Annual Report of Accomplishments and Results

Research and Extension Programs

College of Micronesia Land Grant Programs

Fiscal Year 2005 (October 1, 2004 – September 30, 2005)

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ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS FOR COLLEGE OF MICRONESIA FOR FY 2005:

GENERAL OVERVIEW

During FY 2005, integrated research and extension programs continued to address critical economic, social, and environmental issues affecting small island communities in Micronesia and providing new information and technology to improve the quality of life of Micronesians.

With a mostly rural population that lives on low-lying coral atolls with fragile ecosystems, Micronesian farming of both crops and livestock are mostly on a subsistence nature. Aquaculture/mariculture demonstration projects are also continuing with advances in appropriate technology to transfer the technical know-how to Micronesians to enable them to start engaging in projects that would support the local economy and provide for employment to the indigenous population.

Research and development activities to help improve agricultural productivity, self-sufficiency, provide for food security, and enhance quality of life are continuing. The potential of simplified hydroponics to improve health and the economy, and utilization, processing and development of new products from banana, taro and cassava that are acceptable to the native population and in the local markets are ongoing projects. 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 high yielding) of certain banana varieties that will improve the quality and quantity of certain banana varieties for the export market are also continuing. A research project has looked at determining comparative resistance of different taro varieties to the taro leaf blight disease. Other ongoing research projects are the germplasm of staple root crops, namely sweet potato, cassava and taro, has ensured the genetic conservation of these valuable resources for future generations and the supply of planting materials to growers and the in-vitro multiplication of other food crops such as breadfruit and pandanus.

Activities are on-going toward resistant crop varieties and practical biological pest control measures to provide useful tools to the stakeholders for combating crop pests and diseases and increase productivity of tropical food crops. The biological control of the melon aphid and mile-a-minute is progressing well with the successful control of gallflies and mired bugs with *Chromolaena* and taro leafhopper. Activities are ongoing for the biological control of the *Mimosa diplotricha,* which is still growing along roadsides through the use of the psyllid insects.

The developing technology for the farming of pearl oyster has enabled the establishment of pilot farms in Pohnpei and the Marshall Islands and plans are underway for the transfer of this technology to other parts of Micronesia. The pearl oysters project will encourage local pearl oyster production that will benefit farmers, develop pearl oyster culture industries, create job opportunities, and support national revenues. Two new aquaculture projects involving the development of locally available feed ingredients for mass culture of giant fresh water prawn and the culture of rabbit fish also have been initiated.

Outreach programs continued to focus on a wide range of critical issues ranging from food safety and quality, health and nutrition, food security, soil management, environmental education, strengthening families and developing youth, developing leadership and volunteerism, and managing limited natural resources and the environment. The nutrition, diet

and health programs continued through a consortium of the five land-grant institutions in the American-Pacific region to stress the importance of healthy lifestyles, which include behavioral changes (physical activity and consumption of safe, nutritious local food) to combat the ever rising tide of obesity, diabetes and heart diseases and other NCDs among both children and adult. A project on endangered species of banana is trying to multiply these rare banana varieties to help with the nutritional needs for Vitamin A among both children and adult.

The youth development 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 and home economics and appropriate island lifestyles. More and more students are now exposed to computers through computer training programs at schools that provided the opportunity for children to use the Internet as an introduction to electronic connectivity and information gathering.

Water quality education programs continued in some of the island communities as collaborative efforts with international and regional organizations, government agencies, and community groups on monitoring and surveillance testing of water sources in selected areas continued. 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 fragile island ecosystem integrity and biodiversity.

Multi-state, multi-institutional and multi-disciplinary efforts continued through the consortium of the 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 still a continuing shortage of necessary human resources and professional staff, therefore 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 research/extension apprenticeship program and financial assistance for college students enrolled in agriculture and home economic courses.

Other capacity building activities included sustainable agriculture workshops, pesticide application, tissue culture and nursery practice, integrated pest management, cooking demonstrations, and basic sewing attended by farmers, producers, homemakers, 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:

Four key themes were addressed this year, namely: plant germplasm, innovative farm techniques, aquaculture and value added products from root crops.

For plant germplasm, maintenance and conservation of the root crops germplasm collection currently being done at the PCC Research and Development Station has ensured the conservation of these valuable genetic resources for the future generation. Planting materials obtained from this germplasm collection has also been distributed to farmers. Moreover, mass propagation of high yielding and disease-resistant taro planting materials by tissue culture has provided disease-free taro planting materials for distribution to farmers. Likewise, maintenance of the taro germplasm collection in vitro ensures the preservation of Palau's indigenous taro varieties against harsh environmental stresses, as well as pests and diseases.

On innovative farm techniques, the use of *kisaks* (*Pongamia pinnata*) as mulching material for taro grown in wetland (*mesei*) condition gave the highest corm yield. Upland taro applied with fertilizer and manure gave higher corm yield than unfertilized taro. The use of appropriate production technologies showcases and provides critical information on the importance of these techniques for increasing farmer's income and yield. A new project on Research and Demonstration of Banana Production Technologies in Micronesia has been approved for funding by Western SARE. Banana planting materials are being produced by tissue culture in the laboratory.

On aquaculture, facilities and water supply for the hatchery of the giant freshwater prawn are being completed. A request for an Import Permit to bring Macro brachium rosenbergii into Palau has been submitted to the Bureau of Marine Resource. Likewise, another aquaculture project on Culture of Rabbit fish has been approved by USDA. The problem of protozoan infestation of rabbit fish collected as breeders has been alleviated by hypo salinity and copper sulphate as prophylactic treatments.

For value added products from root crops, fifty processed foods from taro and cassava were standardized. Likewise, six food technology brochures were prepared for teaching and outreach purposes.

CMI-CRE:

Research and extension programs continued to address important agriculture and aquaculture issues affecting low-lying coralline atolls. With limited natural resources, agriculture and aquaculture research and extension programs and activities were augmented with the establishment of a pearl oyster research and development station and through a collaboration with the Center for Tropical and Subtropical Aquaculture (CTSA) for pearl oyster development and small farm development and swine production with the Taiwanese Agriculture Technical Mission and with the Marshall Islands Government Ministry of Resources and Development.

Due to these aquaculture programs, there has been a sustained interest in pearl farming from the outer atoll communities and it with this interest on alternate/supplementary income generation that the research project is written. Representatives from several of these outer atolls have been trained with the Project Research Scientists at the established CMI pearl

hatchery and demonstration farm on all aspects of pearl hatchery, nursery and spat grow-out husbandry techniques.

COM-FSM/CRE:

Yap Site:
Hydroponics system has been accepted as a new technique for vegetable production, which has shown better yield and faster return as compared to traditional methods of vegetable cultivation. Ongoing research activity for this project is to standardize the protocols for the low cost production of vegetables.

Extension activities were focused on small agricultural production such as home gardening and sustainable agriculture program that address basic needs of individuals, family and island communities in support of the Government's efforts in providing sustainable development and recovery from devastation caused by typhoons. Development of aquaculture programs in collaboration with appropriate governmental agencies is still an ongoing effort.

Chuuk Site:
An assessment to determine agricultural needs was carried out with stakeholders throughout the State. Extension agents continued to provide training programs, demonstrating nursery techniques and the production of vegetables, root crops and bananas. High nutrient value banana varieties are being promoted for domestic use and potential for the export market. Planting materials of these crop varieties were prepared and distributed to farmers and follow up visits to recipients of the "*Uht karat",* a vitamin A rich variety of bananas were conducted at farm sites to monitor the growth rate of the new and rare banana variety.

Pohnpei Site:
Research activities included two Hatch-funded projects. The first project is a collaborative effort with the Secretariat of Pacific Communities (SPC) and a local farmer group on a research project on eighteen different varieties of Colocasia spp taro imported for taro leaf blight (TLB) resistance/tolerance test. Additionally, four leaf-vegetable Colocasia varieties were introduced for similar tests. The second project is the for the purpose of collection, preservation and multiplication of nutrient-rich rare banana varieties.

With regard to the swine improvement program, Extension Agents trained farmers in proper herd management, including disease control, breeding stock selection, feeding, housing and environmental concerns. Similar training sessions were conducted in three communities and two High Schools.

As part of an ongoing effort to restart/reestablish the Pohnpei black pepper industry, extension agents provided technical assistance to one pepper farmer who now cultivates five acres of the black pepper plants, from which there is potential for processing, packaging and marketing of the World renowned gourmet product. The project has already employed four field workers to help in the maintenance of the five acres and in the processing of it.

To control the yam disease Anthracnose and to help with the declining in yam production, five thousand pounds of Anthracnose resistant yam varieties were received from SPC and distributed to fifty farmers. The program on the eradication of the false sakau (*Piper auritum*), Mile-a-Minute (*Mikania micrantha)* and other exotic and invasive species continued with the collaboration of SPC, and the Conservation Society of Pohnpei (CSP), a local NGO.

Efforts are continuing for the establishment of a pearl industry and training of local Micronesian in the pearl technology. With three existing demonstration farms, more trainees learned hatchery and farm management skills. Efforts are now shifting to the organization of community groups to form cooperatives to transfer the technology and start engaging in small community pearl farms.

Kosrae Site:

The researcher for Kosrae Campus resigned in early February and a replacement scientist in the same profession has been hired to continue the work at the Micronesia Plant Propagation Research Center. Research programs continued with the tissue culturing of banana and Colocasia taro and the micropropagation and distribution of elite banana varieties that are rich in Vitamin A. Another banana project is on the preservation of 22 identified rare banana varieties.

Other agricultural projects focus on the micropropagation of 7 citrus varieties and standardization of somatic embryogenesis protocol for sweet orange and lime and the multiplication of kava through the nursery techniques for fast and reliable plant materials.

B. Key Themes:

Key Theme – Adding Value to Agricultural Products

a). Description of Activity – The project on processing of root crops in the Republic of Palau addressed the problem of low agricultural productivity and increase in importation of foods into Palau, causing self-insufficiency and lack of food security. Production and utilization of local foods like taro, cassava and sweet potato will result in self-sufficiency and enhancing food security in the Republic. During the reporting period, fifty processed foods were standardized, namely, 22 frozen, 15 dried, 10 baked, and 3 fermented products. Taro ice cream and taro cookies were evaluated by 35 members of Palau Chamber of Commerce, 150 students, teachers and parents, 10 foreigners who are teachers from Yap and 200 visitors during the PCC Charter Day and Earth Day celebrations. Six food technology brochures were prepared for teaching and outreach purposes.

b). Impacts/Accomplishments – In Progress

c). Source of Funding – Hatch Act

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

Key Theme – Agricultural Competitiveness

a). Description of Activity – Planting materials of four varieties for vegetable-leaf taro was received in 2005. The varieties are entries to the taro leaf blight (TLB) resistance/tolerance evaluation. Rearing of the varieties in the shade house in preparation for the field planting is now being conducted. They are being multiplied in vitro and ex vitro using standard and modified protocols. The varieties differed in their response to the recommended MS with BA/BAP and MS with BA/BAP plus auxin (NAA) added with organic supplements reported in the previous year. Two types of cytokinins (BA/BAP and Ki, growth regulators used to induce cell division) at three concentrations with auxin at two concentrations were tested for best response. Hawaii and SPC media with added higher levels of nitrogen from two kinds of N-source at eight different

combinations were tested. The trials were conducted to increase the number of plantlets produced through in vitro multiplication. The modifications were made in the attempt to lower cost of TC propagation and for easier sourcing of some of the media components. Nursery multiplication is being conducted to increase knowledge on the introduced taro varieties for conventional multiplication techniques. Observation on variety growth and multiplication characteristics showed positive responses to higher levels of N in the form of Urea.

The refinement in the developed protocol on the in-vitro propagation of bananas for the expected responses of the varieties to the culture system is continuing. Locally known rare bananas *Utin Iap', 'Akadahn Weitahta'* and a recently introduced variety known as 'Macau' were requested by Pohnpei State Agriculture for the project. Collection of planting materials had been delayed due to scarcity of good quality materials of these varieties. When sufficient parent materials are established, a modified/alternative in-vitro propagation protocol would be developed. Organic supplements (coconut water, others) and media component substitutions (energy source: different brands of table sugar), gelling agent – kitchen cooking unflavored gelling materials will be used. Concentrations of these organic additives and substitutes would be tested for best response. Small amounts of tissue culture of rare banana varieties were produced. The first batch of 'Akadahn Weitahta' explanted died. This could be due to the quality of the suckers collected affected by the condition of the mother plants.

