

Annual Report of Accomplishments and Results

Fiscal Year 2004

College of Tropical Agriculture and Human Resources
University of Hawaii at Manoa

Research and Extension Programs

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

Overview:

CTAHR continued to commit significant research and extension efforts to advance agricultural competitiveness in 2004. Areas addressed by research and extension projects include: adding value to agricultural products, agricultural competitiveness and profitability, aquaculture, biotechnology, bioterrorism, diversified agriculture, invasive species, organic agriculture, ornamental agriculture, plant health, plant production efficiency, rangeland and pasture management, and urban gardening.

Aphids can cause distortion of flowers and foliage, stunt plant growth, and transmit virus diseases resulting in crop losses. A survey identified several new aphid species not previously known to occur in the state. An ongoing project is investigating the use of beneficial bacteria as biological control agents (BCAs) in anthurium production.

Extension faculty made almost 1,000 farm visits to assist flower and nursery growers with specific problems related to nutrient management and integrated pest management (IPM) practices. Turfgrass is an important commodity for landscapes and golf courses in Hawaii. Extension faculty conducted adaptation trials using many different seed and vegetative propagated turfgrasses.

To reduce excessive fertilizer application in macadamia nut orchards and make more efficient use of fertilizers, emphasis was placed on educating growers on the utilization of soil and tissue analysis to assess the nutritional status of orchards.

The Origin Inspection Program allows approved shipments of cut flowers to be sent out of state with minimal inspection. This Program provides expeditious movement of flowers to consumers. Using this Program, 14 Hawaii County flower marketers made over 5,000 shipments without problems.

The 9th annual "A Taste of the Hawaiian Range" food show was held in 2004 to promote the Hawaii beef cattle industry. Thirty-one restaurants participated in this event and over 1,800 people attended the event celebrating the best of Hawaiian agriculture. According to the local media, this event is rated as one of the best food show in the State of Hawaii.

Extension faculty are working on ways to decrease the production cost for mushroom farmers. Five fast-growing tree species common in Hawaii were found to be potentially suitable and inexpensive substrates for oyster mushroom production.

The Urban Garden Center is a one stop educational center for information in the area of horticulture, landscaping, plant material displays, produce utilization, recycling of products and environmental awareness. More than 12,000 contacts in terms of telephone consultations, garden visits, garden clinics, demonstrations, classes, and correspondence were made in 2004.

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)
2004	654,142	7,427,631	715,331	8,797,104	36.3

Fiscal Year	Extension Smith-Lever Funds (\$)	Extension State Funds (\$)	Extension Other Funds (\$)	Extension Total Funds (\$)	Extension Faculty Years (FY)
2004	400,010	1,729,264	149,251	2,278,525	21.0

Key Theme – Invasive Species

- a. Description of Activity. Aphids can cause distortion of flowers and foliage, stunt plant growth, and transmit virus diseases resulting in crop losses. Aphids attack many vegetables, fruits, grasses, ornamentals, and native plants. An important first step in the fight against invasive species is to determine the distribution and plant host range of the invasive species. CTAHR scientists conducted an extensive survey of aphids on five Hawaiian Islands by preparing slide-mounts and digitally photographing aphids at different locations. (994-1014S/970-H)
- b. Impact/Accomplishment. A survey identified several new aphid species not previously known to occur in the state and documented aphid attack on 364 plant species, including 58 native Hawaiian plants. The team also identified an adventitious parasitoid *Endaphis maculans*, which may lead to reduction in aphid plant attack. Baseline data on aphid population dynamics in several vegetable crops will help in identifying potential biological control agents and measure the impact of new natural enemies accurately. Further, the distance diagnostic website will provide essential identification information for agricultural inspectors to make informed decisions on the fate of inspected cargo. The use of biological control agents that are effective against aphids will have the added benefit of reducing the use of insecticides, while increasing the yield of marketable crops.
- c. Source of Funding. Hatch, State, and Grant
- d. Scope of Impact. National and Hawaii

Key Theme – Plant Health

- a. Description of Activity. Bacterial plant diseases are not easily controlled and result in serious damage to crops. An ongoing project is investigating the use of beneficial bacteria as biological control agents (BCAs) in anthurium production. The BCAs are sprayed on anthuriums, then challenged with the bacterial blight pathogen *Xanthomonas campestris pv. dieffenbachiae* (Xcd), and scored for leaf infections. To assess and quantify the movement of the bacterial pathogen, a bioluminescent Xcd strain was used and measured by recording colonized areas of leaves. Physical measurements of treated and non-treated plants were also recorded 12 weeks after treatments with BCAs. Leaf areas, leaf width, leaf length, plant height, plant dry weights and root masses were compared for treated and non-treated plants. (984-1014S/969-H)

- b. Impact/Accomplishment. The BCA treated plants were 50% less infected than the untreated plants. Interestingly, the treated plants were 8-21% taller, 6-16% longer leaves, and 7-23% wider leaves than the untreated plants. In replicated greenhouse studies, BCA treatment enhanced transgenic anthuriums resistance to bacterial blight. These finding demonstrate that engineered-bacterial resistance technology and the use of BCAs are compatible and synergistic. This research opens new avenues for improving plant health and increasing desirable traits.
- c. Source of Funding. Hatch, State, and Grant
- d. Scope of Impact. National and Hawaii

Key Theme – Ornamental/Green Agriculture

- a. Description of Activity. The competitive demands of the flower and nursery industries require implementation of optimum nutrient management and integrated pest management (IPM) practices. Educate growers on using appropriate pesticide (i.e. insecticides, fungicides, and herbicides) for plant protection through site visits and various types of educational activities. (22-30)
- b. Impact/Accomplishment. Extension agents made over 900 site visits to provide information needed to resolve specific problems related to insect infestation and plant diseases. Recommendations led to the use of environmentally safer chemicals, or chemicals that delay the onset of pest resistance. The agent’s recommendations on the use of the insect growth regulators (IGR) led to the wider adoption of these less toxic and safer chemicals. Distance, an IGR used for controlling whiteflies and blossom midges, was added to many Pikake flower growers’ chemical rotations in spite of its higher cost. To the surprise of many growers, this selective insecticide made control easier and resulted in fewer applications of pesticides. Regularly updated information on nutrient and pest management issues reaches over 300 growers and florists through an educational newsletter (Ka Lono Pua) in electronic or printed format on a quarterly basis.
- c. Source of Funding. Smith Lever and State
- d. Scope of Impact. Oahu County

Key Theme – Ornamental/Green Agriculture

- a. Description of Activity. Turfgrass is an important commodity for landscapes and golf courses in Hawaii. The value of turfgrass related industries is approximately \$508 million. For nearly twenty years, many new and improved warm and cool weather turfgrass cultivars have been developed and evaluated for adaptability throughout the U.S. and Canada. There is a need to evaluate the adaptability of turfgrasses in Maui’s varied sub-tropical environments. There is also a need to develop and/or transfer research-based information on new plants, insect pest and disease management strategies, and improved cultural practices to the landscape and golf course “industry.” (21-027)
- b. Impact/Accomplishment. Adaptability trials of turfgrasses were established to compare and evaluate 21 cultivars of bermudagrass and four seashore paspalum cultivars. Displays of four newly imported zoysiagrasses and five locally grown cultivars, 14 grasses for use in erosion control, and miscellaneous turfgrasses were established. Surveys taken during several field days indicated that industry representatives are planning to use the information from these trials and displays within six

months, while others would utilize the information sometime in the near future. Their knowledge of these grasses increased by 43%. This correlates to an estimated increase in their profits by 33%. Feedback from erosion control demonstrations indicated that participants increased their knowledge of these grasses by 55.5%, and that 81% of the participants plan to use the new information in their jobs within 6 months.

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

Key Theme – Plant Production Efficiency

- a. Description of Activity. To reduce excessive fertilizer application to macadamia orchards and to make more efficient use of fertilizers, emphasis was placed on educating growers to use soil and tissue analysis to assess the nutritional status of orchards. Producers were taught that through soil and leaf analysis, over fertilization and potential contamination of the environment can be avoided. Producers were also taught that the type of fertilizer applied could be formulated to meet the specific needs of the trees in an orchard. A simplified tissue sampling method was developed. (16-911)
- b. Impact/Accomplishment. Nearly 70% of the macadamia growers in the state rely fully upon tissue and soil analyses to determine the types and amounts of fertilizer to apply. Growers were shown that the nutritional status of an orchard can be determined through the leaf and soil analyses. After leaf analyses are completed, growers were taught to plot the concentrations of individual nutrients over time on graphs. Growers used the results of these analyses to develop a crop log of their orchards. This information along with records of fertilizer and lime inputs were used by growers to detect trends in nutrient levels within an orchard and to apply corrective measures, if necessary.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. State

Key Theme – Plant Production Efficiency

- a. Description of Activity. The Origin Inspection Program allows approved shipments of cut flowers to be exported with minimal inspection. This program allows for the expeditious shipment of flowers to consumers. This Program also sends a message that Hawaii's shippers offer flowers with a higher standard of cleanliness. (20-024)
- b. Impact/Accomplishment. Fourteen Hawaii County flower shippers exported 5,089 lots (shipments) containing 7,685 parcels (boxes) with no rejections (Hawaii Department of Agriculture, Plant Quarantine records). Although keeping the number of export shipment rejections to below 0.1% is a high standard that is difficult to achieve, Hawaii County flower shippers are now confident that this very low level of rejections can be achieved on a continuing basis with the Origin Inspection Program.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. Hawaii County

Key Theme – Adding Value

- a. Description of Activity. Orchids are one of the fastest growing segments of the potted plant market. Varieties with new colors and improved disease resistance are two pathways to adding value to this ornamental plant. CTAHR scientists have utilized molecular tools to understand the genetic control of flower color and disease resistance. (842-H)
- b. Impact/Accomplishment. Two key *Dendrobium* orchid anthocyanin biosynthetic (color) genes have been cloned and characterized. This effort will enable more productive hybridization strategies to meet market demands for new color varieties. In a separate project, orchids that are resistance to the cymbidium mosaic virus were produced. Viral resistance adds value and increases the competitiveness of Hawaii's orchids.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. National and Hawaii

Key Theme – Biotechnology

- a. Description of Activity. The cut flower industry is limited by the post-harvest life of the flowers. Currently, expensive dip-treatments are used to extend self-life of flowers. Anthuriums make up an increasing portion of Hawaii's cut flower industry. Research into the biochemical and genetic processes that control senescence (aging) in Anthuriums is important and has delivered promising results. (551-1012S/544-H)
- b. Impact/Accomplishment. CTAHR scientist have cloned and characterized the *anth 17* gene, which encodes an enzyme that degrades proteins in aging tissue and recycles the resulting amino acids to younger tissue. *anth 17* expression was shown to be activated during leaf senescence. This research will enhance leaf productivity, the number of flowers per plant, and the post-harvest life of flowers. Thus, Hawaii's growers will be more competitive due to producing more desirable products at higher levels.
- c. Source of Funding. Hatch, State, and Grant
- d. Scope of Impact. National and Hawaii

