for economic development projects. The tools presented at the 2003 conference and the family business counselors at Baruch College will use the monograph developed around these tools with current and future clients. Hawaii researchers developed a user-friendly prototype document and information delivery system: "Factors Affecting Perceived Business and Family Success." The document and an online success-estimator tool are available via the Entrepreneur's Toolbox publication category on the CTAHR Web site.
- c. Source of Funding. Hatch, MRF, and State
- d. Scope of Impact. State

Key Theme – Other (Financial Management)

- a. Description of activity. This project had two goals: (1) provide program participants (mostly college students) an opportunity to increase their understanding of personal financial planning as part of an

on-line course, and (2) work with teachers to teach students at selected schools to grow their food, learn about nutrition and plan menus. (22-014)

- b. Impact/Accomplishment. Of the 165 students who registered for the course on-line 84 completed it. At the end of the course they reported that each month they collectively put \$4,055 into savings, added \$1,565 to their emergency fund, reduced the balance on their credit cards by \$3,425 and reduced “spending leaks” by \$2,506. As a result of this course students listed many positive aspects of what the course taught them. All comments were overwhelmingly positive. For the second goal, teachers reported that students increased their understanding of healthy food choices by 93%, their understanding of how to grow and prepare nutritious meals by 79% and how to grow edible landscapes by 57%.
- c. Source of Funding. Smith Lever, State, and Grants
- d. Scope of Impact. State

Key Theme – Other (Financial Management)

- a. Description of activity. This project focused on financial education for home and businesses. It included specific objectives dealing with financial security in later life, the financial education needs of prospective agricultural and business-related entrepreneurs as related to management practices, and linked with or shared resources with allied professionals locally and nationally in support of financial education and counseling for households and entrepreneurs. (06-357)
- b. Impact/Accomplishment. Senior proponent organizations, agencies, credit unions and financial educators are concerned about the financial education and practices of their constituents. Both locally and nationally, nonprofit organizations with clients in need of financial education such as prisons, credit counseling agencies, and cooperative extension systems have requested and used material and methods developed in Hawaii to educate and counsel their clientele. The project leader for this project acted as a financial education resource to provide context sensitive, reliable, research-based tools, training and programming aimed primarily at identifying and resolving the most critical issues. Clients gained financial information, insight, and the ability to interpret what they learned to reduce their financial risks and increase their financial opportunities. Twenty-six financial counselors and 55 financial educators were trained. Over 2,500 others (entrepreneurs, human service practitioners, faculty, families and other trainers) were educated using a wide variety of tools and presentations. As a result of these contacts it is estimated that over 1,000 decisions were made, of which nearly 800 were enacted. Of the 563 who acquired new skills, 182 actually changed their financial practices. It is estimated that the television audience for this project exceeded 160,000 people and that 10% of them made a positive financial decision, three-fourths of which actually enacted that decision. An estimated 25,000 other people who used written materials developed for the project had a similar response.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

STAKEHOLDER INPUT PROCESS

During this fiscal year, a priorities survey of the College of Tropical Agriculture and Human Resources (CTAHR) was conducted in June–July 2003, to solicit input from the CTAHR Board of Advisors. The survey asked the Board of Advisors for their opinions on what issues CTAHR should be focusing on. The survey was based on issues that Hawaii residents (in September 2001) felt would affect their quality of life in the future. These issues were then categorized under CTAHR’s main missions: (1) *diversification of Hawaii’s economy*, (2) *preservation/maintenance of a sustainable environment*, and (3) *strengthening Hawaii’s communities*. Fourteen of 22 board members responded.

For the issues related to *diversifying the Hawaii economy* 100 percent of the respondents rated “growth of diversified agriculture” and “growth of the vegetable industry” as very important. Over 85 percent of the respondents rated “food composition/nutritional value,” “growth of tropical fruits industry,” “niche marketing of agricultural products,” and “safety or safe handling of food” as very important.

For the issues related to *preserving/maintaining a sustainable environment*, over 85 percent of the respondents rated “water quality” and “waste management (solid waste/waste water)” as very important.

For the issues related to *strengthening communities*, over 85 percent of the respondent rated “quality of education” and “job market/opportunities in Hawaii” as very important. The results of this survey will be posted on the College website and faculty will be asked how their proposals relate to the priority areas identified in the survey as they develop the next year’s proposal.

The guidelines of this year’s RFA were revised to include a description of the process used to obtain information from stakeholders. The guidelines also states that if there is an industry research priority list, the principal investigators needs to attach the list to the proposal. Furthermore, the RFA guidelines state that faculty should be working on CTAHR high priority areas. The high priority research and extension program areas are presented in the white papers posted in the College website:

http://www2.ctahr.hawaii.edu/internal_val.asp

The identified priority areas from the white papers were:

- Revitalize Agriculture and Hawai’i’s Economy
- Improve and Sustain Hawai’i’s Natural Resources and Environment
- Strengthen Communities

Within these broad priority areas are lists of topics that CTAHR faculty should work on. These priority areas and topics were developed by faculty specifically extension specialists and agents who worked closely with our stakeholders in communities and specific industries.

Stakeholder input was also obtained in the following manner:

- Active participation of faculty and administrators on stakeholder boards, committees, associations or similar organizations.
- Active participation of faculty in commodity groups created to deal with a particular problem or issue.
- Use of focus groups.

- Appointment to county, state and regional working groups responsible for addressing stakeholder needs identified by other government organizations, e.g., state departments of agriculture, health, land and natural resources, county economic development boards, and regional working groups.

Input from stakeholders was critical in developing the goals and objectives of projects in the following areas: increasing kava production, harvesting coffee, managing aster yellows on watercress, diagnosing diseases of potted plants, adding value to sweet potatoes, managing bunchy top in bananas, and collecting and disseminating data on Hawaii's families. In each of the programs/projects, faculty met with interested stakeholders (individuals, groups and organizations) to solicit their input formally and informally before initiating proposals (see below). PIs were asked to identify sources of stakeholder input when they developed their project proposals. These and other programs/projects were described in our annual Impact Report provided to our stakeholders.

Provided below are specific examples of recent activities related to seeking stakeholder input using the revised process for Hawaii.

- Kava and Coffee Industries.** Strategic planning sessions were completed with both the kava and coffee industries. The strategic planning covered all aspects of the industries from labor availability, pest management, and production to marketing and regulatory issues. Based on grower concerns experiments were initiated to identify the source of kavalactones and possible alkaloid compounds in commercially available preparations. Field demonstrations were also completed showing that kava planting density could be significantly increased and that it could be planted in cinder under forest canopy. For coffee growers, economic comparisons of Beaumont-Fukunaga coffee pruning verses standard Kona style pruning were completed.
- Potted Foliage and Flowering Plants.** A survey of nurseries on the Big Island was conducted to determine priority areas for pest and cultural problems in nursery production. The most common problem was disease diagnosis and management. Knowing that disease diagnosis and management was a priority problem, the county agent focused his attention on that problem when visiting growers. Seventeen growers changed their cultural practices based on recommendations from the county agent. The recommended control measure reduced losses by 5% or more for 12 of 14 growers. Five growers reported plant loss reductions of 60% or more.
- Sweet Potatoes.** A committee of community agencies was surveyed to determine which products were the best candidates for developing as value-added products. The surveys also identified the lack of management capacity as the major constraint to creating value-added products. Various types of business related training activities were initiated by the county agents. In June 2003, success was achieved in adding value to sweet potato by packaging them for a big box store. Packaging increased the value by 30%. In 2002, the value of sweet potato statewide was \$989,000. A 30% increase would raise the value of sweet potato to \$1.2 million.
- Banana Industry.** USDA and EPA have promoted the development of crop profiles and Pest Management Strategic Plans (PMSP) to address needs for future research and pesticide registration requirements, respectively. The development of the PMSP for banana required the active participation of representatives from the banana growers on all the Islands as well extension specialists, agents and researchers. Based on the PMSP, priorities were established

for each pest and pest management practice. Specialists and researchers are now working on various approaches to managing banana bunchy top disease, the number one priority identified by the PMSP participants.