Regular field maintenance of 1200 bananas at the two sites is being done for future pest evaluation and planting material source. Fruiting/yield data, other horticultural parameters (IPGRI descriptors) and consumer sensory taste acceptability evaluation were collected. Cumulative monthly BLS, flower and harvest data from November 2001 to February 2005 were collated and are being analyzed. Summary of the data for FHIAs was done and submitted to SPC for the Banana and Plantain Network (BAPNET) conference in 2005 and poster presentation in the 2005 World Food Day celebrations in Pohnpei.

b). Impact/Accomplishments – Taro Trials on Leaf Blight Resistance/Tolerance is an ongoing project and the collection and multiplication of in-vitro of Pohnpei bananas is a new project.

As to the Banana trials resistant to BLS, increasing numbers of households requested for planting materials of the banana hybrids. To date approximately 150 households have received planting materials of the FHIA varieties and some of the other varieties. So far, one thousand five hundred planting materials were distributed. Of this amount, one-third have produced harvestable bunches averaging 25 pounds. At the local value of 15 cent per pound resulting in community income of $1,875.

c). Source of Funds – Hatch Act & ADAP

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

Key Theme – Animal Production Efficiency

a). Description of Activity – Five existing farms received technical assistance from the agriculture extension agent on information on proper swine production and management, including hands-on demonstrations on how to improve their local breeds

in terms of the amount of commercial feed and type of feed to use, feeding and weaning of piglets, and sheltering of the sick animals. In order to realize the full potential of swine production, the extension agent who had successfully completed a Paraveterinary training program, worked very closely with Taiwanese animal husbandry experts from the Taiwan Agriculture Technical Mission to promote swine production and provide the information that the small swine farmers needed to maintain healthy swine herds to help with family nutritional need and for a modest income at the market place.

Two brochures on swine production have been developed and translated into the local language: 1. Effective Ways of Rearing and Caring for Weaned Piglet up to Slaughtering; and, 2. The Effective Methods and Ways of Caring of Sow after Furrowing.

b). Impact/Accomplishments – Swine farmers have gained the knowledge necessary to raise healthy pigs for family consumption and some were able to generate additional income from the sale of their pigs.

c). Source of Federal Funds – Smith-Lever

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

Key Theme – Animal Production Efficiency

a). Description of Activity – The agriculture extension staff provided farmers with technical assistance on proper swine management and practices through farm visits, demonstrations and training. CES staffs frequently received farmers at the office during for individual guidance on piggery farm production efficiency and management, which included the administration of medication, rearing and weaning of piglets, castration, feeding and watering, keeping pig in clean and healthy environments, and use of pig manure as fertilizer. A total of 389 clientele participated in training programs conducted in the rural communities and one hundred and twenty-four visits were made to mostly backyard operations in response to requests. A total of 180 telephone calls were referred to CES from Agriculture Station and other agencies involved in animal husbandry.

b). Impact/Accomplishments – About 80% of requests made were to verify the proper use of antibiotic and treatment for parasite, which is a significant improvement from previous years when most requests were for demonstrations and administration of medication. Seven farmers indicated an increase in total sales of pigs due to a combination of increased live-weight, faster growth rate and reduced feed cost. It is estimated that 35% of swine effluent is now being used as fertilizer. One farmer indicated increase in crop production resulting from use of manure and effluent as fertilizer.

c). Source of Federal Funds – Smith-Lever

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

Key Theme – Aquaculture

a). Description of Activity – The pearl quality improvement research has been progressing well. The research was conducted to assess pearl formation and quality as part of the Federal Hatch research project titled “Improving Quality of Pearls from the Blacklip Pearl

Oyster *Pinctada margaritifera* (Linnaeus) in Pohnpei, the Federated States of Micronesia." The hatchery and ocean grow-out skill training has also been in progress to prepare for a commercialization phase of the project's development.

The first group round-pearls were harvested in July 2004 (the 1st series of experiments) and quality of the pearls were assessed. Immediately after the first harvest, the second seeding was conducted in September 2004 (the 2nd series of experiments). In August 2005, about 500 pearls were harvested from those oysters seeded in 2003 (the 1st group) and 2004 (the 2nd group). In September 2005, a new batch of approximately 4000 oysters were seeded round nuclei for the 3rd series of experiments and half-pearl nuclei were also implanted to additional 400 oysters. Among the harvested 1000 oysters, 100 oysters were re-seeded with round-pearl nuclei. These pearl quality experiments have been conducted to determine effects of seeding operations on pearl quality: the 1st series of experiments on the viability of pearl production by using the hatchery-produced young oysters and donor-host relationship; the 2nd series of experiment for post-seeding culture methods and use of chemical-coated nuclei; and the 3rd series of follow-up experiments on the post-seeding culture methods and donor-host relationship as well as use of chemical-coated nuclei.

The project's hatchery and farm skill training programs were extended in order to simulate a small-scale commercial pearl farm by involving 20-30 local people as casual farmhands for the seeding operations at Nett and Pakin Atoll. Most of the hatchery work has been conducted by the project's four hatchery staff with minimum supervision by a pearl expert. During the seeding operation in August 2005, two of the project staff received formal skill training of the half-pearl seeding from a "Master Seeding Technician', which may continue for the next few years if further funding is available.

b). Impact/Accomplishment – The test-harvest in July 2004 (the 1st series experiments) indicated a high percentage of high quality black pearls: top grade-A in luster/flaw ranged 11 - 31%; 64-81% was green color and 16-26% blue color; roundness rate was 13-31%. The quality assessment of the pearls from the 2nd harvest in Sept. 2005 is underway. The follow-up experiments in 2005 may show more detailed results in 2006.

The Project's skill training has now been getting more recognition not only in Pohnpei State, FSM, but also in overseas with inquiries from other Pacific nations for participation in the project's skill training program. It should be noted that the two new hatchery staff were recruited from the Project's skill training program and became the Project's assistant technicians. Earlier in FY2005, one of the Project's trainees was also employed as a research aide by the CMI Land Grant Program's pearl hatchery project in Majuro. Three spawning-larval runs were carried out during this period. As of August 2006, approximately 25,000 young oysters will be held at three demonstration farms together with 6,000 seeded oysters. Learning half-pearl seeding technique from the "Master Technician" is regarded as the first step to be an apprentice of the round-pearl seeding technician. It was a rare opportunity and the first time for the Micronesians having received formal pearl seeding training from a Japanese "Master Technician".

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

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

Key Theme – Aquaculture

a). Description of Activity - The projects on studying the reproductive cycle of the black lip pearl oyster in selected atolls of the Marshall Islands and setting up of a demonstration farm and studies and experiments on factors affecting spat growth and survival, are coming to their completion. Since February 2005, hatchery runs were conducted and the spats were made to settle on a modified research test substrate. Preliminary growth rate and survival data indicated better than average growth than the previous year run. Water quality was monitored to find its effect on the growth and survival of pearl oyster spat. A two-months training on hatchery and pearl farming techniques was conducted by the aquaculture researcher and specialist to 6 trainees from 5 outer atolls. Data on spat growth rate were collected and will be made available in a publication.

From the industry hatchery perspective, aquaculture researcher and pearl oyster specialist are looking into ways, which could increase the percentage of spat production in the hatchery by using more efficient rearing methods. This would lead to more spat being produced in the RMI for the existing and new pearl farmers. The commercial industry has used the techniques of spawning larval rearing and spat grow-out developed as a result of the project to refine their techniques in hatchery and farming. The demonstration pearl farm is also a broodstock oyster holding facility for the commercial hatchery for future hatchery runs. These broodstock oysters and the results of this project studies have been used recently for the first spawning of oysters in the commercial hatchery in Majuro.

b). Impact/Accomplishment – This project has had a definite impact on the black pearl hatchery and farming industry in the Republic of the Marshall Islands. For the first time in three years of research and development, protocols were developed for consistent spawning, larval rearing, and refinement of nursery and spat husbandry techniques. In the first project the objectives are looking into ways which could enhance the percentage survival and growth of spat production in the farms by using more efficient rearing methods, reduction of fouling, predation etc. The new settlement substrate feedback from the industry has been good and it is being further refined to increase its efficiency. This information eventually would be a great boon to the more refinement and success of the commercial black pearl oyster culture in the Marshall Islands.

During its life, the project had an immediate impact on the community, especially the outer atoll communities of the Republic. It has resulted in soliciting interest in pearl farming and has resulted in the development of the Phase II of the project. The outer atoll expansion of the project as a community based income generation venture is one of the significant impact of this project.

c). Source of Funds – Hatch Act/CTSA

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

Key Theme – Aquaculture

a). Description of Activity - The project on “Studies on the Reproductive Cycle of the Black Lip Pearl Oyster *Pinctada margaritifera* in selected Atoll of the Republic of the Marshall Islands”, included the selection of three sites opposite to the Arrak Campus in areas where there are natural stocks of pearl oysters. Forty-five pre sexed pearl oysters (15 x

3 pocket panels) were put on coral heads 45 feet down and a similar number were hung from the pearl farm and each individual oyster was opened every month just before the new moon and their gonad staged visually for their reproductive conditions. Broodstock pearl oysters were observed for their gonadal condition on a monthly basis from January to December, a continuation of the previous year.

So far in this study like in the previous year's observations, no classical gonad maturation progression was noticed with the oysters showing either stage V or a maximum of stage 2 less than (1 %) and suddenly ripening to stage IV and spawning to partially spent or early maturing of stage V with very few times the gonad progressing to intermediate stages of 0, I, II and III confirming the previous years observation that the gonad maturation process takes place very fast

Preliminary data has yielded valuable results in the sense that it is now known that the oysters spawn bi monthly every odd month to be precise. With the available data on hand there does not seem to be any correlation with the limited water quality parameter i.e. temperature and spawning season. Most of the water quality parameters were constant throughout the year. However, it was noticed that oysters held on the farm had the tendency to mature and ripen faster than the one held on the coral reef 30 feet down.

b). Impact/Accomplishment – The impact of this project on the black pearl hatchery and farming industry of RMI where the knowing of the reproductive season in the selected atolls of the Marshall Islands would give the industry a better idea to plan things. The research work on the second year results confirms the suggestion that the hatchery industry to plan hatchery runs on a bi-monthly basis, knowing that the oysters reach ripeness and spawn on a bi-monthly rate in the Majuro Atoll where two pearl oyster hatcheries are located and where the local industry depends solely on spat from the hatchery. Knowledge of the spawning season would give the hatchery industry more time to plan their run and get more healthy spat without inducing artificial spawning using hazardous chemicals. Result of this study has allowed the commercial industry to plan their hatchery run in months were the success of achieving spawning is maximum and get spats which are more healthier. This knowledge is being put to use now by the new hatchery manager, who is basing the spawning in the commercial hatchery on the results of this study to get a better chance of getting better larvae and more spat from the commercial hatchery run.

Moreover, the knowledge of the spawning season has helped the commercial industry to plan their seeding operations in non-spawning months to prevent the incidence of rejection of nuclei thereby saving money.

These results suggested that the oysters in the Majuro lagoon spawn during the odd months of the year are also vital information from a management perspective because it would allow the current legislation to be modified to accommodate the non-harvesting of oysters during the spawning seasons. The local fisheries department, Marshall Islands Marine Resources Authority (MIMRA), would now be able to use these results for the Pearl Oyster Management Plan for the Marshall Islands.

c). Source of Funds – Hatch Act/IFAFS/CTSA

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

Key Theme – Aquaculture

a). Description of Activity – The project on "Development and Utilization of Locally Available Feed Ingredients for the Mass Culture of the Giant Freshwater Prawn in Palau" is at the stage where the construction continues for the larval rearing tanks. Additional work that is needed includes the set-up of 8 larval rearing tanks and a closed water re-circulating system. The drainage, water supply and aeration systems of each of the larval rearing tanks, nursery tanks and water reservoir are likewise being installed. The water pump line that draws freshwater from the creek will be replaced with 3"diameter pipes instead of the 4" pipe currently being installed in order to be operational. This will provide the freshwater requirement for the hatchery, nursery and grow-out operations of the freshwater prawn. In the event that *Macrobrachium rosenbergii* is not locally available and only *M. lar* is present in Palau, a request for an importation permit for some 10,000 freshwater prawn post larvae has been made. The post larvae will be grown to maturity and will serve as the future breeders.

b). Impact – In Progress

c). Source of Funding – Hatch Act

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

Key Theme – Aquaculture

a). Description of Activity – - The USDA approved project, "Culture of the Rabbit fish*, Siganus fuscescens,* in the Republic of Palau" took effect on August 1, 2005 with 4 years duration. Two collections of breeders from the grass flats of Ngaremlengui State were done. Collections in August 12 totaled 57 pieces while that of September 16 was only 34 pieces. The lower number of fish gathered in the second collection was attributed to relatively high level of water (0.7m) and strong wave action at the time of collection. The collected breeders were stocked at the Bureau of Marine Resource facilities in Koror. Upon arrival from the collection ground, the breeders were immediately treated with a broad-spectrum antibiotic (5 ppm nifurstyrate) to prevent infections of the bruises incurred during handling and transport. The breeders are fed *ad libitum* daily with commercial prawn pellet. They are observed daily for signs of sexual maturity. Ovarian biopsy using a 3 mm catheter is performed to 2-3 females on a weekly basis to confirm the presence of eggs. No evidence of sexual maturity was noted.

