



AREERA POW REPORT
Agriculture Research, Extension and Education Reform Act of 1998

Annual Report of Accomplishments and Results
FY 2001

Northern Marianas College
Cooperative Research, Extension, and Education Service (NMC-CREES)
Commonwealth of the Northern Mariana Islands (CNMI), USA

Report: FY 2001 AREERA Report for the Northern Mariana Islands. Submitted by the Northern Marianas College Cooperative Research, Extension, and Education Service (NMC-CREES). This report represents the combined Extension and Research programs of Northern Marianas College as presented in the AREERA plan of work submitted in 1999 and subsequently revised in 2000.

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i. Introduction

The Northern Marianas College-Cooperative Research, Extension and Education Service, (NMC-CREES) provides coordinated extension educational opportunities and research projects through its two programs of Agriculture Research & Extension (ARE) and Family & Consumer Sciences (FCS). With continued support and interaction, both programs (ARE and FCS) are dedicated to helping our many stakeholders improve the economic prosperity, environmental living conditions and overall quality of life within the Commonwealth of the Northern Mariana Islands (CNMI).

The CNMI is a chain of islands located in the Western Pacific. Out of these islands only three (Saipan, Tinian and Rota) are considered fit for human habitation and therefore are the main islands that our programs service consistently. Throughout these islands, we serve our key stakeholders that include: farmers, agriculturists, families, youths, individuals, government agencies, and various ethnic communities.

In relation to other land grant universities and colleges, NMC-CREES is small in size, with fewer than forty employees distributed between all of the three major islands. In order to better serve our stakeholders, meet their growing demands and fulfill our mission and goals, we anticipate NMC-CREES to grow in size. A major component substituting for the shortage of man power, NMC-CREES relies on key collaborations and partnerships with government agencies, non-profit organizations and other entities throughout the CNMI and in the community, to promote its educational programs, extension services and research projects. In exchange, NMC-CREES provides our collaborators with the knowledge and expertise of our professional faculty and staff. In addition, NMC-CREES provides our collaborators with the appropriate resources in order to run our collaborative programs and hires temporary workers to assist with specific projects.

In addition, the programs here at NMC-CREES are focused on providing services to improve the agriculture, environment, health and the economic well being of farmers and families, agriculturists, low-income individuals and the youth. These educational programs, extension services and research projects are the results of the growing needs and challenges that the CNMI community faces. In addition, the programs are in line with the missions of the Cooperative Research, Extension and Education Service and the Northern Marianas College and follows:

1. We are here to develop, test, adapt, and provide appropriate technical information and assistance to the people of the CNMI in the fields of animal and plant sciences, family and consumer sciences, extension services and community development. This assistance will be locally sustainable, environmentally safe, and economically feasible, in order to enhance and improve the quality of life for the people and the various communities.
2. To convey the Northern Marianas College's role of providing information, technology and means for other sectors of society, to make and implement

decisions in the areas of agriculture, family and consumer sciences, extension services, natural, and community resources.

NMC-CREES's many programs of Agriculture Research & Extension (ARE) and Family & Consumer Sciences (FCS) include:

Programs involved in the Agriculture Research & Extension include:

- Aquaculture and Fisheries Development
- Crop Improvement
- Plant Protection
- Soil and Water Management
- Communications

The Family and Consumer Sciences programs include:

- Food Safety and Quality
- Expanded Food and Nutrition Education Program (EFNEP)
- Nutrition, Diet and Health
- Family Development and Resource Management
 - Parenting program
 - Limited Resource Sewing Program
 - 4H Youth Development
 - Leadership and Volunteer Development
 - "Handle the Safe Way," a food safety research component.

NMC-CREES focuses on the combination and integration of Research and Extension activities. Both researchers and extension agents work hand in hand to deliver a total package of information and resources that address our stakeholders' needs. Funding for many of our programs include Smith Lever and Hatch Act appropriations.

A. FY 2001 Annual Report of Accomplishments and Results

Goal 1:

An agricultural system that is highly competitive in the global economy

EXECUTIVE SUMMARY

OVERVIEW

Since the establishment of NMC-CREES in 1987, it has been a priority for the program to enhance agriculture in the CNMI. Importation of agricultural products (e.g. fruits, vegetables, fish, etc.) continues to be a major hindrance in the establishment of a strong agriculture industry in the CNMI. The lack of quality as well as the inconsistent supply of locally grown agricultural produce continues to deter the development of agriculture in the CNMI.

Terrorism has become another major reason why the CNMI's local agricultural industry must be improved. Immediately after the September 11 incident, the CNMI's economy was put into a downward spin. The impact of the incident created a decrease in the supply of imported fresh fruits, vegetables and other agricultural commodities.

NMC-CREES is working to improve our agricultural system, minimize importation and at the same time, stimulate the island's economy. By providing our program's expertise, information and appropriate resources, we helped farmers and other stakeholders improve practices, and develop a competitive approach to farming, so together we could decrease the number of imported products, improve the island's economy and protect ourselves from future disasters.

With established programs aimed at conducting research and implementing extension outreach, advancement of agriculture has taken a step further in the past year. The NMC-CREES Programs that address Goal 1 are the Crop Improvement Program, Aquaculture and Fisheries Development Program, Plant Protection Program, Plant Nutrition and Soil Management Program and the Sustainable Agriculture Program.

PROVIDING EXPERTISE

The Crop Improvement Program continued vegetable trials focusing on five specific crops. The objective of these trials were to determine varieties that can be grown in the CNMI, which are currently being imported from other countries. Seedlings were grown on Saipan and were later distributed to neighboring islands for comparison in growth. In addition, the Aquaculture Development Program conducted several studies focused on feed and species alternatives. Post larvae were acquired from Guam and were raised in recirculating Aquaculture tanks. In collaboration with the Crop Improvement Program, similar vegetable crops that were being tested on farm plots were tested in hydroponics troughs. These crops may be used as a possible feed alternatives for fish and or shrimp as well as serve as water "polisher" in recirculating filtration systems.