- e. **Homeless Families and Children.** The Housing Community Development Corporation of Hawaii, the agency that oversees all emergency and transitional shelters serving the homeless in Hawaii identified the need for additional data on this vulnerable population. The Center on the Family revised the intake form to improve the data needed to understand and serve the homeless. It is anticipated that the revised form will be administered to 5,000 individuals and families in shelters and an estimated 5,800 unsheltered (living on beaches and in parks) individuals and families. Baseline data collected via the forms will provide a means for the HCDC to track changes and develop policies to promote the well-being of Hawaii's most vulnerable people.
- f. **Watercress Growers.** The watercress industry met with extension agents, specialists and researchers to express their concern over crop losses due to an unknown biotic or abiotic factor(s). In 2001, it was discovered that crop damage was caused by aster yellows disease, a heretofore unknown pathogen in Hawaii. With regular input from growers a task force of agents, specialists and researchers developed management practices that allowed growers to re-establish fields that had suffered losses as high as 80-90%.

Input on McIntire-Stennis project proposals submitted for FY2004 were solicited from stakeholders by the Principal Investigator, Department Chair and Associate Director for Research as needed using the criteria described in the Plan of Work. The state of the industry in Hawaii is currently being assessed by an active McIntire-Stennis project, and these results will be used to structure the standing panel of stakeholders to be implemented in FY2005.

PROGRAM REVIEW PROCESS

Merit Review

Each extension project is developed with input from industry and stakeholders and guided by the Hawaii Plan of Work. The Hawaii review process is designed to evaluate the merit of each proposal in terms of how well it relates to the USDA AREERA goals and the Hawaii POW. The department chairs and county administrators review the project proposals to ensure that the objectives are consistent with the Hawaii POW. The review process begins when a project proposal is submitted to the appropriate department chair or county administrator. Extension project proposals limited to a single county are submitted to the county administrator for review. Statewide extension project proposals are submitted to the project leader's department chair for review.

The College Review Committee (CRC) is comprised of CTAHR faculty nominated by department chairs. The CRC reviews projects in terms of merit related to the following:

- Will the project result in positive, measurable impacts regarding the community, economic, social and environmental well-being of Hawai'i stakeholders?
- Is the problem well-linked to a stated AREERA goal?
- Is the problem well-linked to a stated CTAHR priority?

Final review and approval of extension proposals occurs in the office of the Associate Dean and Director for Extension.

Peer Review

Research project proposals are reviewed by the department chair, the College Review Committee (CRC) and the Associate Dean for Research. If the reviews indicate that a proposal needs to be improved and strengthened, the proposal will be returned to the initiator (PI) via the department chair.

The CRC peer review process designates a primary and secondary reviewer for each proposal. The primary reviewer will write an assessment of the proposal and lead the discussion within the CRC. The CRC reviews research projects in terms of the following:

- Are the objectives clear and measurable?
- Are the methods to meet the proposed objectives appropriate?
- Is the PI(s) qualified to perform the proposed work?
- Are output and outcome indicators and methodology for measuring indicators clear?
- Assessment of the past record of accomplishment of PIs and/or potential for future success.
- Assessment of the strengths and weaknesses of the proposal.

Final review and approval of research proposals occurs in the office of the Associate Dean and Director for Research.

EVALUATION OF THE SUCCESS OF MULTI- AND JOINT ACTIVITIES

Existing multi- and joint activities were continued in FY 2003. These activities include: (1) research and extension integrated projects; (2) the Hatch Multi-State Regional Projects; (3) the Agricultural Development in the American Pacific (ADAP) project that involves American Samoa Community College, the University of Guam, the College of Micronesia, Northern Marianas Community College, and the University of Hawai'i; (4) the Tropical and Subtropical Agriculture Research Program that involves the University of Hawai'i, the University of Guam, the University of Florida, the University of Puerto Rico, and the University of the Virgin Islands; and (5) four new integrated projects with external peer reviews were approved in 2003.

A significant new multi- and joint activity occurred in FY 2003. The activity is to evaluate the economic impact of invasive species on the landscape and the environment. This joint project involves the Universities of Hawaii, Florida, Puerto Rico, Virgin Islands and Guam.

Examples of research or extension work showing success with multi- and joint activities for 2003 are provided below:

1. Agricultural Water Management Technologies, Institutions and Policies Affecting Economic Viability and Environment Quality (106R/425R). Several aspects of Hawaii's water institutions need to be modified in order to improve their ability to optimally allocate the state's fresh water supply. These include changes in the legal doctrine currently governing water allocation and transfer in Hawaii (from a variant of the Doctrine of Prior Appropriation to the Public Trust Doctrine), specific mechanisms to resolve increasingly recurring conflicts among water uses and users, the incorporation of water banking features to effectively address drought conditions, effective incentives for water conservation (monetary and non-monetary), and provision of mechanisms to safeguard Native Hawaiian water rights. Many of these issues parallel the concerns of other member states of the W-190 technical committee (e.g., Native American water rights in Colorado, Arizona, Washington, and

Idaho), shift in water demand from agricultural use to newly-emerging uses (e.g., visitor industry demand in Nevada, municipal and industrial uses in California, and environmental/in-stream uses in Colorado and Oregon), and the growing need to address water demand in times of drought (e.g., California and Nevada). Thus the lessons learned and the insights gained from other states are central to the fashioning of robust water institutions in Hawaii, making the case for Hawaii's participation in the W-190 regional project compelling.

2. **Stress Factors of Farm Animals and Their Effects on Performance (257R/W-173).** Hawaii collaborated with scientists from Cornell University as well as scientists in Mississippi and Arizona on research related to animal heat stress. Studies conducted in Arizona concentrated on the effect of solar radiation on dry cows utilizing the new environmental chambers at the University of Arizona at Tucson. These studies clearly demonstrated the ability of individual Holstein cows to sweat and that some cows are better able to adapt to high temperatures and solar assault than others. In Mississippi, the project studied the effectiveness of individual free-stall pen spraying to cool cows and increase lying time. This work demonstrated that it was possible to develop and construct an effective cooling system using very simple devices from a home improvement store. Cows that were cooled spent more time lying down than un-cooled cows and had lower respiration rates, lower rectal temperatures, and similar milk production. A system to monitor cow temperature continuously was also developed and evaluated. This non-invasive temperature monitoring system garnered a great deal of interest among our peers, and researchers were invited to conduct the experiment in USDA/MARC laboratory in Nebraska.
3. **Incarcerated Parents: Adjustment of Their Children and Families (372H).** A survey instrument was developed with input from corrections staff and previously incarcerated mothers. A video conference titled "Children of Prisoners, Children of Promise" was organized and held in June of 2003. Over 60 participants representing various state agencies and community service organizations as well as incarcerated parents attended the conference. Participant working groups identified numerous problems and issues faced by children and families affected by incarceration in Hawaii. A research agreement between the Department of Public Safety and the University of Hawaii is currently being negotiated. The "Children of Prisoners, Children of Promise" conference was rated by participants as "Very Good" on a 5-point scale ranging from "Poor" to "Excellent." Increased awareness and understanding of incarceration from a child's perspective and opportunities for networking and collaboration between organization and agency representatives, and between service providers and ex-convicts, were rated highly by participants. Participants indicated that they would have liked more data and information on children of incarcerated parents in Hawaii as opposed to data from other states. Child and Family Services of Hawaii and the Child Welfare League of America have invited a member of this project's staff to help plan and participate in another conference.
4. **Family Business Viability in Economically Vulnerable Communities (378R/NE-167).** NE-167 researchers collaborated with the Lawrence N. Field Center for Entrepreneurship and Small Business at Baruch College in New York to present a Spring 2003 conference, "A Toolkit for Entrepreneurs." Hawaii's researchers contributed a tool that allows business-owning families to estimate business and family success scores based on factors that have been shown to influence perception of success. Hawaii researchers contributed to the development of a socioeconomic vulnerability scale that will differentiate vulnerable from

nonvulnerable communities across the nation. This tool can be used as a decision-making tool by bankers and policy makers who draft policies concerned with commercial lending and government support for economic development projects. The tools presented at the 2003 conference and the family business counselors at Baruch College will use the monograph developed around these tools with current and future clients. Additional ways to make this information available to a wider audience are being explored.