Key Theme – Rangeland/Pasture Management

- a. Description of Activity. The Beef Industry Initiative Project is a collaborative effort of extension agents and specialists, researchers, and stakeholders that prioritizes research and extension activities to enhance the sustainability of the Hawaii beef cattle industry. Current priority areas include cost of production and economic analyses, marketing options, beef cattle genetic improvement, pastoral system, meat science, field days, and demonstration events. (20-049)
- b. Impact/Accomplishment. The 9th annual "A Taste of the Hawaiian Range" food festival was held in 2004. This forum educates the culinary industry, food service buyers, general public and visitors about the diversity and quality of products grown in Hawaii. According to the local media, this food show is rated as one of the best food shows in the State of Hawaii. Thirty-one restaurants were represented, along with a record 37 food service vendors. Promotional booths were setup by many

vegetable growers and the ranch industry. More than 1,800 people attended the event. The event entered its second year targeting the tourism market. Participants from 19 other states made up 6.1% of the attendees and 8% of the guests were from counties other than Hawaii County.

c. Source of Funding. Smith-Lever and State

d. Scope of Impact. Hawaii

Key Theme – Agricultural Profitability

a. Description of Activity. The high cost of importing raw materials for agricultural production is a significant impediment for Hawaii's growers. CTAHR extension agents are working on ways to decrease production costs for mushroom farmers who have to import wood chips from the mainland United States. The extension agents identified five fast-growing tree species common in Hawaii that are potentially suitable and inexpensive substrates for oyster mushrooms. The trees are eucalyptus (*Eucalyptus grandis*), ironwood (*Casuarina equisetifolia*), albizia (*Falcataria moluccana*), strawberry guava (*Psidium cattleianum*), and gunpowder tree (*Trema orientalis*). Three liters of wood chips from the five species was used in outdoor mushroom cultivation. Mushroom yield and mean biological efficiency were measured and taste tests were conducted. (811-M)

b. Impact/Accomplishment. An average of 200 to 275 grams of fresh mushrooms were produced with a mean biological efficiency as high as 80% with five types of local wood chips. Taste tests revealed that the wood chip substrate did influence flavor but not aroma. Mushrooms grown on ironwood were deemed to be the most flavorful and preferred. Using the locally available raw materials will decrease production costs and increase profitability. Moreover, adoption of project methods could spur the development of a wood chip industry.

c. Source of Funding. McIntire-Stennis and State

d. Scope of Impact. Hawaii

Key Theme – Urban Gardening

a. Description of Activity. The Urban Garden Center (UGC) is a one stop educational center for information on horticulture, landscaping, many different types of plant materials, utilizing produce, recycling products and environmental awareness. Gardening continues to be one of America's favorite past times, with over 80% of U.S. households involved in some form of gardening and spending over \$12 billion in garden products. To meet the increasing demand for educational information on urban gardening, the UGC offers demonstrations, tours, special presentations, many types of publications, and informal classes to the general public. (22-040)

b. Impact/Accomplishment. More than 12,000 contacts (i.e. phone consultations, garden visits, garden clinics, demonstrations, classes, correspondence, etc.) were made during 2004. The 137 volunteers provided almost 13,000 hours to plan, develop, maintain and participate in gardening activities sponsored by the UGC. Home gardeners visited the UGC to view different ground covers, turfgrasses, shade trees, tropical fruit trees, etc. The home gardeners were interested in determining what plants are suitable for their gardens and yards. These are some of the many hands-on garden activities that were offered to the public: garden classes, plant sales, Arbor Day activities, Make a Difference Day, and the dedication of the Children's Garden dedication. Plant materials including

native plants, turfgrasses, and ornamental shade trees were distributed to schools and government and non-profit agencies to beautify their outdoor environments. The success of the Children's Garden was featured in magazine and TV articles.

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

d. Scope of Impact. Oahu County

GOAL 2: A SAFE AND SECURE FOOD AND FIBER SYSTEM

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

GOAL 3: A HEALTHY, WELL-NOURISHED POPULATION

Overview:

Areas addressed by research and extension project include human nutrition, medicinal plants, and nutraceuticals. CTAHR made important contributions to ensuring a healthy, well-nourished population. Stakeholder benefits included educational programs for Hawaii's parents and youth stressing the importance of calcium in their diets for long-term bone health. A diabetes screening program was provided. An educational program on how diabetes can be managed to mitigate lifelong effects was provided for this silent and devastating 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)
2004	26,601	71,900		98,501	0.7

Fiscal Year	Extension Smith-Lever Funds (\$)	Extension State Funds (\$)	Extension Other Funds (\$)	Extension Total Funds (\$)	Extension Faculty Years (FY)
2004	59,279	43,856	147,737	250,872	1.4

Key Theme – Human Nutrition

a. Description of Activity. Osteoporosis is a major public health problem. It affects every gender, race and economic group. It is responsible for more than 1.5 million bone fractures annually. Low calcium consumption may lead to osteoporosis, especially among Asians and Hispanics. Improving bone health in adolescence through targeted behavioral intervention was the approach studied. Nineteen subjects from four local public schools were recruited for this project. (211-H)

- b. Impact/Accomplishment. Current research indicates that the greater the accretion of bone mass prior to the period of bone loss (adulthood, particularly the later years) the lower 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 America. This project has developed and is testing an educational intervention in a classroom setting among multiple ethnic groups. The impact on calcium intake and bone health will be determined.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. National and Hawaii

Key Theme – Human Health

- a. Description of Activity. It is estimated that 13% of Hawaii’s population has diabetes, or 80,000 citizens. In East Hawaii County, up to 15% of the population has diabetes, and many are unaware, are not aware of their condition, or are not actively managing their blood sugar levels. Diabetes screening and education to manage diabetes can mitigate lifelong effects of this silent and devastating disease. This project introduces and educates participants about five medical tests that measure indicators of diabetes health, encourage people to have tests, and provides educational opportunities for participants to learn to manage diabetes. (20-072)
- b. Impact/Accomplishment. In the past year, 76 participants enrolled in the research component of this project and were screened and educated on the five tests that are important indicators for persons with diabetes. Approximately 25% also attended a nutrition class. Approximately 75% of the participants: (a) completed the follow-up survey, (b) showed a gain in knowledge about diabetes and the medical indicators, (c) reported seeing their health care provider, and (d) eating better and exercising more regularly as part of their efforts to manage their diabetes. In collaboration with the Diabetes Education and Counseling Center (program of Hawaii County) and their partners: (a) weekly classes on healthy cooking were offered, (b) 250 classes (understanding diabetes, management, nutrition, exercise) reaching 2,800 people (500 new contacts) were offered, (c) over 400 phone calls were handled, and (d) over 400 walk-ins to the Center were given assistance.
- c. Source of Funding. Smith-Lever
- d. Scope of Impact. Hawaii County.

GOAL 4: GREATER HARMONY BETWEEN AGRICULTURE AND THE ENVIRONMENT

Overview:

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

Hazardous chemicals such as polyaromatic hydrocarbons are persistent environmental contaminants. Research was done on bacterial degradation of organic environmental contamination. Field studies in Hawaii and Japan with borate and other wood treatments demonstrated at least 7 years of efficacy of borate treatments against the Formosan subterranean termite. Borate wood treatments pose fewer health and environmental risks than more toxic biocides.

Although chemical pesticides have had a beneficial impact on agriculture, their attendant side-effects demand that more ecologically sound methods of pest suppression be developed. Significant impact of a fortuitous biological control agent (*Endaphid maculans*) against several important pest aphids in Hawaii was documented.

An outbreak of aster yellow decimated the watercress industry in Hawaii. Work on aster yellow phytoplasma generated management practices to control the disease. Cucurbit growers that adopted an integrated melon fly management program reduced damage from an average of 30% per season to 9.75% per season.

Flies need to be managed by livestock producers because they are a nuisance as well as a potential disease vector. The 42 livestock producers that participated in a fly reduction project had a very high level of success.

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)
2004	163,699	894,910	305,442	1,364,051	6.0

Fiscal Year	Extension Smith-Lever Funds (\$)	Extension State Funds (\$)	Extension Other Funds (\$)	Extension Total Funds (\$)	Extension Faculty Years (FY)
2004	109,499	501,991	881,184	1,492,674	7.6

Key Theme – Hazardous Materials

- a. Description of Activity. Hazardous chemicals, such as polyaromatic hydrocarbons are persistent environmental contaminants because of their highly stable chemical structure and their adherence to solid particles in the environment. The role of bacterial species in decontamination of tropical soils was studied. Bacterial strains were isolated from Hawaiian soils in association with pyrene degradation. All isolates were characterized with regard to pyrene degradation. (905-H)
- b. Impact/Accomplishment. One of the most promising solutions to remediate organic environmental contamination involves bacterial degradation of pollutants. For the first time, pyrene degradation can be quantitatively measured, while simultaneously measuring changes in the bacterial population. The novel biphasic system provides a solution for remediating chemical contamination in the environment.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. National and Hawaii

Key Theme – Pesticide Application

- a. Description of Activity. Field studies in Hawaii and Japan with borate and other wood treatments were conducted to develop more effective treatments against the Formosan subterranean termite. Laboratory studies of termite tunneling behavior were conducted. Field tests across the State of Hawaii were conducted to determine the efficacy of the soil termiticide fipronil. A curriculum project in Hawaii public schools was implemented to increase the termite prevention knowledge and awareness of residents in 22 communities. (923-M)
- b. Impact/Accomplishment. Field studies in Hawaii and Japan with borate and other wood treatments demonstrated that borate treatments were effective for at least 7 years against the Formosan subterranean termite. Borate wood treatments pose fewer health and environmental risks than more toxic biocides. This study will stimulate increased use of borate to deter termite attack. Our documentation of extended longevity (7 years to date) of the soil insecticide fipronil equates to a ca. \$27 million annual savings to the residents of Hawaii for every additional year that a termite treatment does not need to be performed. Our termite curriculum project has reached 56 classrooms in 22 Oahu public schools. This represents direct contact with 1,700 Hawaii households, and a larger impact on the entire school community. These current residents, and the future homeowners, will exercise safer and more effective termite prevention and control methods as a result of the information transmitted to them.
- c. Source of Funding. McIntire-Stennis and State
- d. Scope of Impact. National and Hawaii

Key Theme – Biological Control

- a. Description of Activity. Although chemical pesticides have had a beneficial impact on agriculture, their attendant side effects, such as target pest resurgence, secondary pest outbreaks, pest resistance, and environmental contamination, demand that more ecologically sound methods of pest suppression, such as biological control, be developed. The current project's purpose is to enhance the biological control of pest arthropods and weeds, to reduce the use of chemical insecticides and enhance agricultural productivity and economic viability. (922-R)
- b. Impact/Accomplishment. We documented significant impact of a fortuitous biological control agent (*Endaphid maculans*) against several important pest aphids in Hawaii. We determined host range and minimal environmental risk of a newly introduced parasitoid (*Fopius ceratitivorous*) of medfly, and will be applying for full release permits in the coming months. We re-released *D. kraussii* and achieved at least temporary establishment in a field population of *B. latifrons*. We supplied P. concolor to California where it appears to be established on olive fly, and additional parasitoids from (*D. kraussii*, *F. arisanus*) that have been shown to successfully attack olive fly in the lab.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. National and Hawaii

