Annual Report of Accomplishments and Results

Research and Extension Programs

College of Micronesia Land Grant Programs

Fiscal Year 2002 (October 1, 2001 – September 30, 2002)

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ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS FOR COLLEGE OF MICRONESIA FOR FY 2002:

GENERAL OVERVIEW

Research, extension, and integrated programs continued to address important agricultural, environmental, and human health and well being issues affecting small island communities. With limited amount of land in Micronesia, farming of both crops and livestock are mostly on a subsistence nature. The College is now venturing into the aquaculture/Mari culture arena since over 80% of the 2 million square miles of area that make up the Micronesia region is open seas and there is great potential for developing aquaculture projects. Small aquaculture demonstration projects are now underway and they will require the most appropriate technology and the state-of-the-art infrastructure to reach productive level.

Research programs and activities continued to expand as a result of additional human resources in the agricultural and aquaculture sectors and with additional improvements to research facilities. Projects included research and development activities on the application of biotechnology to conserve citrus germplasm to save the canker-infested citrus industry, cultivation of tropical edible mushroom, potential of simplified hydroponics to improve health and the economy, and utilization, processing and development of new products from taro and cassava that are acceptable to the native population and in the local markets. The trials on taro varieties (Cyrtosperma spp. & Colocasia spp.) for their suitability to grow under atoll conditions and the trials on banana varieties resistant to the black leaf streak (BLS) and other diseases and the micro propagation of elite (disease-free and early maturing) of certain banana varieties that will improve the quality and quantity of certain banana varieties for the export market are continuing. Germplasm of stable root crops consisting of twenty-two varieties of sweet potato, fifty-three varieties of cassava, and ninety accessions of taro have been established and are being maintained at the Research and Development Station in Palau.

Activities are on going for the biological control of the three invasive weeds; lantana, giant sensitive weed and Siam weed. The biological control of these invasive weeds has been successful in opening up areas for farming without the use of harmful chemicals. Other continuing biological control projects are on the taro leafhopper, fruit piercing moth, cassava spider mites, the taro corm rot, and the breadfruit mealy bug.

In aquaculture, technologies are being developed for the production of fresh water prawns and pearl oysters. These projects will encourage local prawn and pearl oyster production that will benefit farmers, develop prawn and pearl oyster culture industries, create job opportunities, and increase national revenues. Aquarium and Mari culture trials have demonstrated that hard corals have potential in the aquarium trade, which could lead to new business opportunities.

Outreach programs continued to focus on improving health and nutrition, provide for food security, strengthening families and developing youth, developing leadership and volunteerism, and managing limited natural resources. The nutrition, diet and health programs continued to stress the importance of healthy lifestyles, which include behavioral changes (physical activity and consumption of safe, nutritious food).

The 4-H programs at the schools and with out-of-school children provided information to increase their knowledge and appreciation of marine and terrestrial flora and fauna. Summer programs also provided information on basic survival skills on small island communities. A

summer internship program offered high school students an opportunity to work with and learn from research and extension staffs to increase their appreciation for agriculture and family and home economics as career choices. More and more students are now exposed to computers and were given the opportunity to use the Internet as an introduction to electronic connectivity and information gathering.

Water quality and food safety education programs continued throughout the island communities. Collaborative efforts with international organizations, government agencies, and community groups to provide programs on water management is becoming more challenging, following damages to infrastructures from tropical storms and typhoons that swept through the islands recently and the impending El Nino phenomenon. Fresh drinking water is limited on most parts of Micronesia as some islands are less than 25 feet above sea level and less than 1,000 feet in width. Sustainable agriculture and integrated pest management programs continued to provide farmers awareness, understanding, and information regarding the adoption of sound agricultural production practices that sustain or protect the ecosystem integrity and biodiversity.

Multi-state, multi-institutional and multi-disciplinary efforts were conducted through collaborations with other American-Pacific land-grant universities and colleges through the Agricultural Development in the American Pacific (ADAP) Project. There are ongoing partnerships with the College of Tropical and Subtropical Aquaculture (CTSA) and with the Secretariat of the Pacific Community (SPC) on a Distance Learning Paraveterinary Training project and aquaculture projects. A cost-sharing agreement with Pohnpei State Government continues, whereby Extension Agents from the Agriculture Station have been working side-by-side with Pohnpei CES staffs.

There is a continuing shortage of necessary human resources. Hence, human resource and capacity building efforts continued to be a top priority. Several programs and activities toward developing this area included a Financial Assistance & Scholarship Program for high school students through a summer extension/research apprenticeship program and financial assistance for attending a 2-4 year college and advanced degree studies programs.

Other capacity building activities included sustainable agriculture workshops, pesticide application, integrated pest management, cooking demonstrations, and basic sewing attended by farmers, producers, the youth and adult sectors of the society and the underprivileged and underrepresented.

GOAL 1 - TO ACHIEVE AN AGRICULTURAL PRODUCTION SYSTEM THAT IS COMPETITIVE IN THE GLOBAL ECONOMY.

A. Goal Accomplishment Narrative

PCC-CRE:

Key themes addressed for this year were plant germplasm, innovative farm techniques, adding value to new agriculture products, and aquaculture.

Germplasm of staple root crops consisting of twenty-two varieties of sweet potato, fifty-three varieties of cassava, and ninety accessions of taro have been established and are being maintained as a field collection at the PCC Research and Development Station (PCC - R&D). This will ensure the conservation of these valuable genetic resources for future generations. Production, printing, and distribution of publications on the morphological characteristics and

yield of sweet potato and cassava have created an awareness of the diversity of these root crops in Palau.

A new project developing a taro micropropagation technique for the mass propagation of disease-free planting materials was started. Likewise, procedures for the in-vitro conservation of the taro germplasm collection will be developed.

The demonstration of traditional taro production systems under wetland and upland conditions (*mesei*, *dechel* and *sers*) was established. Improvement of these production systems in terms of modern methods of land preparation, integrated pest management, and nutrient management will reveal which taro production system will give the highest yields of taro and the greatest income to taro growers.

Further evaluation and testing of new food products developed from taro and cassava are on hold until a new food technologist can be hired. The research on root crop product development and utilization with technical and economic feasibility and technology transfer activities will enhance food security in the country.

In aquaculture, culture of the giant freshwater prawns will be started once the facilities for the hatchery and ponds are completed. This will be a demonstration project of the commercial production of freshwater prawn in Palau. The work with the hard corals will help farmers in Palau that want to grow corals for the aquarium trade without using land based facilities. Maricultured corals can also be transplanted to damaged reef areas to aid in the recovery of the natural coral population.

CMI-CRE:

The College of the Marshall Islands Cooperative Research and Extension program had an inauguration ceremony for its Research and Science Station at the beginning of the fiscal year. The research facility has a nursery, a poly and shade house, a marine lab, a hatchery and 6 storage tanks for marine specimens and also lab equipments required for research activities.

The senior agriculture researcher has completed Phase I of his project on grafting breadfruit cultivars. There is also an ongoing research trial on banana varieties that can grow on atoll soil condition. Planting materials were obtained from several sources in the Pacific region to find out which varieties can adapt well to the soil conditions in the Marshall Islands.

A scientific paper, written by the two aquaculture researchers, Drs. Hamel and Mercier entitled “Perivisceral Coelomic Fluid as Mediator of Spawning Induction in Tropical Holothurians” has been accepted for publication in the “Journal of Invertebrate Reproduction & Development”.

Research proposals approved are on: (1) Tropical Edible Mushroom Cultivation: Right Technology for Food and Nutritional Security in Marshall Islands; (2) Biotechnological Development and Introduction of Leaf Blight Resistant Taro (Colocassia Esculenta (L.) Schoot) in Marshall Islands; and (3) Vitamin A Rich and Pathogen-Tested Micropropagated Sweet Potato Introduction and Field Evaluation in Marshall Islands.

The new aquaculture researcher has been working with the Black Pearl of Micronesia, a private company, on pearl oyster hatchery. Simple protocols were used for the successful spawning of the oysters with some modifications of the already existing protocols.

Reports have indicated that the availability of fresh vegetables has increased this year from 35% to 40%. The Agriculture Extension Agent assisted farmers in selling their produce. Seven local restaurants have committed to buying the vegetables from the farmers. The Laura Farmer's Association has been established as a result of close collaboration with the Ministry of Resources and Development.

COM-FSM/CRE:

Yap Site:
Yap now has a research component to its program with the recent recruitment of a researcher in the area of horticulture. A research project entitled, "Documentation of Yam (*Dioscorea* spp.) Diversity and Associated Traditional Knowledge Systems in Yap State", aims to give greater recognition to the prudent methods of indigenous communities in managing agrobiodiversity. Throughout Yap State, yams play and important role in the life of local communities. Through an array of participatory research methods, this project aims to unfold the traditional wisdom practiced by farmers over generations with respect to the cultivation of yams. The linkage with informal and undocumented knowledge of farmers will be a remarkable process to reveal a wealth of information about the cultivation of this important tuber crop and to develop appropriate program of *inter-situ* conservation.

Extension activities were focusing on the maintenance of small farms and backyard gardening for both crop and animal production. Extension staffs continued to visit clienteles on their farms and provided information to assist them on their projects. Clienteles on both the main island of Yap and outer islands of Ulithi and other nearby atolls were also provided assistance on their vegetable production activities.

Chuuk Site:
Efforts to increase local food production are continuing as importation of foodstuff is still on the rise. The project on Atoll agroforestry and crop production aims at increasing the production of high nutritional local food crops in remote atolls of the Northwest Region of Chuuk State. Agriculture extension staffs had completed identification of suitable crops that are resistant to salt water and are adaptable to atoll environments. Planting materials were collected from nearby islands and are now being cultivated in these atolls.

Five demonstration plots on five islands were planted with five varieties of dry land taro (Colocasia Esculenta) and eight varieties of swamp taro (Cyrtosperma spp), after soil analysis were conducted. Farmers on these islands were provided lessons on proper methods of cultivating the land and managing the growth of staple food crops such as banana, taros, breadfruit, coconuts and sweet potatoes.

Pohnpei Site:
Two research projects are being conducted; one is the banana diseases trial on black leaf streak (BLS) and other diseases in Micronesia in collaboration with the University of Hawaii. New improved and designated hybrid bananas were introduced from the International Center for the Improvement of Banana and Plantain (INIBAP) for resistance/tolerance evaluation to BLS and other diseases in Micronesia. BLS is prevalent in FSM particularly Pohnpei. Chemical sprays are costly to farmers to control the disease. Control with the use of chemical however has a number of disadvantages to Pacific small islands States, especially when it is not properly used. Results of the trials on resistance/tolerance of the bananas to BLS and other diseases will be the basis of recommendations for production towards agriculture competitiveness of quality fruits and yield.

The other project is the trials on taro varieties (*Cyrtosperma* spp. and *Colocasia* spp.) being tested for its suitability to grow under atolls conditions and documentation of field performance in the island of Pohnpei. Also the results of the trials will increase knowledge base on taro cultivation.

To achieve agricultural crop and livestock production, program focus ranges from capacity building, development of planting materials, demonstration to crop production, and data collection for marketing information. Agricultural extension staffs participated in agriculture fairs and worked closely with research units on insect pests and diseases management activities. Program delivery is through extension materials and presentations, demonstrations, community meetings, and farm visits. Emphasis has always been on increasing production to provide for food security and to improve the quality of agricultural products for the export market.

Swine production improvement has been a key activity over the past few years. The emphasis on swine production included the development and maintenance of improved breeding stock, better management, better sanitation, and the utilization of the manure as fertilizer. Artificial insemination conducted during the previous years enabled extension staff to help select hybrid vigor breeding pigs and demonstrated appropriate practices in producing bigger, faster, and better feed conversion rates animals. Program delivery also addressed the decline in agriculture production in areas where urbanization has taken up much of the fertile land.

Four high school students participated in a Summer Research/Extension Apprenticeship Program. The scholarship program is funded by ADAP to promote agriculture and home economics and encourage students to become future employees in these areas.

Kosrae Site:

Advanced research using *in vitro* techniques was carried out at the Micronesia Plant Propagation Research Center (MPPRC) to attain agricultural competitiveness in Kosrae. Research was conducted on *Musa* sp. (banana), *Citrus* spp. (orange, lime, tangerine, manderin and lemon) and *Colocasia esculenta* (taro). These research programs have resulted in the development of protocols for micro propagation of these crops and distribution of micro propagated elite seedlings of banana and taro. Research focus is shifting to the production of banana and *Citrus* resistant to major diseases like *Citrus* canker, *Fusarium* wilt of banana and taro leaf blight.

B. Key Themes:

Key Theme – Agricultural Competitiveness

a). Description of Activity - Maintenance of 1200 bananas at two sites was conducted. As of September 2002, data collection for disease evaluation was eleventh month at Site #1 and tenth month at Site # 2 per leaf per plant basis. Fruiting and yield data and other horticultural parameters are also being collected. So far, 31 bananas were harvested, 20 plants with bunch, 1 more plant at flowering stage at Site # 1. One plant developed flower in September 2002 at Site #2. Apparent differences on field performance of the banana varieties were observed and differences within varieties as well.

A banana field was established for the first three introduced new varieties from SPC in April 1999. The varieties were planted randomly in 2 rows of 5 plants each row. The number of plantlets provided the replications of field planted seedlings. Data was

collected on horticultural parameters of banana on growth and development. The 'scientific note' was submitted to SPC through the Principal Investigator at University of Hawaii and reported at RISBAP annual meeting and conference in 2002.

Crop monitoring and data collection at 5 atolls in the Northwest Region of Chuuk State and 2 atolls in the Southern Islands of Pohnpei were conducted.

Maintenance of the taro patch and plot was accomplished. New area for the swamp taro was re-established in February 2002 for field performance evaluation and documentation of eight cultivars. Thirteen cultivars of dry or soft taro were also planted for field performance evaluation in June 2002. Two or three more trials will be conducted.

Eight of the dry or soft taro cultivars were harvested in May 2002, eleven months after planting, for first trial. About 150 lbs. of tubers were harvested in a 30 ft x 33 ft area. Plant description, tuber characteristics and yield data were collected. Further trials are needed.

Follow-up on atoll crops for practices and management interventions to improve yield was not conducted (no funding support released in FY 2002). Chuuk CES however, conducted activities in two of five atolls.

b). Impact/Accomplishments – The established banana farms for disease trials and PATS planting served as a 'show-window' of the improved hybrid bananas. Local households and farmers extended interest for planting materials even before the results of the trials.

The project on BLS disease evaluation is still continuing field research, awaiting fruiting and harvesting of all banana varieties. In preparation for in vitro multiplication for planting materials of the bananas as a result of the trials, expansion of the laboratory was done and being equipped with minimum requirement for micro propagation.

The taro patch now becomes the demonstration model plot for taro cultivation in the atolls. In lieu of the inaccessibility of the area and the lack of funding support for the project, the varieties were planted on Pohnpei's main island to document field performance.