5. Molecular Detection, Characterization and Management of a Phytoplasma Associated with Watercress Yellows (903H). The identification of the causal agent of watercress yellows has been the major step in devising control strategies to limit the spread of this disease on watercress farms in Hawaii. As a result, the watercress farmers on Oahu are now aware of the pathogen that causes the yellows disease of watercress, and the importance of controlling both the incidence of disease in their crop and the leafhopper that is the vector of the pathogen that causes this disease. The information provided to the watercress farmers and the recommendations for controlling the disease have given watercress farmers the ability to control the incidence of SAY in their crop. This is a highly successful research and extension integrated effort.
6. Supporting Pesticide Registration for Use in Hawaii's Crops (615R/16-920). Before pesticides can be applied to food crops they must be registered with the Environmental Protection Agency. Generally, the registration process takes 3-5 years to collect field and residue data. Since few pesticide manufacturers are willing to pay for the cost of registering products for minor crops (all crops in Hawaii are by definition minor crops), data generated by Interregional Research project 4 (IR-4) is absolutely critical. IR-4 is a nationally coordinated program that involves major land grant institutions, e.g., UC-Davis, Oregon State University, and Washington State University.
7. Pesticide Alternatives and Resistance Management for Vegetable IPM (16-903). The project required close cooperation between growers, county agents, and the manufacturer of spinosid, an environmentally friendly insecticide. Hawaii's crucifer growers had mixed outcomes. Gene frequency and propensity of selection pressure appeared to be important in the different outcomes. DBM resistance management was successful in Hawaii and Maui. Resistance to spinosad insecticide was mitigated after one year and reselection of resistance was avoided by the sub-region-focused program. Selection of highly resistant populations to two other low-risk insecticides was avoided.
8. IPM Strategies for Controlling Tephritid Fruit Flies that Infest Hawaii Grown Fruits and Vegetables (16-924). This joint project was a cooperative effort involving CTAHR faculty, ARS researchers, and the Hawaii Department of Agriculture. Area-wide pest management programs cannot be successful in urban/rural locations without involving homeowners, backyard gardeners and commercial growers. This project was an important component of a larger ARS supported area-wide fruit fly management program involving five suppression techniques. Demonstration sites were established on three islands (Hawaii, Maui, and Oahu). By involving the broader community in the project, melon fly infestation rates in persimmon dropped from 87.5% to less than 5%. The number of flies trapped per day dropped 95-98%. Farmers reduced their use of organophosphates by 40%. Melon fly infestation rates on farms on Oahu dropped to less than 1%. Organophosphate usage for melon flies decreased by 90%. Commercial growers were able to greatly increase persimmon, cucurbit and melon yields by using ecologically friendly techniques applied area-wide.

9. Farm Safety Training for Underserved Farmers in Hawaii (19-926). An immigrant farmer heads one in every five farms in Hawaii. Immigrant farmers often have limited proficiency in English making their use of pesticides problematic and their understanding of IPM questionable. The Hawaii Department of Agriculture, the Hawaii Farm Bureau, the Mutual Assistance Associations Center, and crop consultants have identified this problem. On-site, bilingual pesticide safety and IPM training was conducted in small groups or one-on-one. Training utilized demonstrations, heavy use of graphics and videos. Several reference materials were translated in Ilokana, Lao, and Tagalog. Outputs included: 21 extension publications, 7 displays/posters, 2 power point presentations, 7 weekly radio programs, 40 safety presentations, and an estimated 82 PSAs. “Pesticide Safety for Small Farms, A Grower’s Guide for Pesticide Safety” was translated into Korean and Tongan and the USDA Pesticide Recordkeeping brochure was translated into Lao and Ilocano. EPA’s “Protect Yourself from Pesticides” was translated into Ilokano, Tagalog and Lao. Hawaii is cooperating with the University of Guam, the College of Micronesia, and American Samoa Community College. The Farm Safety program also assists displaced sugarcane workers. In the mid-90s, two such workers each leased 2 acres to grow fruits and vegetables. In 2000 they completed a 12 hour course conducted by the FSS. In 2003, they leased 60 acres. Both farmers attributed their success to the original training and the follow-up meetings provided by the FSS. One commented, “The knowledge I learned from the training helped me make smart decisions on the choice of more effective and relatively safer pesticides on my crops.” These two farmers are now subleasing land to other small farmers and helping them be more successful.

MULTISTATE EXTENSION ACTIVITIES

Form CSREES-REPT (2/00), Page 41.

INTEGRATED RESEARCH AND EXTENSION ACTIVITIES

Form CSREES-REPT (2/00), Pages 42 to 62.

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 (Attach Brief Summaries)

Institution College of Tropical Agriculture and Human Resources
 State Hawai`i

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act Funds)
 Integrated Activities (Smith-Lever Act Funds)

Title of Planned Program/Activity	Actual Expenditures FY 2000	Actual Expenditures FY 2001	Actual Cost FY 2002	Estimated Cost FY 2003	Estimated Cost FY 2004
HAWAII DOES NOT HAVE MULTISTATE EXTENSION ACTIVITIES. THERE ARE NO EXPENDITURES. A PRE-WAIVER WAS REQUESTED.					
TOTAL					

_____ Director

_____ Date

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Institution College of Tropical Agriculture and Human Resources
 State Hawai'i

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act Funds) : **Actual Expenditure and Estimated Cost -- Page 1 of 4**
 Integrated Activities (Smith-Lever Act Funds)

Title of Planned Program/Activity	Actual Expenditure FY 2000	Actual Expenditure FY 2001	Actual Expenditure FY 2002	Actual Expenditure FY 2003	Estimated Cost FY 2004
103H The Relationship Between Oxidation-Reduction Potential of Flooded Soil and Taro Yield	250	5,344	4,238		
111H Community Business Matching				7,650	7,650
130H Effective and Labor-Efficient Management of Weeds in Pastures and Native Forests of Hawai'i	6,747	15,736	20,500		
162H Designing & Implementing Improved Nutrient Management Decision-Making for Natural Resource Management (Project No. Changed to 853H)	4,800				
211H Improving Bone Health in Adolescence Through Targeted Behavioral Intervention			19,840	12,507	12,507
217H Needs Assessment and Resource Inventory Related to a Food Innovation Center			3,883		
220R Factors Influencing the Intake of Calcium-Rich Foods Among Adolescents (Formerly 327R)			22,118		
327R Factors Influencing the Intake of Calcium-Rich Foods Among Adolescents (Project No. Changed to 220R)		54,347			
369H Measuring Success	5,048				
372H Incarcerated Parents: Adjustment of their Children and Families			32,292	45,736	45,736
378R Family Businesses in Economically Vulnerable Communities		25,206	10,328	5,771	5,771

Integrated Activities (Hatch Act Funds) : **Actual Expenditure and Estimated Cost -- Page 2 of 4**

Title of Planned Program/Activity	Actual Expenditure FY 2000	Actual Expenditure FY 2001	Actual Expenditure FY 2002	Actual Expenditure FY 2003	Estimated Cost FY 2004
379H Grandparenting Strengths and Needs of Asian American Families in Hawaii				4,529	4,529
380H The State of Hawai'i's Families	335	20,018			
512H Biotreatability Studies for the Application of Bioremediation to Hydrocarbon Contaminated Soils				30,047	30,047
513R Animal Manure and Waste Utilization, Treatment, and Nuisance Avoidance for a Sustainable Agriculture (Formerly 518R)			9,636	18,536	18,536
518R Animal Manure and Waste Utilization, Treatment, and Nuisance Avoidance for a Sustainable Agriculture (Project No. Changed to 513R)	13,929	14,764			
520R Microirrigation Technologies for Protection of Natural Resources and Optimum Production	18,879				
522H Identification and Remediation of Hazardous Substances to Safeguard Human and Environmental Health				4,483	4,483
550H A Simple Two Stage Bioreactor for Milk Parlor Wastewater Treatment and Reuse in the Tropics			13,764	11,785	11,785
602G Hawai'i Pesticide Impact Assessment Program					
615R A National Agricultural Program to Clear Pest Control Agents for Minor Crops (Project No. Changed to 915R)	393				
618H Acquisition of Pesticide Residue Data on Specialty (MINOR) Crops to Support Registration Requirement	1,200	2,700			
726H Etiology and Control of Fungal Diseases of the Tropics (Project No. Changed to 967H)	18,169	28,290			
735H Control of Papaya Diseases (Project No. Changed to 977H)	40,538	43,589			
798H Disease Management Strategies for Vegetable Crops in the Tropics	30,110	32,104			
832H Overcoming Biotic and Abiotic Stresses that Limit Upland Taro Production				34,900	34,900
853H Designing and Implementing Improved Nutrient Management Decision-Making for Natural Resource Management (Formerly 162H)			9,226	600	600

Integrated Activities (Hatch Act Funds) : **Actual Expenditure and Estimated Cost -- Page 3 of 4**