The fish from previous collections (June 22 and July 22) totaling some 80 pieces suffered massive ciliated protozoan infestations also known as "marine ick" caused by *Cryptocaryon irritans* Brown. This resulted to their mass mortality. To avoid the succeeding collections from suffering the same fate, prophylactic treatments of the succeeding collections were done. A combination of two types of treatments, namely, hyposalinity and copper treatment were employed. In hyposalinity, the salinity of the rearing water was gradually reduced to 14 ppt in order to disrupt the life cycle of the causal organism. The fish were maintained at this salinity for 4 weeks. After the prescribed period, the breeders were gradually acclimated back to the normal seawater salinity of 32 ppt. They were then treated with 0.2ppm of copper sulphate every week to kill all the possible life stages of *Cryptocaryon* present in the water during water exchange. Results showed 100% survival of the collected breeders to date. This reflected the effectiveness of the prophylactic treatment protocol employed.

b). Impacts/Accomplishments – In Progress

c). Source of Funding – Hatch Act

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

Key Theme – Aquaculture

a). Description of Activity – The "Research and Extension Training in Black Lip Pearl Oyster (*Pinctada margaritifera*) Farming in the Atolls of the Marshall Islands" is a new spat grow-out research project to support and expand pearl farming to outer islands atolls and to get valuable spat growth and survival data. A two months training program was held and sponsored by the CMI-CRE aquaculture program staff to six trainees from outer atolls of Bikini, Ebon, Likiep, Maloelap and Rongelap. The trainees spent two months at the College of the Marshall Islands Science Station to be trained in hatchery and pearl farming techniques. The equipment required for the set up farms in these atolls included longlines and nets that have just arrived.

b). Impacts/Accomplishments - Due to activities of the Land Grant Aquaculture team in the last three years, there has been a sustained interest in pearl farming from the outer atoll communities and it is with this interest in mind and request by the respective Mayors of these Atolls, that this alternate / supplementary income generation and research project was written, approved and being implemented.

Representatives of the outer islands are getting trained with the Project Research Scientists at the College of the Marshall Islands Land Grant Pearl Hatchery and demonstration farm on all aspects of pearl hatchery, nursery and spat grow-out husbandry techniques so that this installs as sense of ownership when they receive the research spat in the outer atolls later. They are also being trained in getting and recording research data mandatory for this project.

c). Source of Federal Funds – Hatch, UNDP, Local Match

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

Key Theme – Biotechnology

a). Description of Activity – Objectives of the sweet potato project are to conduct sweet potato demonstration trials and organization of trainings and visits to disseminate information about cultivation of sweet potato among local people and the d distribution of tissue culture raised plants to farmers. All the objectives for the project were achieved before the proposed project termination date. To encourage, educate and train farmers, many activities involving hands-on trainings on sweet potato cultivation aspects, soil amendment methods and composting were organized time to time. In addition to these regular activities, training workshops were organized that included sweet potato cultivation methods and techniques like land preparation, planting material preparation, planting material storage, methods of planting, time and distance of planting, replanting, fertilizer or compost application, cultivation, weeding, control of diseases & pests, harvesting, composting, how to make compost and advantages of composting. To expand the sweet potato research results for the benefit of the community, extensive

extension work for sweet potato cultivation was conducted. This expansion included cultivation at outer atolls also.

The extension work included hands-on trainings of sweet potato cultivation aspects on their own land, which encouraged everyone and resulted in participation of every landowner in the project. Help and guidance were offered in field selection, cleaning and clearing of land, plowing, bed preparation, providing the seedlings, planting, composting and fertilizer application, maintenance and harvesting. Weekly visits were made to the farmers fields for disease and pest survey and also for on spot solutions and recommendations for disease and pest control, and nutrient deficiency remediation. Field performance of eight varieties of sweet potato, multiplied through tissue culture, was evaluated by using randomized complete block design having eight rows, seventy plants of each variety per row and three plot replications per atoll at two atolls. The size of each plot was 12 m x 22 m. At the time of planting, 30 cm distance between plants in a row and 150 cm distance between rows was maintained.

The use of pesticides was avoided. Vigorous vegetative growth was observed for all the varieties, while excellent yield for some varieties. Plant characterization data as per descriptors of the International Potato Center (CIP), the Asian Vegetable Research and Development Center (AVRDC) and the International Board for Plant Genetic Resources (IBPGR) (1991), were recorded. Insect, pest, disease and nutrient deficiency data were also recorded. After 150 days of planting, storage roots were harvested and after 2 weeks of curing, storage root quality and related data were recorded. All the details of variety-wise characterization and field evaluation data along with photographs will be included in the sweet potato book, which is under preparation. Thousands of seedlings of eight sweet potato varieties were distributed to the farmers directly and also through the Ministry of Resources and Development.

b). Impact/Accomplishments – Micropropagation of collected germplasm has resulted in the availability of elite and disease-free planting material in large numbers for local farmers and growers. Training workshops and extension activities have increased farmers' awareness, knowledge, skill and interest in cultivation of sweet potato and many farmers have started sweet potato cultivation. Many others are interested to convert their lands into productive sweet potato farms. The growing interest in sweet potato cultivation has resulted in mass production and consumption of sweet potato and has also provided a means of income generation to the local farmers that would result in their improved economic and social status. One of the farmers reported that he was able to sell his sweet potato harvest to one of the local retail stores.

c). Source of Federal Funds – Hatch Act

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

Key Theme – Biotechnology

a). Description of Activity - Objectives for the reporting period were field evaluation of regenerated plants and distribution of developed, tissue cultured raised plants to farmers. All the objectives for the project were achieved before the proposed project termination date. Field performance of seventeen more varieties of taro, multiplied through tissue culture, was evaluated by using randomized complete block design having eight rows, thirty-five plants of each variety per row and three plot replications per

atoll at two atolls. The size of each plot was 12 m x 22 m. At the time of planting, 60 cm distance between plants in a row and 150 cm distance between rows was maintained. The use of pesticides was avoided. Vigorous vegetative growth was observed for all the varieties, while excellent yield for some varieties. Plant characterization data as per descriptors of the International Plant Genetic Resources Institute (IPGRI) (1999), were recorded. Insect, pest, disease and nutrient deficiency data were also recorded. After 10 months of planting, corms were harvested and corm quality and related data were recorded. All the details of variety-wise characterization and field evaluation data along with photographs will be included in the taro book, which is under preparation. To encourage, educate and train farmers, many activities involving hands-on trainings on taro cultivation aspects, soil amendment methods and composting were organized time to time. In addition to these regular activities, training workshops were organized that included taro cultivation methods and techniques like land preparation, planting material preparation, planting material storage, methods of planting, time and distance of planting, replanting, fertilizer or compost application, cultivation, weeding, control of diseases & pests, harvesting, composting, how to make compost and advantages of composting. To expand the taro research results for the benefit of the community, extensive extension work for taro cultivation was conducted. This expansion included cultivation at outer atolls also.

The extension work included hands-on trainings of taro cultivation aspects on their own land, which encouraged everyone and resulted in participation of every landowner in the project. Help and guidance were offered in field selection, cleaning and clearing of land, plowing, bed preparation, providing the seedlings, planting, composting and fertilizer application, maintenance and harvesting etc. Weekly visits were made to the farmers fields for disease and pest survey and also for on spot solutions and recommendations for disease and pest control, and nutrient deficiency remediation. Thousands of seedlings of different taro varieties were distributed to the farmers directly and also through the Ministry of Resources and Development.

b). Impacts/Accomplishments - Micropropagation of taro has resulted in the availability of elite and disease-free planting material in large numbers for local farmers and growers. Training workshops and extension activities have increased farmers' awareness, knowledge, skill and interest in cultivation of taro and many farmers have started taro cultivation. Many others are interested to convert their lands into productive taro farms. The growing interest in taro cultivation has resulted in mass production and consumption of taro has also provided a means of income generation to the local farmers that would result in their improved economic and social status.

c). Source of Federal Funds – Hatch Act

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

Key Theme – Diversified/Alternative Agriculture

a). Program Description – Activities include the organization of demonstration trials of tropical edible mushrooms and organization of trainings, seminars and hands-on workshops to disseminate information for popularizing mushroom cultivation among local people. All the objectives for the project were achieved before the proposed project termination date. Demonstration trials for tropical edible mushroom cultivation, grown under atoll conditions, were organized. Methods developed through experiments

conducted in the previous years again proved their excellence for mushroom cultivation. Different growth stages of mushroom fruiting bodies were exhibited and harvested mushrooms were distributed among community members. Different aspects of mushroom cultivation including substrate preparation, spawn production, inoculation and maintenance under atoll conditions, were presented. Power point presentations, workshop and hands-on training were organized. Mushroom cultivation techniques, health benefits, nutritional advantages of mushroom consumption and recipes, and economic benefits of growing mushrooms were presented, and related brochures were distributed.

b). Impacts/Accomplishments - This study indicates that the potential for tropical edible mushroom production in the country is fair. Considering the very limited land and poor quality soil, alternative agriculture approaches like mushroom cultivation could prove very fruitful. Developed technology would prove helpful for designing and planning of experiments and to start cultivation of tropical edible mushrooms at large scale, which would certainly help in boosting agriculture and could also provide promising health benefits. Mushrooms are standard health food, low in calories, high in vegetable proteins, iron, zinc, fiber, essential amino acids, vitamins and minerals. Therefore, we need to encourage consumption of mushrooms as daily dietary intake because mushrooms are ideal food for people suffering from hypertension, diabetes and obesity, which are major health concerns in the Republic of the Marshall Islands.

c). Source of Funding - Hatch Act Funds

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

Key Theme – Diversified/Alternative Agriculture

a). Description of Activity – The objectives of this project are to develop, test and standardize suitable protocols for growing vegetables using, as far as possible, local resources incorporating simplified hydroponics technology and to train interested community members in establishing home hydroponics gardens. Objectives are designed to carryout activities in different phases namely inception phase, pilot phase and replication or outreach phase.

b). Impact/Accomplishments - Previous work has shown that one 4'x2' wooden grower can produce 14 pounds of vegetable amaranth in 27 days. Current work shows that up to 15 lettuce heads could be harvested from the same size grower. Economics of this production technique shows this system as a viable alternative for the production of leafy vegetables in those places where unfavorable soil conditions prevail for farming. A method for the production of tomatoes is also standardized using shredded coconut husk media in pots. On an average, each pot yielded about 20 pounds of ripe tomatoes. Based on the results, two hotel owners have decided to establish similar systems to cater their clientele. Four individuals including a staff from the Cooperative Extension Service of University of Guam sought technical assistance.

c). Source of Federal Funds – Hatch Act

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

Key Theme – Diversified/Alternative Agriculture

a). Description of Activity – Over two-dozen new disease resistant BLS cultivars of banana were introduced from the various parts of the world. Field evaluation of new introductions was performed on-site and at farmers' field in Majuro atoll. Data on plant growth, fruiting and vigor was collected. More than twenty-five quality bunches were harvested and distributed among the community. Tissue culture plants of variety *Mysore* were further developed at the nursery and distributed to farmers in Majuro Likiep and Arno atolls. Two demonstration sites in Maloelap and Mili atolls were established for the tissue culture plants of banana. Presentations and demonstrations on banana production were conducted to individuals and farmers groups in communities in these visited atolls. A second training workshop for 30 farmers and college students was organized to demonstrate on all aspects of growing banana, from selecting and treating planting materials to field planting and post harvest handling. Other management aspects, which included desuckering, debelling, and propping were also shared with farmers.

b). Impacts/Accomplishments - Community members who attended the banana training workshop mentioned that their knowledge about atoll banana cultivation have increased and they are better skilled in taking care of their banana plants which are currently growing in their backyards.

c). Source of Federal Funds – Hatch Act

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

Key Theme – Home Gardening

a). Description of Activity – A total of one thousand and one hundred ninety seedlings of various crop varieties were made available to individuals in the communities and to schools. Additionally, hand-on demonstration on cultivation techniques were provided to home gardeners and schools children. The training programs covered basic agriculture methods such as site selection, seedling preparation, planting time, spacing of different vegetables, watering, mulching, pest management and harvesting.

b). Impacts/Accomplishments - Three of the program participants were able to earn some cash from sale of excess produce. One vegetable grower was selected as the best vegetable grower of the year during the annual agriculture fair.

c). Source of Federal Funds – Smith-Lever

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

Key Theme - Innovative Farming Technique

a). Description of Activity – The project on demonstration, preservation and improvement of taro production systems in Palau involved farm plots of taro that are grown in the traditional wetland *(mesei)* conditions with different mulching materials (ramk) that showed that the use of kisaks (Pongamia pinnata) as mulching material in *mese*i resulted in higher corm yield of the *Ngesuas* variety of taro. Furthermore, application of fertilizer in taro planted in the mesei gave better yield compared to those without fertilizer. An

experiment on the effect of frequency of fertilization application of upland taro was started.

b). Impact/Accomplishments – This project showcased and demonstrated appropriate production technologies in various taro production systems such as land preparation, integrated pest management and nutrient management. This provided critical information on the importance of these production technologies for higher yield and income to taro farmers.

c). Source of Federal Funds – Smith-Lever

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

Key Theme – Invasive Species

a). Description of Activity – Regularly scheduled visits on monthly basis were carried out extension agents as part of a collaborative effort with SPC and Conservation Society of Pohnpei where *M. micrantha* were spotted in order to assess damage and apply damage-control with spray. These activities were critical during the months of November, December and January when the invasive species *M. micrantha* have been reported to mature and flowering. Spraying during such time not only killed the plants but also prevent further spread and propagations of this invasive species.