Key Theme – IPM

- a. Description of Activity. An outbreak of aster yellow decimated the watercress industry in Hawaii. The aster yellow phytoplasma project has determined basic characteristics of vector biology, including length of egg stage at different temperatures and host range on tropical plants. We developed a system to successfully rear the leafhopper under greenhouse conditions. We are now focusing our attention on determining pathogen and vector (aster leafhopper) host range and transmission biology. Some of our fieldwork on disease spread and leafhopper natural infectivity allowed us to devise the management guidelines currently being used by growers. (960-H)
- b. Impact/Accomplishment. Management practices to control the aster yellow disease on watercress was developed. These practices have successfully controlled the disease, as demonstrated by the continuous presence of watercress in grocery stores after months of absence in 2003.
- c. Source of Funding. Hatch and State
- d. Scope of Impact. National and Hawaii

Key Theme – Integrated Pest Management

- a. Description of Activity. Since flies are a nuisance as well as a potential disease vector, fly populations need to be managed by livestock producers. Livestock producers need information on fly identification, life cycle and current control methods. Livestock producers need to implement integrated pest management strategies (fly survey, evaluation of baits, lures, trap-crops, monitoring tools or new technologies) to control fly populations. In collaboration with the State Department of Health, information on flies is made available to livestock producers in printed form, electronic form on web-sites, workshops, and site visits. (16-919)
- b. Impact/Accomplishment. The 42 livestock producers that participated in this project had a 96% success rate, as determined by low number of repeat offences cited by the Department of Health. In cooperation with the Department of Health Vector Control Division, the Principal Investigator implemented an indemnity program for cited livestock producers. This allows corrective measures to be implemented through education to mitigate fly problem. At the end of this project, the indemnity program is expected to be adopted by the Department of Health. Educational support materials developed include 11 fly identification fact sheets and a quick identification and reference manual of flies commonly associated with livestock production.
- c. Source of Funding. Smith Lever and State
- d. Scope of Impact. Hawaii

Key Theme – Integrated Pest Management

- a. Description of Activity. A five-year extension IPM program was developed using stakeholder and extension agent input. The program provides IPM education for extension personnel and stakeholders on topics of current interest and importance. An Annual Extension Agent IPM Education Meeting: provides a venue for the formation of technology transfer projects by research and extension personnel, sharing project updates and timely recommendations. Upkeep of CTAHR's Knowledge Master website on which research and extension personnel can post articles,

research reports and recommendations, pest fact sheets, and other educational material. Extension agents and specialists can direct clientele to the site to retrieve timely information. IPM manuals are prepared and published for urban or home gardeners, anthurium, ornamental foliage, coffee, and other commodities. (IPM Education and Publications)

- b. Impact/Accomplishment. Cucurbit growers have adopted the integrated melon fly management program and have reduced melon fly damage from an average of 30% per season to 9.75% per season. For the Fruit Fly IPM Education program, there were 25 cooperators in Waimea and 106 cooperators in Kohala. The IPM program for melon fly has eliminated the need for weekly applications of organophosphate, carbamate, and/or synthetic pyrethroid insecticides to control melon fly; instead, cooperators use environmentally friendly materials and methods. The sustainability of the melon fly IPM program for commercial growers appears to be nearly certain. With the 11 Fly Fact Sheets published last year, Hawaii's poultry industry was encouraged to develop its Egg Producers Quality Assurance Program, which concentrated on sanitation practices and vector control methods. A survey of livestock operations by the Hawaii Department of Health showed that the number of fly complaints from neighboring residents of poultry operations decreased from 16 complaints in 1999-2000 to 2 complaints in 2003-2004.
- c. Source of Funding. Smith-Lever and State
- d. Source of Impact. Hawaii

Key Theme – Natural Resources Management

- a. Description of Activity. Water consumption data was collected and analyzed in specific sectors of Hawaii's economy: agriculture, visitor industry, commercial and industrial, and residential. Also, strategies for water conservation were delineated. Research on Hawaii's water institutions was carried out through the application of the 'entropy concept'. Additionally, specific costs and consequences of institutional failure in Hawaii were analyzed. (106-R)
- b. Impact/Accomplishment. Our research projected that effective implementation of a new pricing policy by the Honolulu Board of Water Supply, coupled with water conservation measures could lead to a 15-20 percent reduction annually in Hawaii's visitor industry water demand, thereby making more water available for agricultural and in-stream uses. The methods employed in this project could be applied to states that closely parallel Hawaii's situation (eg. Nevada, California, and Oregon).
- c. Source of Funding. Hatch and State
- d. Scope of Impact. National and Hawaii

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

Overview:

Research and extension efforts were continued to provide enhance economic opportunity and quality of life for people in Hawaii. Areas addressed by research and extension projects include: children, youth and families at-risk; youth development; community development; conflict management; and family resource management.

Nationally, there is a need for scientifically validated early childhood curricula, particularly those that are shown to be effective for at-risk preschoolers. Learning Connections is the first preschool curriculum designed in Hawaii to meet the needs of Hawaii’s multicultural preschool population, in which Asian, Native Hawaiian, Pacific Islander and immigrant children are highly represented.

Young people were taught life skills to enable them to be more self-confident and to think independently and interdependently as they accept responsible social roles.

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)
2004	102,508	175,726	93,433	371,667	2.6

Fiscal Year	Extension Smith-Lever Funds (\$)	Extension State Funds (\$)	Extension Other Funds (\$)	Extension Total Funds (\$)	Extension Faculty Years (FY)
2004	198,713	1,243,288	37,029	1,479,030	16.9

Key Theme – Youth at Risk

- a. **Description of Activity.** There is a need for empirically validated preschool curricula that address developmentally appropriate emergent literacy and numeric skills. The purpose of this project is to provide kindergarten and first grade follow-up data on the longer-term impact of the Learning Connections curriculum. This curriculum has been shown to have a positive short-term impact on preschool children's literacy and math performance. A professional-quality curriculum package will be developed and disseminated to preschool educators. The main goal of the first project year was to conduct a follow-up assessment of children who had participated in the Learning Connections (LC) curriculum during the 2002-2003 school years. (353-H)

- b. **Impact/Accomplishment.** Learning Connections is the first preschool curriculum designed in Hawaii to meet the needs of the multicultural preschool population in Hawaii, in which Asian, Native Hawaiian, Pacific Islander and immigrant children are highly represented. Earlier work has shown that the Learning Connections curriculum is more effective than other Head Start curricula in promoting literacy and mathematics learning. In this follow-up study, we showed that the positive effects of the Learning Connections curriculum last over time. One year after participating in the curriculum, children scored higher on both reading and math than did a matched control group of Head Start children who had been taught using the popular Creative Curriculum. Overall, the

research results indicate that Learning Connections is a sound and effective curriculum that can help economically disadvantaged children to close the performance gap.

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

Key Theme – Youth Development/4H

- a. Description of Activity. Teaching life skills to young people enables them to be more self-confident and to think independently and interdependently as they accept responsible social roles. A key in implementing programs addressing this need is enhanced recruitment and training of youth volunteers. Research shows the need for volunteer assistance is greatest among youth with high risk factors. This project focuses on building the volunteer ethic in our communities for youth development. (22-022)
- b. Impact/Accomplishment. Oahu 4-H clubs (primarily military clubs) included service-learning projects in their club activities. The results was that projects were implemented for senior centers, retirement centers, domestic shelters, homeless and transitional shelters, hospitals, and animal facilities. Hawaii 4-H service-learning educational materials (powerpoint and Jeopardy game) were utilized by the Georgia Powder Springs Community Taskforce, a volunteer based community group. The task force utilized the on-line materials to train 27 youth from Cobb, Fulton and DeKalb counties in Georgia. These youth later coordinated service-learning projects for 2,000 youth for National Youth Service Day in April 2004. Read to Me VISTA volunteers and the Department of Education Child Care Academy teachers are now training their own colleagues with the use of project materials.
- c. Source of Funding. Smith-Lever and State
- d. Scope of Impact. Hawaii

STAKEHOLDER INPUT PROCESS

Actions Taken to Seek Stakeholder Input and Encourage Their Participation:

Stakeholder input is vital to enable CTAHR to meet its land grant mission. CTAHR seeks stakeholder input through many available means including:

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

In general, programs and projects are the result of faculty and administrators receiving input from stakeholders through formal and informal discussions. Faculty are asked to identify stakeholder support in their proposals.

Process Used for Identifying Stakeholders and Collect Input from Them:

The process for identifying stakeholders and collecting their input has not changed since it was revised in 2002. Briefly, the Revised Stakeholder Input Process has five key elements to insure participation from a wide range of stakeholders. The five key elements are: (1) a CTAHR Board of Advisors; (2) active participation of CTAHR administrators in various stakeholder organizations; (3) use of public opinion surveys; (4) active participation of faculty in stakeholder organizations; and (5) direct faculty interaction with stakeholders.

The CTAHR Board of Advisors consists of 20 members that are selected to insure participation from stakeholder groups on the major Hawaiian Islands. Members of the Board bring stakeholder needs to the attention of CTAHR during regular meetings of the Board. In 2004, the Board of Advisors provided input that helped to guide the strategic direction of CTAHR. For example, the Board provided input on allocation of resources, legislative initiatives, proposed land grant status reorganization, strategic plan, germplasm release, Waimanalo Master Plan, and proposed land transactions.

CTAHR administrators participated in more than thirteen stakeholder organizations to seek stakeholder input. Faculty and especially extension personnel interact with stakeholders on a regular basis to address issues that affect their lives and livelihoods. The result of these discussions forms the foundation for research and extension projects.

How Stakeholder Input Was Considered:

Input from the CTAHR Board of Advisors is considered at the strategic level. In 2004, the Board's input helped shape the five year Strategic Plan for CTAHR.

Input from stakeholders was used to formulate and implement research and extension projects. Examples of research and extension projects that were recently initiated are provided below.

- The Hawaii Anthurium Industry Association, Hawaii Export Nursery Association, and the Big Island Dendrobium Growers Association were consulted to discuss the problem of plant-parasitic nematodes. As a result of these discussions, project HAW00980-H entitled "Tropical Plant Nematology – Biology and Control" was initiated. The objective of this project is to develop improved control measures for plant-parasitic nematodes for tropical crops.
- CEATECH, Inc., Pacific Harvest, and other aqua-farmers indicated that there is a need to develop an "operational" model to assist growers. Growers want to increase their profitability by identifying the most efficient harvesting schedules. A Hatch project entitled "Optimal Harvesting Strategies for Farmed Fish and Shrimp in Hawaii" was initiated as a result of input from growers. The objective of this project is to develop, test and operationalize a quantitative management model to assist shrimp and moi producers in Hawaii to determine optimal harvesting strategies.