PROVIDING INFORMATION

Additional accomplishments include the Integrated Pest Management Program, which conducted numerous workshops involving over 30 individuals from private and public sectors on Saipan, Tinian and Rota. The program also established a system that certifies produce from local farms to have implemented proper pesticide management practices. In addition, the program has established a scouting program consisting of 30 farmers from the major islands.

The Plant Nutrition and Soil Management Program provided fertilizer recommendations based on soil samples taken from private farms. In other projects, the Sustainable Agriculture Program continued promoting Chinaberry and/or Neem to be used as botanical pesticides. More than six farmers have begun planted Chinaberry or Neem on the islands of Saipan, Tinian and Rota. The Neem Extract Management of Anthracnose Disease of Vegetables and Fruits Project continues to research the use of Neem as an alternative to chemical pesticides.

PROVIDING APPROPRIATE RESOURCES

The Pineapple Research and Pilot Production Project acquired and distributed 13,000 crowns to 50 farmers on the islands of Rota and Tinian. The feasibility of the small-scale commercialization of pineapples in the CNMI was studied and determined to be profitable.

In addition the Marketing Information System (MIS) utilizes monthly on-farm field surveys conducted by NMC-CREES and Department of Land and Natural Resource (DLNR) staff. The MIS program was improved over the past year and now provides much more realistic estimates and forecasts of vegetable production on each of the islands of the CNMI.

OUTCOMES

With the collaboration efforts of involved programs and external partners, an increase in vegetable production and farmer collaboration is noticeable. Several thousand people were reached through extension outreach, workshops, training sessions and publications. In response to the increasing demand for fingerlings by farmers, the Rota government built a fish hatchery and is now working on incorporating aquaponics into their system. The Sabalu Market continues to flourish and has increased its membership to include floral designers and food vendors in addition to farmers showcasing their produce in a street market setting.

IMPACTS

Because of the trials conducted by several of the programs, alternatives and opportunities for farmers have increased. This in turn will enhance agriculture in the CNMI by increasing local production and providing better quality produce. In addition, private and public sectors will now be more aware of the impacts of pesticide and the importance of avoiding excessive use.

ASSESSMENT

Currently, all of the programs involved in goal 1 are in line with the objectives of the NMC-CREES 5-Year Plan of Work. Additions to the Plan of Work may be needed to meet the changing needs of the community. For example various activities in the Plan of Work were started late or placed in a different year because of staff turnover.

Key Theme: Adding Value to New and Old Agricultural Products

SITUATION

The pineapple industry development program is designed to jump-start a commercial-scale industry in the CNMI by distributing to interested farmers planting materials of Smooth Cayenne' variety crowns from Hawaii. Three batches of crowns have been distributed on Tinian and Rota over the past three years, totaling approximately 13,000 crowns to approximately 50 recipients.

IMPACT

We now have a core of six commercial producers on Tinian and Rota. When new plantations begin harvest in the next one or two years, this number should double. Although still small, a commercial industry supplying fresh pineapple to the local economy now exists. Given the facts that the pineapple plant grows well on the better sites of Tinian and Rota, its fruit is obtaining good market prices and is hyper-competitive with fresh pineapple imports. Marketing intact fruits ripened on the plant is not a problem. Consumers on Tinian and Saipan quickly buy-out fruits at current production levels, with prices for top-quality fruits consistently ranging from \$1.00 to \$1.25 per pound.

Source of Funds: Hatch, Smith Lever 3b,c

Scope of Impact: Pineapple producers on Tinian and Rota.

Key Theme: Agricultural Profitability

SITUATION

The Crop Improvement Program of NMC-CREES concentrated on identifying commercial varieties of major imported vegetable crops that perform well on Saipan, Rota and Tinian. The goal has been to assist local vegetable growers so that less of these expensive vegetables are imported from the mainland: Tomatoes, Bell Pepper, Sweet Corn, Sweet Melons, and Lettuce. One problem encountered in the CNMI is a reliable source of vegetable seeds and seedlings. Local farmers relied heavily on seeds and seedlings produced locally on the various islands or seeds found through supply stores, which came directly from unreliable vegetable sources. The Crop Improvement program introduced the local farmers to purchasing seeds from reliable sources including locations outside of the CNMI, mainly the U.S. mainland and other existing markets.

IMPACT

As a result of the research, local farmers are now purchasing the seeds introduced by the Crop Improvement Program. In addition, one nursery in the CNMI has adopted the seed

purchasing practice and began to purchase and sell the quality seeds that were recommended by the Crop Improvement Program. It is now selling various brands of Johnny's Selected Seeds. Fifteen farmers are now buying seeds directly from catalogs introduced by the program.

Source of Federal Funds: Hatch, Smith Lever

Scope of Impact: CNMI Wide

Key Theme: Agricultural Profitability

SITUATION

The Crop Improvement program conducted trials to test which crops grew best in the CNMI. Once the results were found, the program introduced the local farmers to these various crops. Research showed that these crops withstood all the environmental aspects of the CNMI and showed to be strong, tasty, abundant and valuable enough to produce a profitable market.

IMPACT

As a result of the research, twenty local farmers are now selling the vegetables, primarily tomatoes and bell peppers, in local markets. In particular, Mr. James Chua, a local farmer, reported a successful harvest of 20,000 pounds of a variety of Johnny's-361 tomato. This variety of tomato was considered the best variety to grow in the NMC Horticulture trial and throughout the CNMI.