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b). Impact/Accomplishments – After eradication of *M. micrantha*, one farmer reported to have planted the area to bananas, intercropped with Colocasia. In eight months time, Colocasia was harvested and provided about 50% of the family food.

c). Source of Federal Funds – Smith-Lever

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

Key Theme – Niche Market

a). Description of Activity – Agriculture Extension Agents continued their visits to 30 pepper farmers around the island of Pohnpei. Three of the pepper farms were six months to one year old, five were about to harvest and twenty-two are new farms. Extension Agents conducted demonstrations on field layout, selection of posts, planting materials, composting and fertilizing, and field planting. The training sessions for established farms focused on pruning techniques, application of fertilizers and composts and mulching to improve the growth of the plants.

b). Impacts/Accomplishments – Production has increased from 8,000 lbs in 2004 to 12,000 lbs in 2005. At a niche market value of $35.00 per pound of processed pepper, this translates to an increase in income of $140,000 or a total production value of $420,000. This has a major impact on this rural community through local employment and as a channel through which other farmers can sell their pepper. He is now able to process, package and market his own harvest under his own label. He also buys pepper from other farmers. He employs a farm manager and five field workers.

c). Source of Federal Funds – Smith-Lever

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

Key Theme - Plant Germplasm

a). Description of Activity - [Maintenance of Root Crop Germplasm Collection of Palau] – Different varieties of the staple root crops that have been collected from the different States of Palau are currently being grown and maintained at the PCC Research and Development Station in Ngermeskang, Ngaremlengui. The germplasm collection consists of 24 accessions of sweet potato, 53 accessions of cassava and 90 accessions of taro. Since all these root crops are vegetatively propagated, it is imperative that continuous replanting is being done to preserve and maintain these germplasm collections. Likewise, fertilization at planting time and regular weeding were done to ensure good growth of the crops in the field.

b). Impacts/Accomplishments – The maintenance of the root crops germplasm collection of taro, cassava and sweet potato ensures the conservation of these valuable genetic resources for the future generation. Moreover, the PCC R&D Station serves as a national repository of these crops, which are the staple food in Palau. The people have also become aware of the genetic diversity of these root crops in Palau. In addition, planting materials of taro, cassava and sweet potato have been distributed to farmers to help increase areas for root crops production in Palau.

c). Source of Federal Funds – Smith-Lever

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

Key Theme – Plant Germplasm

a). Program Description – [Micropropagation and In Vitro Conservation of Taro *Colocasia esculenta L. Schott* in the Republic of Palau] – Shoot tip culture and mass propagation of 19 popular varieties of taro were done in the laboratory by continuous subculture in the multiplication medium. For this year, 3924 cultures of taro have been maintained in the laboratory, 2011 taro plantlets were transferred to potted soil in plastic cups, 1186 taro plants have been transferred to plastic bags which were all distributed to farmers. Growth and yield performances showed that tissue cultured taro produced more suckers and gave slightly higher yield compared to conventionally propagated taro. Long term storage and in vitro conservation of 27 varieties of taro are currently being done in the laboratory for germplasm conservation.

b). Impacts/Accomplishments - Mass propagation of high yielding and disease-resistant taro planting materials by tissue culture has provided disease-free taro planting materials for distribution to farmers. This will ensure greater productivity of this important staple food in Palau. Likewise, maintenance of the taro germplasm collection in vitro ensures the preservation of Palau's indigenous taro varieties against harsh environmental stresses, as well as pests and diseases.

c). Source of Funding - Hatch Act Funds

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

Key Theme – Plant Production Efficiency

a). Description of Activity – The Phase II of the Grafting of Breadfruit project was implemented and field evaluation of grafted rootstocks continued in the Phase II of the project. Several rootstocks were transferred to farmers' field and to the Agriculture Experiment Station for growth monitor and evaluation. Experiments with successful graft union `Approach' was repeated with newly raised rootstocks of *Mejwan*, *Betaktak* and *Mejenwe*. Recording of field data on the plant growth and development were collected.

b). Impact/Accomplishments – A protocol on grafting two varieties of breadfruit has successfully been identified (Approach union). About 12 grafted plants have been planted in the fields and are monitored on a monthly basis.

c). Source of Federal Funds – Hatch Act

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

Key Theme – Small Farm Viability

a). Description of Activities – Training lessons on small farm viability were provided to farmers, homemakers and other groups. Lessons included selection of farm sites, bed preparation, compost-making using sea weeds, nursery and transplanting, weeding, mulching, crop rotation and harvesting. Container gardening is also being promoted. The harvest is mainly for family consumption with excess for sales at the local farmers markets. As part of the training, the Extension Agent highlighted the success of a farmer participant who grew only eggplants and sometimes cucumbers because they were in high demand. The return was comparatively higher than for other farmers who grew more varieties. One hundred and ninety clients acquired skills, which now allow them to manage their gardens using sustainable practices

b). Impacts/Accomplishments - One farmer who specialized in eggplant production to meet the high demand attested to an increased in family income and a reduction credit for food purchase.

c). Source of Federal Funds – Smith-Lever

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

Key Theme – Tropical Agriculture

a). Description of Activity - The project, started about a year ago, was one of the actions taken to provide disease-free yam planting materials for yam production. Agriculture Extension agents took active role in the Participatory Rural Appraisal (PRA) survey, selecting 10 farmers for each of the five municipalities, distribution of planting materials, regular monitoring visits, and finally recording harvest yields. The initial seed materials were purchased at the end of 2004 and distributed to ten selected farmers in each per municipality. As part of a written agreement, participating farmers will return 100 pounds of yam to the project for redistribution to another 50 farmers. One hundred pounds of yam seeds were provided to 50 individual farmers in the five municipalities. These farmers have been harvesting at least 4 times the weight they received from the project. An amount of the original planting material was passed on to a second generation of

farmers. The remaining amount was sold, consumed or saved for replanting. All of the participating farmers were able to harvest except one whose yam plants were attacked and destroyed by the Anthracnose disease. Most of the participants who have harvested provided approximately 100 pounds to another farmer who is selected by the Extension Agent. The second round of participants also signed an agreement to provide the same amount of yam for distribution to another farmer.

b). Impact/Accomplishments - The impact is to date 23 of 50 participating producers have satisfied their agreements to provide an equal amount of planting materials to a second generation of producers. And thus, sharing of disease resistant yam planting materials throughout the communities continues unabated. One of the participating families was able to make an additional income of $560 from selling part of their harvest. The calculated average net yield to the individual farmer is 2000lbs of yams. At a price of $1.00/lb, this is a gross value of $2000/ farmer and a projected total of $100,000 crop value to the communities.

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

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

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	223,165	47,727	37,879	0
2004	270,308	12,304	24,209	0
2005	281,783	16,411	33,317	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	323,303	6,437	19,589	0
2004	364,101	14,924	14,054	0
2005	324,809	9,064	18,402	0

Summary of FTE Allocation:

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 throughout the vast region that programs are situated. 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	4.10	0.0	0.0	13.70	0.0	0.0
2004	4.05	0.0	0.0	13.20	0.0	0.0
2005	4.05	0.0	0.0	13.20	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	4.40	0.0	0.0	3.12	0.0	0.0
2004	4.20	0.0	0.0	3.20	0.0	0.0
2005	3.70	0.0	0.0	3.20	0.0	0.0

Of the FY 2005 total FTE of 73.50, 24.15 have been assigned to programs/projects that support Goal 1, representing 33% of the total FTE for all programs. The FY2005 budget allocated to support programs and activities under 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:

Palau has warm weather all year round. This type of weather lends support to the spread and multiplication of bacteria and viruses that cause food poisoning when proper food handling and preparation are not being practiced. Foods prepared during feasts and traditional ceremonies are usually not handled properly and prepared and kept in room temperature for hours, allowing bacteria to grow and multiply very easily. Foods are also sold as take-outs in small food establishments and stores and usually were not stored properly to prevent the growth of these bacteria. Washing of hands when handling food or before eating these food take-outs is the best practice and also the simplest way to preventing these bacterial infections, however it was not so often practiced and most food establishments also do not have the proper facilities for customers to wash their hands before eating their food. Extension programs continued to emphasize food safety practices through educational awareness programs to food handlers at homes and at food establishments for extra care in controlling the spread of these diseases, especially when preparing, handling, and storing food.

The present situation of unsafe and insecure food and fiber in Palau is alarming in that more and more food are being imported, which are mostly canned and processed food that are high in fats and cholesterol. A project on "Product Development for Food Security in Palau" is attempting to address these concerns on food safety and food security by developing local food products that will be used locally as well as in support of the tourism industry and hopefully will lead to the development of food micro enterprises. Results of this research project will be shared with rural women groups, homemakers, and farmers to help them is make wise decision about the quality food items that may require value-adding and provides for business opportunities.

CMI-CRE:

As a member of the Healthy Living in the Pacific Islands project, the EFNEP staff continued with her plans of work in disseminating information on food safety and quality to people in the communities by way of small group training and through the local radio station. The HLPI catered to expertise in nutrition and food safety and quality from the five American-Pacific land-grant institutions that include the University of Hawaii, University of Guam, American Samoa Community College, Northern Marianas College, and the College of Micronesia. The EFNEP staff also took part in various community meetings and provided food safety, nutrition, diet and health information to clienteles throughout the urban center of Majuro and some of the outer atolls. She also attended various on island and off island meetings and conferences to upgrade her skills and to share the results of her programs.

COM-FSM/CRE:

Yap Site:

Through a collaborative effort with Yap State Government Department of Agriculture and the Department of Health Services through the Yap Interagency Nutrition Education Council (YINEC), awareness programs on food safety and quality, and nutrition, diet and health were extended to more than 200 participants, including homemakers, backyard gardeners and staff of one Head Start Center. In reaching additional clienteles, the extension agent took part in the annual gathering to celebrate World Diabetes Day and the World Food Day and showcased and demonstrated some of the local recipes that she usually included in her EFNEP and nutrition education training programs.

Chuuk Site:

The annual food handlers training program continued with the collaboration of the Department of Health Service Division of Environmental Health and Sanitation. Information on food safety,

personal hygiene and tips on a good kitchen environment are important aspects of keeping people safe from food borne illnesses and were emphasized and shared by nutrition and food safety and quality staff. To support their programs in the communities and at schools, extension agents also conducted cooking demonstrations on healthy and nutritious local recipes and provided information on safe food handling practices.

Pohnpei Site:

Collaborating with SPC, CES staff continued their regular monitoring of twenty-six fruit fly traps. After sometimes, they were able to reaffirm that the only existing fruit fly is the mango fruit fly (*Bactrocera frauenfeldi*), which is an endemic species of no economic importance. Monitoring activities is a first-line of defense against introduction of any alien species that may negatively affect production of fruits and vegetables on the island.

Home gardening activities for family food security and as a supplement to the family diet continued at selected sites and during food safety and nutrition education training programs. In partnership with EFNEP staff, agriculture extension agents prepared and distributed seedlings of green leafy vegetables and other planting materials to interested homemakers and others in the communities.

EFNEP staff conducted several training programs for groups of homemakers around the island. Their training programs were mostly for young mothers who are staying at home and others who have the time to go through all the lessons on food safety and quality and food preparation on several recipes that utilize locally available food ingredients.

Kosrae Site:

Food safety and quality and nutrition education programs were part of the ERS lessons that were conducted in the communities for both adults and young mothers. Through a collaborative effort with the Office of Community Affairs on a girls scout program, home economics and food safety and nutrition programs were provided to high school girls during the 2005 Summer Girls Scout program. Another collaborative effort was initiated through a “Tasty, Healthy Food - Go Local 2005 Campaign” with the Japan International Cooperation Agency (JICA) and Embassy of Japan, the FSM National Government Department of Health Services, the Department of Health Services, and Department of Agriculture sharing resources. The campaign is promoting healthy lifestyle and healthy living with the utilization of local fruits and vegetables.