- The major pineapple growers in Hawaii are Dole Foods Hawaii, Del Monte Fresh Produce Hawaii, and Maui Land and Pineapple. After discussions with these growers, Hatch project HAW00943-H entitled “Pineapple Cultivation and Production in Hawaii” was initiated. This project deals with cultural practices and insect and disease control in pineapple production.
- The Institute for Human Services, the state’s largest homeless service provider, approached the Center of the Family (COF) for assistance in serving its families and children. To address the needs of the homeless, the COF initiated an extension project entitled “Hawaii’s Homeless Families and Children.” The goal of this project is to increase knowledge and understanding of the homeless families and children in Hawaii so that strategic actions can be taken to improve their well being.
- At a workshop for Certified Athletic Trainers (ATC) in Hawaii, a need for reliable sports nutrition information was strongly expressed. A project entitled “Enhancing Nutrition Knowledge of Influential Fitness Professionals” was initiated. The objectives of this project are to: (a) increase nutrition knowledge of ATCs in Hawaii and (b) increase nutritional information resource awareness of ATCs in Hawaii.
- The tropical flower industry specified that research is needed in the area of controlling micro-environments to manipulate growth patterns and flowering to fill market needs or to match market patterns. The project entitled “Controlling Plant Growth with Photo-selective Plastic Film” was initiated. The objective of this project is to determine the effects of photo-selective plastic film on the growth of selected ornamental and floriculture crops.
- In a survey, the Maui Onion Growers Association identified pink root and fusarium basal plate diseases as the major limiting factor facing their industry. A project entitled “Disease Management Strategies for the Control of Soil-borne Diseases of Maui Sweet Onions” was initiated. The objectives of this project are to determine the effects of incorporating organic amendment in soils, soil fumigation, and biological inoculant applications on: (a) crop yields; (b) disease incidence; (c) severity of pink root, fusarium basal plate rot, and bacterial bulb rots. The results of field trials conducted in Hawaii and current disease management strategies used by onion producers worldwide will be disseminated to Hawaii growers.

Input on McIntire-Stennis project proposals submitted in FY 2004 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 most effective method to obtain stakeholder input was discussions between faculty and people directly in the forestry and related industries.

PROGRAM REVIEW PROCESS

There have been no significant changes in our program review processes since the 2003 Annual Report was submitted.

EVALUATION OF THE SUCCESS OF MULTI- AND JOINT ACTIVITIES

Strategic Issues Addressed:

The multi and joint activities have successfully addressed CTAHR's strategic goals of promoting diversified agriculture, sustaining Hawaii's natural resources and environment, and strengthening communities. CTAHR's strategic goals are directly related to National Goals 1, 3, 4, and 5. Examples are described below.

In Hawaii, the vast majority of diversified agriculture is comprised of small farms (<5 acres). A key factor for their success is cost effective management of irrigation. An integrated project is underway to evaluate and refine micro-irrigation for vegetable crops to optimize crop production and promote natural resource protection.

Milk parlor waste results in ground water contamination, surface water pollution, nutrient runoff, and the added burden of lagoon management. A recently completed project utilized a simple two stage anaerobic bioreactor to address this problem. The treatment of waste with the bioreactors allows the reuse of the effluent for liquid fertilizer.

A multi-state team consisting of Hawaii, Montana, and Nevada are developing a model to facilitate economic development by matching community goals with business needs. This project addresses an often-overlooked parameter of strengthening communities in a manner that meets their goals, not just those of industry.

Underserved and Underrepresented Populations Served:

CTAHR's integrated projects have made significant progress in serving ethnic groups and cultures that often are not sufficiently served by most federal programs. Two distinct programs for at-risk children will be highlighted.

Economically disadvantaged children are more likely to be unsuccessful in school than non-disadvantaged children. Thus, there is a need for scientifically validated early childhood curricula for at-risk preschoolers. An integrated program was developed to test an innovative curriculum called Learning Connections. Learning Connections was specifically designed to meet the needs of Hawaii's multicultural preschool population in which Asian, Native Hawaiian, Pacific Islanders, and immigrant children are highly represented. The multi-site project compared the Learning Connections program to the Head Start program and found that the Learning Connections program was more effective than Head Start in promoting literacy and mathematics learning in Hawaii's at-risk preschoolers.

Nationwide, the number of incarcerated people has increased dramatically. Many of these men and women are parents. A new integrated project is investigating the impact on children and families when mothers are incarcerated. Little is known about this underrepresented population and this study will yield valuable information about both risk and protective factors related to impact on children and families.

Program Outcomes and Impacts Achieved:

Overall, our programs are producing valuable outcomes and impacts for our stakeholders and represent sound investments of federal revenues. For example, a small but important program, specifically the Learning Connections program, exemplifies this point. The Learning Connections' success has led to a strong push to disseminate the program to more schools. The program's long-term impact will be to close the scholastic performance gap for at-risk children.

Improvements in Program Effectiveness and Efficiency:

The brief descriptions of the integrated projects above highlight how our programs address our strategic issues, serve underserved and underrepresented populations, and impact our stakeholders. Furthermore, our programs increase their efficiency and effectiveness, which ultimately results in profitable and sustainable agriculture and strengthened rural communities. For example, the optimization of micro-irrigation systems increases the efficiency of small farms by decreasing their water use and water bills. Similarly, the treatment of milk parlor waste with an anaerobic bioreactor reduces the cost of lagoon management and obviates the need to purchase fertilizer for crops. Both programs protect our island environment, while efficiently utilizing natural resources.

MULTISTATE EXTENSION ACTIVITIES

Form CSREES-REPT (2/00) – See Below

INTEGRATED RESEARCH AND EXTENSION ACTIVITIES

Form CSREES-REPT (2/00) – See Below

U.S. Department of Agriculture
 Cooperative State Research, Education, and Extension Service
 Supplement to the Annual Report of Accomplishments and Results – FY 2004
 Multistate Extension Activities and Integrated Activities
 (Attach Brief Summaries)

Institution College of Tropical Agriculture and Human Resources
 State Hawaii

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act Funds)
 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	Actual Expenditure FY 2004	Estimated Cost FY 2005
HAWAII DOES NOT HAVE MULTISTATE EXTENSION ACTIVITIES. THERE ARE NO EXPENDITURES. A PRE-WAIVER WAS REQUESTED.						
TOTAL						

_____ Director

_____ Date

U.S. Department of Agriculture
 Cooperative State Research, Education, and Extension Service
 Supplement to the Annual Report of Accomplishments and Results – FY 2004
 Multistate Extension Activities and Integrated Activities
 (Attach Brief Summaries)

Institution College of Tropical Agriculture and Human Resources
 State Hawaii

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	Actual Expenditure FY 2004	Estimated Cost FY 2005
103H The Relationship Between Oxidation-Reduction Potential of Flooded Soil and Taro Yield	250	5,344	4,238			
111H Community Business Matching				7,650	16,597	16,597
130H Effective and Labor-Efficient Management of Weeds in Pastures and Native Forests of Hawaii	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	10,013	10,013
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			
228R Parent & Household Influences on Calcium Intake Among Preadolescents						
327R Factors Influencing the Intake of Calcium-Rich Foods Among Adolescents (Project No. Changed to 220R)		54,347				
353H Curriculum Innovations for At-Risk Preschoolers					4,282	4,282
369H Measuring Success	5,048					

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	Actual Expenditure FY 2004	Estimated Cost FY 2005
372H Incarcerated Parents: Adjustment of their Children and Families			32,292	45,736	41,680	41,680
378R Family Businesses in Economically Vulnerable Communities		25,206	10,328	5,771	12,300	12,300
379H Grandparenting Strengths and Needs of Asian American Families in Hawaii				4,529	457	457
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	9,674	9,674
513R Animal Manure and Waste Utilization, Treatment, and Nuisance Avoidance for a Sustainable Agriculture (Formerly 518R)			9,636	18,536	9,800	9,800
518R Animal Manure and Waste Utilization, Treatment, and Nuisance Avoidance for a Sustainable Agriculture (Project No. Changed to 513R)	13,929	14,764				
520R Micro-irrigation 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		
550H A Simple Two Stage Bioreactor for Milk Parlor Wastewater Treatment and Reuse in the Tropics			13,764	11,785	14,399	14,399
602G Hawaii 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				

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	Actual Expenditure FY 2004	Estimated Cost FY 2005
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	42,868	42,868
833H Optimizing the Soil Environment for Diversified Crops in Hawaii					6,844	6,844
853H Designing and Implementing Improved Nutrient Management Decision-Making for Natural Resource Management (Formerly 162H)			9,226	600		
854H Cultivar Evaluation for Container Production in Hawaii	2,858					
855H A New Material for Amending Metal Toxicities in Acid Soils		15,626	8,636	1,500		
873H Developing Weed Control Components for Best Management Practices in Hawaii	26,419	36,475	38,544	14,818		
903H Molecular Detection, Characterization and Management of a Phytoplasma Associated with Watercress Yellows				17,345	10,754	10,754
905H Bioremediation of Hawaiian Soils Contaminated with Polycyclic Hydrocarbons			905			
908H New Production Practices for Anthurium				31,875	23,471	23,471
910H Pests of Tropical Fruit and Nut Crops Integrated Pest Management				27,600	22,422	22,422
914H Preservation, Characterization and Genetic Improvement of Hawaiian Taro				54,278	25,584	25,584
915R A National Agricultural Program to Clear Pest Control Agents for Minor Crops (Formerly 615R)						
935H Biology & Management of Invasive Ants in Hawaii					5,000	5,000
943H Pineapple Cultivation & Production in Hawaii					7,988	7,988

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

Title of Planned Program/Activity	Actual Expenditure FY 2000	Actual Expenditure FY 2001	Actual Expenditure FY 2002	Actual Expenditure FY 2003	Actual Expenditure FY 2004	Estimated Cost FY 2005
944H Flower and Nursery Crops: Pest Management & Quarantine Treatments	15,722	30,953	33,855	11,077		
967H Disease Control of Diversified Crops using Etiology, Low Risk Chemicals, Biological, and Cultural Methods (Formerly 726H)			32,802	29,699	22,501	22,501
977H Control of Papaya Fungal Diseases (Formerly 735H)			56,622	6,536	1,083	1,083
TOTAL	185,397	325,152	316,644	371,272	287,717	287,717

_____ 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.

U.S. Department of Agriculture
 Cooperative State Research, Education, and Extension Service
 Supplement to the Annual Report of Accomplishments and Results – FY 2004
 Multistate Extension Activities and Integrated Activities
 (Attach Brief Summaries)

Institution College of Tropical Agriculture and Human Resources
 State Hawaii

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act Funds)
 Integrated Activities (Smith-Lever Act Funds) : **Actual Expenditure and Estimated Cost – Page 1 of 3**

Title of Planned Program/Activity	Actual Expenditure FY 2000	Actual Expenditure FY 2001	Actual Expenditure FY 2002	Actual Expenditure FY 2003	Actual Expenditure FY 2004	Estimated Cost FY 2005
02-005 CTAHR Video Production Facility	38,919					
06-353 The State of Hawaii'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		
10-600B Pesticide Impact Assessment Program						
10-606 Supporting Pesticide Registration for Use in Hawaii's Crops	12,740					
12-505 Evaluation of Animal Waste Management Alternatives for the State of Hawaii						
12-506 Improved Irrigation System and Scheduling in Hawaii						
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		
13-114 Control of Invasive weeds in rangelands and natural areas in Hawaii (RREA)						
13-120 Management of Pasture and Environmental Weeds			33,447			

Integrated Activities (Smith-Lever Act Funds) : **Actual Expenditure and Estimated Cost – Page 2 of 3**