Source of Federal Funds: Hatch, Smith lever 3b

Scope of Impact: CNMI Wide

Key Theme: Agricultural Competitiveness

SITUATION

The Marketing Information System (MIS) utilizes monthly on-farm field surveys conducted by NMC-CREES and Department of Land and Natural Resource (DLNR) staff. The MIS program was improved over the past year and now provides much more realistic estimates and forecasts of vegetable production on each of the islands of the CNMI. The information generated was combined with information collected from hotels and food retailers, on prices paid to farmers for vegetable produce, to prepare a paper entitled: "Potential Agricultural Production and Market Value in the CNMI 1998-2000". The paper gives closer estimates of the amounts of vegetables produced, acres harvested, potential value of crops harvested (if all of the estimated production was sold) and value per acre, for 30 of the most important vegetable crops grown on each of the islands of Rota, Tinian and Saipan. Data on estimated vegetable production, crop yields and prices received were also provided to the USDA Farm Service Agency (FSA) for use in the crop disaster relief program (in case of a bad typhoon).

IMPACT

Due to the data collected, farmers and other entities have been and continue to access information on which crops are the most profitable to produce and will better match their seasonal production to consumer demand.

Source of Funds: Hatch, Smith Lever

Scope of Impact: CNMI Wide

Key Theme: Agricultural Competitiveness

SITUATION

The Integrated Pest Management (IPM) program improves client farmer profitability by reducing expenditures and investments in pesticides and equipment and labor to the bare minimum required for successfully crop protection. Alternative crop protection methods in addition to pesticides are highly recommended, as part of a multi-disciplinary and multiple approach management system. IPM contrasts to the pre-existing, low profit approach to crop protection of “spray everything on a regular basis”.

IMPACT

Farmers involved in the IPM program learned to spray only when the crops needed insecticides, thereby lowering production costs and making their programs more competitive.

Source of funds: Funding from Smith-Lever and USEPA funds.

Scope of impact: CNMI Wide

Key Theme- Innovative Farming Techniques

SITUATION

The Aquaculture Development Program collaborated with several other local government agencies to introduce non-circulating hydroponics into the CNMI. The target of the workshop was for existing farmers, educators and government agencies. The objective was to teach a low cost method of producing hydroponic vegetables.

IMPACT

Out of the sixty participants that attended the workshop, ten (10) have organized themselves to form a non-profit organization focused on the production of crops utilizing non-circulating hydroponics technology. In addition, Tinian High School has incorporated non-circulating hydroponics into their agriculture curriculum.

Source of Federal Funds: Smith-Lever 3(b) and 3(c)

Scope of Impact: CNMI Wide

Key Theme- Innovative Farming Techniques

SITUATION

Because of high demand for shrimp in the CNMI, the Aquaculture Development Program tested new findings made by researchers in the U.S. on the possibility of raising marine shrimp in low-salinity water. The Aquaculture Development Program began producing marine shrimp (*L. vannamei*) in existing circular fish tanks and by using city water in Saipan. Survivability was comparable to systems using brackish water, since the city water in parts of Saipan already contains a moderate salt content.

IMPACT

Farmers on Saipan, Tinian and Rota have showed great enthusiasm to extension on shrimp production by NMC-CREES, and have begun switching to shrimp as an alternative to tilapia. Two farmers on Rota will be conducting trials with the Extension Agent. A restaurant owner/fish farmer on Tinian has begun initial steps in setting up a system to produce shrimp.

Source of Federal Funds: Smith-Lever 3(b) and 3(c), Hatch Funds

Scope of Impact: CNMI Wide

Key Theme: Invasive species

SITUATION

Most agricultural pests in the CNMI are invasive species, and include insects, diseases, and weedy plants. This program advises and teaches technicians and farmers how to deal with these. Fighting invasive species includes using biological control agents when possible. The NMC-CREES IPM program started a major effort in 2001 to investigate the possible control of a very aggressive alien invasive vine, *Coccinia grandis*, or ivy gourd, also called scarlet-fruited or scarlet gourd. It is a major agricultural and environmental pest species on Saipan, harboring agricultural insect pests and destroying native habitats and endemic plants, causing loss of biodiversity in many parts of Saipan.

IMPACT

A survey of Saipan conducted in August 2001, determined that the vine has increased its coverage of Saipan by at least 6 to 10-fold, in the past 4 years, now covering an area of around 1,200 acres. The impact of this alien invasive vine is severe, and getting worse. The NMC-CREES IPM team introduced the use of Garlon ® (triclopyr) herbicide to control scarlet gourd. The most effective method is either to use syringes to inject Garlon ® into the bark of scarlet gourd. The second effective method is to wrap duct tape in two places around an armful of thin vines, then cut the thin vines between the tapes. The cut ends are then dipped in a mixture of 50% kerosene and 50% Garlon ®. Note these two methods do not spray the herbicide in an area, and minimize exposure of Garlon to the environment. The possible impact of controlling the scarlet gourd vine would be immense. The CNMI Division of Agriculture now has a team of a half dozen workers using the NMC technique to control the scarlet gourd with Garlon ®.

The NMC-CREES IPM team tried to introduce a biocontrol parasite against scarlet gourd. The Division of Fish and Wildlife has mandated further testing to show the biocontrol agent will not damage a local vine related to scarlet gourd. If and when permission is granted, the biocontrol agent will be introduced to the CNMI and Guam. The biocontrol agent has been a great success in Hawaii.

Source of Funds: Funding from Smith-Lever and USEPA funds.