Title of Planned Program/Activity	Actual Expenditure FY 2000	Actual Expenditure FY 2001	Actual Expenditure FY 2002	Actual Expenditure FY 2003	Estimated Cost FY 2004
854H Cultivar Evaluation for Container Production in Hawai'i	2,858				
855H A New Material for Amending Metal Toxicities in Acid Soils		15,626	8,636	1,500	1,500
873H Developing Weed Control Components for Best Management Practices in Hawai'i	26,419	36,475	38,544	14,818	14,818
903H. Molecular Detection, Characterization and Management of a Phytoplasma Associated with Watercress Yellows				17,345	17,345
905H Bioremediation of Hawaiian Soils Contaminated with Polycyclic Hydrocarbons			905		
908H New Production Practices for Anthurium				31,875	31,875
910H. Pests of Tropical Fruit and Nut Crops Integrated Pest Management				27,600	27,600
914H Preservation, Characterization and Genetic Improvement of Hawaiian Taro				54,278	54,278
915R A National Agricultural Program to Clear Pest Control Agents for Minor Crops (Formerly 615R)					
944H Flower and Nursery Crops: Pest Management & Quarantine Treatments	15,722	30,953	33,855	11,077	11,077
967H Disease Control of Diversified Crops using Etiology, Low Risk Chemicals, Biological, and Cultural Methods (Formerly 726H)			32,802	29,699	29,699
977H Control of Papaya Fungal Diseases (Formerly 735H)			56,622	6,536	6,536
TOTAL	185,397	325,152	316,644	371,272	371,272

Director

Date

Note: A Pre-Waiver was requested. The Target amount is \$221,000. The Reduced Target amount was \$144,591. However, since the actual expenditures exceeded the Target of \$221,000, the Pre-Waiver is not needed.

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 State Hawai`i

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act Funds)
 Integrated Activities (Smith-Lever Act Funds) : **Actual Expenditure and Estimated Cost -- Page 1 of 2**

Title of Planned Program/Activity	Actual Expenditures FY 2000	Actual Expenditures FY 2001	Actual Expenditure FY 2002	Actual Expenditure FY 2003	Estimated Cost FY 2004
02-005 CTAHR Video Production Facility	38,919				
06-353 The State of Hawai`i's Families	7,056	17,043			
06-355 Measuring Success: Measuring Effectiveness of FCE and 4-H Programs	2,975				
06-362 Hawaii's Homeless Families and Children				5,033	5,033
10-600B Pesticide Impact Assessment Program					
10-606 Supporting Pesticide Registration for Use in Hawai`i's Crops	12,740				
12-505 Evaluation of Animal Waste Management Alternatives for the State of Hawai`i					
12-506 Improved Irrigation System and Scheduling in Hawai`i					
13-106 Weed Control Workshop: Noxious Alien Plants	100				
13-108 Cooperative Vegetation Management Case Studies in Pastures and Forests	3,100				
13-111 Community Business Matching				12,967	12,967
13-114 Control of Invasive weeds in rangelands and natural areas in Hawaii (RREA)					
13-120 Management of Pasture and Environmental Weeds			33,447		
14-202 Enhancing Conception Rates in Dairy Cows Under Heat Stress Conditions by Determining the Chemical Constituents of Cervical Mucus at Estrus				17,433	17,433

Integrated Activities (Smith-Lever Act Funds) : **Actual Expenditure and Estimated Cost -- Page 2 of 2**

Title of Planned Program/Activity	Actual Expenditures FY 2000	Actual Expenditures FY 2001	Actual Expenditure FY 2002	Actual Expenditure FY 2003	Estimated Cost FY 2004
14-205 Porcine Reproductive and Respiratory Syndrome (PRRS) in Hawai'i			2,768	832	832
16-908 Hot Water Treatment for Cut Flowers and Propagative Materials	250				
16-912 Educational Programs to Transfer Pest Management Technology To The Cut Flower Industry					
16-920 Supporting Pesticide Registration for Use in Hawai'i's Crops		49,690	47,702	13,678	13,678
16-921 Fungal Disease Control and Educational Program in Hawai'i			15,089	0	0
16-925 Nematode Control for Tropical Crops in Hawai'i			8,136	8,100	8,100
18-806 Technology Transfer to Support Sustainable Farming Systems in Hawai'i	671	6,388	16,714	11,700	11,700
18-809 Development and Expansion of the Floriculture Industry in Hawai'i	12,941	58,360	35,821	31,500	31,500
19-705 Fungal Disease Control and Educational Program in Hawai'i	237				
20-080 Weed Management in Hawai'i Pastures	6,000				
21-022 Disease Management Strategies for the Control of Soil-borne Diseases of Maui Sweet Onions				2,194	2,194
21-029 Demonstration on Technologies to Produce Value-Added Taro Products			4,236	7,005	7,005
21-030 Edible Crops of Maui			22,044	37,800	37,800
22-016 O`ahu-Kaua`i Food Crops Extension Project			15,200	1,958	1,958
22-034 Aster Yellows Disease: A New Threat to Many Crops in Hawai'i			1,921	30,675	30,675
23-040 Improved Cultural Management of Ornamental, Nursery, Landscape and Turf Commodities	4,500	18,800	20,150	19,500	19,500

Integrated Activities (Smith-Lever Act Funds) : **Actual Expenditure and Estimated Cost -- Page 2 of 2**

Title of Planned Program/Activity	Actual Expenditures FY 2000	Actual Expenditures FY 2001	Actual Expenditure FY 2002	Actual Expenditure FY 2003	Estimated Cost FY 2004
103H The Relationship Between Oxidation-Reduction Potential of Flooded Soil and Taro Yield	250	11,799	6,600		
TOTAL	89,489	162,080	229,828	205,841	205,841

Director

Date

Note: A Pre-Waiver was requested from the Target amount of \$85,000. However, since the actual expenditures exceeded the Target of \$85,000, the Pre-Waiver is not needed.

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Brief Summaries

Institution College of Tropical Agriculture and Human Resources
State Hawai`i

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act Funds) : **Brief Summaries -- Page 1 of 9**
 Integrated Activities (Smith-Lever Act Funds)

103H The Relationship Between Oxidation-Reduction Potential of Flooded Soil and Taro Yield (Goal 1).

Progress/Accomplishments: Terminated

111H Community Business Matching (Goal 5).

Progress/Accomplishments: A survey was designed to help communities determine their development goals and worksheets designed to help communities assess their initial resource base have been developed. A pilot community in Montana has tested the survey and worksheets. The community business matching software has been written and pilot tested, using the information supplied from Montana as the basis for testing. Pilot testing will continue to determine what businesses want (desirability and compatibility from a business point-of-view).

130H Effective and Labor-Efficient Management of Weeds in Pastures and Native Forests of Hawaii (Goal 1)

Progress/Accomplishments: Large *Psidium guajava* and *Bocconia frutescens* trees were susceptible to very-low-volume basal bark applications of triclopyr. Soil applications of tebuthiuron severely injured *Psidium cattleianum* and *P. guajava* plants even at 30 months after application. Invasive weeds reduce pasture productivity and endanger natural ecosystems. The treatments used in this project are more economical than mechanical clearing of pasture and forests lands and are safer on non-target plants than foliar applications to tall trees.

162H Designing and Implementing Improved Nutrient Management Decision-Making for Natural Resource Management (Goal 1).

Progress/Accomplishments: Project No. Changed to 853H.

211H Improving Bone Health in Adolescence Through Targeted Behavioral Intervention (Goal 3).

Progress/Accomplishments: Current research indicates that greater accretion of bone mass prior to the period of bone loss (adulthood, particularly the later years) lowers the incidence of osteoporosis. Peak bone mass is in part affected by calcium intake in childhood, adolescence, and early adulthood. Unfortunately, calcium intake actually declines during adolescence, particularly in young women. Therefore, there is a pressing need to develop behaviorally based interventions for the youth of the United States. This intervention can assist youth to consume more calcium and improve bone health, averting costs associated with osteoporosis and associated poor quality of life.

217H Needs Assessment and Resource Inventory Related to a Food Innovation Center (Goal 1).

Progress/Accomplishments: A mail-out survey instrument had been developed. Pre-testing and discussions with leadership of the target clientele groups strongly recommended that surveys NOT be conducted by mail but by telephone instead. The general need for assistance in value-added products and niche marketing still exists. The larger program provided information and contacts for future interactions with this new clientele group, as well as useful insights on appropriate partnerships and organizational structures to serve those clients. Survey instrument may provide starting point for future research.

220R Factors Influencing the Intake of Calcium-Rich Foods Among Adolescents (Goal 3)

Progress/Accomplishments: Not Integrated from FY 2003

327R Factors Influencing the Intake of Calcium-Rich Foods Among Adolescents. (Goal 3)

Progress/Accomplishments: Project No. Changed to 220R.

369H Measuring Success (Goal 5).