B. Key Themes:

Key Theme - Food Handling

a). Description of Activity - Women’s groups from Majuro Atoll participated in this year’s outreach workshops conducted by the EFNEP Extension Agent. Lessons provided were on proper nutrition, food safety and quality, food preparation and handling, sanitation and a balance diet with the use of the 3 food groups. Cooking demonstrations were also provided by the extension agent and hands-on opportunities to try out the different local recipes were provided to participants. The participants received their certificates of completion during the closing ceremony on the last day of the workshop.

b). Impact/Accomplishments – Interview and observations of household members by extension staff found that there was an increase awareness in proper food preparation and handling practices, as family members started cooking and eating more healthier food than before.

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

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

Key Theme - Food Safety

a). Description of Activity - Two groups of adult participants from different communities and one group of high school students from Bethania High School received 10 hours of home food safety and food handling practices. The lessons in the training program addressed such food safety practices as personal hygiene, safety tips in the kitchen and safe food handling and storing practices. All together, fifty-two participants of thirty-one adults and twenty-one youths completed the required number of hours of the home food safety and food handling program. Some of the participants in this program also participated in the EFNEP training programs.

b). Impact/Accomplishments – The ERS Summary report under food safety practices showed that 68% (21 participants) more often followed the recommended practices of not allowing meat and dairy foods to sit out for more than two hours. Furthermore, 68% (21 participants) always followed the recommended practice. Under number of practices improved, 94% (29 participants) showed improvement in one or more of the food safety practices (i.e. thawing and storing foods properly) and 58% (18 participants) showed improvement in both of the food safety practices (i.e. thawing and storing foods properly).

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

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

Key Theme – Food Handling

a). Description of Activity – Twenty-six food handlers from department stores, bakeries, take-out shops, local food markets and restaurants had completed a one-week training program on food safety and food handling practices. Conducted annually, homemakers from four lagoon islands whose families currently reside in the capital center were targeted.

Another 12 homemakers were visited at their home islands for training and one hundred and thirty five youth participants of the Youth-At-Risk program in two elementary schools were also provided lessons on food safety, proper food handling, and food borne illnesses. Another 141 adults and 15 youths from eight different communities participated in similar training.

b). Accomplishments/Impacts – Post test showed a significant improvement on knowledge gained on food safety and food handling practices.

c). Source of Funds – Smith-Lever
d). Scope of Impact – County Specific (Chuuk)

Key Theme - Food Safety

a). Description of Activity – About 70 female senior students and their home economic teachers from Assumption and Marshall Islands High Schools participated in the EFNEP and ADAP HLPI outreach program. The trainers spend a total of 20 hours with the trainees in providing them with lessons on food safety, proper food handling, and sanitary kitchen practices. Hands-on cooking demonstrations of local recipes were also provided.

b). Impact/Accomplishments – The participants indicated that they have increased awareness of the proper food handling and food safety practices and they will begin to use the knowledge that they gained at home.

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

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

Key Theme – Food Security

a). Description of Activity – Food security issue is more critical on the outer islands and the situation was compounded by the devastation of local food crops from two typhoons. The agriculture extension agent teamed up with the agriculture extension agents with the Government Department of Resources and Development in providing and introducing new planting materials and demonstrating appropriate techniques on home gardening and cultivation of new crops. More than 200 clients participated in one or more of the training programs. A home gardening demonstration plot was set up at the Agriculture Station that display five favorite local food crops such as sweet potato, Colocasia taro, swamp taro, bananas, and cassava which also served as a seed bank for new planting materials.

b). Impact/Accomplishments – Close of 50% of the participants had replanted their land and are soon to make their first harvest after the devastation from the typhoons.

c). Source of Funds – Smith-Lever

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

Key Theme – Food Security

a). Description of Activity - Development of local foods in Palau, such as fish, coconut and banana in addition to root crops will help in reducing large food importation and enhance food security, contributing to the Gross Domestic Product (GDP) of the Republic. It also supports the tourism industry by providing tourists with local foods that are nutritious and safe for consumption. This project is in support of the Product Development Committee organized by the President of Palau. Also, the project will lead to the development of food micro enterprises, which will benefit the people in meeting the needs for good quality local food items, creating job opportunities, increasing additional tax revenues for the government, and improving the overall quality of life of Palauans. This year, nine (9) food products were developed from coconut, banana, and fish, in addition to 50 taro and tapioca products. Twenty three (23) women were taught 39 food products from taro, tapioca, fish, coconuts and bananas in a 24-hour Food Technology Class held in Ngaremlengui State from September 6 to 23, 2005.

b). Impacts/Accomplishments – Fifty-seven women learned to prepare 40 local recipes from taro, cassava, fish, banana, and coconut for family consumption and for the tourism industry.

c). Source of Federal Funds – Hatch Act

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

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	112,836	24,132	19,152	0
2004	133,195	6,063	11,929	0
2005	138,849	8,086	16,417	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	32,244	642	1,954	0
2004	37,927	1,555	1,464	0
2005	35,305	985	2,000	0

Summary of FTE Allocation:

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	2.90	0.0	0.0	6.10	0.0	0.0
2004	2.50	0.0	0.0	6.00	0.0	0.0
2005	2.50	0.0	0.0	6.00	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	0.30	0.0	0.0	0.45	0.0	0.0
2004	0.30	0.0	0.0	0.45	0.0	0.0
2005	0.30	0.0	0.0	0.45	0.0	0.0

From the FY2005 total FTE of 73.50, 9.25 had been assigned under Goal 2, representing 13% of FTE input. The FY2005 budget allocated to Goal 2 programs and activities takes into account this FTE distribution plus how Goal 2 integrates with other programs conducted by COM as a whole.

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

A. Goal Accomplishment Narrative

PCC-CRE:

The EFNEP staff, which is also responsible for health and nutrition education programs, worked very closely with healthcare providers and health workers in their continuing battle against the growing problems of overweight/obesity and chronic diseases. Coronary heart disease, hypertension, gout, diabetes and other non-communicable diseases are increasingly affecting Palauans of all ages and continues to rise and programs such as EFNEP and other public health services programs are of great importance in the continuing efforts at controlling and combating these lifestyle associated problems.

CMI-CRE:

The EFNEP Extension Agent worked very closely with staff of the Ministry of Health and Environment on programs that provide appropriate information on nutrition, diet and health to communities in the main island and outlying atolls in the Republic of the Marshall Islands. The EFNEP staff is also a partner in projects that taught homemakers in the communities the art of preparing and preserving traditional local foods such as breadfruit, pandanus, and fish for family use, especially in the remote areas during off-season of these local crops. Preservation of these traditional foods is good for remote islands and areas since they can be used for an extended period of time. Other health programs conducted in the communities and at schools emphasized eating a healthy local food in the correct amount and lessen the use of imported processed and canned food.

COM-FSM/CRE:

Yap Site:

Through a collaborative effort with the Yap State Government Department of Resources and Development and the Yap Interagency Nutrition Education Council (YINEC), health and nutrition education training programs were conducted to clients on Yap Proper as well as to those in the outer islands. Health education programs were conducted as part of the EFNEP training programs in the communities and in schools and EFNEP lessons were an integral part of these programs.

Chuuk Site:

Extension training programs were conducted on nutrition, diet, and health to adult and youth participants in the communities and at schools, including programs that promote physical exercise and physical fitness. A component of intervention efforts provided was the measurement of height and weight to determine the body mass index (BMI) of participants as a heath indicator. Cooking demonstrations emphasized utilization of locally available foods and green leafy vegetables and good menu planning for a balanced diet.

Pohnpei Site:

Cooperative Extension Services staffs had conducted nutrition, diet and health programs with a strong emphasis on increasing use of locally available food for homemakers, teachers, and school children. Food selection and preparation of healthy meals was demonstrated during EFNEP programs and take-home recipes were provided to program participants. Nutrition education staffs conducted surveys with women groups before any training program to determine what the needs are and what local food are available for cooking demonstrations.

A referral arrangement was established with the Division of Public Health for nutrition counseling. Nutrition education staffs worked with Public Health staff in providing health tips to NCD patients on the importance of including nutritious local foods in their meals and lesser dependence on imported processed and canned food that are high in fats and cholesterol.

Nutrition education staff also played an important role in a recently completed Phase One of a project "Documentation of the Tradition Food Systems in Pohnpei". Phase Two of this project is interventions. The project is being conducted at a remote village with high population density that relies mostly on seafood such as fish, shellfish, and other edible organism in the ocean.

Kosrae Site:

In addition to regular extension programs in the communities and at schools that promoted a healthy lifestyle and eating healthy local food, extension staff joined efforts in the "Tasty, Healthy

Food - GO LOCAL 2005" campaign conducted in close coordination with other agencies and coinciding with Kosrae State Liberation Day activities that featured agriculture fair that display local agricultural produces. Other collaborators of this campaign were the Japan International Cooperation Agency (JICA) and the Embassy of Japan, FSM National Government Department of Health, Education and Social Services, the Kosrae State Department of Health Services, the Department of Agriculture, and the COM Land Grant Program. This campaign will be extended to other States in the FSM.

Health and nutrition programs were also conducted to high school students who are members of the Girls Scout Program through a collaborative effort with the Kosrae State Office of Community Affairs.

B. Key Themes:

Key Theme - Human Nutrition

a). Program Description – Two programs on food and nutrition were conducted in two underserved states and to sophomore students in one high school. The programs consisted of twelve lessons that emphasized consumption of a variety of foods for different nutrients, meal planning using the food guide pyramid, reading food labels, personal hygiene, safety tips in the kitchen, safe food handling and storing, and preparation and cooking of twenty-two healthy recipes that are modified to include local food.

b). Impact/Accomplishments – Acceptable practices in all the areas of food resource management showed a 10% (3 participants) at ENTRY demonstrated acceptable nutrition practices (i.e. plans meals, makes healthy food choices, prepares foods without adding salt, reads nutrition labels and has children eat breakfast) and at EXIT 87% (27 participants) demonstrated all the above acceptable nutrition practices. At ENTRY, 29% (9 participants) demonstrated acceptable food safety practices (i.e. thawing meat and storing foods properly) and at EXIT, 97% (30 participants) demonstrated acceptable food safety practices. 6% (2 participants) at ENTRY achieved acceptable scores in all three categories listed above: food resource management, nutrition practices and food safety and at EXIT, 87% (27 participants) achieved acceptable scores in all three categories listed above.

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

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

Key Theme – Human Nutrition

a). Description of Activity – Nutrition education staffs conducted nutrition education programs and also provided cooking demonstration on local recipes to adults and youths in the communities and in schools. Preschool nutrition, menu planning, and recipe formulation were components of these training programs. A total of one hundred and fifteen Head Start teachers, staffs, and parents from forty-five centers participated in the training programs. A total of three hundred and forty-eight adults and youths from seven different communities and two Elementary Schools also participated.

b). Impact/Accomplishments – A total of one hundred and fifteen Head Start teachers, staffs, and parents from forty-five increased awareness on preschool nutrition, menu planning, and recipe formulation.

c). Source of Federal Funds – Smith-Lever/FAO

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

Key Theme – Human Nutrition

a). Description of Activity – Through a collaboration with the Yap Interagency Nutrition Education Council (YINEC), nutrition education training programs that included the three basic food groups, sources and functions of various nutrients, nutrients balancing, BWI, understanding food labels and nutritious recipes were conducted to clients in the outer islands. Cooking demonstrations were part of the training. The program reached one hundred and thirty-four families of which one hundred and seventeen were new contacts.

b). Impact/Accomplishments – Seventy-five percent of the program participants have started adding vegetables to their diet 3 to 4 days a week. Head Start staff reported an increased number of parents using vegetables in their family diet. Eight clients interviewed reported improved diets and a feeling of better health.

c). Source of Funds – Smith-Lever Act

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

Key Theme - Human Nutrition

a). Description of Activity - A nutrition, diet and health education program was conducted to adults and school children as part of the “Tasty, Healthy Food - Go Local 2005 Campaign”, which is a collaborative effort among the FSM National Government Department of Health, Education and Social Services, Japan International Cooperation Agency (JICA) and the Embassy of Japan, State Departments of Health Services and Agriculture, and the Land Grant Programs. The purpose of the campaign was to help people in the communities to start getting into the habit of healthy lifestyle, healthy diets, and physical fitness for the prevention and control of non-communicable diseases. Distributed to participants during the campaign were sugar bottles, vegetable fans, and recipe books. The Health Services staff took height and weight measurements and blood pressure of participants and provided healthy tips. The COM-FSM Land Grant staff and the Japanese cooking instructor entertained the audiences with their cooking skills and the end results of their cooking demonstrations.