Scope of impact: State Specific

Key Theme: Neem Extract Management

SITUATION

Previous work showed the successful use of ethanolic extracts as a prophylaxis treatment on mango against the fungi, *Colletotrichum gloeosporioides* and *Phomopsis mangiferae*. Subsequent work focused on the use of ethanolic and aqueous extracts only on *C. gloeosporioides*, the causal agent of Mango anthracnose, and the most important limiting factor to commercial mango production in the Northern Marianas Islands. This project was begun in response to a request from several government agencies, state legislators, and growers in order to address the problems of diversifying the agriculture production in response to a serious economic downfall in the Commonwealth.

IMPACT

The fundamental reasons for using the neem extracts remains valid, and has proven to be successful in the laboratory and nursery trials. Several individual growers have adopted the practice of spraying their vegetable and small fruit trees with mixtures of neem leaf extract to control both insects and fungi.

Source of Funds: Hatch, Smith Lever

Scope of Impact: CNMI Wide

Key Theme: Sustainable Agriculture (also found in Goal 4)

SITUATION

As a result of several one-on-one client contacts, farmers on the islands of Rota, Tinian and Saipan have indicated an interest in Sustainable Agriculture (SA), and have incorporated SA farming techniques on their farms.

IMPACT

On Rota, two farmers have incorporated SA techniques into their farms. A farmer who has planted Neem and Chinaberry trees is using water extracts from these plants as a botanical pesticide. By growing his own insecticide, he has reduced the need for costly commercial insecticides, which saves money and helps maintain the environment. The other farmer has intercropped approximately 300 betelnut palms between the rows of an existing banana plantation. Literature research indicates that this particular intercrop has a beneficial effect on soil chemistry and fertility. Furthermore, the mature bananas

provide mulch, compost, and much needed shade for the young betelnut palms. This practice significantly increases the land use ratio, (yields) while reducing several commercial inputs such as fertilizers, plastic mulch, and various pesticides. In four to five years, we expect this intercropped plantation to have a land use ratio of at least 50% higher than mono-cropped bananas and betelnut.

On Tinian, one farmer has indicated an interest to plant betelnut between bananas after having a catastrophic failure of approximately 1,000 betelnut seedlings exposed to direct sunlight. He is currently planting the bananas and will not plant betelnut seedlings until after his bananas have become established.

On Saipan, four farmers have planted Neem and Chinaberry trees with the intent to use water extracts of seed and leaves as a botanical pesticide. Two farmers have indicated the complete elimination for the need of commercial insecticides in their plantations by spraying water extracted Neem and Chinaberry on a monthly basis. Many farmers in the CNMI spray their crops with commercial pesticides twice a week. One farmer has planted betelnut between rows of bananas. Ultimately, this plantation will be a multi-cropped system of bananas, betelnut, black pepper, coffee and papaya using both horizontal and vertical space in the cropping system. These sustainable farming techniques reduce costly commercial inputs while increasing the productivity and yields of their farms.

Source of Federal Funds: Smith-Lever

Scope of Impact: CNMI Wide

SITUATION

The NMC-CREES Communications Program continues to help promote all programs, projects and activities related to NMC-CREES. Within the past year, the Communications Program created a Communications Committee to help NMC-CREES promote program related projects and activities to a wider audience within NMC-CREES and throughout the CNMI. The program made headway with a local newspaper, "The Saipan Tribune," to have a full-page coverage of one NMC-CREES program every week. In addition to all other media outlets, the Communications program hosts the website entitled crees.org. This site promotes all the programs at NMC-CREES, educational material, our staff, and links to local and federal agencies, our events and activities.

IMPACT

Thousands of residents of the CNMI have learned about NMC-CREES programs through newspapers, brochures and the radio. Hundreds of extension articles have been disseminated by printing pages from the website crees.org (<http://www.crees.org>) and distributing to farmers and homemakers.

Source of Federal Funds: Smith-Lever

Scope of Impact: CNMI Wide

SITUATION

The Plant, Nutrition and Soil Management program focuses on the fertilizer and plant nutrient recommendation needs of CNMI farms. Some projects include: Coconut water analysis - Twenty-five coconut trees throughout Tinian were sampled, by collecting the water, or juice, of immature coconut fruits for sulfate analysis, with the assistance of the water quality laboratory at the University of Guam. Coconut water has been used elsewhere in the Pacific for sulfate analysis, because sulfur, an essential plant nutrient, is not usually analyzed in soil nutrient laboratories, but water quality laboratories routinely analyze sulfate.

Kagman watershed nutrient management recommendations - Some notable information has come out of this work: One fact is that, unlike most other CNMI soils, Kagman Agriculture Park soils are deficient in phosphorus more often than not, probably because of thirty years of continuous cultivation without adding sufficient phosphorus back to the soil. A third observation was that, unexpectedly, some local soil samples (one from Kagman, one from Marpo Valley on Tinian) are indicating magnesium deficiency.

IMPACT

Five farmers growing coconut on Tinian were recommended to use ammonium sulfate fertilizer to supply both nitrogen and sulfur. Twenty farmers in the Kagman Agricultural area were recommended to use a complete 16-16-16 fertilizer instead of only nitrogen fertilizer.

Source of Federal Funds: Smith-Lever

Scope of Impact: CNMI Wide

SITUATION

The IPM field research to document long-term population trends of major pest species in the Northern Marianas Islands was established in 2001. Five research trap sites were set up on the islands of Rota, Tinian, and Saipan, distributed to sample agricultural areas and areas remote from active farms. Population data is being collected on our most serious agricultural pests, the Melon Fly, (*Bactrocera cucurbitae*), Oriental Fruit Fly (surveillance monitoring), Sweet Potato Weevil (*Cylas formicarius elegantulus*), White Flies, and aphids.