Follow-up on the plants for practices and management interventions depends on funding support allocation (no funding received for FY 2002). Chuuk CES however, did some activities in two of five atolls. If proper crop practices and management and intervention could be demonstrated, then atoll crops cultivation for food security could be impacted in the communities.

c). Source of Funds – Hatch Act & ADAP

d). Scope of Impact – County Specific (FSM)

Key Theme – Agricultural Competitiveness

a). Description of Activity - Planned activities, including training programs on swine production, visits, and demonstrations were conducted to farmer groups and individual farmer throughout the main island of Pohnpei. Most program delivery was conducted based on immediate needs or problems at pigpens. Response to requests from

farmers was conducted through demonstrations to teach farmers proper pig handling practices. These included castration, tooth clipping, application of Iron, and the administration of antibiotics. Farmers usually acquired medications for antibiotic from the government and extension staffs demonstrated proper administration of it. At other times, extension staffs provided advice on how to improve feeding and watering, management, proper housing, and timely weaning. Extension staffs also assisted in the designing of a piggery project and they had conducted a series of training on proper housing, waste management practices and sanitation, and the use of manure as fertilizer.

b). Impact/Accomplishments - About 70% of the more than 300 swine raisers adopted best management practices. A positive impact of this program is more and more people are administering antibiotic, Iron, and tooth clipping. A community piggery project funded by Pohnpei State Legislature was successfully implemented for 15 households or families. Each unit, all of which started with one sow or gilt, has at least one litter. A few now raise piglets from the second litter. Aside from competitiveness and sustainable development opportunities, this program is seen as an integral component of the socio-economic development and cultural practices of the island where swine of large size are displayed and used on special occasions.

c). Source of Funds – Smith-Lever

d). Scope of Impact – County Specific (Pohnpei, Micronesia)

Key Theme - Agricultural Competitiveness.

a). Description of Activity - Harvest of bananas from the banana experiment farm has been completed and data is being processed for publication. The data collected showed marked advantage of the tissue culture planting material over conventional planting materials. Tissue culture planting materials established better, grew faster and flowered earlier and produced better yield on an average.

Standardized protocol for micro propagation of all the 6 varieties of *Citrus* in Kosrae. Callus cultures of lime and sweet orange were established and cell culture is being developed. Somatic embryogenesis achieved in the case of lime and sweet orange.

Standardized a procedure for micropropagating soft taro from micro cuttings and through tissue culture. Standardized conditions for large-scale nursery operation.

b). Impact/Accomplishments – [Field Performance Evaluation of Micro propagated *Kufwafwa* Banana] - Third objective of the project in FY 01 was to carry out a field trial experiment using tissue cultured bananas and conventionally produced suckers as control. This objective, started in 2001 continued through 2002. Data (growth and yield) collection from the experiment continued through 2002. The results gathered showed distinct advantages of the micro propagated banana plants over conventionally propagated suckers. Micro propagated bananas established 100% in the field while up to 6% loss of planting was recorded when conventional planting material was used. Loss of planting was due to soil borne or seedling borne diseases carried with the seedlings. Micro propagated plants grew faster, produced earlier and were more uniform in yield. More than ninety percent (90%) of the micro propagated plants flowered within 10

months of planting, while it took 13 months for the conventional suckers to flower. Average bunch weight was significantly higher in the case of tissue culture bananas.

Cell line selection to develop *Citrus* resistant to the canker pathogen was conducted. Objectives of the citrus project in 2002 included: (1). Develop micro propagation procedure for 6 *Citrus* varieties in Kosrae; (2) Develop callus and cell cultures of the *Citrus* varieties lime and sweet orange; and (3) Conduct a field evaluation for establishment and growth of micro propagated *Citrus plants*. The first two objectives were achieved, but the third was halted due to the ongoing infected Citrus plant eradication program on Kosrae.

A procedure for multiplication of taro from micro cuttings was developed. Using this procedure, between 20 and 40 seedlings could be generated from a single corm of taro depending on the size of the corm. Of all the plant growth regulators studied, kinetin was found to be the most effective plant growth regulator inducing development of dormant buds on micro cuttings into plantlets.

c). Source of Funds – Hatch Act & Smith-Lever 3b&c

d). Scope of Impact – County Specific (Kosrae, Micronesia)

Key Theme – Agricultural Competitiveness

a). Description of Activity – Extension staffs have been assisting cash crop farmers to better understand their operations and potentials for increasing production. Production data collected during periodical surveys for the past five years has enabled Extension agents to generate production forecasts per farm per crop for any given period. This aspect of the project is a continuation from an ADAP Marketing Information System, which has been terminated three years back. Data collected during these surveys included type of crops and size of farms. Extension staffs visited these farms on a monthly basis to collect data and provide advice or technical assistance. Data collection was based on two categories or sets of information; new plantings in the field and update on existing crops. The first set of data collected included types of crops, size of planting, and cultural methods used. Aside from the survey, farm visits offered the opportunity to interact with individual farmer. CES staff also assisted backyard garden operators on site inspection, production of planting materials, and insect pests and diseases.

During EFNEP training, CES staff also presented information on crop production and home gardening to program participants.

b). Impact/Accomplishments – The computer generated forecasts were used by farmers in managing their farms and marketing farm products. Fourteen (14) program participants increased their awareness and knowledge about the impacts of importation, which resulted in the inconsistency of production. One farmer has gone further to purchase a computer set and is keeping accurate records of the marketing component of his operation. From discussions and demonstrations, farmers are adopting such practices as intercropping, maintenance of soil fertility and reduction of incidents of insect infestations and disease outbreaks. More than 50 other individuals increased their knowledge in subject matters from nursery to field practices. More than 10 program participants harvested from their home gardens.

c). Source of Federal Funds – Smith-Lever

d). Scope of Impact – County Specific (Pohnpei, Micronesia)

Key Theme - Plant Germplasm

a). Description of Activity **-** [Evaluation of Root Crop Varieties Adaptable Under The Palauan Environment] – Twenty-two varieties of sweet potato, fifty-three varieties of cassava, and ninety varieties of taro were collected from different parts of Palau. The samples are being maintained in the root crop germplasm collection at the PCC Research and Development (R&D) Station in Ngermeskang, State of Ngaremelengui.

The informative booklet, "Sweet Potato Varieties in the Republic of Palau", has been distributed to interested farmers and visitors to the R&D Station. The publication contains morphological descriptions, yield, and resistance or susceptibility to pests and diseases of the twenty-two varieties of sweet potato.

The final manuscript of "Cassava Varieties in the Republic of Palau" was prepared for publication and printing in Guam. It contains information on the morphological characteristics and yield of the fifty-three varieties of cassava in the germplasm collection.

The IBPGR descriptor's list for taro was used to characterize the seventy-eight varieties in the germplasm collection. Replicated yield trials of several taro varieties in both wetland and upland conditions were conducted. Data are still being analyzed and evaluated.

b). Impacts/Accomplishments – The establishment and maintenance of the germplasm of sweet potato, cassava, and taro, which are the staple food crops of Palau, ensured the conservation of these valuable genetic resource for future generations. Distribution of the publications on sweet potato and cassava will further create an awareness of the diversity of these crops grown in Palau. Visitors to the PCC R&D Station were given planting materials of high yielding cassava and sweet potato varieties, which have helped boost root crop production in Palau .

c). Source of Federal Funds – Hatch Act and Smith-Lever Act

d). Scope of Impact – County Specific (Palau, Micronesia)

a). Program Description – [Micropropagation and In-Vitro Conservation of Taro (*Colocasia esculenta* Schott) in the Republic of Palau] - The Tissue Culture Laboratory, which will be used for the implementation of this newly approved Hatch Funded Project, has just been completed. Experiments are being conducted to develop a tissue culture technique to obtain the highest plant regeneration for the in-vitro culture of popular and widely planted varieties of taro in Palau. This will serve as a means for the mass propagation of disease-free planting materials of desired varieties of taro, which will be distributed for large scale planting in Palau. Likewise, procedures for the in-vitro conservation of the ninety accessions of taro germplasm will be developed.

b). Impact - This project will result in the production of numerous disease-free planting materials of elite and high-yielding varieties of taro, which will be distributed to local

farmers. Realization of this objective will lead to increased taro production for the local and export market in Palau. Establishment of an in vitro germplasm collection will ensure the conservation of different varieties of taro in Palau from environmental stresses. It makes these valuable genetic resources available for future breeding activities and the future generations.

c). Source of Funding - Hatch Act Funds

d). Scope of Impact - County Specific (Palau, Micronesia)

Key Theme – Plant Production Efficiency

a). Description of Activity - Research activities were augmented with the completion of the Marshall Islands Science Station (MISS), a research complex with a shade house (50'x60'), poly house (30'x60'), compost and tools houses all in a fenced area of about 100'x120'. The drip irrigation, water pumps, water catchments, wooden tables, etc. have been installed in the nursery. The field facility of AES is functional and various projects have been implemented.

The second year of the project on grafting of breadfruit cultivars produced positive results. Germplasm of more than a dozen different varieties of breadfruits, including viz. *Betaaktak, Mejwan, and Mejenwe* were collected from different locations in the Marshall Islands and the neighboring island of Kosrae and were successfully established in the nursery. Vegetative propagation through root suckers in various varieties was accomplished and over five hundred rootstocks were raised for the grafting. Different types of graft unions and methods were applied for the successful grafting, which includes T-budding, Cleft, Splice and Approach. Grafting experiments were conducted on both, mature trees in the field and juvenile seedlings (one year old) in the nursery. The major breakthrough was achieved midway through the second year. *Betaaktak* (Rootstock) and *Mejwan* (Scion) and vice-versa were successfully grafted using Splice graft. Presently, twenty grafted plants are growing well in the nursery and high percentage is positive and bearing branches of two different varieties. Phase I of the project has achieved its goals and at the end.

b). Impact/Accomplishments–The major impact of the project is the successful development of technique of grafting in two different varieties of breadfruit viz. *Betaakatak* (seedless) and *Mejwan* (seeded). The positive results indicated that grafting is feasible in breadfruit and ready to apply in other varieties of the important staple crops of the Marshall Islands. This will help in the increase of fruiting season and subsequently shall give higher yields or year-round fruits. Over five hundred plants are ready for distribution to breadfruit growers.

c). Source of Federal Funds – Hatch Act & Local Match

d). Scope of Impact – County Specific (Marshall Islands)

Key Theme – Biotechnology

a). Description of Activity – A new project, "Generation of Know-How for In-vitro Multiplication of Food Crops of the Marshall Islands: Breadfruit and Pandanus" has been initiated. No source of local match for financial support and difficulty in

transportation for field visits for the collection of research material resulted in the limited progress of the project. Some of the significant outcomes up to this point are installation of growth room, installation of temperature control units, timers for the lamps; aseptic inoculation and culture room were completed and functional. Aseptic cultures in breadfruit var. *Betaaktak* and *Mejwan* were established. Various culture conditions, media manipulation and physico-chemical factors were tried for axillary shoot bud induction from the stem explants obtained from the mature trees. Murashige and Skoog's medium containing various growth hormones viz. indole acetic acid, naphthalene acetic acid, kinetin, benzyl adenine were used for the shoot induction and multiplication in breadfruit. Indole butyric acid was used for the root induction. Experiments are in progress for the aseptic inoculation and shoot bud induction in Pandanus.

b). Impact/Accomplishments - The infrastructure and the new research facility, including laboratory and growth room are completed and functional. Various supplies and instruments were procured in this fiscal year and are being used for the project. The tissue culture technique for the regeneration and multiplication of elite breadfruit plants shall become available after field transfer and further evaluation of in vitro produced plants.

c). Source of Federal Funds – Hatch Act

d). Scope of Impact – County Specific (Marshall Islands)

Key Theme - Innovative Farming Techniques

a). Description of Activity – [Demonstration, Improvement and Preservation of Taro Production Systems in Palau] – This project will highlight traditional and modern systems of taro production. Demonstration plantings of the traditional wetland (*mesei)* taro production system has been established. The demonstration plots will be used to determine the growth and yield of the *Ngesuas* variety of taro using different kinds of traditional and modern mulching materials such as banana, hibiscus, acasia, *kisaks, ngolm,* and *kelel a charm.* Likewise, the demonstration of the effect of fertilizer on the growth and yield of ten varieties of taro in a "dechel" taro production system has been established.

A hand tractor has been ordered to demonstrate the modern ways of land preparation of wetland and upland areas for taro production.

b). Impact/Accomplishments – The comparison of traditional to modern methods of land preparation, integrated pest management, and nutrient management in wetland and upland taro production systems will reveal which taro production system will give higher yields of taro. Thus, farmers will be able to see and evaluate production technologies that will increase their taro yields and income.

c). Source of Federal Funds – Smith-Lever

d). Scope of Impact – County Specific (Palau, Micronesia)

Key Theme – Innovative Farming Techniques

a). Description of Activity - The project on local food production was initiated as a result of difficulties in many of the outer atolls in Chuuk in producing their own local food. The aim of the program was to decrease reliance on imported foodstuff and increase food production and provide for food security on remote atolls.

Extension staff provided lessons to farmers and landowners on how to grow staple food crops such as banana, taro, breadfruit, sweet potato, papaya, and coconuts. The residents of these atolls were taught lessons on how to prepare their land, selection of planting materials, and maintenance of their crops. Demonstrations plots were set up on five atolls. Mulching and use of local resources to enrich the soil condition of these atolls was demonstrated and planting materials were brought from nearby volcanic islands for the project. Thirteen cultivars of dry or soft taro and eight cultivars of swamp taro were planted in these plots. Vegetables and other perennial crops were also introduced to the islands.

A soil analysis was conducted on all five atolls, which found that the soil requires substantial level of enrichment through composting. Crop monitoring and data collection at the 5 atolls in the Northwest Region of Chuuk State is continuing.

b). Impact/Accomplishments – The project has boosted the moral level of the residents in knowing that there is a window of opportunity for them to raise their own food and to stop relying on imported foodstuff. It also shows commitment by local leaders to provide support necessary to keep the project going.

c). Source of Funds – Smith-Lever 3b&c & Local Match

d). Scope of Impact – County Specific (Chuuk, Micronesia)

Key Theme – Adding Value to New and Old Agricultural Products

a). Description of Activity - [Processing of Root Crops in the Republic of Palau] - Six taro food products were standardized, which include products such as taro balls, taro hotcakes, taro salad, taro pasta, taro steamed cake, and taro pastilles. Based on tests conducted, all the standardized products were very acceptable to the panel of evaluators in terms of color, texture, and flavor. In addition, twenty-two varieties of taro were boiled, vacuum-packed, and frozen for ready use. Taro flour mixes for balls, hotcakes, pasta, and steamed cakes were also prepared. Taro ice cream and taro cookies were subjected to a consumer' taste test during an agricultural fair in October of 2001 and results showed that both products were very acceptable to 300 tasters in Palau.