Title of Planned Program/Activity	Actual Expenditure FY 2000	Actual Expenditure FY 2001	Actual Expenditure FY 2002	Actual Expenditure FY 2003	Actual Expenditure FY 2004	Estimated Cost FY 2005
14-202 Enhancing Conception Rates in Dairy Cows Under Heat Stress Conditions by Determining the Chemical Constituents of Cervical Mucus at Estrus				17,433	16,710	16,710
14-205 Porcine Reproductive and Respiratory Syndrome (PRRS) in Hawai'i			2,768	832		
14-221 Parent & Household Influences on Calcium Intake Among Preadolescents					4,545	4,545
16-902 Developing Insect Identification Guides and On-Farm IPM Training for Banana and Papaya Growers					32,004	32,004
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						
16-916 Etiology & Control of Fungal Diseases and Education Program for Local Growers					18,254	18,254
16-920 Supporting Pesticide Registration for Use in Hawaii's Crops		49,690	47,702	13,678		
16-921 Fungal Disease Control and Educational Program in Hawaii			15,089	0		
16-925 Nematode Control for Tropical Crops in Hawai`i			8,136	8,100	8,700	8,700
18-806 Technology Transfer to Support Sustainable Farming Systems in Hawaii	671	6,388	16,714	11,700		
18-809 Development and Expansion of the Floriculture Industry in Hawaii	12,941	58,360	35,821	31,500		
19-705 Fungal Disease Control and Educational Program in Hawaii	237					
20-080 Weed Management in Hawaii Pastures	6,000					
21-022 Disease Management Strategies for the Control of Soil-borne Diseases of Maui Sweet Onions				2,194		
21-029 Demonstration on Technologies to Produce Value-Added Products on Molokai			4,236	7,005	5,009	5,009

Integrated Activities (Smith-Lever Act Funds) : **Actual Expenditure and Estimated Cost – Page 3 of 3**

Title of Planned Program/Activity	Actual Expenditure FY 2000	Actual Expenditure FY 2001	Actual Expenditure FY 2002	Actual Expenditure FY 2003	Actual Expenditure FY 2004	Estimated Cost FY 2005
21-030 Edible Crops of Maui			22,044	37,800		
22-016 Oahu-Kauai Food Crops Extension Project			15,200	1,958	1,530	1,530
22-034 Aster Yellows Disease: A New Threat to Many Crops in Hawaii			1,921	30,675	30,946	30,946
23-040 Improved Cultural Management of Ornamental, Nursery, Landscape and Turf Commodities	4,500	18,800	20,150	19,500	18,400	18,400
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	157,441	157,441

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.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results – FY 2004
Multistate Extension Activities and Integrated Activities
Brief Summaries

Institution College of Tropical Agriculture and Human Resources
State Hawaii

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act Funds) : **Brief Summaries -- Page 1 of 12**
 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: Cooperators have been located in other Western states. A Western Rural Development Center Grant has been obtained. A survey of businesses is underway to determine what businesses are looking for in communities as they consider relocation or expansion. The qualitative community surveys have been pilot tested. The CBM model has been reprogrammed.

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

Progress/Accomplishments: Terminated

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: Nineteen subjects were recruited from Hawaii from 4 local public schools for this project. Recruited public schools include Stevenson Middle School, Washington Middle School, Kaimuki Middle School and King David Kalakaua Middle School. These public schools were recruited as control schools. The third of 3 visits to measure DXA bone and body composition is ongoing. All visits will be completed by Summer 2005.

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

Progress/Accomplishments: Not Integrated from FY 2004

Brief Summaries for Research Integrated Projects – Page 2 of 12

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

Progress/Accomplishments: Osteoporosis is a major public health problem. It affects every gender, race and economic group. It is responsible for more than 1.5 million bone fractures annually. Low calcium consumption may lead to osteoporosis, especially among Asians and Hispanics. This project aims at understanding the role of parents in calcium consumption of their pre-adolescent children and developing simple messages to increase calcium intake. The messages will be based on scientific findings obtained from research among parents and pre-adolescents. Further research will test how effective these messages are. Eleven states collaborated to identify the role of parents' knowledge, attitudes, behavior, and environment in total calcium intake of their preadolescent children using qualitative methods. 206 parents of pre-adolescent children age 10-13 years with different ethnicity were interviewed to collect data on their knowledge, attitude, behavior and food environment. Parents were not randomly selected. They were recruited as convenient sample and only Asian, Whites and Hispanic race/ethnicity were included. The Hawaii site recruited 16 parents during the 2003-2004 year (8 Asian, 7 White and 1 Mixed).

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

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

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

Progress/Accomplishments: The main goal of the first year was to conduct a follow-up assessment of children who had participated in the Learning Connections (LC) curriculum during the 2002-2003 school year. Approximately 60% of the former Head Start students are now enrolled in kindergarten; the remaining children were completing a second year at Head Start. In all, 81 families were successfully contacted and participated in the follow-up assessments. While 55% of LC children returned for follow-up, only 38% of control children participated. In addition, the two groups were not evenly balanced in terms of age; 64% of the LC follow-up children had moved on to kindergarten, while only 21% of control group children had done so. The small and unbalanced composition of the follow-up sample should be taken into consideration when interpreting the follow-up data. Children were tested individually on the Test of Early Reading Abilities-3 and the mathematics and writing scales of the Developing Skills Checklist. Teachers and parents were also asked to complete surveys describing children's motivation and achievement in the areas of early math and literacy. A total of 35 parents and 55 teachers returned surveys. Child assessment data were analyzed using two-way analysis of covariance. Treatment condition and current school placement were the two between-group factors; pretest score, pretest age, and degree of familiarity with the tester were the three covariates. One-tailed tests were conducted. Results indicated the LC children showed better performance on two of the three academic outcomes. LC children scored higher on emergent reading, $F(1, 69) = 3.73, p < .03$, and on mathematics, $F(1, 73) = 10.73, p < .001$. There were no group differences on writing skill. Two-way analysis of variance techniques (treatment condition by current school placement) were used to analyze the parent and teacher survey data. LC parents reported providing a more cognitively stimulating home environment, $F(1, 29) = 4.02, p < .03$. There were no difference on parent report of home literacy and math interactions, home-school communication, or child approaches to learning. There were no differences in teacher perceptions of child academic skill, approaches to learning, or parental involvement. In preparation for dissemination among teachers and families across the state, the LC teachers' guide and family guide were sent to a professional editor for review and correction. A graphic design company was contracted to complete the design and layout of these two curriculum manuals. This work is currently 80% complete.

Brief Summaries for Research Integrated Projects – Page 3 of 12

369H Measuring Success (Goal 5).

Progress/Accomplishments: Terminated.

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

Progress/Accomplishments: Project staff contributed "A Researchers Perspective" power-point presentation at a two-day conference on "Children of Prisoners: Impact on the Innocent" sponsored by Child and Family Service of Hawaii and the Child Welfare League of America. A research agreement between the University of Hawaii and the Hawaii State Department of Public Safety (DPS, which oversees prisons) was negotiated and approved, allowing access to incarcerated subjects. DPS staff cooperation was sought and obtained, and incarcerated subjects were recruited. Interviews of subjects were initiated.

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

Progress/Accomplishments: Hawaii researchers contributed to the development of an index that measures the socio-economic vulnerability of all counties in the U.S. Specifically, Hawaii researchers conducted pilot testing of the index in Hawaii and worked on standardization of the measurement tool. Hawaii researchers also contributed to a methodology paper describing the development of the vulnerability index. The index was presented to community development professionals at the Community Development Society meeting in Cleveland, Ohio in July 2004. The socio-economic vulnerability index was also used to dichotomize U.S. counties into two groups, more versus less vulnerable counties. Then statistical analyses were performed to distinguish the characteristics of family businesses operating in more versus less vulnerable counties. The findings indicate that managers in more vulnerable counties have more problems with marketing strategies, business location and overhead expenses than those in less vulnerable counties. Operating a business in a more vulnerable county was also associated with lower levels of company goal achievement and overall business success. Of interest is that business managers in agriculture, retail and the entertainment industry reported lower levels of perceived business success than those in the public administration industry. In summary, business resources and constraints were the most important predictors of business success, regardless of the location of the company. In particular, if a business were located in a more vulnerable county, the significant predictors of business success were: gender, age and health status of the business manager. Business and cash flow problems impact business success negatively, while community support and computer use affect business success positively. A research abstract entitled Business success: A comparison of family owned businesses in non-vulnerable and vulnerable communities will be published in early 2005 in the Papers of the Western Family Economics Association.

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

Progress/Accomplishments: The subjects recruited were from two community centers for seniors in Honolulu, consisted almost entirely of women (92%). Most of the subjects were between the ages of 60-79 with the largest concentration between 70-74 (25%). Childcare was provided in the grandparents homes. Over half of the grandchildren were 5 years of age and older while the remainder were toddlers and preschoolers. Most of the subjects found that caring for their grandchildren was satisfying. Many (82%) felt it allowed them to stay connected and spend time with their grandchildren. Many grandparents felt they were a good influence (92%) and effective in teaching values: (a) I try to teach my grandchild a sense

of right and wrong (88%) and (2) I try to teach my grandchild good manners (84%). In response to an open-ended question in which they had to describe good things about caring for grandchildren, many stated it kept them active and busy. On the other hand, not so good things about caring for grandchildren included not having enough time for outside social activities. Caring for grandchildren can be difficult for some, but most Japanese-American grandparents did not report major concerns. Most grandparents seemed to get along well with their grandchildren. While 13% expressed frustration with their grandchildren's TV habits, 75% believed their grandchildren treated them well. Most subjects reported generally good health with 79% saying their health was about the same as 1 year ago. Increasing age did not pose limitations to caring for grandchildren. While 92% reported limiting vigorous activities, 71% said moderate activities such as carrying groceries did not pose limitations. Also, mental health seemed to be excellent. 75% stated that emotional problems did not interfere with normal social activities with family or friends. Although most subjects reported excellent physical and mental health, caring for grandchildren, especially preschoolers did take a toll. Half of the subjects said they felt worn out some of the time. While some new insights into the grandparenting strengths and needs, as well as the physical and mental health of Japanese-American grandparents have been gained, further study is needed. The inclusion of other Asian minorities could shed light on similarities or differences among different ethnic groups in Hawaii. Also, an examination of Asian grandparent's socioeconomic levels may be beneficial to understand the impact of limited financial resources on caring for grandchildren.