Thanks to increased scrutiny of crops and ecosystems, we have documented two more weevils attacking sweet potatoes in these islands: the "West Indian Sweet Potato Weevil" (*Euscepes postfasciatus*) was detected as a recent arrival, and has spread into the three islands. It appears that the first introduction came into Rota on plant materials brought in from Hawaii. The third weevil attacking sweet potatoes is much larger, and undetermined. It is about 7 mm long, is similar to the "Cucurlio" weevil type, and the grubs cause serious external scoring of the tubers. We also discovered a second species of cucumber beetle, (*Aulacophora quadrimaculata*), in wild cucumbers or "loofa", which may have the ability to attack our commercial crops.

FTEs & Program Cost for Goal 1:

FTEs - 6	Program Cost – \$379,839
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Goal 2:

A safe and secure food and fiber system

EXECUTIVE SUMMARY

OVERVIEW

NMC-CREES, through its Family and Consumer Science and the Agriculture Research and Extension programs, has helped CNMI consumers become more informed about food safety and quality issues. The educational programs continue to deliver research-based information and education in the classroom, community group settings, and food and retail establishments to help participants prepare, handle, and store food safely. In addition, extension agents and researchers continue to work together to promote container gardening to students and families in schools and homes. As a result, consumers have access to a wholesome and secure food and fiber supply.

The programs of Family and Consumer Science (FCS) and Agriculture Research and Extension (ARE) that address Goal 2 are the Plant Protection Program, the Aquaculture and Fisheries Development Program, Food Safety and Quality Program, the Expanded Food and Nutrition Education Program, and the Nutrition, Diet and Health program.

WORKING TOGETHER

In the past year, FCS and Agriculture extension agents, with collaborators have continued to use culturally appropriate food safety education material. Many of these educational resources have been distributed to homemakers, school-aged children, consumers, and food and retail establishment employees. NMC-CREES conducted different workshops and training sessions in the areas of container gardening, pesticide application, and food safety education through formal and non-formal educational approaches. Additionally, the NMC-CREES official web site continues to serve as another form of outreach to the community where educational materials are available.

During the summer of FY 2001, FCS and ARE programs conducted the second phase of the pilot project entitled the Summer Youth Program (SYP). The goal of SYP is to promote basic life skills to at-risk youth groups. Various FCS and Agriculture extension agents continue to teach the clients the following subjects: food safety, kitchen safety, the food guide pyramid, physical activity, horticulture, aquaculture, and basic sewing and crafts.

COLLABORATIONS

Through collaborations with the Division of Environmental Quality, the Nutrition Assistance Program (NAP), the Public School System, the Department of Public Health, and the Department of Lands and Natural Resources, FCS and Agriculture Research and Extension has reached over 3000 families, individuals and youth throughout the CNMI. Additionally, 2,700 consumers were reached during September's Food Safety Education Week coordinated by the Bureau of Environmental Health, the Attorney General's Office, the Division of Environmental Quality, the Hotel Association of the Northern

Mariana Islands, and the Northern Marianas College Cooperative Research, Extension and Education Service.

WORKSHOPS

FCS and Agriculture extension agents and researchers conducted workshops in the areas of container gardening of high nutrient-density crops, food safety and quality education of fresh food, food label reading, pesticide applicator's training and certification, and food resource management. As a result, participants (consisting of public agency employees, farmers, teachers, homemakers, and food and retail establishment personnel) learned about the effects of chemicals used in farming and its alternatives, container gardening of high nutrient-density produce, proper food label reading, and food safety education. Moreover, agents served as guest speakers at various classes at the local high school to teach students kitchen and food safety, ways to include local vegetables into their diets, and budgeting and money management.

SHARING RESOURCES

Due to a limited number of extension agents within programs, every program is required to share resources and clientele. As a result of the program redirection, NMC-CREES program participants increased their knowledge and skills in order to provide and consume safe food. In addition, with the integration of research and extension, FCS extension agents successfully collaborated with researchers to implement the second phase of the pilot project The Summer Youth Program (SYP). Youth who participated in SYP emerged with an increased knowledge in basic nutrition, food safety, basic sewing and crafts, horticulture and aquaculture.

IMPACT

With the collaboration efforts between FCS and Agriculture Research and Extension and various internal and external partners, over 3000 families, individuals and youth were reached last year. In addition, stakeholders increased their clientele numbers because of our collaborative efforts. Evaluation results from stakeholders show that NMC-CREES programs are appropriate for their clientele and program needs. Memorandums of Understanding secure the relationship and the collaborative efforts between NMC-CREES and its stakeholders. Participants who completed NMC-CREES programs were taught skills to provide a safe and secure food and fiber system. They have more knowledge in the areas of food safety and quality, pesticide application, and container gardening of high nutrient-density crops. With the stringent requirements of the IPM and PAT programs, the access and use of chemicals that may leave a residue on locally produced crops are reduced. In time, alternative-farming techniques can be springboards for a local organic food market where consumers can purchase safe produce grown without the use of chemicals.

Through collaborations with the 4-H program, the Nutrition Assistance Program (NAP), the Public School System, and the Department of Public Health, EFNEP and the Nutrition, Diet and Health program has reached over 2700 families throughout the CNMI in the last year. In addition, there was about 70 youth and families with young children throughout the CNMI enrolled in EFNEP. According to the EFNEP evaluation report,

about 72% of the graduates showed improvement in one or more food resource management practices such as planning meals, comparing prices, using grocery lists, and not running out of food or cutting children's meals because there was not enough money to prepare them. Meanwhile, 87% of the graduates demonstrated acceptable food safety practices such as thawing or storing food properly. Also, 90% of youth from the pilot project The Summer Youth Program (SYP) demonstrated the ability to wash hands properly, to avoid cross-contamination, and to use temperature control when handling food.

ASSESSMENT

All Family and Consumer Science and Agriculture Research and Extension activities are in line with the NMC-CREES Plan of Work. There were some changes that needed to be made to adapt to the changing needs of the community. For example various activities in the Plan of Work were started late or placed in a different year because of staff turnover.