Eight food products from cassava were also standardized. These were cassava pretzels, cassava sticks, cassava native and steamed cakes, cassava pasta, cassava salad, cassava hotcakes, and cassava balls. Also, cassava flour mixes for pasta, steamed cakes, hotcakes and balls were prepared and were studied for their shelf life at room temperature conditions.

b). Impact/Accomplishments - The potential impact of the project was to focus research and development efforts on the production and utilization of local foods to deter the fast decline in the Gross Domestic Product (GDP) of Palau. The project addresses the problems of low agriculture productivity and the large importation of food in Palau, which leads to self-insufficiency and lack of food security. This research of root crop product

development and utilization with technical and economic feasibility and technology transfer activities will enhance food security in the country

c). Source of Funds – Hatch Act Funds

d). Scope of Impact – County Specific (Palau, Micronesia)

Key Theme – Aquaculture

a). Description of Activity – [Cultivation of Scleractinian Corals for the Home Aquarium Trade] - Over the past three years, coral mariculture trials were conducted at barrier reef, lagoon, and laboratory sites to determine the difference in the growth and survivability rates between varieties of corals and depths. Growth measurements were taken approximately every two months. With the final measurements taken this past quarter, an analysis of the collected data will be completed to ascertain the best sites, depths, and varieties of corals for a profitable mariculture operation in Palau. Once the analysis is finished, a termination report will be prepared.

A secondary growth project was started this year. This is important because it was shown that corals, previously harvested directly from the ocean, could be grown then broken apart and grown again successfully. Being able to grow corals without continually harvesting from the ocean makes any future coral mariculture operations much more environmentally friendly and sustainable.

b). Impact/Accomplishments – The work with the hard corals will help farmers in Palau that want to grow corals for the aquarium trade without the use of land-based facilities. Maricultured corals can also be transplanted to damaged reef areas to aid in the recovery of the natural coral population.

c). Source of Federal Funds – Hatch Act

d). Scope of Impact – County Specific (Palau, Micronesia)

Key Theme - Aquaculture

a). Description of Activity – [Culture of the Giant Freshwater Prawn in the Republic of Palau] Since the beginning of this year, progress has been made in this program. A sixty-six by thirty-two feet hatchery building was built. Inside the building, two concrete broodstock tanks with a fifteen-foot diameter were completed and seven fiberglass tanks for seedstock, nursery, and larval use are ready to connect to the water system. A 450,000-gallon concrete water reservoir was constructed and tested for leaks. The three grow-out ponds, which are ready to be used, were protected from erosion and cleaned. Finally, a small pump house was constructed to protect the water pumps from the elements and vandalism. Upon completion of the hatchery's water and electrical system, some time next year, the adult prawn broodstock will be imported from Hawaii.

b). Impact/Accomplishments – Since the beginning of this year, progress has been made in this program. A sixty-six by thirty-two feet hatchery building was built. Inside the building, two concrete broodstock tanks with a fifteen-foot diameter were completed and seven fiberglass tanks for seedstock, nursery, and larval use are ready to connect to the water system. A 450,000-gallon concrete water reservoir was constructed and tested for

leaks. The three grow-out ponds, which are ready to be used, were protected from erosion and cleaned. Finally, a small pump house was constructed to protect the water pumps from the elements and vandalism. Upon completion of the hatchery's water and electrical system, some time next year, the adult prawn broodstock will be imported from Hawaii.

c). Source of Federal Funds – Hatch Act Funds

d). Scope of Impact – County Specific (Palau, Micronesia)

Key Theme – Aquaculture

a). Description of Activity – The project on development of a pearl aquaculture industry and expertise in Micronesia is progressing well with additional funding support from the Department of Interior. The project commenced in earnest with the recruitment of an Australian expert in pearl oyster hatchery technology and the establishment of a low-tech hatchery in an abandoned dock warehouse in Pohnpei.

The pearl expert and his Micronesian staff/trainees have successfully conducted three spawning events during Phase I which resulted in tens of thousands of black-lip pearl oyster spat (juveniles) which are growing well at three pilot pearl farms in two island communities of Pohnpei State. Two Micronesian staffs and a new trainee from the Outer Island of Yap are being trained as future trainers in production and farm grow-out technology. In addition to these trainees, about 30 other Micronesian trainees/volunteers have been involved in the hatchery and farming activities.

In view of the successful results that were achieved during the first year of this project, there is willingness and enthusiasm to implement the remaining objectives of the project. These objectives include production trials for round pearls and the aggressive promotion of pearl business development. The implantation of round nuclei (pearl seeding) will be performed by one of the best pearl technicians from the cultured black pearl industry. The pearl production trials and the business development programs will be extremely important in the development of the pearl industry in the Micronesian region. In addition to the trial pearl production, an effective preventive measure against the predation on the juvenile oysters will be researched to improve grow-out techniques.

b). Impact/Accomplishment – Some of the results so far with this project are: (1) the establishment of a low-tech operational pearl spat hatchery; (2) training of Micronesian staff on all aspects of hatchery production and ocean-based grow-out farms; (3) the establishment of three pilot grow-out pearl farms at two island communities; and (4) farming skill training of the Micronesians in the rural and island communities.

c). Source of Funds – Hatch Act & DOI Funds

d). Scope of Impact – Micronesia

C. Allocated Resources

Fiscal Resources

Extension

Year	Federal	State	Local	Other
2000	300,953	107,483	21,479	0
2001	276,931	55,193	69,225	0
2002	237,954	47,378	71,599	0
2003				0
2004				0

Research

Year	Federal	State	Local	Other
2000	407,240	85,470	10,055	0
2001	291,492	71,817	59,143	0
2002	405,333	102,846	96,796	0
2003				0
2004				0

Manner of Expenditures:
Expenditures from formula funds from Hatch and Smith-Lever 3b&c and local matching funds were used to fund research, extension and integrated research and extension projects. In general, these monies were used for salaries and wages and fringe benefits of research, extension, and administrative staffs. International travels for program personnel to participate in workshops, meetings and conferences designed for exchange of information, ideas and forming regional collaboration in projects were also funded. Domestic travels were for monitoring progress on research and extension projects. Publication/printing costs on published articles in local newspapers, scientific journals and manuals; proceedings, pamphlets and brochures were part of the total expenditures. Communication within the COM region and to offices collaborating with the College through phone calls, faxes, e-mails and regular mails was also an expense.

Human Resources (FTEs)

Extension FTEs

Year	Professional			Paraprofessional		
	1862	1890	Other	1862	1890	Other
2000	3.60	0.0	0.0	18.70	0.0	0.0
2001	4.80	0.0	0.0	17.00	0.0	0.0
2002	3.30	0.0	0.0	13.20	0.0	0.0
2003	0.0	0.0	0.0	0.00	0.0	0.0
2004	0.0	0.0	0.0	0.00	0.0	0.0

Research SYs Only

Year	Scientist Years			Research Assistants		
	1862	1890	Other	1862	1890	Other
2000	6.17	0.0	0.0	3.00	0.0	0.0
2001	5.40	0.0	0.0	3.12	0.0	0.0
2002	4.80	0.0	0.0	3.25	0.0	0.0
2003	0.00	0.0	0.0	0.00	0.0	0.0
2004	0.00	0.0	0.0	0.00	0.0	0.0

Of the FY2002 total FTE of 72.31, 24.55 FTE has been assigned to programs that support GPRA Goal 1, representing 34% of the total FTE for all programs. The FY2002 budget allocated to GPRA Goal 1 takes into account this FTE distribution plus how Goal 1 integrates with other programs conducted by COM as a whole.

GOAL 2 - A SAFE, SECURE FOOD AND FIBER SYSTEM.

Goal Accomplishment Narrative

PCC-CRE:

Food and water borne illnesses have persisted in Palau due to its warm and humid climate. In 1998, the Palau Public Health reported that almost 7% of the Republic's population was affected

with food and water borne illnesses. Food is continually prepared and served improperly during custom celebrations such as weddings, funerals, birthdays, house parties and other civic and sports events. Information on proper food handling, food selection, storage and safety measures is still inadequate. The sale of expired foods was also a major concern to consumers. Palau has to contend with low quality produce due to the damage caused by insect pests and diseases.

Last year a CSREES-USDA Project on "Reduction of Food-Borne Illness in Palau" was completed. The project established the Palau Food Safety and Education Program that resulted in the implementation of food safety programs that targeted students, teachers, parents, women groups, and food handlers.

CMI-CRE:

Programs have been targeting communities in the rural and remote atolls since government agencies and other programs are focusing more on communities on the main island of Majuro, which is the capital city.

The EFNEP Extension Agent was actively involved in the ADAP Healthy Living in the Pacific Project and the Republic of the Marshall Islands Mobile Team project, two projects that share a single goal of promoting healthy people and healthy communities. In reaching their goal, a coalition of staffs from several disciplines visited remote villages and provided information on healthy lifestyle and healthy diets for families and offering food handling and food safety demonstrations. Six outer islands/atolls were visited during the year, which include the islands of Enewetak, Ebon, Likiep, Maloelap, Jaluit, and Lae.

Extension staffs attended a Food Safety Seminar sponsored by the Ministry of Health and Environment and the World Health Organization (WHO). The highlights of the workshop were that participants conducted a sanitation inspection at the local restaurants and interviewed restaurants managers and staffs to see how they prepare meals for their customers and to find out if food safety guidelines were used/followed. The Food Safety Seminar also reviewed and revised existing food safety regulations.

COM-FSM/CRE:

Chuuk Site:

The changing lifestyle throughout the islands had caused many people to give up their traditional way of living and had moved into the urban areas (State Centers) in search of employment and new life. This had caused people to leave their subsistence way of life and had become confused in the turmoil of the cash economy. Many people found it difficult to live on their local diet, as they could only depend on processed and imported foodstuff that they found in the stores and in fast food establishments.

Extension staffs had been working with two groups of homemakers and elementary school students in providing food safety lessons and healthy dips. There were also training program on food safety and food handling practices provided to Headstart program staffs and parents of Headstart program children through a collaborative effort with the Department of Environmental Health and Sanitation and the Chuuk Association for Community Action (COCA), which is a women organization.

Pohnpei Site:

Problems associated with food safety such as stomach upset and lost of appetite, and food poisoning continued to occur when food is not prepared properly and served to a big crowd during traditional ceremonies and on special occasions. Public Health and other Health Clinics are still reporting cases of food poisoning, resulting from improper food preparation and food handling. Food safety and food security programs were conducted in conjunction with EFNEP and home gardening programs with the aim of increasing knowledge on safe and secured food and fiber system. Lessons also included good sanitation and good personal hygiene.

Promoting food security consists of a broader emphasis with food safety and food affordability. Home gardening programs were emphasizing that the availability of fresh fruits and vegetables from the garden is much more healthier than shopping at the grocery stores for processed food. The home gardening program also offered more food sources and food with higher nutritional value.

Home gardening programs were conducted at the schools and to individual households as a way of reducing consumption of imported foodstuff and increase food security and affordability. In this time and age where the cash economy has taken over the subsistence way of life, individuals and families need to know how to manage the meager resources that they have. Home gardening also provides for the family income by reducing food expenses.

Kosrae Site:
Extension programs continued in the communities on food safety and food security. Awareness and educational programs were conducted through collaborative efforts with staffs from the Department of Education and the Department of Health Services. Workshops and other educational programs continued to emphasize community awareness on food borne diseases and protection from food borne pathogens.

Yap Site:
A research project entitled “Potential of Simplified Hydroponics to Improve Health and Economic Prospects of Yapese Community aims to introduce, develop and promote low-cost vegetable production technique using simplified hydroponics, among Yapese communities. Successful development of simplified hydroponics will enable them to meet their own nutritional requirements and supplement to their daily income.

Healthy living for people in these islands has been the focus of Extension activities, as traditional lifestyle has been greatly influenced by Western and modern day amenities. Extension programs on food safety and food borne diseases were conducted at schools and with homemakers through collaborative efforts with the Yap Interagency Nutrition Education Council and the Department of Agriculture. Home economic staff worked very closely with Department of Health Services staff in providing information on NCDs and providing advises on health risk factors. Information on traditional or healthy lifestyle and proper diets were the major components of educational programs.

B. Key Themes:

Key Theme - Food Safety

a). Description of Activity - This program was developed to educate participants on safe food handling and storage, using hands-on activities such as demonstrations on

nutritious recipes and preparation of healthy meals and snacks. Other activities were conducted through a Youth EFNEP program called “Healthy Body, Healthy Mind” and the Adult EFNEP program, “Food and Nutrition Education”, with collaboration from the Ministry of Education and other government agencies and NGOs.

b). Impact/Accomplishments – Participants became aware of and upgraded their skills on proper procedures for safe food handling. Fifteen women and eighteen students from two elementary schools participated in the food safety and quality program. All fifteen women had started following food safety practices while 78% of the students improved their practices on food preparation.
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c). Source of Federal Funds – Smith-Lever 3b&c

d). Scope of Impact – County Specific (Palau)

Key Theme – Food Safety and Foodborne Illness

a). Description of Activity - A curriculum and lesson plans were developed to address problems related to food safety, food borne illness and food borne pathogens. Extension staff visited schools and women groups and provided lessons to address issues on food safety and quality, food selection, purchasing, processing, transport, personal hygiene, disease organisms, proper food handling and preparation, safe food storage and service. Actual demonstrations of preparing local recipes accompanied these lessons.

b). Accomplishments/Impacts – A total of 168 adult homemakers, and staffs from Chuuk Organization of Community Action (COCA) and 66 youths attended programs on food safety and food borne illnesses. Post-tests showed marked improvement on the participants’ knowledge on the subjects. Food handling during cooking demonstrations had shown marked improvement in food handling practices.

c). Source of Funds – Smith-Lever

d). Scope of Impact – County Specific (Chuuk, Micronesia)

Key Theme – Food Safety & Food Security

a). Description of Activity - Food Safety lessons were presented, followed by food safety demonstrations as components of EFNEP to homemakers and youth. Topics presented and discussed included food selection, food preparation, storage, and sanitation. Program participants were provided pointers such as thawing meat at room temperature as opposed to common practices of thawing in water, not storing cooked food out in the open, checking for expiration dates on food labels, and how to properly stack food and meat in the same refrigerator or freezer.

b). Impact/Accomplishments – More than 90% of 105 program participants had increased their awareness on food safety issues. On food recalls conducted, participants have shown positive behavior changes in all aspects of food selection, preparation, and storage.

c). Source of Funds – Smith-Lever Act

d). Scope of Impact – County Specific (Pohnpei, Micronesia)

Key Theme - Food Accessibility and Affordability

a). Description of Activity - Home gardening lessons was conducted as a key component of the nutrition education program at schools and Headstart Centers. Parents of Headstart program children assisted Extension staff in preparing gardening plots at 17 Headstart Centers around Pohnpei Island. The Agriculture Extension Agents, who taught parents and students the proper ways of preparing the land, transplanting seedlings and caring for them, provided planting materials to the Centers. Both parents and Headstart program children were involved in looking after the gardens. Seedlings of cucumber, beans, cabbage, eggplant, and tomato, were provided to the Centers by Agriculture Extension staff.