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

Progress/Accomplishments: Terminated

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

Progress/Accomplishments: Treatability tests were performed on (1) petroleum contaminated soils; (2) sediments obtained from the Ala Wai canal, containing heavy metals and chlorinated organic compounds; and (3) compost/perlite mixture (for use in a biofilter) contaminated with odorous amine compounds. The concentrations of amendments, such as fertilizers and additional carbon substrates, as well as moisture and oxygen content were varied. Good correlation between CO₂ production, O₂ consumption and plate count analyses was observed for many of the biotreatability experiments performed. A more complex media, such as a non-sterilized soil with petroleum contaminants containing communities of microorganisms was studied; the correlation between respirometry and contaminant degradation was better than the correlation between plate counts and contaminant degradation. This indicates that, in addition to being less labor-intensive, respirometry is a better indicator (than plate counts) of microbial activity related to biodegradation. Substrate-induced respirometry is used to estimate total biomass carbon, and to determine the magnitude of contaminant toxicity on microbial activity. The microbial respiratory response initially decreased due to contaminant toxicity, but showed that the microbes were able to acclimate and metabolize the contaminant. Respirometry was used in the scale up of a biofilter for treatment of an odorous waste air stream. Bench-scale batch treatability experiments were performed to determine the optimal nutrient and contaminant concentrations for biodegradation of a long-chain amine compound, which is odorous, and expected to be present in the waste air stream of paint booths. Based on respirometry and gas chromatography results, it was determined that this contaminant was biodegraded by the microbial communities present in the compost/perlite mixture. A pilot scale biofilter was designed and constructed, and respirometry was used to monitor microbial activity. Difficulties in introducing the contaminant to this pilot scale biofilter did not allow for additional experiments to be completed,

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but initial results indicated that respirometry could be used at the pilot scale for monitoring microbial activity. In summary, our experiments have demonstrated that respirometry can be useful in assessing microbial activity in relation to biodegradation at both the bench-scale and pilot scale, and for assessing toxicity effects on microorganisms and their activity. The results of these experiments have been presented and published in various venues. In addition, we have partnered with an environmental consulting company who is actively marketing the use of treatability testing for the application of bioremediation to contaminated soils, water or air streams.

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

Progress/Accomplishments: A laboratory scale of a 2-stage bioreactor for the anaerobic treatment of milk parlor wastewater was investigated. It was found that 2-stage bioreactor is effective for the biological treatment of high lipid/fat content of milk parlor wastewater at lower temperature of 22 Centigrade. The advantages of operating this reactor (Bio-nest) include high biomass contact, best application of EMT (Effective Mixing Time) and EBRP (Effective Biomass Reaction Process), less dead zone, provides stable operating conditions with regard to COD removal and methane gas production, combines the advantage of UASB (Upflow anaerobic sludge blank) and anaerobic filter design/operation and corrects the disadvantage of UASB and anaerobic filter process. The process of filing for a U.S. patent has been initiated for this bioreactor design/operation. A pilot plant with two stages of bioreactor (10m³ each) is under construction now.

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: Analytical procedures are important tools for emergency responses, responses to intentional threats, evaluation of risks posed by hazardous substances, and hazard waste mitigation and remediation. We have developed new extraction and analysis procedures for explosives, pesticides and common environmental pollutants. Our findings demonstrated that copper dissociation is a mechanism of fungal laccase denaturation by humic acid. We continue to collaborate with the Hawaii State Department of Health to offer a series of workshops specifically designed for Fire Department Hazardous Material Units to give them an overview of to respond to unknown chemicals in emergencies. A workshop was offered on Kauai on chemical and biological weapons of mass destruction, field sampling techniques, and field characterization of unknowns.

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

Progress/Accomplishments: Milk parlor wastewater from a dairy operation was used to evaluate its reuse potential. A simple two stage bioreactors (Bio-nest) were used to evaluate its efficiency in removing the organic pollutants contained in the milk parlor wastewater. It was found that more than 70-75% of TCOD (Total Chemical Oxygen Demand) removal efficiency and biogas production of 1.5 l/day with CH₄ content of 70-75% could be achieved at 8-15 g COD/l/day at 22 centigrade. The unique points for this system are high COD removal with high loading rate, simple design/operation, better sludge distribution and less dead zone. The milk parlor wastewater can be easily integrated into the existing lagoon system or integrated into the aerobic/intermittent aerobic treatment unit for further removal of carbon and nitrogen to enable the wastewater to be disposed of, discharged, or reused. Because on the success of this project, a pilot plant study has been funded by a grant.

602G Hawaii 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: Taro plants grown at 100% of evapotranspiration (water lost by evaporation from moist surfaces plus water lost by plants) had greater fresh and dry weights of corms than those grown at 50% of evapotranspiration and were not different from those grown at higher irrigation levels. To determine the cost-benefits of mulching compared to supplemental irrigation, taro variety Maui Lehua was planted and will be harvested in November 2004. To evaluate blight-resistant taro varieties and hybrids, over 250 cultivars of taro were grown over two cropping cycles. The highest yielding taro variety was a hybrid cross between Ngeruuch and Niumalu. It had a fresh weight yield of 32,253 kg/ha. Sawa

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Bastora was the highest-yielding taro cultivar; however, it had a very poor consumer acceptance rating for poi. It had over double the yield of Lehua maoli, which had the highest consumer acceptance rating for poi. Fourteen cultivars of taro were evaluated along the Hamakua Coast of Hawaii during 2002-2003. The highest yielding taro variety was Ngesuas, a Palauan variety known to have resistance to Phytophthora leaf blight. The second highest yielding cultivar was another Palauan variety Ochelochel. They had yields more than double that of the popular Hawaiian variety Lehua maoli. Nine varieties of taro were evaluated along the Hamakua Coast during 2003-2004. The highest yielding taro variety was the University of Hawaii (UH) patented variety Pa akala, the second highest was the UH patented variety Pauakea, and the third highest was the UH patented variety Pa lehua. Yields of these UH hybrids were more than double that of Lehua maoli. In taste tests, consumer acceptance of Pa lehua was as high as Lehua maoli for poi; however, it was observed that corm disease adversely affected the flavor of Pa lehua. Consumer acceptance ratings of poi made from Palauan varieties, Ngesuas and Ochelochel, and UH patented varieties, Pa akala and Pauakea, were acceptable, but lower than that of Lehua maoli.

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

Progress/Accomplishments: Soil samples were taken from the Poamoho (Wahiawa Oxisol) and Waimanalo (Waialua Mollisol) Experiment Stations. The sites had been under compost amendments, or urea plus lime applications (one time) about 10 years ago, and were left fallow ever since. The analytical results showed that soil fertility (pH, organic C, extractable Ca, Mn, etc.) varied significantly within a short distance (about 5 m), perhaps because of past treatments. The Oxisol contained less Mehlich 3-extractable Ca, but more Mn than the Mollisol. Given such background data, an experiment was set up, consisting of four treatments: (1) Redwood compost plus chicken manure-based compost, (2) yard waste from the University of Hawaii compost plus chicken manure-based compost, (3) urea, and (4) unamended control. Tomato and ginger were planted in these treatments.

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

Progress/Accomplishments: Terminated

854H Cultivar Evaluation for Container Production in Hawaii (Goal 1).

Progress/Accomplishments: Terminated

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

Progress/Accomplishments: Terminated

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

Progress/Accomplishments: Terminated

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

Progress/Accomplishments: The incidence of yellows disease caused by phytoplasma on watercress farms on Oahu has decreased markedly over the last year, due to continued efforts by farmers: (a) to rogue out infected, symptomatic plants and (b) to control the population of the insect vector, *Macrosteles* sp., in their fields. All of the watercress farmers on Oahu are now aware of the problem this disease presents and of the most efficient ways to protect their farms from this threat. Further characterization of the phytoplasma infecting watercress in Hawaii has included the cloning and sequencing of the Rp and Tuf genes in addition to the cloning and sequencing of the 16S/SR/23S ribosomal DNA genes previously characterized. Sequence analysis of both the Rp and Tuf genes has been used to further classify phytoplasmas of the Aster Yellows group throughout the world. Our analyses of these genes has revealed that the watercress phytoplasma may be most closely related to the phytoplasma that causes Onion Yellows in Japan, and is probably less closely related to the phytoplasma that causes Aster Yellows in western North America.

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

Progress/Accomplishments: Hazardous chemicals, such as polyaromatic hydrocarbons are persistent environmental contaminants because of their highly stable chemical structure and their adherence to solid particles in the environment. Bacterial strains were isolated from Hawaiian soils in association with pyrene degradation. Strains were purified and then characterized by phenotypic and genotypic methods. As determined by 16S rDNA sequencing, the genera present in pyrene-degrading consortia included *Achromobacter*, *Alcaligenes*, *Arthrobacter*, *Bacillus*, *Frateuria*, *Microbacterium*, *Micrococcus*, *Mycobacterium*, *Ochrobactrum*, *Paenibacillus*, *Pseudoxanthamonas*, *Ralstonia*, and *Rhodanobacter*. Using an overlay method developed during this study, all isolates were characterized with regard to pyrene degradation. All strains in this study able to use pyrene as a sole carbon source belonged to the genus *Mycobacteria*. Those strains able to degrade pyrene were tested for PAH-degradative activity of benzo(a)pyrene, chrysene, fluoranthene, fluorene, and phenanthrene. Several strains could degrade the smaller compounds (phenanthrene and fluoranthene), but compounds with higher molecular weight generally are more persistent and more difficult for bacteria to degrade. Chrysene and fluorene were not degraded by any of the isolates associated with pyrene degradation. Benzo(a)pyrene was degraded only by one of the isolates. PAH degradation as determined by the plate assays has been confirmed by degradation studies in liquid culture systems. Degradation studies in bioreactor systems showed variable results due to incomplete extraction of pyrene from soil. Thus, modeling studies under defined parameters of pH and nutrient levels were carried out in liquid culture rather than soil. The impasse for obtaining quantitative results for pyrene degradation in soil 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 used to characterize mixed populations during the degradation process. The significance of this work was presented in several public seminars to increase general awareness of environmental pollution and bioremediation as a potential solution to chemical contamination in the environment.

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

Progress/Accomplishments: This integrated Hatch project assesses the use of beneficial bacteria for stimulation of anthurium microplants when they are deflasked (Stage 3) and transplanted into community pots (Stage 4). Treated plants were more vigorous and a larger percentage of

transplants reached maturity, and treated plants flowered earlier than nontreated plants. In this project, the collaboration between an extension agent, growers, and researchers was developed in order to transfer results from greenhouses in Manoa to commercial shade houses in Hilo. The beneficial bacteria that were used both for biostimulation and control were grown in large quantities for field applications. Currently, strains are grown on semi-solid medium then suspended in phosphate buffer for application onto anthurium plants. To produce larger amounts of inoculum, growth of individual strains has been evaluated in liquid medium consisting of mineral solution and carbon sources. The three mineral solutions tested were: Miracle Gro, modified Hoagland solution, and standard Mineral Base (SMB). Interestingly, the beneficial bacteria were not able to utilize glucose as a carbon source when a commonly used modified Hoagland solution was used to supply minerals. A bacterial nutrient solution developed by Hutner, was more suitable for scale up of bacterial growth. When augmented with other organic sources, bacterial growth was optimized. We are currently optimizing methods used to enhance survival of beneficial bacteria on the tissue-cultured plants as well as producing large numbers of microplants in vitro for transport to the field.