Key Theme – Food Resource Management

SITUATION

The NMC-CREES Expanded Food and Nutrition Education Program (EFNEP) and the 4-H Program continued to recruit limited resource-families and individuals with young children. The EFNEP program collaborated with the 4H program, the Nutrition Assistance Program (NAP), the Public School System, the Head Start Program, the Division of Youth Services and the Department of Public Health, to teach clients about making most out of their food dollars, and meal planning. EFNEP Program Aides used the EFNEP curriculum, Food and Money Basics, developed by the University of Hawaii,

IMPACT

Due to the collaboration among various agencies and EFNEP, over 2700 families, individuals with young children, and youth were reached throughout the CNMI last year. In addition, there was about 71 youth and 178 families or individuals with young children throughout the CNMI enrolled in EFNEP. According to the EFNEP evaluation reports, more than 72% of the graduates demonstrated acceptable practices of food resource management. As a result, these families were able to save money by planning meals, comparing prices while shopping, and using grocery lists.

Source of Federal Funds: Smith-Lever 3(d), State-local matching

Scope of Impact: CNMI Wide.

Key Theme – Food Safety

SITUATION

EFNEP staff helped coordinate Food Safety Education Month in September 2000. EFNEP enrolled about 178 youth and families with young children last year. They were taught how to keep food safe using University of Hawaii's Food and Money Basics curriculum. Moreover, EFNEP collaborated with other FCS programs to provide food safety education to The Summer Youth Program (SYP) participants. And finally, due to

the high incidence of food-borne illnesses among very young children in day care facilities, EFNEP conducted food safety education workshops to a number of childcare facilities on the island of Saipan.

IMPACT

Through collaborations with the 4-H program, the Nutrition Assistance Program (NAP), the Public School System, and the Department of Public Health, EFNEP has reached over 2700 families throughout the CNMI in the last year. According to the EFNEP evaluation report, 87% of the graduates demonstrated acceptable food safety practices upon exit of the program. Families are now safer from food-borne illnesses due to unsafe food handling practices. In addition, 90% of The Summer Youth Program (SYP) participants demonstrated the ability to wash hands properly and to prepare food safely. Finally, about 90% of childcare providers who attended the Food Safety in Daycares workshop improved their knowledge of food safety.

Source of Federal Funds: Smith-Lever 3(d), State-local matching

Scope of Impact: CNMI Wide

Key Theme: Food Safety

SITUATION

The safety and quality of our food supply is improved when farmers and commercial pest control operators handle and use pesticides properly, and with appropriate skills. These training programs were designed to educate the public and pesticide users in the safety, handling, and regulations of pesticide use. They also educated the participants in how to recognize their management problems and make well-reasoned pest control decisions. When put into practice, these correct decisions, to use the correct pesticides for a given situation, and then only when needed, will produce a safer food supply and protect worker safety.

IMPACT

Except for when all were expired, the 29 people who are now qualified to apply for and be licensed to handle the very dangerous RUP pesticides are the lowest number in recent history. The requirements for passing the exams are much more stringent, requiring that those who desire to be licensed actually prove that they know their complete management system, including regulations, pesticide safety, handling, pest biology and recognition, and environmental (non-target) protection.

Source of Funds: Smith-Lever 3(d), State-local matching

Scope of Impact: CNMI Wide

ON-GOING AND PLANNED RESEARCH & EXTENSION PROGRAMS

SITUATION

The Aquaculture and Fisheries Development Program conducted more studies with kangkung (*Ipomoea aquatica*) for both its nutritional value and its nitrate uptake ability. To maximize productivity, kangkung and two leafy-lettuce varieties were cultured in two Aquaponics troughs. Adding kangkung into both troughs, reduced nitrate levels from an average of 128 mg/L to 50 mg/L. Chlorosis, a nitrogen deficiency indicator, was observed in approximately 90% of the lettuce. Because of its efficiency in nitrate uptake, kangkung will be further tested as a component to a low-cost filtration system. To increase protein content in kangkung, leaves were dried and fed to tilapia. However, the tilapia did not respond favorably to dried kangkung leaves because of low palatability. Because of the lack of equipment to mix and extrude feed using dried kangkung leaves, raw leaves will be the only option at this time. Utilization of kangkung in a filtration system will maximize productivity by allowing farmers to grow fish and vegetables simultaneously; promote high nutrient density vegetable consumption; and it will reduce negative impact on the environment by removing high levels of nitrates, and other nutrients, in the water.

SITUATION

The Farm Safety Program is providing efforts to improve farmer and community awareness of the hazards of living on and operating a farm. The major effort has been in collaboration with the 4H program on each of the islands.

SITUATION

NMC-CREES conducted free pesticide residue-testing workshops to teach government agency staff and other interested parties how to use the field test kit for testing produce, soil, air and water, for pesticides. After carefully training staff and demonstrating the testing method to the public, NMC-CREES tested almost 200 samples of fresh vegetables from several sources where the public buys their food. None of the samples tested contained detectable levels of pesticide residue, whether from off-island sources (US mainland, Korea, or Japan) or local farmers, thus providing evidence that local produce is as safe to eat as vegetables purchased from the US mainland. The IPM program promotes that food produced using only low amounts of pesticides will be of higher quality, by virtue of lack or minimal amounts of pesticide residues. Pesticide residue testing was demonstrated to the public at open farmers' market, with IPM staff on all three islands of CNMI.

SITUATION

Previous work on the Neem Extract Management project reported on the successful use of ethanolic extracts as a prophylaxis treatment against the fungi, *Colletotrichum gloeosporioides* and *Phomopsis mangiferae*, on mango. Subsequent work focused on the use of ethanolic and aqueous extracts only on *C. gloeosporioides*, the causal agent of Mango anthracnose, and the most important limiting factor to commercial mango production in the Northern Marianas Islands. This project helps consumers and stakeholders have access to a wholesome and secure food and fiber supply by using neem

extract instead of toxic pesticides to control insects and fungal diseases on fruits and vegetables.