It is the hope and dream of this program that participating families will be empowered to find alternative ways of supplementing their diets, which consist of very little green leafy vegetables. The program will also show children that working on a farm or caring for a garden is fun and it requires a team effort to make something like gardening happen. It will also provide for accessibility and affordability of fresh produce, while reducing family or school food program expenses.

b). Impact/Accomplishments - More than 100 parents at 17 Head Start centers have increased their knowledge and interest in home garden, resulting from workshops and demonstrations conducted at the main Head Start center. Head Start kids were exposed to fruits and vegetables, which are normally not part of their diet at home. One elementary school used fresh beans and cucumbers harvested from the school garden in the school lunch program.

c). Source of Funds – Smith-Lever

d). Scope of Impact – County Specific (Pohnpei, Micronesia)

Key Theme – Food Accessibility and Affordability

a). Description of Activity – Home gardening programs continued in the communities for both school children and homemakers, emphasizing healthy diets from fresh and green leafy vegetables over imported canned goods. Programs provided an opportunity for homemakers and school children basic gardening activities such as site selection, preparation of compost, caring for seedlings, transplanting of seedlings to the field, and caring for the plants. Container gardening is a new concept and it was done through the use of empty cement bags used at sites that lack sufficient topsoil.

b). Impact/Accomplishments – Thirty-six container gardens were established and some schools were benefited from the harvest of vegetables such as bell pepper, Chinese cabbage eggplant, and tomato. Several other backyard gardens provided fresh vegetables for family consumption and save a few dollars at the grocery store.

c). Source of Funds – Smith-Lever Act

d). Scope of Impact – (Kosrae, Micronesia)

Key Theme – Food Security

a). Description of Activity – A technical collaboration is established with International Institute of Simplified Hydroponics, Tehuacan, Mexico. Its Managing Director, Ms. Peggy Bradley who has international expertise in simplified hydroponics technology, has successfully trained many entrepreneurs in several Latin American countries, funded by UNDP/FAO. Tomato and bell pepper are selected as model system for media based experiment and lettuce for floating beds. The researcher is in the process of establishing the pilot phase, which forms the first part of this three years project.

b). Impact/Accomplishments – At the inception phase (prior to pilot phase) several substrates were considered for media based experiment. Coconut fiber, which is available locally, found more suitable. However, detailed study will follow in pilot phase where coco pith alone or in conjunction with coconut fiber will be tested for its efficacy.

c). Source of Funds – Hatch Act

d). Scope of Impact – County Specific (Yap, Micronesia)

Key Theme – Food Safety and Food Handling

a). Description of Activity – The EFNEP Extension Agent visited 5 atolls and conducted weekly awareness programs with the community members. In her presentations, she provided information on nutrition, food safety and safe food handling practices. She also demonstrated and prepared several nutritious and locally accepted dishes using local crops and green leafy vegetables. She also talked about communicable diseases, and non-communicable diseases such as hypertension, diabetes and heart attacks.

Healthy living for people in small island communities was also the focus of two workshops on food processing conducted in collaboration with the Ministry of Health and Environment. Dr. Lydia Marero, a food technologist from Palau Community College had conducted two workshops, which were attended by over 60 homemakers. Lessons on making cold coconut drinks, coconut jam, banana pie, banana chips, coconut bread budding, and fish balls were used to teach homemakers to utilize locally available food resources for good health.

b). Impact/Accomplishments – The nutrition bingo game has become a very important educational tool to evaluate if nutritional information has been imparted. The game provided valuable knowledge on nutrition and most players have done well, which is a good indication that their knowledge of nutrition has been improved, and that is true for those who has done well in the game. The game is played in such a way that anyone who answers the questions correctly and quickly wins and will receive a prize.

About 55% of the participants of the two workshops on food processing have already started making homemade products out of the different recipes they learned. One small store in Majuro is now selling some of these products.

c). Source of Federal Funds – Smith-Lever & Local Match

d). Scope of Impact – County Specific (Marshall Islands

Key Theme – Food Handling

a). Description of Activity – A training program for food handlers was coordinated with the Division of Environmental Health and Sanitation, Department of Health Services in Chuuk for cooks at elementary and high schools, Headstart Program centers, restaurants, take out vendors, and agriculture and fish markets. Topics presented were on microorganism and food bore diseases, prevention of cholera, personal hygiene, food handling and preparation, food selection, storage and purchasing, and rules and regulations at food establishments.

b). Impact/Accomplishments -168 adult homemakers and 66 youths participated in the training program. It has been observed that fish and agriculture produce markets had had installed basins of water for washing fish and fresh produce. Inspections conducted at restaurants and food take-out places found them to be clean and neat.

c). Source of Funds – Smith-Lever 3b&c

d). Scope of Impact – County Specific (Chuuk, Micronesia)

C. Allocated Resources

Fiscal Resources
Extension

Year	Federal	State	Local	Other

2000	121,461	43,379	8,676	0
2001	111,280	22,179	27,817	0
2002	104,556	20,818	31,460	0
2003				0
2004				0

Research

Year	Federal	State	Local	Other
2000	71,807	15,071	1,773	0
2001	92,374	22,759	18,743	0
2002	37,764	9,582	9,018	0
2003	0	0	0	0
2004	0	0	0	0

Manner of Expenditures:

Funds from formula funds and other sources like local matching funds were expended as planned in each specific research, extension and integrated research and extension projects. In general, these funds were utilized for the salaries and wages and fringe benefits of research, extension and administrative staff. International travels were conducted as key program and management staffs participated in international workshops, meetings and conferences designed for exchange of information, ideas and forming regional collaboration in projects. Domestic travels were for monitoring of research and extension projects. Publication/printing costs for publishing articles in local newspapers, scientific journals and manuals, proceedings, pamphlets and brochures were part of the total expenditures. Communication within the COM region and to offices collaborating with the College through phone calls, faxes, e-mails and regular mails was part of the total cost of this Goal.

Human Resources (FTEs)

Extension FTEs

Year	Professional			Paraprofessional		
	1862	1890	Other	1862	1890	Other
2000	2.90	0.0	0.0	6.10	0.0	0.0

2001	2.56	0.0	0.0	6.20	0.0	0.0
2002	2.20	0.0	0.0	5.05	0.0	0.0
2003	0.0	0.0	0.0	0.0	0.0	0.0
2004	0.0	0.0	0.0	0.0	0.0	0.0

Research SYs Only

Year	Scientist Years			Research Assistants		
	1862	1890	Other	1862	1890	Other
2000	1.94	0.0	0.0	0.30	0.0	0.0
2001	2.20	0.0	0.0	0.50	0.0	0.0
2002	0.30	0.0	0.0	0.45	0.0	0.0
2003	0.0	0.0	0.0	0.0	0.0	0.0
2004	0.0	0.0	0.0	0.0	0.0	0.0

From the FY2002 total FTE of 72.31, 8.00 had been assigned under GPRA Goal 2, representing 11% of FTE input. The FY2002 budget allocated to GPRA Goal 2 takes into account this FTE distribution plus how Goal 2 integrates with the programs conducted by COM as a whole.

IV. GOAL 3 - A HEALTHY, WELL-NOURISHED POPULATION.

A. Goal Accomplishment Narrative

PCC-CRE:

Food consumption practices, 24-hour food recalls and survey questionnaires of participants in both Adult and Youth EFNEP Programs indicated that many families in Palau have poor dietary practices. Food such as milk, fruits and vegetables groups are lacking in families' meals. A big portion of the population continued to have a diet that does not meet the daily recommendations for sufficient amount of calcium, vitamins, and minerals.

Most of the adult participants in health programs suffered from overeating. People are still consuming large amount of food that contain mostly calories with fat and refined sugar. As a

result of overeating, many adult and youth are getting obese and are also suffering from chronic diseases such as coronary heart disease, hypertension and diabetes. More than 500 persons in Palau have been diagnosed with diabetes and high blood pressures. Palau will continue to implement both the Adult and Youth EFNEP programs to raise public awareness on healthy lifestyles and healthy living.

CMI-CRE:
Programs continued to target the populations in remote communities to assist people who are suffering from chronic diseases. Both adult and youth EFNEP programs continued with individuals and small group of homemakers.

Collaborative efforts have been established with the Ministry of Internal Affairs through the Mobile Team Project, which is a coalition of various disciplines within the Ministry and other programs. The Mobile Team members visited several of the outer atolls and provided educational programs on topics ranging from nutrition and physical education to women in development and civil rights. Duration of the Team's visit lasted for a week in each of these islands and it provided a good opportunity for closer interaction with the local homemakers on their specific needs.

The EFNEP staff has also been collaborating on the ADAP funded Healthy Living in the Pacific Islands Project (HLPI). The HLPI is a new initiative to improve health among Pacific islanders by encouraging healthy lifestyles.

Among other goals, the two projects promoted community welfare by providing workshops on food safety and food handling practices to people on these outer atolls.

COM-FSM/CRE:

Chuuk Site:
Non-communicable diseases, hypertension, and diabetes are the top three causes of morbidity and mortality in Chuuk State. One of the causes of NCD is high consumption of foods, which are high in fats, sugar and salt. While obesity and NCD are the main problems among adults, undernutrition and micronutrient deficiency remain a problem among children. Pregnant and nursing mothers were also found to be anemic, contributing to low birth weight babies. In addressing these problems, programs on food and nutrition were conducted for homemakers and others in the communities.

Individual dietary counseling was provided to those identified with nutrition deficiency and other health problems. Clienteles were provided with diet plans, which included different food groups and the number of servings recommended. Nutrition sessions also included anthropometrics in order to determine the "body mass index of the participants". Knowing the body mass index provided a realistic program on how best to address nutritional needs of clienteles.

Chuuk Women Advisory Council and Chuuk Association for Community Action (COCA) are two organizations that have been collaborating with CES staff in providing educational programs on human nutrition, diet and health and other social issues affecting communities in Chuuk.

Pohnpei Site:
Health programs were conducted in the communities in conjunction with EFNEP lessons. Home gardening lessons were taught as a way of providing information on maintaining a proper diet and to live a healthy lifestyle. Homemakers were provided information on nutrition, diet and

health, which included lessons on meal preparation and meal planning and other nutrition related topics, such as a balance meal, calories and serving size, obesity, etc. Demonstrations of recipes using mostly local resources by Extension staff and participants at these trainings provided a first hand knowledge of healthy food that they need to raise and to eat. Common and affordable local resources of carbohydrates and protein are the main ingredients in these cooking demonstrations. Western-style breakfasts and frozen foods were discouraged as being expensive, less nutritious, and may be harmful because of the length of storage and potential adverse effect from chemical preservatives.

Nutrition education program was extended to inmates and cooks at the Division of Correction & Rehabilitation, Department of Public Safety.

Kosrae Site:

Some components of EFNEP were provided to twenty-one families through awareness programs conducted in the communities and with individual clientele. Other health awareness programs were done through collaborative efforts with the Department of Health Services on such occasions as Breastfeeding Week, Cultural Day, and during the Kosrae State Fair.

Vitamin A has always been lacking in the diet of many islanders. Certain varieties of banana have been found to have a high content of Vitamin A. Mass propagation of these banana varieties has become a high priority for agriculture extension agents and other health officials to address the problem of Vitamin A deficiency.

B. Key Themes:

Key Theme - Human Nutrition

a). Program Description – [Adult EFNEP] A program on Food and Nutrition was conducted for food handlers who requested assistance in one of the under-served States in Palau. The program was developed to educate and assist limited income families and individuals in obtaining the basic nutritional knowledge and skills needed for making wise food choices to plan and prepare healthy and low cost meals. A series of lessons were emphasizing the consumption of a wide variety of foods, safe food handling and storing, and the planning and the preparation of balanced meals.

b). Impact/Accomplishments – There are indications of an increased awareness in food resource management and food nutritional practices with families in Palau. Fifteen women completed forty hours of EFNEP lessons. On food resource management, 20% of participants planned meals in advance, 40% had compared prices when shopping, 27% did not run out of food before the end of the month, and 33% used a shopping list when they go for grocery shopping. As to nutritional practices, 23% of the participants planned meals in advance, 38% thought about healthy food choices for their family, 62% prepared food without adding salt, 54% used “Nutrition Facts” on food labels to make food choices, and 38% reported that their children ate breakfast more often.

c). Source of Funding – Smith-Lever 3b&c

d). Scope of Impact – County Specific (Palau)

Key Theme – Human Nutrition

a). Description of Activity – [Youth EFNEP] The Healthy Body, Healthy Mind Campaign, an enrichment program conducted after school and during the summer, was designed to teach 9-19 year old students about making wise food choices, how nutrients affect the body, safe food handling and storage, safety tips for the kitchen, preparing healthy snacks and recipes, and other health concepts that could be applied to their everyday lives. The Healthy Body, Healthy Mind Campaign is a drive for the youth to take charge of their health by eating better and being more physically active.

b). Impact/Accomplishments – Eighteen students from two elementary schools completed the program and had increased their knowledge on food selection, low-cost nutritious food, food preparation and food safety. As a result of the program, 83% of the youth had started eating a variety of food, 89% increased their ability on the essential of human nutrition, 72% increased their ability to select low-cost and nutritious food and 78% increased practices in food preparation and food safety. .

c). Source of Funding – Smith-Lever 3b&c

d). Scope of Impact – County Specific (Palau)

Key Theme – Human Nutrition

a). Description of Activity - The EFNEP Extension Agent visited 5 atolls and conducted weekly awareness programs with the community members. In her presentations, she provided lessons on nutrition, food safety and safe food handling practices. She also demonstrated and prepared several nutritious and delicious dishes using local crops and green leafy vegetables. She also talked about communicable diseases, and hypertension, diabetes and heart attacks problems that are affecting the island populations.

Healthy living for people in small island communities was also the focus of two workshops on food processing conducted in collaboration with the Ministry of Health and Environment. Dr. Lydia Marero, a food technologist from Palau Community College conducted two workshops, which were attended by over 60 homemakers. Lessons on making cold coconut drinks, coconut jam, banana pie, banana chips, coconut bread budding, and fish balls were used to teach homemakers to utilize locally available food resources for good health.

b). Impact/Accomplishments - The nutrition bingo game has become a very important educational tool to evaluate if nutritional information has been imparted. The game provided valuable knowledge on nutrition and most players have done well, which is a good indication that their knowledge of nutrition has been improved, and that is true for those who has done well in the game. The game is played in such a way that anyone who answers the questions correctly and quickly wins and will receive a prize.