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

Progress/Accomplishments: Southern green stinkbug (*Nezara viridula*, Hemiptera: Pentatomidae) is a pest of macadamia nuts, causing pitting to kernels by feeding. In spite of its pest status, many aspects of the ecology of this insect in macadamia orchards are poorly understood. We showed that there are distinct seasonal peaks in damage detected after harvest, and that over six years of data collection, mean damage levels were fairly low, albeit with spikes in damage levels recorded. Sampling nuts from different strata in the trees and from the ground showed that at least 50% of damage may be incurred within the canopy. These results show that management of *N. viridula* within macadamia canopies is important. The canopy samples consistently showed damage levels approximately 50% of the fallen nut damage levels. Feeding damage to macadamia nuts by *Nezara* is determined after harvest and processing. A method for the detection of stinkbug feeding on macadamia nuts using a ruthenium red dye staining process was developed. Correlations between feeding damage to the husk of the nut and feeding damage to the kernel were significant. This technique can be used to detect feeding damage in immature and mature nuts, and may be useful in planning management measures for *N. viridula*. Investigation of *Trissolcus basalis*, an egg parasitoid of *N. viridula* as an augmentative biological control agent, has shown that the insect is not an effective biocontrol agent within macadamia orchards. The parasitoids are able to effectively parasitize eggs of *N. viridula* in weed environments. *Aspidiotus destructor* (coconut scale) occurs on bananas in Hawaii, infesting leaves and fruit. We show that there are distinct seasonal variations in *A. destructor* numbers on bananas in Hawaii. Cavendish incurred highest *A. destructor* populations. An aggregated dispersion was found for *A. destructor*. A preliminary sequential sampling plan based on a nominal threshold was provided. Work on banana aphid (*Pentalonia nigronervosa*, Hemiptera: Aphididae), was aimed at finding indigenous entomopathogenic fungi with potential as biological control agents. The seasonal and spatial distribution of the aphids in Oahu banana plantations was investigated during the course of this work. There were no distinct patterns in seasonal distribution, but aphid numbers were negatively correlated with rainfall. An aggregated dispersion pattern was evident in plantations with lesser cultural management inputs. Bioassays with *Paecilomyces fumosoroseus* showed that the aphids were stimulated to increase their reproductive output when stressed by sub-lethal doses, with an evident hormetic response. Further bioassays are investigating two other fungal pathogens, combined with foliar applications of imidacloprid to determine whether there may be a synergistic interaction.

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

Progress/Accomplishments: Several growers in Hanalei, Kauai, have adopted two of the three food type hybrid taros developed in 1999. These growers have and are increasing the amounts of both hybrids in their commercial plantings. Seven other taro hybrids developed in 1999 and 19 hybrids developed in 2000 have been selected for advanced tests to identify potential leaf blight (TLB) resistant taro varieties. All of the hybrids were generated from genetic crosses between a TLB resistant parent and a susceptible commercial food type taro variety. The resistant parents used in these crosses came from 7 different leaf blight resistant parents that were introduced from Thailand, Federated States of Micronesia, Guam, Palau, and Papua New Guinea. Genetic crosses between hybrids with different parental sources of TLB resistance have been made this year to try to multiple TLB resistances. The progeny from these crosses will be evaluated for horticultural and TLB resistant attributes in the coming year.

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 projects: triflumizole in pineapple and trifloxystrobin in papaya. Hawaii's IR-4 Residue Satellite Laboratory completed analyses and submitted Analytical Summary Reports for the following projects: mefenoxam in kiwi fruit, imidacloprid in caneberry, and mefenoxam in papaya. Ongoing laboratory projects are spinosad and triflumizole in pineapple, spinosad in almond, oxyfluorfen in ti, and buprofezin in coffee. Efficacy studies were/are being conducted to determine possible future residue studies: dinotefuran in watercress; pyraclostrobin in papaya and persimmon; pyraclostrobin+boscalid in papaya and persimmon; fludioxonil+cyprodinil in papaya and persimmon; glufosinate in papaya, coffee, ginger, and taro; zoxamide, famoxate+cymoxanil in papaya; pyraflufen and carfentrazone in papaya, ginger, and taro. Preliminary results indicate that: dinotefuran is effective against the watercress leafhopper to aid in reducing the spread of aster yellows virus in watercress; pyraclostrobin and boscalid+pyraclostrobin are effective against *Asperisporium (caricae)* leaf spot and anthracnose (*Colletotrichum gloeosporioides*) in papaya and anthracnose in mango, and *Cercospora* leaf spot in persimmon; zoxamide and cymoxanil+famoxate are effective against *Phytophthora* in papaya; and, glufosinate is a suitable alternative to paraquat in coffee, papaya, ginger, and taro. Additionally, an efficacy evaluation trial of registered insecticides (e.g., Biocover [oil] and malathion) in papaya was conducted to determine if they could be used to control the white peach scale. Results from this study indicate that the white peach scale population can be suppressed or reduced to manageable levels with existing insecticides, but growers have to remain vigilant with repeated sprays at 2-3 wk intervals. However, depending on their costs of production and the price they get for their papayas, this additional management practice may not be feasible.

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

Progress/Accomplishments: Produced and distributed to the public a guide to monitor and identify the little fire ant (LFA). This will greatly aid efforts to survey (and subsequently contain) the distribution of this ant on the island of Kauai.

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

Progress/Accomplishments: For ant control, bait stations are being evaluated to reduce pesticide usage. In a 12-month period, 3 applications of ant bait and one application of diazinon for mealybug control was compared to a control field with no applications of bait stations in the field. In a large-scale test, control is possible with bait stations but not effective. For nematode control, acibenzolar-s-methyl activated a nucleotide sequence in pineapple homologous to the barley basic PR-1 gene sequence. The amino acid sequence deduced from the fragment revealed 73%, 70%, 69%, 67%, 67% and 61% identity to the maize PR-1, barley PR-1, wheat PR-1, rice PR-1, tobacco PR-1, and Arabidopsis PR-1 genes respectively. It is likely that a PR-1 gene is expressed in pineapple treated with acibenzolar and that pineapple has a SAR pathway and this pathway is able to reduce nematode reproduction by 50%. Dragon fire, a sesame oil product, reduced nematode populations and increased pineapple growth warranting further evaluation. Methyl iodide reduced nematode numbers at planting but subsequent plant growth was reduced compared to other treatments. Emulsifiable 1,3-D continues to prove valuable as a post-plant treatment. Efficacy and utility of vermicompost and a LCF (liquid compost factor) experiments have begun. For fungal disease control, 15 products are being evaluated for Bayleton replacement. Informational meetings were held with clientele to present information on the biology and control of pests as well as cultural practices for pineapple.

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

Progress/Accomplishments: Terminated

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

Progress/Accomplishments: Basic Mycological Research: (1) With great difficulty the new pocket rot pathogen was isolated. This near obligate pathogen grows extremely slowly but several cultures have been isolated from pocket rots from Kauai and Oahu. The pathogen is likely to be a new undescribed species of Phytophthora and morphological studies are continuing to characterize this species. (2) We were also able to isolate and culture the causal agent of black spot of papaya, a new disease that entered the state in 2001. We believe this is the first time this pathogen has been cultured. (3) Identification of Fusarium proliertatum on orchids. (4) Identification of unreported Phialophora melinii and Verticilium dahliae in Hawaii. (5) Other mycological studies that support the pathological research e.g. new coffee pathogens. Pathological Studies: (1) Identified the causal agents of several new diseases and have also helped growers identify pathogens in their crops. This allows for effective control efforts (list of new pathogens provided above). Fungicide Efficacy: Screening experiments have identified several new fungicides that are effective on tropical diseases caused by Phytophthora, Bipolaris and other pathogens. Interdisciplinary Work with Taro Growers: Growers are using less nitrogen, phosphorus, and potassium fertilizers. This saves on the cost of fertilizers and labor to apply fertilizers. Our field tests have impacted growers, as more growers are willing to test their crops and soil for nutrient deficiencies or excess. More growers are also interested in adding organic matter or organic fertilizers to their fields and are concerned about the amount of nitrogen that might be leaving their fields and polluting the environment. Taro growers now recognize that healthy, disease free hulis or cuttings, needs to be used to replant new fields. Demonstration Trials: Testing new practices on commercial farms have been shown to be one of the best communication tools between researchers and farmers. Gathered around the plot, the farmers are filled with questions. This learning environment provides us with an excellent opportunity to explain plant growth requirements, environmental effects, microbial interactions, pathogen movement, nutrient availability, and much more. Going to the field and spending time with growers has built strong bridges between the College and the agricultural community.

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977H Control of Papaya Diseases (Goal 1)

Progress/Accomplishments: Work continued in developing a culture medium for the axenic culture of *Asperisporium caricae*. This papaya pathogen is being successfully grown in culture on several non-defined, general purpose culture media such as PDA and V-8 juice agar but growth is slow and without conidia production. Trials on numerous other media have resulted in similar results. Tests with other media continue. Preliminary tests show that wettable sulfur applied at 4 lbs per acre at 14-day intervals reduced incidence of black spot lesions on papaya fruit.

U.S. Department of Agriculture

Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results – FY 2004
Multistate Extension Activities and Integrated Activities
Brief Summaries

Institution College of Tropical Agriculture and Human Resources
State Hawaii

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act Funds)
 Integrated Activities (Smith-Lever Act Funds): **Brief Summaries -- Page 1 of 7**

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

Progress/Accomplishments: Terminated

06-353 The State of Hawaii'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: Terminated

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

Progress/Accomplishments: Terminated

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

Progress/Accomplishments: Terminated

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

Progress/Accomplishments: Terminated.

12-506 Improved Irrigation System and Scheduling in Hawaii (Goal 1).

Progress/Accomplishments: Terminated

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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: A survey of businesses across the United States has just been completed. The Community Business Matching model has been revised and a pilot community has been selected. Communities will be able to prioritize their goals and selected businesses for retention, expansion or recruitment that are compatible with their goals. This will result in development that is more compatible with Hawaii's communities.

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

Progress/Accomplishments: A very-low-volume basal bark pesticide application trial was installed in cooperation with the Division of Forestry and Wildlife of the Hawaii Department of Land and Natural Resources to control *Acacia mearnsii*, a tree invading forests on Kauai. A very low volume foliar application trial was installed to control *Eucalyptus robusta respouts*. *E. robusta* invades forests and threatens passage along forest roads. A trial to control *Rhodomlyrtus tomentosa*, a serious pest of pastures and forestlands, was installed. It proved tolerant to most brush killing herbicides except for dicamba. This trial seeks to evaluate rate responses of *R. tomentosa*. A weed identification CD was created featuring almost 200 weed species not in the recently published "Weeds of Hawaii's Pastures and Natural Areas." This CD will be revised as more information is gathered. CDs of weed management lessons are in preparation to help livestock agents in making public presentations. As effective methods for the control of invasive weeds are developed; ranchers, foresters and conservationist will have additional tools to manage invasive plants.

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

Progress/Accomplishments: Unfunded, no activity.

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

Progress/Accomplishments: Over 150 samples were collected from cows in estrus during the summer and winter breeding periods to determine the concentrations of Manganese, Copper and Iron in mucus. The samples were collected to determine if Manganese, Copper and Iron from mucus of cows/heifers in estrus under heat stress are different from those under cool conditions. The objective is to develop a rapid test kit/marker for estrus to indicate the best time to successfully breed a cow. Sample collection was disrupted for a few months due to changes in A.I. technician and contamination of mucus by urine or fecal material. Work was done on developing methods to break down mucus so that analyses for the appropriate minerals can be accomplished with the GC. Initial analyses of mucus pH showed no differences between those cows that subsequently became pregnant and those that failed to conceive. There is no difference between pH for the summer and winter breeding period.