FTEs & Program Cost for Goal 2:

FTEs - 7	Program Cost – \$350,625
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Goal 3:

A healthy, well nourished population

EXECUTIVE SUMMARY

OVERVIEW

NMC-CREES through its Family and Consumer Science (FCS) and the Agriculture Research and Extension (ARE) programs has helped CNMI youth and families with young children improve their overall quality of life. The educational programs deliver research-based information and education in the home, classroom, and community group settings to help participants make informed lifestyle and health decisions. The results are strong, nurturing families, healthy children, positive youth development, and savings in food and healthcare costs.

The FCS and ARE programs that address the health needs of families, individuals and youth in the CNMI are the Expanded Food and Nutrition Education Program (EFNEP), Nutrition, Diet and Health, the Aquaculture and Fisheries Development Program, Plant Protection and Crop Improvement programs.

WORKING TOGETHER

In the past year, FCS and Agriculture extension agents have continued to use culturally appropriate educational materials that are used as supplemental information to pre-existing curriculums. Many of these educational resources have been distributed to homemakers, school-aged children, and individuals. Research and Extension efforts to help curb diabetes and other diet-related diseases have been conducted by finding alternative food sources for the people of the CNMI.

WORKSHOPS

FCS and ARE agents also conducted different workshops and training sessions in the areas of nutrition integration in the classroom, promoting the consumption of local produce and making healthy food choices. In addition, a nutrition newsletter is circulated to over 1500 food stamp recipients monthly. Additionally, the NMC-CREES official web site continues to serve as another form of outreach to the community.

During the summer of fiscal year 2001, FCS programs in collaboration with the NMC-CREES Agriculture Research and Extension conducted the second phase of the pilot project entitled The Summer Youth Program (SYP). The goal of SYP is to promote basic life skills to at-risk youth groups. Various FCS and Agriculture extension agents taught

the clients' food safety, kitchen safety, the food guide pyramid, physical activity, horticulture, aquaculture, and basic sewing and crafts.

Additionally, FCS extension agents conducted workshops to promote the integration of food and nutrition education into the current public school system's curriculums. As a result, participants (mostly public schoolteachers and administrators) learned ways to include nutrition education into their lesson plans. Due to the success of the workshop, the public school system would like to train more of its teachers on integrating food and nutrition education into current curriculums. Moreover, agents attended various classes at the local high school to teach students kitchen and food safety, ways to include local vegetables into their diets, and budgeting and money management.

COLLABORATIONS

Through collaborations with the Division of Environmental Quality, the Nutrition Assistance Program (NAP), the Public School System, the Department of Public Health, and the Department of Lands and Natural Resources, FCS and Agriculture Research and Extension has reached over 3000 families, individuals and youth throughout the CNMI. Furthermore, the Expanded Food and Nutrition Education Program (EFNEP) enrolled 70 families and youth. According to EFNEP evaluation reports, at entry, none of the participants achieved acceptable scores in nutrition practices. However, in the end, 75% achieved acceptable scores.

SHARING RESOURCES

Due to a limited number of extension agents, every program is required to share resources and clientele. As a result of the program redirection, NMC-CREES program participants developed more knowledge and skills to be productive members of the family and the community. In addition, with the integration of research and extension, FCS extension agents successfully collaborated with researchers to implement the second phase of the pilot project The Summer Youth Program (SYP). Youth who participated in SYP emerged with an increased knowledge in basic nutrition, food safety, basic sewing and crafts, horticulture and aquaculture.

Lastly, because of the active role FCS has in the community, health fair organizers continually depend and rely on its support. Thus, FCS was well represented at the annual First Lady's Vision Foundation – Healthy Families, Healthy Communities Symposium, the Early Childhood Conference, the Pacific Basin Association of Conservation Districts Conference, and various public school events.

IMPACT

With the collaboration efforts between FCS and ARE and various internal and external partners, over 3000 families, individuals and youth were reached last year. In addition, stakeholders increased their clientele numbers because of our collaborative efforts. Evaluation results from stakeholders show that FCS programs are appropriate for their clientele and program needs. Memorandums of Understanding secure the relationship and the collaborative efforts between FCS and its stakeholders. Participants who completed FCS programs were taught to become nurturing individuals with the skills to

be a productive member of the family and society. They have more knowledge in the areas of basic nutrition, food safety and quality, and family development and resource management. According to clientele evaluation results, there was an approximate 50% increase in knowledge and skills of clients in various FCS programs and another 50% increase in behavior change.

ASSESSMENT

All Family and Consumer Science and Agriculture Research and Extension activities are in line with the FCS Plan of Work. There were some changes that needed to be made to adapt to the changing needs of the community. Various activities in the Plan of Work had to be placed in a different year because of staff turnover.

Key Theme-Human Nutrition

SITUATION

Diabetes and other diet-related diseases are very common in the Northern Mariana Islands due to bad eating habits and the lack of healthier alternative protein sources. In the past, many residents considered tilapia as a “trash fish” and refused to accept it as a protein source. In hopes of reducing health problems and increasing tilapia acceptance, the Aquaculture Development Program, in collaboration with other local agencies, took an aggressive approach to introduce tilapia, as a healthier, cheaper, protein source, to residents who have reluctantly accepted tilapia in the past. More than 60 pounds of tilapia was donated to an annual fiesta on the island of Rota. The fish were prepared and served during the festivities.