About 55% of the participants of the two workshops on food processing have already started making homemade products out of the different recipes they learned. One small store in Majuro is now selling some of these products.

c). Source of Funds – Smith-Lever, ADAP, & Local Match

d). Scope of Impact – County Specific (Marshall Islands)

Key Theme – Human Nutrition

a). Description of Activity - Nutrition lessons were provided to small groups of homemakers in different municipalities. Identification and recruitment of homemakers were conducted at various sites with the assistance of traditional and local government officials. EFNEP lessons were also taught to participants, in addition to cooking demonstrations of local recipes. Entry and exit food recalls were taken for individual participants to determine behavioral changes. Also supplementing the program, participants were subjected to the BMI (Body Mass Index) measurement, which is calculated by body weight, height, and age data that were recorded at the beginning of the program and two additional weightings were done before the end of the program.

b). Impact/Accomplishments – More than 90% of program participants completed the program. Total recruitment for the year was 105 homemakers in six different villages. More than 80% of participants who completed the program are showing positive behavioral changes in their practices of food selection and preparing meals. Participants increased their awareness on proper diet and weight management.

c). Source of Federal Funds – Smith-Lever 3b&c

d). Scope of Impact – County Specific (Pohnpei, Micronesia)

Key Theme – Human Nutrition

a). Description of Activity – Obesity is a growing health problem in many of the islands, especially in communities where lifestyle has been dramatically changed from the traditional to the Western way of life.

Extension staffs have been working collaboratively with local health agencies in providing information on healthy living and conducted training programs on maintaining a healthy lifestyle. Lessons on meal planning, infant nutrition and complimentary feeding, preschool nutrition, adult nutrition, and dietary counseling were provided to homemakers at different communities. Extension staff had worked with 259 homemakers in four municipalities and provided information on meal planning and proper diet. Extension staff and trainees conducted demonstrations of different local recipes, consisting of locally available starchy food, protein rich food, and fruits and vegetables.

b). Impact/Accomplishments – Participants had become aware of the growing influence of imported Western lifestyles and are becoming conscious of the right kind of food to eat and the kind of food that contribute to obesity and other non-communicable diseases. Participants had increased their awareness of the rapidly changing lifestyle in their communities and have started making adjustments to assist in reversing the trend.

c). Source of Funds – Smith-Lever

d). Scope of Impact – (Chuuk, Micronesia)

Key Theme – Human Nutrition

a). Description of Activity – Twelve lessons on food nutrients, food preparation, food purchase, food safety and sanitation and meal planning were provided to small groups of homemakers. Similar lessons were also provided to school children at five elementary schools. Children were taught to eat healthy and locally prepared snacks instead of eating too much of processed snacks. Cooking demonstrations were provided on a variety of recipes that used local ingredients and homemakers and school children had hands-on experience in preparing these recipes.

b). Impact/Accomplishments – More than 90% of participants had increased knowledge on healthy food to eat and same level of percentage had increased knowledge on preparing healthy snacks.

c). Source of Funds – Smith-Lever Act

d). Scope of Impact – (Kosrae, Micronesia)

Key Theme - Medicinal Plants

a). Description of Activity – A draft manuscript of the publication, “Medicinal Plants in Palau”, has been produced. It contains photographs and information of local, English and scientific names, botanical descriptions, habitats, uses, and preparation of the plants. After a review by the Publication Committee of PCC-CRE, the draft manuscript will be sent to a print shop in Guam for printing and distribution.

b). Impact/Accomplishments – The printing and distribution of the publication “Medicinal Plants in Palau” will increase knowledge and create awareness of the identification of locally available plants that posses healing properties for certain ailments. In remote communities, this information could lead to the establishment of village level herbal gardens as a source of alternative medicine.

c). Source of Funding – Hatch Act Funds

d). Scope of Impact – County Specific (Palau, Micronesia)

Key Theme – Human Health

a). Description of Activity – Some components of the Healthy Living in the Pacific project have been conducted through focus group meetings of women groups and government and other non-governmental agencies. Health and nutrition problems were identified through a needs assessments and surveys conducted in four municipalities. The Healthy People, Healthy Communities initiative promote the capacity of individuals, families, and communities to increase healthy behaviors and lifestyle choices and make informed consumer decisions. The initiative brought together people from different sectors of the society to identify health issues and to find ways of addressing these issues. An action plan has been drawn up and is currently being implemented in the selected communities.

b). Impact/Accomplishments – The project has drawn the attention of key government and traditional leaders to the seriousness of health issues affecting the lives of their people. Another accomplishment of this project is the organization of the focus groups, which

comprised of a fair representation of all sectors of the State. has taken off in four target municipalities, after the “Interview Schedule” was finalized.

c). Source of Federal Funds – Smith –Lever & ADAP

d). Scope of Impact – (Chuuk, Micronesia)

C. Allocated Resources

Fiscal Resources

Extension

Year	Federal	State	Local	Other
2000	114,443	40,873	8,175	0
2001	116,616	23,242	29,151	0
2002	101,383	20,186	30,506	0
2003				0

2004				0

Research

Year	Federal	State	Local	Other
2000	71,807	15,071	1,773	0
2001	58,161	14,330	11,801	0
2002	25,176	6,388	6,012	0
2003	0	0	0	0
2004	0	0	0	0

Manner of Expenditures:

Budgets coming from the formula funds, competitive grants and other sources like local matching funds were expended as planned in each specific research, extension and integrated research and extension projects. In general, these monies were utilized for the salaries and wages and fringe benefits of administrative and support staffs, and research and extension staffs. International travels for key program personnel to participate in international workshops, meetings and conferences designed for exchange of information, ideas and forming regional collaboration in projects. Domestic travels were for monitoring research and extension projects. Publication/printing costs were incurred as a result of publishing articles in local newspapers, scientific journals and manuals, proceedings, pamphlets and brochures. Communication cost between the six delivery sites and the Central Office located in Pohnpei and with offices collaborating with COM through phone calls, faxes, e-mails and regular mails incurred as well.

Human Resources (FTEs)

Extension FTEs

Year	Professional			Paraprofessional		
	1862	1890	Other	1862	1890	Other
2000	0.68	0.0	0.0	7.80	0.0	0.0
2001	1.18	0.0	0.0	8.00	0.0	0.0
2002	0.98	0.0	0.0	6.05	0.0	0.0
2003	0.00	0.0	0.0	0.00	0.0	0.0
2004	0.00	0.0	0.0	0.00	0.0	0.0

Research SYs Only

Year	Scientist Years			Research Assistants		
	1862	1890	Other	1862	1890	Other
2000	1.13	0.0	0.0	0.3	0.0	0.0
2001	1.20	0.0	0.0	0.5	0.0	0.0
2002	0.10	0.0	0.0	0.4	0.0	0.0
2003	0.0	0.0	0.0	0.0	0.0	0.0
2004	0.0	0.0	0.0	0.0	0.0	0.0

Allocate Resources:
From the FY2002 total FTE of 72.31, 7.53 have been assigned under GPRA Goal 3, representing 10% of FTE input. The FY2002 budget allocated to GPRA Goal 3 takes into account this FTE distribution plus how Goal 3 integrates with the programs conducted by COM as a whole

V. GOAL 4 - TO ACHIEVE GREATER HARMONY (BALANCE) BETWEEN AGRICULTURE AND THE ENVIRONMENT.

A. GOAL ACCOMPLISHMENT NARRATIVE

PCC-CRE:
In 2002, our programs were able to address three essential themes: biological control, integrated pest management, and sustainable agriculture.

Our research projects on two invasive weeds, *Mimosa diplotricha* and *Chromolaena odorata*, were successful in using biological control agents to delay or prevent dispersal of these two harmful weed species. These two weeds are still recurring because of a massive road construction project. However, every time the examination of those weeds was done, the biological control agents were also present. The *C. odorata* project, which was a joint program between University of Guam (UOG) and PCC-CRE, has found that the gallflies have already been established as they were following the spread of the *C. odorata*. Furthermore, the projects on the Integrated Control of Cassava Spider Mite, Biological Control of Taro Leafhopper and Sustainable Control Strategy Against Corm Rot are progressing very well.

Last year, CRE staff published four important extension reports to support our IPM and PIA programs. These were: Insect Pests of Root Crops in Micronesia, Sweet Potato Varieties in

Palau, Crop Profile for Cucumber and Chinese Cabbage in the Republic of Palau and Knowing Pesticides. The Knowing Pesticides pamphlet was written in five languages, English, Palauan, Filipino, Sonsorolese and Hatohobeian. All of the publications were distributed to farmers, political and traditional leaders, some national and state government agencies, and interested individuals. These publications have made our stakeholders better informed on the current programs of the College.

The staff at PCC-CRE started collaborating with the other Land Grant Institutions involved with the American Pacific Pest Management Information Network. The group is now working on a Crop Profile for Taro in the Pacific Region. On sustainable agriculture, the project on Sustainable Marketing Strategy in Micronesia, which was funded by Western Region SARE, has just been completed. The report was submitted to SARE.

The staff member in charge of research and extension projects on marine conservation and natural resource management resigned last year. PCC-CRE is now looking for a replacement to ensure continuity of those projects.

CMI-CRE:

Sustainable agriculture programs were conducted with local farmers and at some high schools. The Extension Agent provided information on proper ways of cultivating the land and managing the farms. A lot of efforts are required to enrich the soil in these islands, as they are mostly coralline in nature.

The Agriculture Extension Agent is a member of the RMI Mobile Team and he joined other members in their visits to 5 outer atolls and made presentations on sustainable agricultural practices and helped some of the residents to start their own backyard gardens.

A workshop on integrated pest management was sponsored for farmers and students. Presentations and field visits were conducted to identify common pests and diseases that are affecting local plants. Some of these pests and diseases are exotic to the Marshall Islands and they have caused significant damages to local crops. In recent years, many of these pests have become prevalent as they spread from initial points of entry to atolls and islands in both Ralik and Ratak island chains, where they cause outbreaks that seriously damage crops, and regularly destroy important food crops.

The Marshall Islands government realized the vulnerability of the atolls, and the impact that pesticides and many other non-natural control methods may have on the environment. It has therefore adopted guidelines to promote environment-friendly pest control methods. These methods are part of the Integrated Pest Management approach, in which a major focus is on biological control. In line with this approach, a number of natural enemies have successfully been introduced in recent years to some island groups where they have contributed to a decline in pest density.

It was recommended that Inter-island quarantine measures should be implemented to prevent introduction of pests within the Republic. An extension publication on `Survey of Arthropod Pests and Invasive Weeds in the Republic of the Marshall Islands' is produced from the ongoing survey.

COM-FSM/CRE:

Yap Site:

The research project entitled "Documentation of Yam (*Dioscorea* spp.) Diversity and Associated Traditional Knowledge Systems in Yap State, Federated States of Micronesia" (# MIR-COMF28) aims to give greater recognition to the prudent methods of indigenous communities in managing agrobiodiversity in Yap. Throughout Yap State, yams play and important role in the life of local communities. Through an array of participatory research methods, this project aims to unfold the traditional wisdom practiced by farmers over generations with respect to the cultivation of yams. The linkage with informal and undocumented knowledge of farmers will be a remarkable process to reveal a wealth of information about the cultivation of this important tuber crop and to develop appropriate program of *inter-situ* conservation.

Sustainable agriculture programs and IPM projects were conducted in close coordination with local and International agencies, such as SPC. An IPM survey was conducted in the four FSM States, which provided new information on insect pests and other diseases that are affecting local crops. Activities are continuing on the control and eradication of the *Siam Weed, Lantana, Mimosa* and other newly emerging invasive weed species.

Pohnpei Site:

Crop production on small islands is basically subsistence with the traditional backyard or home garden of multi-story cropping system. Until recently, 'semi-commercial' and 'commercial' farms were established and vegetable crops are being promoted for their nutritional value. The advocacy to increase crop production for surplus requires concomitant and appropriate soil management towards conservation on growing crops while controlling further erosion and depletion of rather poor soil condition.

With the introduction of new crops, exotic pests and diseases were also accidentally introduced by air, sea and by humans. Chemical control of pests (diseases and weeds) is the most commonly used on crops. The toxic nature and disadvantages to man and environment and prohibitive cost to small farmers are deterrent for using chemicals. The program on integrated pest management involves alternative control and other approaches thus, reducing use of chemicals. It involves monitoring of pests and cultural practices and management integration that ensures crop economic yield.

Another project is on endangered species of banana with high nutritional value for both children and adults suffering from Vitamin A deficiency. The rare banana varieties are now being propagated through tissue culture.

The formation of a task force recently was for the purpose of controlling the spread of an Invasive Alien Species (IAS) of weed that accidentally introduced to Pohnpei about two years ago. The Agriculture Station, Secretariat of the Pacific Communities, the Micronesia Plant Propagation Research Center, USDA-NRCS, The Nature Conservancy, and COM-FSM are members of this task force. Agriculture extension staffs participated in an island-wide campaign to eradicate the *Piper auritum* at more than 60 sites within the agroforestry areas to the watershed zones on the mountains. More than 2,000 plants were found at those locations and about 50% have been eradicated. Posters of the *Piper auritum* were distributed around the island to assist people in identifying the plant.

Waste management workshops were conducted in communities that have piggery operations. Agriculture extension agents continued to assist farmers and other individuals who are engaging in cultivation of Kava in the lowland agroforestry areas.

Kosrae Site:

The extension part of the project at MPPRC has been concentrating at improving sustainability of the agriculture system on Kosrae. As part of the program, nearly 16,500 elite seedlings of banana and 6,500 seedlings of taro were distributed to farmers. Several field visits were undertaken to educate farmers on important steps in sustainable agriculture while looking at ways to improve agriculture production. Four students were trained in laboratory and nursery practices at the MPPRC in summer of 2002. Researcher continued with the formal instruction at Kosrae campus (Agriculture major students). Senior staff at MPPRC underwent trainings in advanced fields in 2002.

B. Key Themes:

Key Theme - Biodiversity

a). Program Description - Different types of institutions (farmers, NGOs, Government Departments, International Institutes) are involved in this on-farm conservation effort at different levels. This has the added effect of balancing the needs of various stakeholders. Linkage with International Plant Genetic Resources Institute's (IPGRI) Regional Office at Malaysia (Dr. Bhuwon Sthapit, *In situ* Crop Conservation Specialist) and Fiji based Pacific Agricultural Genetic Resources Network (Dr. L. Guarino, Genetic Resources Advisor) was established, which has greatly facilitated the design of a workable approach to on-farm conservation research. First objective of the project is to document the distribution of yam landraces of Yap State. Criteria such as: (i) important for local livelihoods; (ii) important for future food security; (iii) high, useful or important diversity contained in the region; and (iv) rare or endangered were considered while identifying yam as target species. A range of information sources like descriptor lists (IPGRI), published literature in the natural and social sciences (from AGRICOLA and IPGRI), grey literature (e.g., government reports) and personal knowledge of experts are consulted as part of data collection. Currently, researcher is in the process of identifying appropriate study sites across Yap based on crop diversity, agroecological factors and logistics (site accessibility throughout the year and availability of resources).

b). Impact/Accomplishments – Preliminary survey revealed 36 varieties (landraces) of yams that belong to three main species. Farmers generally identify these varieties by color of the tuber, shape of the tuber, smell of the tuber, size of the tuber, thorns on the stem, shape of the leaves etc. *Dioscorea alata* is regarded the most prestigious of all yam species in which 19 landraces are identified based on above characteristics. The information collected eventually will allow the determination of the extent and distribution of genetic diversity on farm

c). Source of Funding – Hatch Act

d). Scope of Impact – County Specific (Yap, Micronesia)

Key Theme - Biological Control

a). Program Description – [Creeping Sensitive Plant, *Mimosa diplotricha*] Two years after releasing the psyllid insects, *Heteropsylla spinulosa*, on several areas infested with *Mimosa*, the psyllids have continuously established themselves and dispersed naturally. They have even occurred on newly burned and disturbed areas in which *Mimosa* had started to grow.