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

Progress/Accomplishments: Unfunded, no activity.

14-221 Parent & Household Influences on Calcium Intake Among Preadolescents (Goal 3)

Progress/Accomplishments: The aim of the study was to identify parental and household influences that increase calcium intake among families. Semi-structured individual interviews were conducted with parents self reported as Asian (n=54), Hispanic (n=57), or Non-Hispanic White (n=90) with at least one early adolescent child. Respondents were mostly women (94%), 57% were college graduates and 25% had some postsecondary training. Sixteen interviews (8 Asian and 8 Non-Hispanic Whites) were conducted in Hawaii. The three main strategies reported by parents to increase calcium intake included parents modeling, encouragement and food availability. Parent-child conversations about food and health were similar among groups and focused on the need to moderate or increase intake of specific foods. Preserving family meals was among the strategies identified by Asian and Hispanic parents to improve food intake of children. Therefore, greater effort was made to reduce its interruption by extracurricular activities. Differences between the three groups were noted in the availability of selected calcium rich foods in the home and reasons for intake. Asians would drink milk and eat cheese and yogurt for health rather than for taste. Milk and water were made available and children have to have milk in the morning and evening. The findings suggest that interventions should include parents and children focusing on specific strategies to ensure adequate calcium intake.

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

Progress/Accomplishments: A severe outbreak of *Banana bunchy top* virus occurred in the northeast of the Big Island, which reinforced the importance of this disease. A series of identification pamphlets and electronic media were developed to facilitate identification of plants symptomatic for the disease. This was accomplished through an informal coalition of researchers, extension agents and growers, called the Banana Action Group. Further work in bananas addressed development of a sampling plan for coconut scale (*Aspidiotus destructor*, Diaspididae). This has been completed (a manuscript has been submitted to the *International Journal of Tropical Insect Science*, current status is “accept with minor changes”), and a pamphlet describing the sampling procedure and appropriate control measures is in preparation, for release as soon as the manuscript is accepted for publication. The papaya pest that required immediate attention was white peach scale (*Pseudaulacaspis pentagona*, Diaspididae). Fieldwork was conducted to detect natural enemies (predators and parasitoids). A series of images were prepared for the Papaya Growers Association (PGA) to facilitate identification of the pest and to explain its biology and control. This was presented at the PGA annual meeting in October 2004.

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

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

Progress/Accomplishments: The causal organism of Naupaka wilt (*Scaevola sericea*) from Oahu has been identified as *Phialophora melinii* while the Naupaka wilt on the Big Isle was identified as caused by *Verticillium dahliae*. This is the first *Phialophora* disease recorded in Hawaii, and the first record of severe diseases on highly valuable Naupaka plants. *Gliocladium* was found for the first time in actively growing palm with weakened tops. In a field test, four rates of calcium were tested, with calcium added as gypsum at rates of 0, 300, 1200 and 4800 lbs per acre or calcium carbonate at 0, 1,000, 2,000 or 3,000 lbs per acre. There was no difference in yield for the 0 to 1200 plots and the highest level of 4800 had the highest level of soft rots. Similarly the highest rate of calcium carbonate had only 10,000 lbs of taro per acre while the 0 and 1,000 rates had nearly 30,000 lbs of taro. Field tests were poor since the grower lost many plants during the year that the test was conducted. We developed a greenhouse test and determined the nutrients needed to produce taro in hydroponics culture. These experiments showed that calcium at about 200 to 260 lbs per acre gave the best growth. Addition of calcium at 400 lbs per acre did not increase yield and plants with no calcium added died. The effectiveness of reduced risk fungicides and biological control agents was determined. Plants tested included pothos (*Epipremnum pinnatum*), palms (*Dyopsis lutescens*), and rose vinca or periwinkle (*Catharanthus roseus*). Heritage (azoxystrobin), a reduced risk fungicide originally made from mushroom extracts, was tested on all 3 hosts and effectively reduced diseases caused by *Bipolaris* and *Phytophthora tropicalis* and *P. nicotianae*. Gavel (Zoxamide) was highly effective against *Phytophthora* species and Sovran (kresoxim-methyl) was also effective. Milsana (extract from knotweed) and LCF (liquid compost factor) were not effective for *Phytophthora* control and Messenger (inducer for systemic disease resistance control) was effective in reducing the number of *Bipolaris* spots on palm but spots levels still needs to be further reduced. Growers understand that a new disease is present on Naupaka and are planting clean cuttings along with cleaning up and discarding diseased plants. Coconut trees that were infected have been removed preventing accidents from falling tree parts that are diseased. Calcium levels that are recommended for taro is now at 200 to 250 lbs per acre. Heritage is now an alternative for growers to control *Phytophthora* and can be rotated with Dithane M45 and Subdue (metalaxyl).

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

Progress/Accomplishments: Efficacy studies were/are being conducted to determine possible future residue studies: dinotefuran in watercress; pyraclostrobin in papaya and persimmon; pyraclostrobin+boscalid in papaya and persimmon; fludioxonil+cyprodinil in papaya and persimmon; glufosinate in papaya, coffee, ginger, and taro; zoxamide, famoxate+cymoxanil in papaya; pyraflufen and carfentrazone in papaya, ginger, and taro. Preliminary results indicate that: dinotefuran is effective against the watercress leafhopper to aid in reducing the spread of aster yellows virus in watercress; pyraclostrobin and boscalid+pyraclostrobin are effective against *Asperisporium (caricae)* leaf spot and anthracnose (*Colletotrichum gloeosporioides*) in papaya and anthracnose in mango, and *Cercospora* leaf spot in persimmon; zoxamide and cymoxanil+famoxate are effective against *Phytophthora* in papaya; and, glufosinate is a suitable alternative to paraquat in coffee, papaya, ginger, and taro. Additionally, an efficacy evaluation trial of registered insecticides (e.g., Biocover [oil] and malathion) in papaya was conducted to determine if they could be used to control the white peach scale. Results from this study indicate that the white peach scale population can be suppressed or reduced to manageable levels with existing insecticides, but growers have to remain vigilant with repeated sprays at 2-3 week intervals. However, depending on their costs of production and the price they get for their papayas, this additional management practice may not be feasible.

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16-921 Fungal Disease Control and Educational Program in Hawaii (Goal 4)

Progress/Accomplishments: Terminated

16-925 Nematode Control for Tropical Crops in Hawaii (Goal 1)

Progress/Accomplishments: We have developed information on several species of rootknot nematodes, reniform nematodes, and burrowing nematodes. Nematodes are serious pathogens and often if left unchecked are devastating to plant growth. Professionals and homeowners alike need information on nematode pest. Armed with information, plant producers can take action to minimize damage and subsequent losses caused by nematodes.

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

Progress/Accomplishments: Terminated

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

Progress/Accomplishments: Unfunded, no activity.

19-705 Fungal Disease Control and Educational Program in Hawaii (Goal 1).

Progress/Accomplishments: Terminated

20-080 Weed Management in Hawaii Pastures (Goal 1).

Progress/Accomplishments: Terminated

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

Progress/Accomplishments: Unfunded, no activity.

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

Progress/Accomplishments: Hydroponic awa production was introduced as an alternative understory cash crop. The hydroponic system will increase the efficiency of harvesting the awa roots, and the percentage of roots that the awa produces. Workshops were conducted on establishing forest trees on homestead lands. Workshops were conducted for youth on agroforestry and native plants. The 10-year old multi-cropping agroforestry demonstration project has been used as an outdoor classroom for Molokai, State, national, and international clientele and audience. The educational activities resulting from this project have been used as a launching pad for the initiative to establish tree farms on Hawaiian homesteaders lands and is used to educate intermediate and high school student in forest resource management. It has also provided the foundation for our annual Earth Day educational activities.

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21-030 Edible Crops of Maui (Goal 1)

Progress/Accomplishments: Unfunded, no activity.

22-016 Oahu-Kauai Food Crops Extension Project (Goal 4)

Progress/Accomplishments: To address new food safety regulations, CTAHR collaborated with the Hawaii Department of Agriculture in developing and conducting educational programs for growers to deal with new food safety regulations. A HDOA approved course dealing with food safety issues was developed. Attendees received two hours of re-certification pesticide credits and indicated an increase in knowledge and heightened level of competencies in identifying high-risk areas. Growers, who attended the workshop, modified their operations and have secured their marketplace. Through development of a tissue-sampling program, greenhouse cucumber growers were able to reduce the number of hydroponics solution treatments needed to a once a day treatment for the first two-three weeks. This change resulted in a savings of 63 applications per crop cycle resulting in a savings of approximately \$370.00 per acre. Developed and implemented educational programs in responsible farming, pesticide safety and integrated pest management for new immigrant farmers, and assisted small acreage growers in developing better safety protocols when applying crop protection chemicals. Impacts may include heightened awareness of pesticide and food safety and reduction of potential risk to workers, consumers and non-target species. Web based sales were promoted through grower cooperators posting weekly inventory of commodities for local area chefs to explore. Restaurants, wholesale, and retail operations will be able to locate desired commodities and contact growers for sales information. Worked with a collaborative group of CTAHR, HDOA and USDA staff in reducing melon fruit fly population, infestation, and organophosphate usage by as much as 100%. On Oahu, the team was able to assist growers in reducing infestation levels to less than 1%.

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

Progress/Accomplishments: The watercress task force was able to complete two cycles of survey for the watercress leafhoppers from watercress farms around the state. Watercress leafhoppers have not been found on the neighbor islands (vector of the phytoplasma yellows). Also, to date, no watercress leafhoppers have been found outside of the Aiea/Pearl City/Waipahu watercress production area on Oahu. We are continuing programs to educate watercress farmers to follow the 4-pronged approach to controlling AYD: (1) monitor watercress leafhopper population and apply insecticides when necessary (>2 leafhoppers per sticky trap per week), (2) eradicate all known alternate weed hosts (amaranth, broadleaved plantain, false daisy, flora's paintbrush, parrot's feather, sows thistle), (3) maintaining and selecting clean planting materials for replanting fields, and (4) aggressive rouging symptomatic plants in the fields at least twice weekly. Information from watercress task force appears to raise the possibility that the phytoplasma and its vector may not have come from the continental west coast.

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

Progress/Accomplishments: Acquired a \$5,000 grant from County of Kauai, Office of Economic Development for the HTFA-Kauai Chapter to design and produce marketing brochures for internet marketing shipment/sales of tropical flowers. Distributed tropical rhizomes (*Heliconia* spp., *Costus* spp., *Calathea* spp., *Zingerber* spp.) to HTFFA-Kauai Chapter members. Continued assessment and selection of *Heliconia orthotricha* seedling accessions for advanced testing with grower cooperators. Collaborate with HDOA to conduct an island-wide survey of Sago Palm Scale (*Aulacaspis yasumatsui* Takagi) on cycads, determine establishment of predator beetle (*Rhyzobius lophanthæ* Blaisdell), and synthesize alternative pest control strategies in order to provide stakeholders with control options. Provided control strategies for Goosegrass/Wiregrass (*Eleusine indica* Gaertn) to golf course superintendents. Provided fertilizer/pesticide calibration education/training for Certification Program for Landscape Industry Council of Hawaii.

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

Progress/Accomplishments: Terminated