b). Impacts/Accomplishments – There was an increased in awareness on what participants can do to stay healthy and they learned new recipes. Information from the campaign has been used in the homes of participants. Refinements on program implementation will be made as the campaign moves to other States in the FSM.

c). Source of Federal Funds – Smith-Lever/State/JICA

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

Key Theme – Human Nutrition

a). Description of Activity – It has been observed that the elderly and young ladies living in the urban areas of Majuro were either already lost or starting to lose their knowledge on preparing traditional foods and they are losing their interest on consuming traditional foods. The goal of an ongoing project is to address the issue of traditional foods that are highly nutritious and economical instead of depending on imported processed and canned food. The extension agent promoted the use of these traditional foods with homemakers and students from two high schools. The training programs involved participants in the collection, preparation and demonstrations of three different traditional dishes of *Ma Jenkun* (dried breadfruit roll), taro pudding, and coconut jam.

b). Impacts/Accomplishments – A publication "Marshallese Food Preservation Project" was completed as a guide to the preparation of these different local recipes and more than 50 young high school girls indicated that they now can prepare the dried breadfruit roll, taro pudding, and coconut jam because they can always refer to the handbook.

c). Source of Federal Funds – Smith-Lever

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

Key Theme – Human Health

a). Description of Activity – The EFNEP staff participated in the 2005 combined celebration of World Diabetic Day and Word Food Day and provided cooking demonstrations on the different healthy local recipes that were also on display. She also provided printed information on better ways to prevent or control obesity and diabetes. She also assisted in organizing a one-mile walk-a-thon that catered to many government officials to encourage people, including diabetic patients, to exercise for better health. The Department of Health Services staffs did health screening, took height and weight measurement, and provided healthy tips to participants. A special guest of the day was a diabetic patient who shared the experience of being diabetic and encouraged Extension effort to promote local food as a preventive measure.

b). Impact/Accomplishments – Seventy percent of participated indicated they had become aware of their health status when they receive complete health screen. Editor of Yap Network News published nutritious recipes displayed for the World Diabetic.

c). Source of Federal Funds – Smith –Lever/FAO

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

Key Theme - Human Health

a). Description of Activity - The EFNEP Extension Agent visited the outer atoll of Jaluit and provided information on nutrition, diet and health and did cooking demonstrations on several local recipes. In addition, she also organized physical fitness programs of through sports such as softball, volleyball, and played a nutrition bingo game as some of the ways to promote healthy living in the islands.

b). Impacts/Accomplishments – The ladies in the atoll had increased awareness in proper nutrition for good health and became aware that being lax and not doing any work will contribute to poor health.

c). Source of Federal Funds – Smith-Lever

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

Key Theme – Human Health

a). Description of Activity – The EFNEP staff is a cooperator of the Healthy Living in the Pacific Islands (HLPI) project, which is a consortium of the health professionals from the Land Grant institutions in American Samoa, FSM (Federated States of Micronesia), CNMI (Commonwealth of Northern Mariana Islands), Guam, Hawaii, Palau and the Marshall Islands. The goal of HLPI is to reduce the disparity in the prevalence of chronic diseases by living a healthy lifestyle and respecting cultural values. The EFNEP staff has been doing programs on nutrition, diet and health to help both the adult and youth population on proper ways of staying healthy and not succumb to the diabetes epidemic that is spreading ever quickly throughout the Pacific region.

b). Impacts/Accomplishments - 150 recipe books and 500 posters were printed with the help of SPC and have been distributed to clients and will be used in nutrition classes throughout Palau.

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

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

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	77,105	16,490	13,088	0
2004	92,453	4,208	8,280	0
2005	96,378	5,613	11,395	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	21,496	428	1,302	0
2004	25,285	1,036	976	0
2005	23,537	657	1,333	0

Summary of FTE Allocation:

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	0.90	0.0	0.0	5.25	0.0	0.0
2004	0.90	0.0	0.0	5.00	0.0	0.0

2005	0.90	0.0	0.0	5.00	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	0.20	0.0	0.0	0.3	0.0	0.0
2004	0.20	0.0	0.0	0.3	0.0	0.0
2005	0.20	0.0	0.0	0.3	0.0	0.0

Allocate Resources:
From the FY2005 total FTE of 73.50, 6.40 have been assigned under Goal 3, representing 9% of FTE input. The FY2005 budget allocated to Goal 3 programs and activities takes into account this FTE distribution plus how Goal 3 integrates with other 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:
Two important themes were addressed during this reporting period: Biological Control and Integrated Pest Management.

On Biological Control, the gallflies that were released to control the Siam weed on Angaur and Peleliu were already established. Galls on stems and shoots of the weed were very prominent. Likewise, the mirid bugs released to control the taro leafhoppers were already established. Low incidence of leafhopper infestation on taro occurred.

Contact scientists from the University of Hawaii promised to send pure culture of the wasp parasite for melon aphid control, once the rearing technique for the parasite has been perfected. Likewise, scientists from Indonesia and Fiji had been contacted for the pure culture of Actinote butterfly for release to control the mile-a-minute weed in Palau.

On Integrated Pest Management, a Hatch-funded project on identification and micropropagation of scab-resistant sweet potato varieties has been started. Some varieties like kangkum 1,

kangkum 2, ishiobing, Guam orange and Koror 1 were susceptible to scab fungus infection as shown by the presence of distorted leaves and fungal spots on young leaves and shoots in susceptible varieties.

CMI-CRE:
Staff turn out has affected implementation of agricultural research programs that would address this goal.

The Agriculture Extension Agent has been an active member of the Republic of the Marshall Islands Biodiversity and Biosafety Committees and this year the National Policy on Biodiversity and Biosafety has been completed. Sustainable agriculture programs continued with farmers who cultivate sweet potato, banana and breadfruit.

COM-FSM/CRE:

Yap Site:
The yam identification and conservation program continued with the aim to unfold the traditional wisdom practiced by farmers over generations with respect to the cultivation of yams. Over the past three years, an array of participatory research exercises carried out throughout Yap to elucidate centuries of accumulated experience and skills of women farmers in yam farming. The study found that women farmers were instrumental in all aspects of conservation – from seed selection to safe storage of the harvested tubers. Principal findings of this study were presented during the United Nations Conference on Small Island Developing States in Mauritius early this year.

Extension collaborated with SPC/FSM Plant Protection program and the University of Guam on biological control of *Chromoleana odorata*, an alien invasive weed species.

Pohnpei Site:
One of the challenges confronting contemporary agriculture is to be able to produce crops, adopting good management practices and not risking farm management to the environment. Practices and management should be environment friendly, economically viable and socially acceptable. Use of chemicals, specifically pesticides, is the last resort if economic yield is to be realized. Integrated farming strategies that are being practiced included resistant crop varieties, adequate plant nutrition, mulching, crop rotation, proper harvesting and marketing decisions. Economic yield is dependent on the combinations and integration of practices needed by crops at critical stages of growth, affecting productivity and ultimately the yield. It also involves monitoring of pests during the cropping cycle.

The activities carried out in the area of agricultural waste management, including demonstration on how to set up a gutter to collect and separate solid waste from the liquid waste for use as fertilizer. Liquid wastes are channeled to crops like banana and others fruit trees. Solid wastes are composted and incorporated into the soil for root crops and vegetables. Activities for this program are conducted in conjunction with normal site visits and workshops.

B. Key Themes:

Key Theme – Agricultural Waste Management

a). Description of Activity – Extension staffs conducted presentations and demonstrations on how to manage swine wastes during site visits and workshops. The hands-on approach to collecting and managing swine waste was used during demonstrations to increase adult and youth awareness in agricultural waste management, including the benefits of using manure as fertilizer and for reducing environmental pollution and health hazards. Training programs were conducted in three communities and at two high schools.

b). Impact/Accomplishments – Two of the participating farmers who annually bought about $200 worth commercial fertilizer are each saving about $150 by not buying as much commercial fertilizer as they are now using manure to supplement commercial fertilizer. One hundred fifty (150) farmers plan to adopt appropriate waste management practices and use manures as fertilizer.

c). Source of Funding – Smith-Lever

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

Key Theme - Biological Control

a). Program Description – The first shipment of *Actinote sp.* which came from Marihat Experiment Station in Indonesia was received on March 15, 2005. It took almost two weeks to reach Palau despite sending it by airfreight. The package containing the *Actinote* eggs were sent through Singapore, Manila, Japan, Guam and finally to Palau. When the package was opened, majority of the eggs hatched, many larvae were already dead, and host leaves were rotten. The larvae that survived the trip could not reach the third instar and also died.

The second shipment of *Actinote* eggs was received on April 11, 2005. It took more than a week for the package to reach Palau. Many eggs hatched on rotten leaves and young larvae were dead. The few larvae of *Actinote* that survived were reared on detached fresh leaves of *Mikania* and *Chromolaena* in the laboratory. When the larvae reached the third instar, they were transferred to potted *Mikania* and *Chromolaena* in the greenhouse. More than 30 larvae developed into pupae but ants and lizards ate more than half. Those that survived and emerged into adult butterflies mated but would not lay eggs on either *Mikania* or *Chromolaena*. To save the remaining butterflies that emerged, they were collected and transferred to a rearing cage provided with a sponge soaked in sugar solution. However, the female butterflies did not lay eggs and they died after 6 days. Eventually the *Actinote* cultures were lost.

Dr. Desmier de Chenon who supplied the *Actinote* eggs could not be reached despite several e-mail messages sent. A letter requesting for *Actinote* was also sent to Dr. Warea Orapa of the Secretariat of the Pacific Community (SPC) who has an ACIAR funded project on Biological Control of *Mikania* in Fiji and Papua New Guinea using also the nymphalid butterfly.

b). Impact/Accomplishments – In progress.

c). Source of Funding – Hatch Act Funds

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

Key Theme - Biological Control

a). Program Description – [*Melon Aphid*] - Dr. Russell Messing, a University of Hawaii professor who works on biological control of aphids had difficulty rearing to pure cultures the parasitoid *Lysephelebis testaceipes* and therefore could not provide program staffs the parasite. In the meantime, he is trying to perfect the rearing technique to produce pure cultures of the parasite. He also promised that once he has enough numbers of the other parasites of the melon aphid such as *Endaphis maculans* and *Aphelinus gossypii*, he will send those to Palau for rearing in the screen house on potted taro infested with the melon aphid.

b). Impact/Accomplishments – In Progress

c). Source of Funding – Hatch Act Funds (New)

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

Key Theme – Biological Control

a). Description of Activity – The Extension Agent involved both adults and youths in the biological control effort to eradiate *Chromoleana odorata* that are popping up everywhere. This invasive weed species is suspected to spread quickly by way of heavy equipments that were used to clear areas for construction and recreation, and by other means. This community involvement enhanced the effort and increases community awareness and support for the eradication program. One hundred sixty-six clients were actively participated in the project. The biological control used pest-specific bio-control agents [*Parachaeutes pseudoinsulata* (arctiid moth) and *Cecdochares connexa* (gallfly)].

b). Impacts/Accomplishments - A total of four release areas were established and observations showed the weed is being controlled in release areas without negative environmental effects such as those previously caused by the use of herbicides and savannah fires.