Cultures of the psyllids are still being maintained in the screenhouse for release in other areas of Palau where *Mimosa* is becoming a problem weed and in which the psyllids do not yet occur.

b). Impact/Accomplishments – On six vegetable farms, the weed is no longer considered a problem and farmers have increased areas for production. Also, Mimosa does not pose as a threat to the vegetation in Palau.

Because of the success in controlling the weed with a psyllid, a manuscript titled "Biological Control of *Mimos*a in the Republic of Palau" was submitted for publication in a University of Guam research journal. If accepted, it will be known in the scientific community that the successful classical biological control program of *Mimosa* occurred in Palau.

c). Source of Funding – Hatch Act Funds

d). Scope of Impact – County Specific (Palau, Micronesia)

Key Theme – Biological Control

a). Program Description – [Siam Weed, *Chromolaena odorata*] - The gallfly continued to disperse and established naturally to other areas in Palau where the Siam weed occurred. Cultures of the gallfly are being maintained in the screenhouse for release in other areas where the gallfly is still absent and the Siam weed infestation is still prevalent.

b). Impact – In many disturbed areas, the gallfly has considerably reduced the threat of the weed to the natural vegetation. New areas are now open for vegetable farming. As a result of the successful biocontrol program, a manuscript on "Biological Control of C. odorata on the Republic of Palau" was published in the Proceedings of the Fifth International Workshop on Biological Control of the Siam Weed, *C. odorata*.

c). Source of Funding – T-Star and Hatch Act Funds

d). Scope of Impact – Multi-State (Palau and Guam)

Key Theme – Biological Control

a). Program Description – [Taro Leafhopper, *Tarophagus colocasiae*) – A total of one thousand nymphs of the mirid bug, *Cyrtorhinus fulvus*, were released in five areas planted with taro in which the leafhopper, *T. colocasiae,* is a problem pest. Mirid bug establishment will be monitored starting three months after their introduction.

b). Impact/Accomplishments – Once the mired bugs are established and have reduced the leafhopper infestation in those taro farms where they have been released, it will help to reduce farmer dependence on chemical sprays and at the same time ensure increased production of taro corms

c). Source of Funding – Hatch Act Funds

d). Scope of Impact – County Specific (Palau, Micronesia)

Key Theme - Integrated Pest Management

a). Program Description – [Integrated Control of the Cassava Spider Mite] – In two cropping seasons, Vendex at 0.75 lb. ai/A and Kelthane at 0.75 lb.ai/A when sprayed twice at fifteen days intervals on three-month-old cassava plantings, significantly reduced spider mite infestation.

Cassava sprayed with Vendex had a higher yield of tubers as compared to Kelthane, Diazinon and Malathion sprayed plantings.

The predatory mite, *Phytoseilus persimilis*, was ordered three times from the commercial company Beneficial Bugs in Australia. However, every time a shipment of mites arrived, the mites had perished. Apparently, the mites could not cope with the many stresses involved in travelling such a far distance. Arrangement is now being made with a commercial company in the United States to ship five thousand predatory mites to Palau. If mites are still alive upon arrival in Palau, they will be released immediately on some cassava farms infested with spider mites.

b). Impact/Accomplishments – Two farmers who have seen the chemical control trials were convinced that spraying with chemicals such as Vendex or Kelthane was necessary to reduce the high population of spider mites on cassava, especially on susceptible varieties. Likewise, six farmers were given planting materials of the mite resistant varieties, Ochobirang and Ngesuong.

c). Source of Funding – Hatch Act and Integrated Pest Management Funds

d). Scope of Impact - County Specific (Palau)

Key Theme – Integrated Pest Management

a). Program Description – [Sustainable Control Strategy Against Taro Corm Rot] – Results of the first planting of a field experiment on the chemical control of the taro corm rot indicated that Captan, used as a drench in each planting hole or by soaking the planting materials overnight, reduced incidence of corm rot. Furthermore, Captan-treated taro had higher corm yields than the rest of the treatments.

The second planting of the same experiment was established. Initial data showed that at the early stages of plant growth, corm rot infection occurred on deeply (ten to eleven inches) planted taro and on taro in which wood ash and lime was applied in each hole before planting.

Another replicated trial involving ten varieties of taro is currently in progress. The aim is to determine which variety(ies) is/are resistant to corm rot.

b). Impact – Once validated in the second planting that Captan is still effective against corm rot, demonstration plots will be established at various farms so that the farmers will be better informed on how to control the disease. Varieties of taro showing a high degree of resistance to corm rot will be mass propagated by tissue culture for distribution to farmers.

c). Source of Funding – Hatch Act Funds

d). Scope of Impact – County Specific (Palau, Micronesia)

Key Theme – Integrated Pest Management

a). Program Description – [Development of Publications on Integrated Pest Management] - A publication titled “Sweet Potato Varieties in the Republic of Palau” was prepared and printed in Guam. Another manuscript on “Cassava Varieties in the Republic of Palau” has been completed. Once it has undergone editing by the PCC-CRE Publication Committee, a final draft will be produced and it will be sent to Guam for printing and then distribution to interested parties.

b). Impact/Accomplishments – Copies of the publication “Sweet Potato Varieties in the Republic of Palau” were distributed to 100 farmers, extension agents, government and traditional leaders in Palau and agencies in other Micronesian islands. Farmers were better informed and could select the best varieties of sweet potato to plant on their farms. .

c). Source of Funding – Smith-Lever Act Funds

d). Scope of Impact – County Specific (Palau, Micronesia)

Key Theme - Integrated Pest Management

a). Description of Activity - [American Pacific Pest Management Information Network] - This project covers pest management issues, crops, cropping systems, environmental conditions and pests unique to the American Pacific Region (Hawaii, Guam, the Northern Mariana Islands, American Samoa, the Federated States of Micronesia and the Republics of Palau and Marshall Islands). Regulatory decisions affecting crop production practices can have a major impact on ultra- minor crop producers. The American Pest Management Information Network (APPMIN) allows stakeholders to respond to federal regulations that affect the use of pesticides. The APPMIN Steering Committee (SC) composed of representatives of land grant colleges in the American Pacific prioritizes, develops, and revises crop profiles, develops outreach activities for their stakeholders, and responds to USDA requests for information. The Stakeholder Advisory Committee (SAC), identified by the SC, develops pest management strategic plans, prioritizes projects, and advises the SC. APPMIN maintains a web page to facilitate communications.

As a land-grant institution in the American Pacific, Palau Community College represents the College of Micronesia in the Steering Committee. A draft of Crop Profile for Taro in Palau has been prepared and submitted.

b). Impact/Accomplishments -The participation of Micronesia in APPMIN has provided greater access to crop production and pest management strategies for important tropical crops in the region. The development of Crop Profile for Taro in Palau will serve as a guide for taro growers in the region and will greatly help farmers tackle pest problems in the production of this important root crop.

c). Source of Funds – Western Region Pest Management Center

d). Scope of Impact – Mult-State (American Pacific)

Key Theme - Integrated Pest Management

a). Description of Activity – The "Survey of Insect Pests in the FSM: Update and Assessment" was conducted. Accomplished two-surveys-in-one, first in August 2001 and second in February 2002 in FSM (Yap, Chuuk, Kosrae and Pohnpei) with the Consultant-Entomologist. The manuscript of the survey has been finalized for publication.

The development of IPM program on leaf-footed bug of cucurbits (cucumber) commenced in March-April 2001. The investigators submitted the final report in scientific format to American Farmland Trust Foundation. The trials included monitoring of insects (and the crop) twice weekly at three sites in one year, effective project time duration. Cucumber cultivation involved treatments such as mulching (coconut, grass) and fruit bagging done few days to one week after fruit-set. Yield and unmarketable fruits data as affected by mulching and bagging were reported in addition to insects and diseases.

Assistance was provided for an SPC-led project on fruit fly monitoring, traps collection, and maintenance. Monthly activities for the year on monitoring, processing of flies collected, surveillance and maintenance of traps were accomplished.

The project on Survey of Diseases in the FSM was planned for March-September 2002. Survey preparation was undertaken as early as April 2002 to include administrative communications to the sites and technical aspects. Postponed due to unavailability of the Plant Pathologist consultant.

A staff was involved in the University of Hawaii Department of Natural Resources and Environmental Management (DNREM) on field demonstration for sustainable pest management project on important crop on the island in June 2002. The field demonstration was conducted in farmer's farm on 3 and 10 of September 2002. The project is for two years with 2-field day demonstration activities on sites at cooperator's farm.

b). Impacts -The publication is now being distributed to the public as additional reference material for awareness and identification of insect pests (and some weeds) of crops in the field. If used by stakeholders, it would undoubtedly help in pest management of crops.

Three sites for the project were two vegetable (cucumber) farmers and State Agriculture Farm. All sites are 'problem' areas for cucumber cultivation with considerably low yield. Other pests damaging the crop and critical practices and management were identified. Holistic approach is needed to develop IPM program on cucumber that could result to improving cucumber productivity and yield, producers' benefit and crop based contribution towards island food security.

Monthly fruit fly record is vital for trading agriculture produce and products. The fruit fly record is impacting the agriculture industry of the islands.

Preparation for survey was accomplished, however actual survey for diagnosis and identification of diseases was postponed due to uncontrolled circumstances.

Unsuccessful and interested cucumber farmers and students attended the field demonstration on 3-10 September 2002. Extension Agents, CES, LGP and NRCS staff participated. Twenty participants were provided first-hand information on producer's experiences and 'farm secrets' on cucumber cultivation. Handout on Cucumber Cultivation in English and Pohnpeian was distributed. If participants would adopt the knowledge, experiences and 'secrets' shared would undoubtedly improve yield, farmers' income from cucumber cultivation in the island.

c). Source of Federal Funds – Smith-Lever/IPM/American Farmland Trust/Hawaii

d). Scope of Impact – (FSM-Micronesia)

Key Theme – Integrated Pest Management

a). Description of Activity – The project entitled: "Eco-Friendly Farming Through Integrated Pest Management in the Republic of the Marshall Islands" proposes to enhance pest and disease control through environment-friendly methods by: (1) determining the agricultural pests and diseases, and their distribution in the Marshall Islands; (2) Training farmers, extension and research staff in the identification of agricultural pests and diseases; (3) developing and implementing Integrated Pest Management approaches, with a particular emphasis on biological control and other non-chemical methods; and (4) promoting and encouraging the adoption of these approaches by end-users.

The Government of the Marshall Islands encourages the use of non-chemical control methods, and seeks to keep pesticide usage to a minimum and for emergency situations only. Integrated Pest Management approaches aim to maintain pest damage at acceptable levels by manipulation of the crop ecosystem without causing damage to it, through both the application of a range of practices, and a minimum use of pesticides. The IPM approach is therefore the most appropriate means for agriculture programs in the Marshall Islands.

An IPM team, organized by the College of the Marshall Islands - Cooperative Research and Extension program, is composed of the agriculture researcher, research aide, the agriculture extension agent and the chief of agriculture from the Ministry of Resources and Development. The team has conducted insect pest surveys in the atolls of Majuro, Arno, Wotje and Jaluit. A wide range of insect pests and weeds were found and listed, quite a few of them were new to the Marshall Islands. An insect survey with the help of an Entomologist from University of Guam was conducted on Likiep Island and Majuro atoll. Red coconut scale is widespread and some trees were heavily infested. The natural enemy, *Anabrolepis oceanica* was not observed in the surveyed islands. Introduction of this natural enemy to Saipan and Guam has resulted in effective suppression of this scale. The spiraling whitefly is abundant in all the surveyed islands. Recently the parasitoid, *Encarsia haitiensis* was introduced to Majuro and it has established. The mango fruitfly, *Bactrocera frauenfeldi* is causing serious damage to breadfruit in the Marshalls. The two patches of new weeds *Chromolaena odorata* and *Coccinia grandis* established at Laura village in Majuro should be immediately eradicated to prevent their spread and permanent establishment. Cuscuta is the most

invasive parasitic weed found in all the islands of Likiep atoll. It was found covering Scaevola, Messerschmidia and other native trees. Cuscuta and Cassytha, the two parasitic weeds were found common in Majuro.

b). Impact/Accomplishments - There were significant accomplishments from the ongoing IPM project. The insect pest survey has generated the update information and new insect pests in the Republic of the Marshall Islands. The Plant Protection and Quarantine officers of the Ministry of Resources & Development and the Cooperative Research and Extension - College of the Marshall Islands staffs truly benefit by attending and participating in the various workshops and training programs organized by the Secretariat of the Pacific Community and University of Guam. The local farmers gained knowledge in the area of pest management for the various crops, including fruit trees and vegetables.

c). Source of Federal Funds – Hatch Act, SPC & Local Match

d). Scope of Impact – (Marshall Islands, Micronesia)

Key Theme - Sustainable Agriculture

a). Program Description – [Sustainable Marketing Strategy in Micronesia] - The farm and market survey was done to determine the supply, demand and condition of fresh produce in Palau. The survey showed that there is a big demand for fresh produce that could not be met by local production. Hence, the island continues to be heavily dependent on imported produce. Chinese cabbage and cucumbers were the leading vegetables produced and sold in the market. The local vegetable supply in the market can still be enlarged to meet the increasing demand and reduce dependence on imported produce. Results of the survey were published in local newsletters and newspapers.

A vegetable production training was conducted to instruct farmers on best management practices and marketing. Contract growing is effective in ensuring higher incomes and assured market for the farmer.

The final report of this project has been completed and submitted to the USDA. Copies of the final report were also distributed to government and traditional leaders, government agencies as well as farmer and market cooperators.

b). Impact – Information generated from this project provided a database on the status of supply and demand of local and imported fruits and vegetables in the local market. Data have been included in the Palau Statistical Yearbook. Likewise, a publication of the results of the survey in local newsletters and newspapers created an awareness and opportunities for growers to increase local vegetable production especially for those imported products that can be grown under Palau's tropical conditions.