Progress/Accomplishments: Terminated.

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

Progress/Accomplishments: A video conference titled “Children of Prisoners, Children of Promise” was organized and held in June 2003. Over 60 participants representing various state agencies and community service organizations as well as incarcerated parents attended the conference. Participant working groups identified numerous problems and issues faced by children and families affected by incarceration in Hawaii. These issues include childcare, visitation, economics, mental health, parental rights, and correctional facility and public policy. Participant working groups also identified and discussed possible strategies for the support of children and families affected by incarceration. These strategies have implications for resource allocation, transitional release programs, collaboration among agencies, and legislation. The “Children of Prisoners, Children of Promise” conference was rated by participants as “Very Good” on a 5-point scale ranging from “Poor” to “Excellent.” Increased awareness and understanding of incarceration from a child’s perspective and opportunities for networking and collaboration between organization and agency representatives, and between service providers and ex-convicts, were rated highly by participants. Participants indicated that they would have liked more data and information on children of incarcerated parents in Hawaii as opposed to data from other states.

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

Progress/Accomplishments: A 2003 conference entitled “A Toolkit for Entrepreneurs” reached approximately 100 attendees. The conference was designed for entrepreneurs and family business owners to provide them with pre-published conference proceedings and hands-on experience with a set of tools they can use to evaluate aspects of their family and business lives that affect success. Hawaii contributed a tool that allows business-owning families to estimate business and family success scores based on factors that have been shown to influence perception of success. The success estimator tool was subsequently developed into a Web-based resource that is available to the public through CTAHR's Entrepreneur's Toolbox. Hawaii researchers contributed to the development of a socioeconomic vulnerability scale that will differentiate vulnerable from nonvulnerable communities across the nation. Bankers and policy makers who draft policies can use this tool as a decision-making tool

concerned with commercial lending and government support for economic development projects. The tools presented at the 2003 conference and the family business counselors at Baruch College will use the monograph developed around these tools with current and future clients. Hawaii researchers developed a user-friendly prototype document and information delivery system: "Factors Affecting Perceived Business and Family Success." The document, together with an online success-estimator tool, is currently available via the Entrepreneur's Toolbox publication category on the CTAHR Web site.

379H Grandparenting Strengths and Needs of Asian American Families in Hawaii (Goal 5).

Progress/Accomplishments: During the project's first year, 20 grandparents were interviewed. Additional interviews will be conducted during the second year. The data will be analyzed to identify the specific strengths and weaknesses of Japanese American grandparents, particularly satisfaction and frustration in addition to health and their overall impact on the quality of childcare.

380H The State of Hawai'i's Families (Goal 5).

Progress/Accomplishments: Terminated

512H Biotreatability Studies for the Application of Bioremediation to Hydrocarbon Contaminated Soils (Goal 1).

Progress/Accomplishments: The similarity between the respirometry results at the laboratory and pilot scales provides evidence that laboratory scale treatability tests which are much simpler and less expensive can provide useful information for scale up. The results of the treatability tests are necessary for the environmental engineer that is designing a bioremediation plan for a specific site to determine optimum conditions, such as moisture content, and time needed for biodegradation. In addition, since plate counts and respirometry correspond well with one another, the use of the less labor intensive respirometry method when monitoring either laboratory or pilot scale experiments is proving to be feasible.

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

Progress/Accomplishments: A bioreactor with simple design and operation and high treatment efficiency was developed. This new "bio-nest" bioreactor is based upon modifications of design and operation of the up flow anaerobic sludge blanket (UASB) and anaerobic biofilter reactor. The unique and simple operation of the bio-nest reactor allows for higher chemical oxygen demand removal efficiency with a high organic loading rate. The new bioreactor will provide better sludge distribution, less dead zone, and a higher total chemical oxygen demand loading rate than does the conventional UASB reactor. The simple design and operation of the new bioreactor developed by this project can easily be integrated into the existing lagoon systems popularly used in the United States. It can also be integrated into the aerobic and intermittent aerobic treatment unit, the entrapped mixed microbial cell (EMMC) process, developed at the University of Hawaii.

518R Animal Manure and Waste Utilization, Treatment, and Nuisance Avoidance for A Sustainable Agriculture (Goal 4).

Progress/Accomplishments: Project No. Changed to 513R.

520R Microirrigation Technologies for Protection of Natural Resources and Optimum Production (Goal 1).

Progress/Accomplishments: Terminated.

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

Progress/Accomplishments: A new method was developed for trace analysis of eight explosives in soil using pressurized fluid extraction and gas and liquid chromatography mass spectrometry. Unlike the standard U.S. Environmental Protection Agency method, SW-846 8330, this new method provides mass spectral confirmation of the analytes. Further, the extraction requires approximately 15 minutes, compared to the 18 hours needed for the EPA method. Workshops were conducted to train 60 personnel from Fire Department Hazardous Material Units in all counties of Hawaii. These workshops trained participants in responses to situations in which chemical and biological weapons of mass destruction (WMD) may be involved. Another workshop offers lectures about chemical and biological WMD, field sampling techniques, and field characterization of unknown elements. Attendees practiced hands-on scenarios using techniques demonstrated in the lectures.

550H. A Simple Two Stage Bioreactor for Milk Parlor Wastewater Treatment and Reuse in the Tropics (Goal 4).

Progress/Accomplishments: A case study of a dairy farm (70 acres) located on the island of Oahu was investigated for potential development of an appropriate wastewater treatment and reuse system. A bioreactor, which is the modification of an anaerobic sequence batch reactor (SBR) and an upflow anaerobic sludge blanket (UASB) reactor, was investigated. It was found that more than 75% of total chemical oxygen demand (TCOD) removal efficiency and biogas production of 1.5 L/L/day and CH₄ content of 70–75% could be achieved. This was operated with an influent TCOD concentration of about 9,000 mg/L and hydraulic retention time of 10 hours (more than 12 g TCOD/L/day) at 22C. The unique operation of the bioreactor is to achieve a higher chemical oxygen demand (COD) removal efficiency with a higher organic loading rate. The simple design and operation of the bioreactor used in this study can easily be integrated into the existing lagoon system to protect the water quality and reuse the treated wastewater on the farm. At an HRT range of 24–48 hours with one-hour aeration and two hours without aeration, further removal of residual COD of 50–55% and of total NH₄-N of 92–98% from the effluent of anaerobic bioreactor can be achieved. This will allow for the potential on-farm reuse of treated wastewater without creating negative impacts on the environment. Thus, optimization of various treatment alternatives listed in this study to achieve optimal management of milk parlor wastewater can be realized with the consideration of total system analysis, in order to meet the requirement of water quality, treated wastewater reuse, odor prevention, and cost effectiveness.

602G Hawai`i Pesticide Impact Assessment Program (PIAP) (Goal 4).

Progress/Accomplishments: Terminated

615R A National Agricultural Program to Clear Pest Control Agents for Minor Crops (Goal 4).

Progress/Accomplishments: Project No. Changed to 915R.

618H Acquisition of Pesticide Residue Data on Specialty (MINOR) Crops to Support Registration Requirement (Goal 4)

Progress/Accomplishments: Terminated.

726H Etiology and Control of Fungal Diseases of the Tropics (Goal 1).

Progress/Accomplishments: Project No. Changed to 967H.

735H Control of Papaya Diseases (Goal 1).

Progress/Accomplishments: Project No. Changed to 977H.

798H Disease Management Strategies for Vegetable Crops in the Tropics (Goal 1)

Progress/Accomplishments: Terminated.

832H. Overcoming Biotic and Abiotic Stresses that Limit Upland Taro Production (Goal 1).

Progress/Accomplishments: Researchers continued the evaluation of taro hybrids developed for *Phytophthora* leaf blight-resistance. The principal investigator is in the process of multiplying several promising *Phytophthora* leaf blight-resistant taro hybrids for distribution to Extension agents and participating farmers. Planting materials of several traditional taro cultivars from the Kauai Branch Station collection were distributed to one taro farmer, the University of Hawaii-Hilo farm, and the Molokai Applied Research Farm. New taro hybrids with greater resistance to *Phytophthora* leaf blight will support taro production and enhance its sustainability. In addition, information on nutrient requirements and green manure crops for dryland grown taro will help to improve the economic stability of taro crops for growers in Hawaii.