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

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

Key Theme – Biodiversity

a). Description of Activity - Objectives of the project were to document yam agro biodiversity, including traditional landraces (farmer's varieties) by conducting a range of participatory research surveys across Yap Island, to collect and conduct field trials to test and assess identity of each landraces based on morphological characteristics; to record morphology of each cultivar tubers based on IPGRI Descriptors and farmer's descriptions and to document traditional knowledge, beliefs and bicultural heritage associated with all aspects of yam cultivation and identify the custodians.

b). Impact/Accomplishments - Identity of the previous recorded cultivars of *Dioscorea alata* and *Dioscorea esculenta* cultivars were confirmed by repeated interventions. Participatory Research Appraisal revealed over 80 percent of the yam farmers are

women and their direct involvement and decision-making in cultivars choice, selection of planting sites, tuber selection, storage, maintenance and further management indicate they have access to and control over yam genetic resources and are important stakeholders in the conservation and utilization. Forty percent of the farmers give priority to taste rather than yield and yield potential and their special knowledge of the value and diverse uses of cultivars for food value, cultural and social significance has important implications for the conservation of yam genetic resources. Since the genetic base of this crop is relatively narrow, it must be broadened to respond to environmental changes (like frequent typhoons and coastal flooding), by selecting those varietals portfolios acceptable to farmers. The collated data from this documentation exercise helped to formulate a similar agro biodiversity conservation strategy for swamp taro on Yap and to tap funding from GEF under Micronesia Small Grants Scheme.

c). Source of Federal Funds – Hatch

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

Key Theme – Biodiversity

a). Description of Activity – The project on documentation of the cultivars of local food crops of the Marshall Islands was in collaboration with the Secretariat of the Pacific Community (SPC) that has provided some funding assistance for matching. Five local food crops such as coconut, breadfruit, pandanus, banana and taro were the target of this project. A survey had been conducted in collaboration with staff of Ministry of Resources and Development in Majuro atoll, Namdrik atoll and Arno atoll. The following numbers of cultivars were documented for the following crops: eight coconut, seven breadfruit, twenty-five pandanus, twelve bananas and six taro plants. Information in English and the vernacular and scientific names, botanical descriptions, habitat and uses of over 58 cultivars were documented from interviews with the farmer communities. A publication is aimed at the end of the program, which will be distributed to the farming communities and agriculture researchers. Information on the documentation of food crops will help in the traditional knowledge of the identities and uses of the native food crops of the Marshall Islands. Collected data have been submitted to SPC in Suva, Fiji for compiling and printing of manuscript.

b). Impact/Accomplishments – In progress.

c). Source of Federal Funds – Smith-Lever

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

Key Theme – Integrated Pest Management

a). Program Description – The project on the “Identification and Micropropagation of Scab Resistant Sweet Potato Varieties in Palau” involved the collection of twenty-three varieties of sweet potato and the rearing of these varieties in the experimental farm. The varieties collected *were Dirradid, Bertakl, Nikangets, Bent 3, Guam Orange, Guam White, Hawaiian, Ishiobing, Kangkum 1, Kangkum 2, Ngaraard, Ningsing, Oisca, Sers, Siakl, Sment, Tainung, Telekeok, Telentund, Koror 1, Koror 2, Siabal, and Techeboet.* Ten cuttings of each variety were planted in each row. A handful each of fertilizer and chicken manure were applied to promote good growth.

One month after planting, the varieties were evaluated for resistance/susceptibility to sweet potato scab. Initial results revealed that Kangkum 1, Kangkum 2, Ishiobing, Guam Orange and Koror 1 were susceptible to scab infection as shown by the presence of distorted leaves on shoots and lesions on stems and shoots.

b). Impact/Accomplishments – In progress.

c). Source of Funding – Hatch Act Funds

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

Key Theme – Integrated Pest Management

a). Program Description – In three release sites on Angaur State and one release site on Peleliu, the galls produced by the flies on shoots, stems and petioles of the Siam weed were very prominent. The flies were well established and stunted growth of the weed was very evident. Also, the mirid bugs were established on taro plantings infested with the leafhoppers. It is expected that the leafhopper population will gradually decrease on taro plantings in both islands.

b). Impact/Accomplishments – Both the mired bugs and the gall flies were established in Angaur and Peleliu areas. Thus, reduction in the population of the taro leafhopper has ensured farmers of increased production of taro corms. Likewise, reduction in Siam weed infestation will enable farmers to open up new areas for crop production.

c). Source of Funding – Smith-Lever Funds

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

Key Theme – Integrated Pest Management

a). Description of Activity **-** Extension staffs assisted four farmer cooperators (after the on-farm demonstration field trials) on their current cropping practices and maintenance of the established cucumber farm plots. Interventions on the practices and management included managing the soil and regular pest monitoring. Extension staff continued with the informal discussions on the practices and management of cucumber gardens. Discussions emphasized the importance of each step from cultivation of compacting soil, improving fertility of the soil by combined application of inorganic and organic nutrients, compost (or commercial compost in the absence of ample amount of composted farm waste and/or residues) and application of organic based micronutrient that extends harvesting from two to three or even four weeks. Fallowing for one year to three years after one crop cycle and crop rotation were also emphasized. Farmers were encouraged to plant other crops, a non-relative of cucumber.

b). Impact/Accomplishments **-** Adoption of the practices and management interventions was 100% for 50% of the cooperators. Improvement in the harvest duration and yield were realized in the cooperators' field. The farmer increased harvesting duration four times; yield, five to six times with the intervening practices and management.

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

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

Key Theme – Integrated Pest Management

a). Description of Activity - Three atolls was surveyed for insect pests. Survey results revealed that three major insect pests were common in the Marshall Islands viz. *Spiraling Whitefly*, *Mealy bugs* and *Coconut scale*. The research staff organized training on the Pacific Islands Distance Diagnostics System (PIDDS) for the Plant Protection and Quarantine officers of the Ministry of Resources and Development. Training program demonstrated the technique of digital photography and sample submission for the insect pests and plant diseases on the network for diagnosis.

b). Impact/Accomplishments - Insect pest surveys generated the updated information on new insect pests in the Marshall Islands. Farmers and Plant Protection and Quarantine officers from the Ministry of Ministry of Resources and Development are now capable of identifying common pests found in their plants.

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

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

Key Theme – Water Quality

a). Description of Activity - A staff from the USDA Natural Resources Conservation Services in Pohnpei, Federated States of Micronesia, visited the Marshall Islands to work with the Water Quality Extension Agent to introduce and to build a simple solar distillation water unit, which is currently being used in the rural atolls of Pohnpei, FSM as a means of providing clean and fresh drinking water for families. This unit is simple to build, inexpensive, not more than $500 for labor cost and materials and does not require electricity or fuel, since it uses the sun as its source of fuel. It converts salt water to fresh potable drinking water. It is suitable for rural atoll conditions and so far, 5 atolls were introduced to this new project. The construction and usage of this unit was demonstrated to the communities and at the same time the advantages were also explained to the audiences. The water from these units was tested using the H2S method and result indicated that it was clean and safe for human consumption. The units that were set up are currently being housed at each of the outer islands health dispensaries and the health aide and local government officials are currently monitoring the units. Two workshops were held at the AES site to demonstrate this unit. A large number of people showed up for the workshops. A unit has been set up on campus to be used for demonstration purposes to clients and stakeholders.

b). Impact/Accomplishments - Improvement in the health of the atoll residents as a result of the water units that provides clean and safe drinking water.

c). Source of Federal Funds – Smith-Lever & Region IX

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

Key Theme – Water Quality

a). Description of Activity – A brochure entitled " Water Issues are a High Priority in Palau – Clean Drinking Water #1 Concern", which highlighted the results of a survey on Water Issues in Palau was published in the Palau Community College Newsletter with over 700 copies and over 200 individual local distribution. Likewise, a booklet, "A Guide for Rainwater Catchments Systems in Palau" was finalized and used as training materials for the first island wide Rainwater Catchments System training held on May 12, 2005. The training was held in collaboration with the Palau Environmental Quality Protection Board, Division of Environmental Health & Sanitation, and Public Water Utilities program. There were 21 participants in the workshop, which composed of School Food Services Programs, health practitioners, and rural water operators.

b). Impact/Accomplishments – Increased awareness on water quality by a good portion of the population as a result of the publication.

c). Source of Federal Funds – Hatch Act & CSREES 406 Regional Water Quality Grant

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

Key Theme – Water Quality

a). Program Description - The water quality awareness program was delivered to 9 public schools and 8 villages on Majuro atoll. The issues discussed during the visits were: water treatment, water conservation, sanitation, H2S testing method, waterborne diseases, and environmental issues. A demonstration on the simple solar distillation unit was also given. A total of 25 families were involved in the visits. More than 100 water samples were collected from community catchments to be tested for bacterial quality. The Extension Agent provided the results of the tests to the catchments' owners. The owners were immediately advised and provided with information on how to treat their catchments.

b). Impact/Accomplishments - The Extension Agent promoted his awareness program through radio, which is the main source of communication for the population of the Marshall Islands. Calls and letters from community members were received asking information on water quality issues. Homeowners have mentioned that they have done what was recommended to them by the Extension Agent to prevent their drinking water from getting contaminated.

c). Source of Federal Funds – Smith Lever & Region IX

d). Scope of Impact – Marshall Islands

Key Theme – Soil Quality

a). Program Description - Dr. Robert Gavenda and Robin DeMeo of USDA NRCS-Guam/Palau Office, conducted a two-day soil management training workshop. There were 21 participants from seven state government representatives and PCC-CRE staff. Each participant received a packet of information about the conservation and land management practices with topics such as general soils in Palau, importance of soil organic matter, soil biology, Palau soil survey use, soil erosion and control, composting, and soil management.

b). Impacts/Accomplishments – None

c). Source of Federal Funds – Smith Lever

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

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	199,971	42,767	33,942	0
2004	250,720	11,412	22,455	0
2005	250,646	14,936	30,323	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	206,364	4,109	12,504	0
2004	242,734	9,949	9,369	0
2005	225,954	6,305	12,801	0

Summary of FTE Allocation:

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	3.50	0.0	0.0	12.45	0.0	0.0
2004	3.60	0.0	0.0	12.40	0.0	0.0
2005	3.30	0.0	0.0	12.40	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	2.30	0.0	0.0	2.50	0.0	0.0
2004	2.30	0.0	0.0	2.50	0.0	0.0
2005	2.30	0.0	0.0	2.50	0.0	0.0

From the FY2005 FTE of 73.50, 20.50 had been assigned under Goal 4, representing 28% of FTE input. The FY2005 budget allocated to Goal 4 programs and activities takes into account this FTE distribution plus how Goal 4 integrates with other 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:

PCC-CRE programs continued to address issues to enhance economic opportunities and the quality of life among families and consumers by way of using research results in extension services. An outreach program was extended to all 16 States of Palau to benefit farmers, fishermen and rural folks in improving their agricultural techniques through research results from agronomy, crop protection, aquaculture and processing of agricultural produce into stable products. About 200 participants from these States had benefited by this outreach program.

The Babeldaob Science Program was extended to 13 elementary schools with 250 students in the 6th, 7th, and 8th grades. Environmental sciences comprising of agriculture, island formation and ecology, watershed management, and water quality were taught to the students who in turn were very enthusiastic and showed great appreciation, interest, and comprehension of lessons based on tests given to them.

A similar science program was extended to 13 Upward Bound students from Palau, Pohnpei, Kosrae and the Marshall Islands in a 6-week program. The students were also oriented on possible career opportunities in the environmental field.

CMI-CRE:

Funding was obtained from the UNDP Sustainable Livelihood Project to support the Outer Islands Pearl Farming Demonstration Project and a Memorandum of Understanding among the outer atoll Mayors of Kili, Ebon, Likiep, Maloelap and Rongelap atoll local government was executed for the hatchery production of pearl oyster spats. Through the MOU, a two months pearl hatchery and pearl farming training was conducted for trainees from these atolls.

Collaboration with the Chinese Agricultural Technical Mission has been expanded with the establishment of the Laura Farmers Association and the adoption of bi-laws to govern the activities of the 37 member association.

In the area of youth development, a CYFAR Sustainable Community Project will begin in 2006 and the CMI-CRE Dean attended a pre-conference session in Guam on the guiding principles for National CYFAR outcomes and logic model development. This is a regional project that has Guam and the other Micronesia land-grant institutions, Palau Community College and College of Micronesia-FSM, collaborating.

COM-FSM/CRE:

Yap Site:
Extension programs continued to provide information to increase community awareness of opportunities available in the aquaculture sector for economic development. A fish pond project was initiated as a way of providing families the technique for raising certain species of fish to supplement their diets and provide for additional income. Other youth programs included the planning and implementation of community beautification programs, reconstruction of seawalls, handicraft making, cultural dance lessons, and sports.

Pohnpei Site:
Training activities continued for youth on pearl industry development. Four additional apprentices were recruited and were trained on hatchery and farm operation. Other training programs to enhance economic opportunities for families and individuals were in the farming and cultivation of certain cash crops for domestic needs and for the export market. Swine production is still another quick way of providing for additional family income, as swine is an important commodity in the custom and culture of Pohnpei and pigs can go on sale up to a couple of thousand dollars.

Chuuk Site:
In collaboration with Department of Health Services and the Girl Scouts Program, Extension Agents provided a three-day training workshop on parenting skills to girl scouts and also provided remedial lessons on reading, writing, science, social studies, and math to twenty-six high school drop-outs. Extension agents also collaborated with Department of Health Services-Youth Wellness Center to conducted training on subjects including substance abuse, HIV- AIDS and juvenile delinquency and assisted homemakers on handicraft and sewing groups in two municipalities.

Kosrae Site:
Sewing training programs were conducted for adult homemakers and students as a way of providing new knowledge and skills in enhancing family economic opportunities and improving the quality of lives. Purchasing ready-made imported clothes that are extraordinarily expensive is becoming a heavy burden for a lot of families and gaining knowledge on sewing is very helpful to a lot of families.

Other training programs were conducted by agriculture extension agents on the cultivation of certain important economic crops, such as banana, taro and oranges for the domestic and export markets.