Farmers learned best management practices on soil management, nutrient management, integrated pest management and marketing during the Vegetable Training. Farmers who brought their produce direct to the consumers / end users got a higher price for their produce than those who consigned their harvest to a wholesaler did.

c). Source of Funding – Western Region (WSARE)

d). Scope of Impact – County Specific (Palau)

Key Theme – Sustainable Agriculture

a). Description of Activity - Micropropagation and distribution of elite planting materials of banana variety *"kufwafwa"* were done and ten farmers developed commercial banana farms with 500 or more banana plants of which 30-40 percent of these plants flowered already. Even though there was a 20% loss of plantings due to stormy weather conditions and diseases, about 13,000 or more banana plants were planted as replacements because of the availability of elite seedlings from the project. A significant increase in the production of "Kufwafwa" banana is experienced in Kosrae as a direct result of the project. The Kosrae State Department of Commerce and Industry is surveying the level of production to streamline export.

Workshops to provide training to farmers were conducted and these trainings could help farmers to perform better in the future. Education programs offered by MPPRC staff helped farmers to achieve better results and trainees were oriented to the exciting field of plant tissue culture and better ways of maintaining their banana fields.

Micropropagation and distribution of elite taro seedlings are ongoing.

b). Impact/Accomplishments - In 2002, 16,500 micropropagated seedlings of banana variety kufwafwa were distributed to over 400 farmers in Kosrae. More than 40% of the seedlings distributed in 2002 are in flowering or have already harvested. One farmer brought in the largest bunch he harvested from tissue culture bananas weighing 64 pounds! It is an all time record for variety kufwafwa in Kosrae (Records maintained by the Dept. of Agric. Land and Fisheries, Kosrae State). Many farmers reported good and uniform yield from using tissue culture banana seedlings

Over 12,000 micro-cuttings were planted in the nursery. Of this six thousand and five hundred (6500) elite seedlings of taro were distributed to 42 farmers in Kosrae since the beginning of the project (May 2002). More than 3000 micro-shoots are in tissue culture**.**

Four high school students were trained in laboratory and nursery operation during summer 2002. Researcher offered formal education to students majoring in agriculture at the Kosrae campus. Senior technicians and researcher underwent training in microbiology and cryopreservation of banana meristems respectively.

Researcher along with the Crop production division, Dept. of Agriculture offered training to farmers on farm. Conducted 16 farm visits and advised 76 farmers during these visits on sustainable agriculture practices in banana farming like control of diseases by cultural practices rather than chemical application.

c). Source of Federal Funds – Hatch Act/Smith-Lever/Local

d). Scope of Impact – (Kosrae, Micronesia)

Key Theme – Sustainable Agriculture

a). Description of Activity – The IAS (*Piper auritum*) or locally known as the 'false kava' was accidentally introduced to Pohnpei recently and now it is spreading fairly rapidly throughout the main island. Eradication of the IAS (*Piper auritum*) requires locating sites where the plant is being cultivated, negotiating with the landowner for visits, and spraying with chemical to kill the plants. Extension staffs and Task Force members continued their visits to areas where the false kava have been located and demonstrated to landowners how to spray and how to pull young seedlings before they are established.

b). Impact/Accomplishments - Every individual and farmers who cultivated the invasive species have increased their awareness in risks associated with the cultivation of the IAS. More than 10 farmers reported destroying their own plants and the Invasive Weed Task Force has successfully eradicated the IAS from about 50% of the known locations. Another 20% of the areas affected is considered eradicated but still requires several months of monitoring before total eradication is accomplished.

c). Source of Funds – Smith-Lever/Local Match/SPC

d). Scope of Impact – County Specific (Pohnpei, Micronesia)

Key Theme – Endangered Species

a). Description of Activity - Procedures tested need further verification for the stages in micropropagation of Vitamin A rich banana varieties. Also limited data were collected from few cultures explanted due to difficulty of sourcing for mother plants and available right stage of suckers. Substitution of some media composition was tried for economic reason and availability. Setback of activities on verification trials was encountered in 2002. High contamination of cultures was due to room structure defect resulted to ordinances detonation at premises, room leaks aggravated by 'anomalous wet weather'. A lowland collection area is now in the process of being established.

b). Impact/Accomplishments - Media addition with organic additive and components substitution for in vitro multiplication were tested. Better and faster response was observed on tissues using MS+2.5BA+10CW for initiation medium; same media with higher concentration of organic additive for multiplication. If protocol could be verified and adopted, in vitro multiplication of the bananas could easily be justified for lesser cost and sourcing of media items facilitated albeit advantageous technique.

c). Source of Federal Funds – Hatch

d). Scope of Impact – Micronesia (FSM)

Key Theme – Water Quality

a). Description of Activity – The Water Quality Extension Agent worked with the communities and schools in educating them about water quality issues and also to collect samples of their drinking water to be tested to see if it is safe for consumption. Because the testing kits are costly, the Extension Agent first used an assessment survey of the community water tanks and water catchments and ground water wells, which could determine the condition of the water without having to have it tested in the lab.

The effectiveness of the survey is 99 % accurate because it has been used and compared to the results of the samples that were tested before in the lab, and both results were the same.

b). Impact/Accomplishments – One thousand community water catchments were tested and 80% of them were positive for coliforms. The Extension Agent had visited the owners of the catchments and provided them with measures on how to clean and treat their catchments. Brochures on how to keep water catchments and ground water wells from getting contaminated were handed out during the visits. A follow up visit found that about 95% of those monitored had shown positive changes.

c). Source of Funds – Smith-Lever 3b&c

d). Scope of Impact – County Specific (Marshall Islands)

Key Theme – Water Quality

a). Description of Activity - The Reversed Osmosis unit at the College of the Marshall Islands campus continued to provide monitoring and surveillance of the college and nearby communities' drinking water. On a monthly basis, the Water Quality Extension Agent conducted tests for bacteriological presence. The latest tests found that the water system still provide safe drinking water to students, faculty and staff, administrative officials, and governmental agencies of nearby communities.

b). Impact/Accomplishments - Since the implementation of the RO Unit in 1998, the college has saved a large amount of money compared to when they had to buy their drinking water from the local bottling company. All twenty- four bacteriological tests that were conducted both at the CRE and RMIEPA labs have confirmed that the water is safe for consumption.

c). Source of Funds – Smith-Lever

d). Scope of Impact – County Specific (Marshall Islands)

C. Allocated Resources

Fiscal Resources

Extension

Year	Federal	State	Local	Other
2000	197,037	70,370	14,074	0
2001	201,346	40,129	50,331	0
2002	237,233	47,234	71,382	0
2003				0
2004				0

Research

Year	Federal	State	Local	Other
2000	254,588	53,432	6,286	0
2001	191,591	47,204	38,873	0
2002	203,926	51,742	48,699	0
2003				0
2004				0

Manner of Expenditures:

Budgets coming from the formula funds, competitive grants and other sources like local matching funds were expended as planned in each specific research, extension and integrated research and extension projects. In general, these monies were utilized for the salaries and wages and fringe benefits of administrative and support staffs, and research and extension staffs. International travels for key program personnel to participate in international workshops, meetings and conferences designed for exchange of information, ideas and forming regional collaboration in projects. Domestic travels were for monitoring research and extension projects. Publication/printing costs were incurred as a result of publishing articles in local newspapers, scientific journals and manuals, proceedings, pamphlets and brochures. Communication cost between the six delivery sites and the Central Office located in Pohnpei and with offices collaborating with COM through phone calls, faxes, e-mails and regular mails incurred as well.

Human Resources (FTEs)

Extension FTEs

Year	Professional			Paraprofessional		
	1862	1890	Other	1862	1890	Other
2000	1.80	0.0	0.0	12.80	0.0	0.0
2001	2.00	0.0	0.0	13.85	0.0	0.0
2002	3.30	0.0	0.0	13.15	0.0	0.0
2003	0.00	0.0	0.0	0.00	0.0	0.0
2004	0.00	0.0	0.0	0.00	0.0	0.0

Research SYs Only

Year	Scientist Years			Research Assistants		
	1862	1890	Other	1862	1890	Other
2000	2.40	0.0	0.0	2.67	0.0	0.0

2001	2.50	0.0	0.0	3.10	0.0	0.0
2002	2.50	0.0	0.0	1.55	0.0	0.0
2003	0.00	0.0	0.0	0.00	0.0	0.0
2004	0.00	0.0	0.0	0.00	0.0	0.0

From the FY2002 FTE of 72.31, 20.50 has been assigned under GPRA Goal 4, representing 28% of FTE input. The FY2002 budget allocated to GPRA Goal 4 takes into account this FTE distribution plus how Goal 4 integrates with the programs conducted by COM as a whole.

VI. GOAL 5 - TO ENHANCE ECONOMIC OPPORTUNITIES AND THE QUALITY OF LIFE AMONG FAMILIES AND COMMUNITIES

A. GOAL ACCOMPLISHMENT NARRATIVE

PCC-CRE:

The Cooperative Extension Service has been in Palau for the past twenty years and the local people know what programs are available to them. Collaboration has been established with women's groups, youth groups, and other community associations and government and private agencies. The existing collaborative efforts and new coalitions have made it possible for PCC-CRE to offer programs to clienteles who are in need of assistance and those who requested for specific programs. Due to staff turnover, the personal sewing classes were suspended this fiscal year.

The global economic crunch as a result of September 11 has not exempted Palau from its pressures. A number of small stores have closed down due to drop in sales. Many businesses have been forced by limited income to lay off workers. Informational brochures on family resource management (pointing ways out of poverty) that targeted individuals and families with limited income and other resources were extended to government employees at the bottom end of the pay scale. At the request of clients, several popular and informative brochures were reprinted.

CMI-CRE:

Extension agents visited three outer atolls this year to conduct awareness and outreach programs. Extension staff visited these atolls as part of the Republic of the Marshall Islands Mobile Team (RMI Mobile). The RMI Mobile Team is a coalition of staffs from the College and from various governmental agencies that provided technical assistance and skill building information to outer island communities.

COM-FSM/CRE:

Pohnpei Site:
Extension staffs were engaged in outreach educational programs to enhance social and economic well-being of families and communities. Presentations and demonstrations were provided to groups and to individuals in the communities and at schools on topics ranging from home gardening, crop production, and on special commodities such as banana and black pepper for the export market.

Chuuk Site:
Community resource development and youth programs continued in schools and in some communities. On-going collaborative efforts with the Chuuk Women's Association was conducted through leadership training and family resource management programs.

Youth development programs were focusing on at risk youth who are no longer in school. Youth activities were organized through the formation of a Girls Scout program and sports competitions. Extension staff organized youth summer programs to help school dropouts and provided opportunities for children to interact with one another and to discuss issues and problems at home and in the communities.

Yap Site:
Surplus from crop production has been one way of making extra cash at the market place and provide for family security. Farmers usually would sell some of their harvest to support other needs of the family. Extension agents continued to assist subsistence farmers on ways of sustaining their crop production technology and provided assistance on marketing strategies. A community beautification project is one way of making an income and 4-H clubs have been involved in a number of landscaping projects in the communities.

Other strategies for income generation are the initiation of a fish bond project for the production of milkfish, rabbit fish, and mangrove crabs. These are some ways of replacing the rapidly depleting marine resources with new technologies for individuals and families to get involved in. The interest on pearl oyster production is spreading quickly and survey of wild stocks has been conducted at several sites.

B. Key Themes:

Key Theme – Children, Youth and Families at Risk

a). Program Description – Brochures on children's daily nutrition and three tables on nutritional values were developed by Extension staff and were used with thirty sophomore students at the Mindzenty High School, following a request from the teacher. Ninety copies of nutrition tables on fresh fruits, green leafy vegetables, root crops and cereals were made available to the students. The students also received thirty copies of the Children's Daily Nutrition Table**.**

b). Impact**/**Accomplishments – According to the teacher, 100% of the students had increased knowledge on which local foods are more nutritious after using the tables.

c). Source of Funding – Smith-Lever Act Funds

d). Scope of Impact – State Specific (Palau, Micronesia)

Key Theme – Family Resource Management

a). Description of Activity – [Family Budgeting] - Eight hundred fifty copies of the brochure "Holes in Your Pocket" were distributed to the general public. The brochure helped in outlining the pitfalls of careless spending and offered advice and solutions on how to curb such activities.

b). Impact – Three top administrators at Palau Community College and several staffs had quit chewing tobacco and many others quit chewing betel nuts and smoking in order to cut down on spending and for health reasons. The Minister of Health who is also the Vice President of the Republic used the brochure to show the public how to save money and to help with rising medical cost to the Republic.

c). Source of Funding – Smith-Lever Act Funds

d). Scope of Impact – County Specific (Palau)

Key Theme – Family Resource Management

a). Description of Activity – Sewing lessons provided homemakers an opportunity to learn new skills and to save on buying costly ready-made clothes. Personal sewing classes consists of three levels: basic, intermediate and advance. Sewing programs were conducted at two sites for homemakers and young mothers.