853H Designing and Implementing Improved Nutrient Management Decision-Making for Natural Resource Management (Goal 1)

Progress/Accomplishments: An internal workshop was developed which included participants from the nutrient management group at NRCS, CES extension agents in crops, livestock, and plants, as well as ADSC and new soil fertility/nutrient management extension staff. A review of existing recommendations, suggestions for improvement, new issues relating to analysis methods for ADSC, soil sampling suggestions, and feedback to ADSC from a Waimanalo study were all presented and discussed. Major suggestions were made for the improvement of FACS, considering newly available technology.

854H Cultivar Evaluation for Container Production in Hawai'i (Goal 1).

Progress/Accomplishments: Terminated.

855H A New Material for Amending Metal Toxicities in Acid Soils (Goal 1)

Progress/Accomplishments: Manganese induced iron deficiency and fruit translucency, respectively, reduced crop yield and fruit quality in the pineapple industry. This study was conducted to assess the efficacy of three soil amendments, coral limestone, gypsum, and basaltic dust to control these two problems. The result of the first fruit harvest clearly demonstrate that amending the soil with coral limestone, gypsum, or basaltic dust is insufficient to correct manganese induced iron deficiency, and that the standard industry practice of treating the crop with foliar application of iron is necessary. This study also shows that when the pineapple crop is treated with iron, the supplemental calcium from all three amendments significantly reduced fruit translucency. Since high application rates of coral limestone increased incidence of root diseases, gypsum and basaltic dust can be used in its place when high application rates are required. Translucency in pineapple fruit is directly related to leaky fruit which presents poor appearance and encourages rot. Supplemental calcium during growth will raise the proportion of marketable fruit and reduce shipping loss.

873H. Developing Weed Control Components for Best Management Practices in Hawaii (Goal 1).

Progress/Accomplishments: This project marks the first report of pineapple production in Hawaii under no-till conditions. During this reporting period the comparison of 1.3 dichloropropene (Telone EC) on nematodes and pineapple in conventional and no-till cropping systems was completed. Research found that Telone EC is effective in reducing reneform nematode counts when applied through a drip irrigation system. Further, Telone EC was found to be more effective in conjunction with the use of plastic mulch. The presence of living mulch as opposed to plastic mulch clearly reduced the size of plants and the size of individual fruit. This may be caused by the amount of water that living mulch takes up. Research on the development of chemical weed control for seed production of native Hawaiian plants was also conducted and completed this year. Ronstar and Surflan were found to be safe “over the top” sprays for pre-emergence weed control of newly transplanted pili and emoloa seedlings. The postemergence herbicide Garlon 4 can safely be used on both of the newly transplanted grasses used in this experiment. Pineapple growers are offered a promising alternative to bare-ground cultivation in the conventional no-till and living mulch/plastic mulch combination that can significantly reduce polluted runoff. The enforcement of the Clean Water Act has caused the preservation of Hawaii’s water quality to become an increasingly important consideration for commercial farmers. The development and implementation of production systems that minimize polluted run off are therefore imperative. The results of this study will significantly contribute to these goals.

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

Progress/Accomplishments: We have used polymerase chain reaction assays (PCR) to identify a pathogen that is consistently associated with watercress yellows on all the watercress farms on Oahu. Sequence analysis of the cloned PCR products has confirmed the identity of the phytoplasma as the severe strain of western North American aster yellows (SAY). The project conducted surveys of the incidence of watercress yellows every two weeks for the six months on the largest watercress farm on Oahu. During the period from May 1 to July 1, 2003, the incidence of SAY on this farm increased to levels as high as 50–75% in some plots. During this period, populations of the most-likely vector, *Macrostoteles* sp. nr. *severini*, a leafhopper, were very high on this farm and contributed to the rapid spread of this disease within the farm. The project has initiated the rearing of the leafhopper that is most closely associated with the transmission of this pathogen within the watercress farms. The project now has established colonies of this vector on plant hosts other than watercress on which they are able to complete their lifecycle, and we have begun using these colonies to conduct controlled transmission tests of the pathogen to different plant species. The identification of the causal agent of watercress yellows has been the major step in devising control strategies to limit the spread of this disease on watercress farms in Hawaii. As a result, the watercress farmers on Oahu are now aware of the pathogen that causes the yellows disease of watercress and the importance of controlling both the incidence of disease in their crop and the leafhopper that is the vector of the pathogen that causes this disease. The information provided to the watercress farmers and the recommendations for controlling the disease have given watercress farmers the ability to control the incidence of SAY in their crop.

905H Bioremediation of Hawaiian Soils Contaminated with Polycyclic Hydrocarbons (Goal 4)

Progress/Accomplishments: This study focused on the isolation and characterization of pyrene-degrading bacteria from Hawaiian soils contaminated with polycyclic aromatic hydrocarbons (PAHs). Four isolation protocols were compared for their capacity to recover PAH-degrading bacteria. Groups of bacterial species isolated by each protocol were characterized by bacteriological tests, density gradient gel electrophoresis, and 16S rDNA sequence analysis. Bacteria were identified by comparing bacterial genome sequences with the national BLAST database. Methods A and B resulted in recovery of several species including *Methylobacterium extorquens*, other *Methylobacterium* sp., and *Sphingomonas* sp. Method

C resulted in no useful strains. Method D resulted in isolation of *Mycobacterium sp.*, *Mycobacterium sp.*, *Achromobacter xylosoxidans*, and a member of the Gamma superfamily of the class *Proteobacteria*. Bacterial strains were incorporated into soil bioreactors to determine their ability to degrade pyrene in soil, but no degradation of pyrene occurred in reactors amended with bacteria in groups A or B compared to controls. A two-phase liquid system was then designed to permit quantitative degradation of pyrene with simultaneous measurement of bacterial growth. Using the two-liquid phase (TLP) flasks pyrene removal was positively associated with growth of Group D strains. A *Mycobacterium sp.* was most effective in removing pyrene from the TLP cultures. The TLP system will permit further evaluations of biological and environmental factors that accelerate or retard pyrene degradation. The focus of this project has been on defining the microbial factors involved in bioremediation of toxic wastes in pyrene-contaminated soils. Bacterial species isolated from Hawaiian soils were shown to degrade pyrene under defined conditions that enable simultaneous growth measurements of populations. The impasse for obtaining quantitative results has been the physical separation of bacterial microflora (which require an aqueous phase) from toxic hydrocarbons, which are miscible in oil. For the first time, pyrene degradation can be quantitatively measured while simultaneously measuring changes in the bacterial population. A novel biphasic system was developed and genomic methods were to characterize mixed populations during the degradation process.

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

Progress/Accomplishments: The accomplishments of this project include training a commercial operator to produce anthuriums in tissue culture in Hawaii. A novel method has been developed for protecting tissue-cultured plants from a hostile environment when they are deflasked at Stage 3 and transplanted into community pots (Stage 4). When stage 3 microplants are protected with defined species of beneficial bacteria and the stage 4 microplants are continuously treated for three months under controlled conditions, growth enhancement is significant. Commercially important locally grown aroids manifested accelerated growth when treated with beneficial bacteria (*Sphingomonas vesicularis*, *Microbacterium testaceum*, *Brevundimonas vesicularis*, and *Herbaspirillum*) used for biological control. This technology is being transferred to the anthurium industry via demonstration plots, industry collaborations and participation of local extension agents.

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

Progress/Accomplishments: Measurable yield losses over the past two years have identified the southern green stinkbug (*Nezara viridula*) as the most damaging pest for macadamia. Contrary to the previously accepted belief that the bulk of damage occurs on the ground, researchers found that substantial damage occurs in canopies. Furthermore, geographic study found that damage levels are higher in wetter areas. In addition, the project has begun to investigate augmentative biological control of the stinkbugs. Macadamia growers have recognized the importance of assessing green stinkbug numbers within the canopy of the trees, and in some cases, have adjusted their insecticide application approach accordingly. However, many macadamia growers do not use insecticides, and they await the results of our work on biological control. Research showed that banana aphids, vectors of banana bunchy top virus, were consistently present in banana plantations, with some limited seasonal variation. Drier areas had higher aphid numbers. The parasitic fly (*Endaphis maculans*) caused up to 20 percent mortality of aphids. Insect pathogens are scarce in banana plantations, and efforts are being made to develop augmentative release procedures for indigenous pathogens collected from various insects.

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

Progress/Accomplishments: Three out of nine taro hybrids developed in 1999 were evaluated in October of 2002 on Kauai under wetland conditions and were found to be equal or better than the poi industry standard variety ('Maui Lehua') in both taste and color. In addition, two of

these hybrids out-yielded 'Maui Lehua' in weight. A commercial poi miller evaluated these same three taro hybrids, and the poi obtained from each of them was found to be as good or better in color, starch, and gum attributes than that of 'Maui Lehua'. These hybrids are currently being increased in order to conduct yield and taste trials on all major islands where taro is grown. Four taro hybrids were selected as potential ornamental taros. These have green, white, and/or red striped petioles. There is a growing commercial market for ornamental taro for use in landscapes and water-gardens in the southeastern USA. A major plant propagation business in Florida and a major nursery operation in North Carolina have expressed interest in commercializing them.