B. Key Themes:

Key Theme – Community Development

a). Program Description – Results of researches conducted at the PCC-CRE Research and Development Station in Ngaremlengui State are ready for dissemination to the people and communities in Palau through outreach programs on agricultural, aquaculture, crop protection, food safety, and water quality, family and consumer education programs and environmental education. This year, three seminars were conducted in 3 States of Palau, namely, Ngaremlengui State with 38 participants, Ngarchelong State with 36 participants and Ngaraard State with 53 participants.

b). Impact**/**Accomplishments – About 200 farmers, fishermen, and rural area folks were benefited by these outreach programs by way of improving their agricultural techniques through research results from agronomy, crop protection, aquaculture and food processing of agricultural produce into stable products.

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

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

Key Theme – Community Development

a). Description of Activity – With vegetable crop production becoming a major activity on Majuro atoll, the Agriculture Extension Agent met with farmers to identify the potential site and interest level for home gardening projects. Home gardening activities have been a collaborative effort with the Taiwanese Agricultural Technical Mission that involved the continuing promotion of backyard home gardening and sharing of information on soil fertility, application of compost and fertilizers to enrich the mostly sandy soil on the atolls, and cultivation of vegetable crops that can thrive in poor soil conditions.

b). Impacts/Accomplishments – Thirty-seven local farmers are now fully engaged in backyard home gardening and some of them have already supplied the local markets for additional income for the families.

c). Source of Federal Funds – Smith-Lever

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

Key Theme - 4-H/Youth Development

a). Program Description – [Babeldaob Science Program] – In this science program, 13 elementary schools in the Babeldaob State, which composed of 250 students in the 6^{th}, 7^{th}, and 8^{th} grades participated. The emphasis of the class was environmental sciences and the main topics were agriculture, island formation and ecology, watershed management, and water quality. The lessons were tailored to have as much hands-on and experiential learning as possible. Mini-experiments were conducted on scientific testing of water and soil quality, various acids and bases. To test student comprehension of the lessons, home works and pre and post-tests were given.

b). Impact – Based on test results, the students gained a lot of knowledge from this class and had fun as well. They had learned the formation of the Palau rock islands, why it is important to keep the soil and water clean and healthy, and ways they can do to improve the environmental quality of Palau

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 –Thirteen eleventh-grade students from Palau, Pohnpei, Kosrae, and the Marshall Islands participated in the class. The objective of the program was to teach the students about environmental sciences and to expose them to professional opportunities available in the environmental sciences. Among the activities conducted were: forest inventories, water quality testing, composting, eradication of invasive species, and other natural science topics. Speakers from various government and non-government agencies were invited to talk about careers in environmental science.

b). Impact/Accomplishments – By the end of the six weeks, the students had gained a deeper understanding of environmental sciences, especially in Palau and were able to meet professionals in the field and learned about possible career opportunities.

c). Source of Federal Funds – Smith-Lever

d). Scope of Impact – (Palau)

Key Theme – 4-H/Youth Development

a). Description of Activity – The Extension Agent assisted youth groups in the development of meaningful activities through visits to cultural sites and offices and listening to presentations from resource persons. The extension agent organized beautification activities for youth where they cleaned government offices, roadsides and planted ornamental trees beside the roads. In one training program, children were taught the tradition art of making local handicrafts and weaving different handicraft from the coconut palms. Children also helped in the reconstruction of collapsed seawalls cleaning pathways and cultural sites.

b). Impact/accomplishments – More than 700 youngsters contributed to community efforts in addition to increasing skills in handicraft making.

c). Source of Federal Funds – Smith-Lever

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

Key Theme – Youth Development

a). Description of Activity – The extension agent conducted various training programs to different target groups, including students in the Girls Scouts Program, high school drop-outs, and community women groups. The following academic subjects were taught for

three months to school drop-outs: reading and writing, general science, social studies and math. Substance abuse, HIV- AIDS and juvenile delinquency were included also as part of the training programs.

Extension agents also worked with three women groups on handicraft and sewing in two municipalities and organized another group in collaboration with Chuuk Women Association.

b). Impact/Accomplishments – Twenty –six youths who had completed the academic training program were able to reenroll in high school and some women were able to sew clothing needs for their families.

c). Source of Federal Funds – Smith Lever

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

Key Theme - 4-H Youth Development

a). Description of Activity – More than hundreds of youths were involved in skill building activities such as beautification, public speaking, fishing, and gardening. In beautification activities, they learned the importance of living in a clean environment and they were also introduced to the concepts of recycling and composting. Public speaking exercises helped them to overcome shyness and to be outspoken about their problems and needs. The fishing exercises taught the students the basic skills that provide for their family food and to learn fishing as a hobby and a sport to islanders. As for gardening, they were taught all the basic steps in setting up a backyard garden.

b). Impacts/Accomplishments - Parents were reporting that their children were showing self confidence and can speak freely about their needs.

c). Source of Federal Funds – Smith-Lever

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

Key Theme – Jobs/Employment

a). Description of Activity – Development of economically viable industries in Micronesia to support the fledging economy continued to be at the top of the development priorities. The research and extension project continued to make progress in its endeavors to establish pearl industry in Pohnpei, provide training programs for local people, and promote pearl business development and creating employment. Following the successful demonstrations of hatchery and farm skill training for the local people as well as production of the black pearls in July 2004 and in August 2005, the national, state and local government leaders, island communities, local business owners and overseas investors have shown increasing interests in pearl farming business in Pohnpei and other FSM states. The COM Pearl Project entered into Phase 3 in January 2005 and will undertake the following: to develop pearl farming business models; to continue demonstration of small-scale commercial pearl production; to establish a frame-work on sales and marketing strategies for the “Micronesian-brand” black pearls and pearl-related products; and to collaborate with regional and overseas government agencies, organizations and institutions in sustainable pearl industry development in Micronesia.

b). Impacts/Accomplishments – During the period between January 2004 and December 2005, 19 local people were supported under the WIA (Workforce Improvement Act) /JTPA (Job Training Partnership Act) to learn pearl farming skill, of which 12 trainees represented from Pakin Atoll and 7 were from Pohnpei main island. The trainees joined for one year of training and became "stand-by" status, in which each trainee became eligible with knowledge and skill for working at a local commercial pearl farm once it is established. At the same time, the Project also provided onsite farm skill training at the three demonstration farms at Nett and Pakin Atoll involving 20 - 30 local people at every month or two months intervals.

The two Micronesian "core" technicians began training their own apprentices on hatchery production and grow-out farming, two of those local trainees learned various hatchery and farming skills over the last 3 years were employed by this project as assistant technicians. Another local trainee was also employed overseas as a hatchery technician by the CMI Land Grant Program's pearl hatchery project.

Several discussions/consultation meetings were held with the Pohnpei's stakeholders which included Pohnpei State Government's departments and agencies (e.g. Economic Affairs, Marine Development, Attorney General's Office, Land and Natural Resources, Economic Development Authority), local governments (Municipal Offices of Sokehs) and communities (Pakin Atoll Community) on the issues related to the Pohnpei's pearl farming business development. The Project has been advising the economic development potential for the communities and local business owners to utilize the tens of thousands of oysters in the COM LG demonstration farms; to develop some business models/options.

c). Source of Funds – Hatch Act & DOI

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

Key Theme – Supplemental Income Strategies

a). Description of Activity - The extension agent advised the project owners of fish ponds to raise the dikes around the ponds to protect against strong waves. The agent also advised on timely restocking of the fishpond and demonstrated how to care for brackish water fish species such as mullet, milkfish, and rabbit fish for faster growth. The Extension Agent annual contacts under this project activity are 109 including more than 10 tour groups composed of students and adults. The extension agent also helped in preparing a briefing paper seeking funding for a freshwater prawn project.

b). Impacts/Accomplishments – Many individual have expressed interest in the aquaculture program and five potential aquaculture farm sites were visited and provided assistance.

c). Source of Funds – Smith-Lever & SARE

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

Key Theme – Supplemental Income Strategies

a). Description of Activity – The extension agent on home economics provided assistance to thirty-tree women on how to cut and sew blouses and skirts as a way of supplementing the family income. With the rising cost of imported ready-made clothes, families are starting to experience difficulties in clothing their children and themselves. The sewing program has become popular as a way of teaching young mothers and not-well-to-do families to help themselves in gaining new knowledge and skills in sewing for their family needs and reducing family clothing expenses. During the summer, a training program on sewing was conducted for high school girls as part o the Girls Scout Summer Program, in which 34 students completed. The extension agent also provided assistance on a one-on-one basis, allowing participants to work on their own time to complete their projects.

b). Impacts/Accomplishments - Twenty-nine of the participants were able to draft, cut and sew different styles, patterns and sizes of dresses. Two of the participants are now skillful in making dresses and no longer pay for other women to sew clothing for their children. Five of the participants indicated they are making extra income from sewing and saving money for their children's uniform. All of the Girls Scouts Program students were able to finished sewing a pillow case at the completion of the three-week training and brought them home.

c). Source of Federal Funds – Smith-Lever

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

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	127,254	27,215	21,600	0
2004	158,267	7,204	14,175	0
2005	181,321	10,560	21,438	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	77,386	1,541	4,689	0
2004	85,968	3,524	3,318	0
2005	98,855	2,758	5,601	0

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Summary of FTE Allocation:

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 administrative staff and research and extension staff that were responsible for programs under this Goal. 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 of research and extension projects scattered throughout the islands and for discussion with stakeholders at those sites. In some instances when local experts are not available locally like social scientist, funds were made available for the hiring of consultants from other land-grant institutions or nearby institutions for a period of one to two weeks to assist in the necessary capacity building 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	3.10	0.0	0.0	7.05	0.0	0.0
2004	3.10	0.0	0.0	7.00	0.0	0.0
2005	3.10	0.0	0.0	8.0	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	1.10	0.0	0.0	0.7	0.0	0.0
2004	1.00	0.0	0.0	0.7	0.0	0.0

2005	1.00	0.0	0.0	1.1	0.0	0.0

From the FY2005 FTE of 73.50, 13.20 FTE has been assigned to programs addressing Goal 5, representing 18% of FTE input. The FY2005 budget allocated to 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 - Information Technology

a). Description of Program - A continuing effort has been to provide access to the global information superhighway to the schools and the 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 consultations 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 continued through 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 completed 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 is still viewed as an entity that had contributed well to the social and economic development of the islands and will continue to serve the needs of the people and the communities throughout Micronesia in the next 20 years of the new relationship.

Research and Extension administrative and program staffs located at the six program delivery sites (islands) have gone through four strategic planning meetings in the four FSM States that catered to continued interactions with stakeholders in those localities. Most of the program administrators and program staff are members of government and private organizations and they received feedback periodically through interactions with these different organizations. At meetings conducted at the county level, feedbacks were received from stakeholders on issues and concerns unique to the different islands.

As a response to stakeholders input, research and extension staff undertook the task of drawing up local plans of work to address concerns and problems that are unique to the different islands or groups of islands. Stakeholders input is also use to determine what research and extension programs that will be funded by local matching funds as government and private organizations demand the most out of their contributions to these projects.

Inputs for program design and implementation for the last POW cycle and the POW Update were obtained and used through consultation with our various stakeholders from the local, state, national and regional levels and we will continue to take into account these inputs for future programs.

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 agencies.

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 before it is send to CSREES-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.

Assessment of Accomplishments Relative to 5-Year POW

Overall, there have been major accomplishments in research and extension projects proposed in the 5-Year POW and this was due mostly to the improvement on research infrastructure and the acquisition of appropriate technologies. Research activities have provided for an increase in production of indigenous and staple food crops and the development of new products. New varieties of tropical crops have been acquired through the tissue culturing process and micro propagation procedures and protocol for somatic embryogenesis of these crops has been standardized.

Extension activities on the biological control of several invasive weeds have contributed to the reduction in pesticide usage and increase in the adoption of new practices to reduce the contamination of the air, water, and soil of small island communities. Food safety, nutrition and health programs have decreased illnesses and have decreased low birth weight and infant mortality rate. Improving eating habit and curbing the Western influences on the lifestyle of the local population is a continuing struggle and it has been a tug of war.

Extension efforts in transferring research results has been positive and resulted in programs becoming more readily available to underserved and underrepresented communities. As programs expanded and there is an increase in collaboration, there is a bigger segment of the population that is being served.

Program efforts in aquaculture/mariculture development is steadily growing as more and more communities and organizations are showing interest and are becoming involved in pearl farming. The hatchery production and training had resulted in over 20,000 oysters which have been deployed in two pilot farms. The Micronesian trainees had successfully performed their

first solo pearl oyster hatchery spawning and have subsequently handled all the hatchery procedures as required in raising and growing the oysters spat, including making feed, changing tanks, placement of collectors, keeping records, calibration of feeding schedule and other activities.

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