Sixty-seven homemakers were trained on sewing simple pattern for adult and children dresses and other patterns such as nikotang, rags, oven mitts, pan holder, and mumu. Homemakers were also trained on different parts of the sewing machine and how to operate it.

b). Impact/Accomplishments – A good percentage of the participants have started sewing for their family with the knowledge and skills they gained from cutting patterns and actually sewing dresses for their family.

c). Source of Funds – Smith-Lever 3b&c

d). Scope of Impact – (Chuuk & Kosrae, Micronesia)

Key Theme - 4-H/Youth Development

a). Program Description – The Summer Marine Science Program was designed for high school students to inform them about Palau's marine life. Informative lectures were provided to the students by CRE staffs and local scientists, covering marine areas such as the mangrove forest, unique marine lakes, and the coral reefs. Field trips were conducted to the famous Palau rock islands to learn about their formation and to identify the marine lives there.

b). Impact – All seven students demonstrated an increase in knowledge and appreciation

of the marine world. The student had passed all ten daily quizzes and a final exam, demonstrating their newly obtained knowledge and understanding of the marine world.

c). Source of Funding – Smith-Lever Act Funds

d). Scope of Impact – County Specific (Palau)

Key Theme - 4-H/Youth Development

a). Description of Activity – The 4-H Extension Agent visited 3 high schools and provided programs on community social problems, such as the use of drugs and alcohol, teen pregnancy, smoking and chewing tobacco, and suicide among teenagers. As the population is growing so rapidly and there is shortage of jobs and other things to do, these are topics of major concern for parents and the communities.

b). Impact/Accomplishments – A total of 303 students attended and participated in these presentations and over 80% of them has become aware of the problems and are making positive changes in their lives.

c). Source of Federal Funds – Smith-Lever

d). Scope of Impact – County Specific (Marshall Islands)

Key Theme – 4-H/Youth Development

a). Description of Activity – A two-week summer workshop was conducted by the 4-H and Agriculture Extension Agents. 25 students ranging from ages 12-16 attended the workshop. During the two weeks, the students learned home gardening skills and food handling and preparation skills. Some of the students were able of start their own gardens and some were able to prepare nutritious recipes. The students were taken on field trips to visit the college laboratories, farms and offices. They had a camp out at the College Science Station.

b). Impact – All 25 students completed the workshop and were awarded certificates. They all had positive feedback about the program and wanted the program to continue next Summer.

c). Source of Federal Funds – Smith-Lever

d). Scope of Impact – County Specific (Marshall Islands)

Key Theme – 4-H/Youth Development

a). Description of Activity – Outdoor Wildlife is an educational program for high school students focusing on the terrestrial life in Palau. The 14-day program enabled students to learn about insects, endemic birds, medicinal plants, reptiles and amphibians from local wild life experts. Entomologists and other local experts assisted the students and provided lessons on biological control of insect pests and conservation of the mangrove forest.

b). Impact – Students are now aware of the different wild life species and their habitats and

learned how to prevent destruction of the mangrove forest. Pre and Posttests administered showed a dramatic increase in understanding of the flora and fauna of Palau and ways of conserving the wild life.

c). Source of Federal Funds – Smith-Lever

d). Scope of Impact – (Palau, Micronesia)

Key Theme – 4-H/Youth Development

a). Description of Activity - Every summer, from August to September, an average of 40-60 youths enroll in the Youth Summer Program. This year the youth summer Training Program was provided to out-of-school youths from different communities. Extension staffs and volunteers worked with these children and provided programs on social problems that all societies are facing today. These children learned to love one another and to respect the elderly. They were also provided information on the problems of teen pregnancy, substance abuse, alcohol and tobacco use, and dropping out of school. The love of God, family and the community were also part of the training.

b). Impact/Accomplishments - Seventy (70) out of school youths completed the training and went home with a better perspective about life and new directions for the future.

c). Source of Funds – Smith-Lever

d). Scope of Impact – Chuuk, Micronesia

Key Theme - Workforce Preparation – Youth

a). Program Description – Fifteen apprenticeship positions gave high school juniors and seniors an opportunity to gain valuable knowledge about the vast fields of agriculture, marine science, and home economics. Under the supervision of Research and Extension staffs, students developed their own research and extension projects. The students worked with and assisted the agriculture, marine science, and home economic staffs in order to gain actual work experience in these areas.

b). Impact/Accomplishments – Many of the interns continued their interest in these fields of studies at the college level. Agriculture, marine science, and home economics are now career choices for some of the students after they participated in an actual professional work environment

c). Source of Funding – ADAP

d). Scope of Impact – State Specific (Micronesia)

Key Theme – Promoting Business Education

a). Description of Activity – Through collaborative efforts with the Chuuk Department of Commerce and Industry, two workshops were conducted for business entrepreneurs and others who are aspiring to become business owners. Information on different aspects of operating a business and procedures for securing business loans was shared

with participants. Different speakers from the business community shared information with participants from the Chuuk Women Small Business Association, who are mostly small business owners.

b). Impact/Accomplishments – Participants had gained knowledge on how to secure funding assistance and had gained management skills. A few small businesses on locally crafted potholders, bags, and picture frames have been initiated

c). Source of Funding – Smith-Lever

d). Scope of Impact – (Chuuk, Micronesia)

Key Theme – Jobs/Employment

a). Description of Activity - The project on development of a pearl aquaculture industry and expertise in Micronesia is progressing well with additional funding support from the Department of Interior. The project commenced in earnest with the recruitment of an Australian expert in pearl oyster hatchery technology and the establishment of a low-tech hatchery in an abandoned dock warehouse in Pohnpei.

The pearl expert and his Micronesian staff/trainees have successfully conducted three spawning events during Phase I which resulted in tens of thousands of black-lip pearl oyster spat (juveniles) which are growing well at three pilot pearl farms in two island communities of Pohnpei State. Two Micronesian staff and a new trainee from the Outer Island of Yap are being trained as future trainers in production and farm grow-out technology. In addition to these trainees, about 30 other Micronesian trainees/volunteers have been involved in the hatchery and farming activities.

In view of the successful results that were achieved during the first year of this project, there is willingness and enthusiasm to implement the remaining objectives of the project. These objectives include production trials for round pearls and the aggressive promotion of pearl business development. The implantation of round nuclei (pearl seeding) will be performed by one of the best pearl technicians from the cultured black pearl industry. The pearl production trials and the business development programs will be extremely important in the development of the pearl industry in the Micronesian region. In addition to the trial pearl production, an effective preventive measure against the predation on the juvenile oysters will be researched to improve grow-out techniques.

b). Impacts/Accomplishments - Some of the results so far with this project are: (1) the establishment of a low-tech operational pearl oyster hatchery; (2) training of Micronesian staff on all aspects of hatchery production and ocean-based grow-out farms; (3) the establishment of three pilot grow-out farms at two island communities; and (4) farming skill training of the Micronesians in the rural and island communities.

c). Source of Funds – Hatch Act & DOI

d). Scope of Impact – State Specific (Micronesia)

C. Allocated Resources

Fiscal Resources

Extension

Year	Federal	State	Local	Other
2000	139,005	49,645	9,929	0
2001	130,589	26,027	32,644	0
2002	156,473	31,155	47,082	0
2003				0
2004				0

Research

Year	Federal	State	Local	Other
2000	65,781	13,806	1,624	0
2001	78,689	19,387	15,966	0
2002	44,310	11,243	10,581	0
2003	0	0	0	0
2004	0	0	0	0

Manner of Expenditures:

Budgets coming from the formula funds and local matching funds were expended as planned in research, extension and integrated research and extension projects. In general, these monies were expended on salaries and wages and fringe benefits of the Vice President, key program, research, extension and administrative staff. International travels were for key program personnel to participate in international workshops, meetings and conferences designed for exchange of information, ideas and forming regional collaboration in projects. Domestic travels were for monitoring research progress in effectiveness of programs. In some instances when local experts are not available locally like social scientist, funds were allotted to hire consultants from other land-grant institutions or nearby institutions for a period of one to two weeks to assist in the respective activities. Publication/printing costs for publishing articles in local newspapers, scientific journals and manuals, proceedings, pamphlets and brochures were acquired. Communication between the six delivery sites and to the COM Central Office in Pohnpei, and to offices collaborating with COM through phone calls, faxes, e-mails and regular mails were part of the total expenditures.

Human Resources (FTEs)

Extension FTEs

Year	Professional			Paraprofessional		
	1862	1890	Other	1862	1890	Other
2000	3.00	0.0	0.0	7.30	0.0	0.0
2001	2.28	0.0	0.0	8.00	0.0	0.0
2002	3.05	0.0	0.0	7.80	0.0	0.0
2003	0.0	0.0	0.0	0.00	0.0	0.0
2004	0.0	0.0	0.0	0.00	0.0	0.0

Research SYs Only

Year	Professional			Paraprofessional		
	1862	1890	Other	1862	1890	Other
2000	1.01	0.0	0.0	0.3	0.0	0.0
2001	1.20	0.0	0.0	1.1	0.0	0.0
2002	0.68	0.0	0.0	0.2	0.0	0.0
2003	0.0	0.0	0.0	0.0	0.0	0.0
2004	0.0	0.0	0.0	0.0	0.0	0.0

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From the FY2002 FTE of 72.31, 11.73 FTE has been assigned to programs addressing GPRA Goal 5, representing 16% of FTE input. The FY2002 budget allocated to GPRA Goal 5 takes into account this FTE distribution plus how Goal 5 integrates with other programs conducted by COM as a whole

Management Key Themes:

Key Theme – Multicultural and Diversity Issues

a). Brief Description of the Activity - The Civil Rights Performance Plan to cover the period 2001-2004 was presented to a small group at the Western Extension Administrators Conference in Maui, Hawaii for feedback. The Plan will further strengthen efforts to ensure equal access and opportunity in all aspects of federally funded and assisted programs. Much of the goals and procedures in this new Plan are the result of information obtained from the Maui meeting. Assessment of the Plan and further discussions will be conducted with COM staff and other potential stakeholders to ensure full commitment to its implementation.

b). Impacts/Accomplishments – So far, there is an increased understanding of Civil Rights laws and regulations and their impact on Research and Extension programs. Two staff attended the Western Extension Administrators Conference in Maui, Hawaii where Civil Rights/EEO matters were part of the meeting agenda. All activities with regards to responsibilities of parties under Memorandum of Agreements, Memorandum of Understanding, etc. are in compliance with non-discrimination requirements of the Civil Rights Act of 1964, as amended, Title 9 of the Education Amendment of 1972, as amended, and Section 504 of the Rehabilitation Act of 1973.

c). Source of Funding – Smith-Lever 3b&c

d). Scope of Impact - Micronesia

Key Theme - Information Technology

a). Description of Program - A continuing effort has been to provide access to the global information superhighway to the colleges and communities. The relative isolation of some islands has made access to current information very costly as well as difficult.

b). Impact/Accomplishments – Purchase of high-speed computer systems with built-in communication hardware and software are now providing research and extension staffs

the capability in surfing the WWW. Most land-grant offices have computer systems and are now capable of accessing the WWW for information gathering. The Video Teleconference (VTC) capability is now available at the colleges, so college faculty and staff have been using this new technology for meetings and conferences.

c). Source of Funding – Smith-Lever/Hatch

d). Scope of Impact – Micronesia

Stakeholder Input Process:
On-going consultation through public meetings were held to discuss the U.S. Federal requirements, stakeholder input and the implementation role by COM Land Grant Program faculty and staffs. Needs assessment surveys with government offices and agencies, farmers, private organizations, church groups, 4-H clubs, and NGOs were conducted. During these meeting, the public was asked or invited to define and rank issues of concern to them. Issues ranging from food security to women issues were noted.

Stakeholders input process included open forum and interviews with government and traditional leaders, collaborating agencies, and community-based organizations. Solicitation for input also occurred through direct written invitations to Ministries, Senators and Mayors, and through announcements that were placed in local newspapers and were aired over radio stations

The three college presidents and the vice-residents for Cooperative Research and Extension have made state visits to the different states throughout the Micronesia to meet with state leaders and community members to solicit input on state needs and issues.

The College of Micronesia Board of Regents acts as an advisory body to the COM land-grant program. The board met more frequently during the year as renegotiation of the Compact of Free Association for FSM and Marshall Islands continues and the status of land-grant program is still in limbo. Accomplishment reports for land-grant program are always an item in their meeting agenda.

The College evaluates the relevance of priorities and concerns of the island governments with those set by the funding sources. These sources are the USDA, South Pacific Commission, Australian Center for International Research, Agricultural Development in the American Pacific and local donors, like the National Congresses, local legislatures, Board of Trustees/Regents for the three Colleges, COM Board of Regents and local governments.

The review of programs was an integral part of the recently concluded renegotiation of the Compact of Free Association between the Governments of the Republic of the Marshall Islands and the Federated States of Micronesia and the U.S. Government. The College of Micronesia Land Grant Programs will continue to serve the needs of the people and the communities throughout Micronesia for the next 20 years.

Program Review Process:

Merit Review

The standard procedure for program proposals is to subject each proposal to an in-house review by an internal review team composed of researchers, specialists and extension agents. The review team edits and makes comments and suggestions on the program / project proposal before it is finalized. Once finalized, the program / proposal goes through a review process, this time with College administrators, the local College Board of Trustees, through the College of Micronesia (COM) administrator, and finally through the COM Board of Regents before it is sent to the USDA or non-USDA funding agency.

Advisory committees established at the three colleges continued to review plans of work as they relate to agriculture, family and consumer sciences, and community economic development needs of the three nations under the College of Micronesia system. Advisory committees situated at the three colleges provided the review of programs based on the priorities of the governments and non-governmental organizations. The COM Board of Regents and the local Board of Regents at the three colleges were involved in these reviews, as they are also members of these advisory committees. The COM administration and faculty served in these committees as resource persons. All attempts were made to include a broad based advisory group, which represents a multi-institutional and multi-disciplinary effort.

Scientific Peer Review

A peer review process has been in use for research proposals. The peer review team includes administrators and researchers. They reviewed proposals for their potential impact and their relevancy to the communities and their fragile ecosystems.

A project proposal goes to the internal review team and outside experts who also specialized in the field of the proposed project. Once the comments and suggestions of the reviewers are included in the final project proposal, it goes to the AES Director at COM Central Office for his comments and final endorsement to the USDA for approval.

At the colleges, peer review teams have been organized. Other professionals at land-grant institutions through the Agricultural Development in the American Pacific (ADAP) coalition and other collaborating agencies in the South Pacific region were always invited to review and comment on proposals, in order to satisfy the need for a multi-institutional and multi-disciplinary requirement.

Evaluation Of Success Of Multi And Joint Activities

The project in Goal 4, particularly on Biological Control of Invasive Weeds is a joint project involving University of Guam (UOG) and Palau Community College Cooperative Research and Extension (PCC-CRE). This joint activity enabled both institutions to find appropriate methods of controlling a species of weed that occurs in Guam and Palau. The research endeavor proved successful in that the gallflies that were introduced from Palau to control the Siam weed are well established, dispersing themselves naturally and are preventing the weed to produce flowers and therefore no weeds are being produced. The Principal Investigator from UOG travelled to Palau to see for himself the success of this joint effort in controlling the weed. At the same time,

other aspects of activities that need to be undertaken to ensure continuing success of reducing the threat of this weed to the native vegetation were also discussed.

The management of natural resources is an important aspect of every farm if Palau's natural resources are to be maintained. PCC-CRE staffs work closely with the USDA Soil Conservation Office, Palau Conservation Office, and other government agencies. Together, they created a conservation plan for the PCC-R&D Station with the aim of demonstrating to farmers how agriculture production can be conducted in harmony with the environment. Likewise, the staff works with state governments, resource managers, and conservation officers in the planning and management of the marine environment.

List of Acronyms

1. ADAP – Agricultural Development in the American Pacific
2. CMI – College of the Marshall Islands
3. CMI-CRE – College of the Marshall Islands Cooperative Research and Extension Department
4. COM – College of Micronesia
5. COM-FSM – College of Micronesia – Federated States of Micronesia
6. COM-FSM/CRE – College of Micronesia – Federated States of Micronesia/Cooperative Research and Extension Department
7. FSM – Federated States of Micronesia
8. IAS – Invasive Alien Species
9. IBPGR – International Board for Plant Genetic Resources
10. MISS – Marshall Islands Science Station
11. Micronesia Plant Propagation Research Center
12. PCC – Palau Community College
13. PCC-CRE – Palau Community College Cooperative Research and Extension Department
14. RMI – Republic of the Marshall Islands
15. ROP – Republic of Palau
16. SPC – Secretariat of the Pacific Community
17. UNDP – United Nations Development Program
18. UOG – University of Guam
19. USP – University of the South Pacific