915R (formerly 615R). A National Agricultural Program to Clear Pest Control Agents for Minor Crops (Goal 4)

Progress/Accomplishments: Field residue trials and field data notebooks were completed and submitted to IR-4 for the following pesticide projects: abamectin in pineapple, bifenthrin in papaya, and mefenoxam in papaya. Hawaii's IR-4 Residue Satellite Laboratory completed analyses and submitted Analytical Summary Reports for the following projects: coffee-imidacloprid, banana-imidacloprid, pomegranate-imidacloprid, and pineapple-abamectin. Over the course of five years, approximately 22 field residue studies were conducted in 69 field sites. Many potential new uses are still moving through the IR-4/EPA process of testing for tolerance, petition, preparation, and review.

944H Flower and Nursery Crops: Pest Management and Quarantine Treatments (Goal 1)

Progress/Accomplishments: Management studies were conducted on four new invasive species that threatened floriculture and nursery industries. Five insecticides were tested as possible tools to manage the stinging nettle caterpillar. Two conventional insecticides gave 100% control within 24 hours. The slowest acting and least effective insecticide (Dipel, a biorational) gave slightly more than 50% control after two weeks. Although larvae were moribund and did not feed they were still a hazard to workers. Citric acid was identified by the Hawaii Dept. of Agriculture and USDA Wildlife Service as an effective pesticide against the coqui frog. Citric acid was phytotoxic to some plants, particularly their young, tender leaves and shoots. Phytotoxicity was dose dependent and could be limited by rinsing with water within one hour of spraying. Orthene and Pedestal were tested for phytotoxicity to anthurium cultivars grown under 78% shade cloth. Unlike foliar applied sprays, granular formulations of acephate applied to media for systemic uptake caused extreme phytotoxicity in many cultivars. Mesurool, a common molluscicide, was not phytotoxic to Dracena even after three weeks of 2X applications (applied once per week). Forty-two species and varieties of ornamental plants were evaluated for tolerance to vapor heat. Only dendrobium and epidendrum orchids suffered significant heat damage. Preliminary analysis indicates that vapor heat may be economically feasible as an inter-island quarantine treatment for coqui frog. Thirty-two cultivars of anthurium were drenched in hot water to eliminate nematode infections. None of the cultivars exhibited permanent heat damage. Nematode and bacterial infestations were absent two months after treatment and replanting. Hot water treated dendrobium exhibited loss of vase life and marketability. A variety of cut tropical flowers and foliage were irradiated in a demonstration for flower importers from Japan. Five days after treatment there were no observable differences between untreated controls and those that were irradiated. Foliar sprays of hot water were found to have the potential to control aphids and, to a lesser extent, ants and mealybugs. The white peach scale on papaya was found to be susceptible to Scythe, a herbicide. Buprofezin was found to be effective against this same scale. Orchid plants recovered within a few days of being removed from the simulated shipping container and being placed in a greenhouse. All were of high quality and marketable. Shipping by barge will be far less costly to growers than shipping via air.

967H Disease Control of Diversified Crops using Etiology, Low Risk Chemicals, Biological, and Cultural Methods (Goal 1)

Progress/Accomplishments: Several pathogens collected from coffee berries in Kona, were determined to be a major threat to this valuable crop. A *Phialophora* species was isolated from Naupaka for the first time in Hawaii. *Gliocladium* was isolated from living coconut trees. Recommendations for management were developed for coconut tree trimmers. Calcium applied at a rate of 200-260 lbs per acre (in hydroponics) gave excellent taro growth.

977H Control of Papaya Diseases (Goal 1)

Progress/Accomplishments: *Asperisporium* black spot of papaya disease incidence and severity on fruit continues to decline in commercial and non-commercial plantings for unknown reasons. Incidence on foliage, however, continues to remain steady. Despite these observations, research was focused on the axenic culture of the fungus *Asperisporium caricae* for future experiments with environmentally friendly materials. Although *A. caricae* was successfully isolated and is being maintained on PDA and V-8 juice agar sporulation is limited and a better medium is being developed.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results – FY 2002
Multistate Extension Activities and Integrated Activities
Brief Summaries

Institution College of Tropical Agriculture and Human Resources
State Hawai`i

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act Funds)
 Integrated Activities (Smith-Lever Act Funds): **Brief Summaries -- Page 1 of 6**

02-005 CTAHR Video Production Facility (Goal 1).

Progress/Accomplishments: Terminated

06-353 The State of Hawai`i's Families (Goal 5).

Progress/Accomplishments: Terminated

06-355 Measuring Success: Measuring Effectiveness of FCE and 4-H Programs (Goal 5).

Progress/Accomplishments: Terminated

06-362 Hawaii's Homeless Families and Children

Progress/Accomplishments: Data and information on homeless families and children in Hawaii is needed by policy and decision makers to develop programs and make resource allocations addressing the causes and consequences of homeless. Work was done with clientele organizations to revise and add new items to the intake form used by the Housing Community Development Corporation of Hawaii, the agency that oversees all emergency and transitional shelters serving the homeless in Hawaii. The revised form will improve the data collected improving our understanding of this population. Eighteen transitional shelters, six emergency shelters and one agency offering both transitional and emergency shelter agreed to administer the new intake form this year. In total, it is anticipated that this new form will be administered to 5,000 individuals and families in shelters. The new intake form will also be used to collect information on an estimated 5,800 unsheltered (living on beaches and in parks) individuals and families. This baseline data, when tracked over time, will be valuable in assessing changes in the well being of Hawaii's most vulnerable people.

10-600B Pesticide Impact Assessment Program (Goal 4).

Progress/Accomplishments: Terminated

10-606 Supporting Pesticide Registration for Use in Hawai`i's Crops (Goal 4).

Progress/Accomplishments: Terminated

12-505 Evaluation of Animal Waste Management Alternatives for the State of Hawai`i (Goal 4).

Progress/Accomplishments: Terminated.

12-506 Improved Irrigation System and Scheduling in Hawai`i (Goal 1).

Progress/Accomplishments: Terminated

13-106 Weed Control Workshop: Noxious Alien Plants (Goal 1).

Progress/Accomplishments: Terminated

13-108 Cooperative Vegetation Management Case Studies in Pastures and Forests (Goal 1).

Progress/Accomplishments: Terminated

13-111 Community Business Matching

Progress/Accomplishments: The goal of this project is to develop and deliver a community development extension program that will strengthen Hawaii's communities in the areas of business management, economic development, human resource, and natural resource management. Several books have been published as part of the Keiki Kuleana, a program to help children understand economics. A series of travel brochures were developed for the Windward Coast of Oahu identifying historical sites and providing information about businesses. Each of the seven brochures focused on a single community.

13-114 Control of Invasive Weeds in Rangelands and Natural Areas in Hawaii (RREA)

Progress/Accomplishments: The major focus of this year's effort was to establish the susceptibility of woody species to very low volume basal bark (VLVBB) applications with triclopyr. A VLVBB trial was installed in cooperation with the Division of Forestry and Wildlife to control *Acacia mearnsii*, a tree invading forests on Kauai. A similar trial was installed to control *Eucalyptus robusta* resprouts. A trial was also installed on *Rhodomyrtus tomentosa*, a serious pest of pastures and forestlands. It has proved tolerant to most brush killing herbicides except for dicamba. As effective methods for the control of invasive species are developed, farmers and ranchers will have additional options for managing these pests.

13-120 Management of Pasture and Environmental Weeds (Goal 1)

Progress/Accomplishments: The objective of this project was to train ranchers, conservationists, and other workers in methods and strategies for managing pasture and environmental weeds efficiently, effectively and safely. "Weeds of Hawaii's Pastures and Natural Areas" was completed and published as a hard copy. This was supplemented by a weed identification guide that included 200 additional weed species. The supplement was published on a CD.

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

Progress/Accomplishments: The objectives of this project included determining the concentrations of Mn, Cu and Fe in mucus from cows/heifers in estrus with respect to conception rates following breeding, and under heat stress compared to cool conditions, and to develop a test kit to indicate

the most likely time to breed a cow successfully. Initially, many samples were contaminated due to poor handling and cows urinating because of over stimulation. After adjustments were made, over 150 samples were collected. The new rules and cost of shipping samples seriously affected our ability to collect samples from dairies outside of Hawaii. A new system of working with mucin interference is being worked on. Initial results suggest that certain minerals in cervical mucus may be indicators for successful breeding.

14-205 Porcine Reproductive and Respiratory Syndrome (PRRS) in Hawai'i (Goal 1)

Progress/Accomplishments: PRRS was probably brought into Hawaii with breeding stock imported from the mainland. In 1996, the disease was first diagnosed and within a relatively short period of time it had spread throughout swine herds. Since the outbreak an extensive education and testing program has been conducted. In the areas where the disease was established the focus was on effective vaccination programs and on minimizing the impact of secondary problems. The support of the Hawaii DOA was obtained to use their database to help quarantine pig movement. A \$200,000 grant for vaccines, serological testing and a graduate student to support the eradication effort was obtained. There have been no new outbreaks or losses to PRRS in Hawaii since the initial outbreak on Oahu. In part this is due to the aggressive steps to educate producers, identify and localize outbreaks, and vaccinate swine as needed.

16-908 Hot Water Treatment for Cut Flowers and Propagative Materials (Goal 1).

Progress/Accomplishments: Terminated

16-912 Educational Programs to Transfer Pest Management Technology To The Cut Flower (Goal 1).

Progress/Accomplishments: Terminated

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

Progress/Accomplishments: Residue trials and field data notebooks were completed for abamectin in pineapple, bifenthrin in papaya, and methoxyfenoxam in papaya. Efficacy trials were conducted on watercress using two different products and on papaya using several different products including "safer" products. In addition, trials were completed on coffee, turf, banana, pomegranate and pineapple. An insecticide (imidacloprid) was labeled on several tropical fruits including acerola, jaboticaba, guava, papaya, mango, passion fruit, persimmon, and star fruit. The registration of Amdro® hydramethylnon was finalized by EPA based on data developed by the IR-4 program. After 20 years pineapple growers now have a product for in-field use and more importantly an opportunity to evaluate alternative ant control products. Hydramethylnon was also registered for use on tropical fruits for ants meaning that "softer" chemicals may be used to control sucking insects previously protected by ants from their natural enemies. Foramsulfuron was labeled for turf providing the first effective method to control goosegrass, a major pest on Hawaii's golf courses.

16-921 Fungal Disease Control and Educational Program in Hawai'i (Goal 4)

Progress/Accomplishments: Terminated

16-925 Nematode Control for Tropical Crops in Hawai'i (Goal 1)

Progress/Accomplishments: A variety of media such as oral presentations, fact sheets, refereed publications, and telephone calls were used to keep

anthurium, coffee, and pineapple growers informed about how to identify nematode damage and manage it. Efforts are underway to engineer tobacco and anthurium with cystatins to control burrowing nematodes. Although Messenger was not effective, two Avid drench applications nearly eliminated burrowing nematode in anthurium. Various heat treatments (temperatures and times) were found to give varying degrees of control of nematodes in anthurium. Chemical and non-chemical methods were tested under greenhouse conditions to control nematodes in pineapple. One test substance was found to decrease egg production by 58% as compared to untreated controls. Other compounds were found to reduce egg production by 60-64%. These experiments and outreach efforts have helped growers deal more effectively with problems caused by nematode infections.

18-806 Technology Transfer to Support Sustainable Farming Systems in Hawai`i (Goal 4).

Progress/Accomplishments: Seven presentations were made to groups representing ornamental flower growers, turf grass maintenance personnel, producers of native Hawaiian seeds and plants, and coffee growers. Orchid growers were updated on completed research projects dealing with chemical weed control. Growers were also taught how to conduct their own small-scale tests to determine efficacy and safety of new products. Turf grass maintenance personnel were trained on how to calibrate pesticide application equipment. Producers of native Hawaiian seeds and plants were able to see the response of native plants to several herbicides and determine if their efforts to produce seed could be improved with the methods demonstrated.

18-809 Development and Expansion of the Floriculture Industry in Hawai`i (Goal 1).

Progress/Accomplishments: The protea research project continues to make excellent progress with 23 new cultivars released for the first time to Hawaii growers in 2003. Local growers have expressed much satisfaction with the results of this program. Since this project began in 1995, over 5,000 hybrid protea seedlings have been evaluated from which 84 new cultivars have been introduced.

19-705 Fungal Disease Control and Educational Program in Hawai`i (Goal 1).

Progress/Accomplishments: Terminated.

20-080 Weed Management in Hawai`i Pastures (Goal 1).

Progress/Accomplishments: Terminated

21-022 Disease Management Strategies for the Control of Soil-borne Diseases of Maui Sweet Onions

Progress/Accomplishments: This project is still in its first year. There is no significant progress to report.

21-029 Demonstration on Technologies to Produce Value-Added Taro Products (Goal 1)

Progress/Accomplishments: It was determined that sweet potato, taro, papaya and awa have the greatest potential for development. Cassava and yam were regarded as possibilities. A committee of community agencies has been formed and interviews and surveys indicate a need to increase management capacity. Training activities have increased the capacity of clientele to produce value-added products. In June 2003, success was

achieved in adding value to sweet potato by packaging them for a big box store. The value-added activity increased the value of the sweet potato by 30%. In 2002, the value of sweet potato statewide was \$989,000. This value-added activity will boost the value of sweet potato to nearly \$1.3 million.

21-030 Edible Crops of Maui (Goal 1)

Progress/Accomplishments: The insecticide resistance management program for the Diamond Back Moth has been successful but growers have been advised to maintain the program as defined by agents and specialists. The area-wide fruit fly management program has resulted in growers reducing their crop losses from 40% to less than 5%. Many growers of fruiting vegetables have been able to significantly reduce the number of applications (and amount) of insecticides thereby reducing the production costs. New varieties of tomatoes resistance to Tomato Spotted Wilt Tospovirus are now available. Growers using the new varieties are able to make an additional planting per year that significantly increases their annual farm revenue. Field days involving local chefs have been very successful as they incorporate the use of locally grown products into their recipes.

22-016 O`ahu-Kaua`i Food Crops Extension Project (Goal 4)

Progress/Accomplishments: Progress has been made in the papaya nitrogen calibration trials. Growers now have information needed to achieve economic papaya yields. New varieties of taro were evaluated for high starch content suitable for export. Taro starch represents another value-added product for producers. A major effort was made to promote the use of Chinese cabbage for simple, nutritious salads. This idea came from working with chefs to promote “regional cuisine.” This effort helped to maintain sustainability for growers. Tea has the potential for becoming a new Hawaiian product. A survey was conducted to identify arthropod pests of tea grown in Hilo and Waimea. This information with accompanying pictures was included in a new extension publication “Small-scale Tea Growing and Processing in Hawaii.” Three area-wide suppression tactics for fruit flies resulted in melon fly infestation rates in Central Oahu dropping from 30-60% to less than 1% with a corresponding 90% reduction in organophosphate pesticide usage. Melon fly infestation rates in Waimea, Hawaii dropped from 20% to less than 2% and Oriental fruit fly populations dropped from more than 15 flies per trap day to less than 0.45 flies per trap day. There was a corresponding 100% reduction in the use of organophosphate insecticides. A total of 186 growers were involved in the two area-wide programs.

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

Progress/Accomplishments: Work with CTAHR plant pathologists confirmed that AYD is now found in Hawaii. However it is confined to watercress growing areas on Oahu. It has not spread to other potential hosts, indicating that the strain found in Hawaii has a very narrow host range. Monitoring was conducted on the neighbor islands to determine if it had already moved from Oahu. Growers have adopted the following management practices recommended by the College: (1) monitoring leafhopper populations and applying insecticides only when necessary, (2) eradicating known alternate weed hosts around walkways and farm borders to prevent reinfestation, (3) roguing out symptomatic watercress plants, and (4) selecting clean planting materials for replanting. These practices proved to be successful in re-establishing a 9 acre field that had been 80-90% destroyed by AYD.

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

Progress/Accomplishments: According to members of the Hawaii Tropical Flowers and Foliage Association-Kauai Chapter, the tropical flower cultivars collected by the agent in South America and released to the industry has been significant. All of the five named and released Heliconia orthotricha cultivars and 39% of the unnamed H. orthotricha clones, 38% of the H. bihai/caribaea clones have been adopted by HTFFA growers and shippers.

103H The Relationship Between Oxidation-Reduction Potential of Flooded Soil and Taro Yield (Goal 1).

Progress/Accomplishments: Terminated