IMPACT

More than 500 people from Saipan, Tinian, Rota and Guam attend the annual fiesta that takes place on the island of Rota. An informal survey showed that more than 90% of the people, who have never tasted tilapia, have admitted that it tasted good and would be willing to eat it more often.

Source of Federal Funds: Smith-Lever 3b&c

Scope of Impact: State Specific

Key Theme – Human Nutrition

SITUATION

Through collaborations with the 4H program, the Nutrition Assistance Program (NAP), the Public School System, the Head Start Program, the Division of Youth Services and the Department of Public Health, EFNEP Program Aides continue to recruit limited resource-families and individuals with young children. Program Aides used the EFNEP curriculum, Food and Money Basics, developed by the University of Hawaii, and the curriculum entitled Project EXCEL, developed by the University of Guam, to teach clients about the Food Guide Pyramid, making healthy food choices, feeding young children, and prenatal nutrition. Program Aides had to adapt some of the material to include culturally appropriate information. One of the resources used was the CNMI

Food Guide Pyramid, which emphasizes local food sources. Besides regular client outreach, EFNEP staff conducted workshops in local elementary and high schools to promote healthy food choices since the rates of obesity among children are rising. Furthermore, in order to spread more information about proper nutrition and making healthy food choices, materials were distributed to homemakers, families, and youth at the various health fairs and events. Finally, EFNEP collaborated with The Summer Youth Program (SYP) to teach participants the essentials of food and nutrition education.

IMPACT

According to the EFNEP evaluation reports, 13% of graduates demonstrated acceptable nutrition practices such as meal planning, making healthy food choices, reading the nutrition label, and preparing healthy food for the family. As a result, families save money on health care costs by eating more fruits, vegetables and less fat. This has been proven to prevent certain chronic diseases. Furthermore, 89% of EFNEP youth participants increased their knowledge of the essentials of human nutrition. Also, 85% of The Summer Youth Program (SYP) participants demonstrated the ability to read nutrition labels, to identify food sources in the food guide pyramid, to make healthy 'pyramid' meals, and to make healthy food choices.

Source of Federal Funds: Smith-Lever 3(d)

Scope of Impact: CNMI Wide

ON-GOING AND PLANNED RESEARCH & EXTENSION PROGRAMS

SITUATION

The NMC-CREES Communications Program collaborated with the many programs of the Family and Consumer Sciences to produce brochures, pamphlets, leaflets, web pages, press releases and other media services to help participants and stakeholders make informed lifestyle and health decisions.

SITUATION

The Pesticide Applicator's Training Project insists that proper pesticide handling and use can only improve human health, by reducing the risk of pesticide exposure to the consumer public and to farm laborers and food handlers. Proper regulation and appropriate training in the use of toxic chemicals form the foundation of safe use, to minimize risk of poisoning and damaging human health.

SITUATION

The Farm Safety Program is providing effort to improve farmer and community awareness of the hazards of living on and operating a farm. The major effort has been in collaboration with the 4H program on each of the islands.

SITUATION

The pineapple industry development program is designed to jump-start a commercial-scale industry in the CNMI by distributing planting materials (crowns of the variety 'Smooth Cayenne') from Hawaii to interested farmers on Tinian and Rota. These farmers

are in turn selling their fresh produce in the local market at a ranging \$1.00 to \$1.25 per pound. The consumers on the other hand are receiving a fresh product full of vitamin C.

SITUATION

Crop Improvement Program was selected to participate in a grant-writing workshop at the University of Hawaii. This “Healthy Gardening” program gathered stakeholder priorities at focus groups both within the department and with the community. Two local newspapers published articles on the subject. NMC-CREES staffs are producing the first draft of the “Healthy Gardening” grant proposals.

FTEs & Program Cost for Goal 3:

FTEs - 8.42	Program Cost – \$409,603
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Goal 4:

Greater Harmony between agriculture and the environment

EXECUTIVE SUMMARY

OVERVIEW

Because of limited land area, invasion of harmful insects and weeds, the depletion of natural resources and the health of the CNMI people, protecting the environment has always been a high priority for NMC-CREES. Steps have been taken to protect the environment by educating extension agents, partner agencies, farmers, families and the community, about the options and practices that are available to protect our natural resources. NMC-CREES’s IPM program has formed an environmental protection team, which tests and recommends alternative methods of controlling pests and diseases while producing good crops. These IPM methods reduce farmers’ dependence on pesticides and chemical fertilizers, and protect food, soil, and water resources from chemical contamination. The IPM program started a new campaign to control the dreaded Scarlet Gourd (*Coccinia grandis*) vine, a major invasive threat to the CNMI’s environment.

OUTPUT INDICATORS

To help minimize pesticide use, the Plant Pathology Program has conducted research aimed at reducing the use of chemical pesticides by finding effective botanical pesticide alternatives that will have minimal environmental impact. Throughout the CNMI, there are many uncertified pesticide applicators that continue to mishandle all types of pesticides. The Pesticide Applicator Training courses require a series of pesticide safety training, certification workshops and exams in order to help train the applicators and keep the CNMI’s environment, food supply and people safe. The IPM Project also conducted crop protection and pesticide safety workshops on the islands of Saipan, Tinian and Rota to support the IPM Crop Scouting teams and programs.

The Neem Extract Management Program’s relevant factors include the high cost of imported pesticides, their sporadic availability, the amount of time required to receive the

product from the US mainland, and the short shelf life of chemicals due to the high temperatures and humidity of the tropical climate. Most of the agricultural lands are located over island aquifers, raising increased public concerns regarding the possibility of pesticide residues in the drinking supply. Pesticide runoff is extremely damaging to the surrounding coral reefs, aquatic life, and marine habitats helping to degrade the ecosystem encircling the islands. Organic crop production and sustainable integrated pest management are newly reintroduced concepts to the region and require specific projects to successfully demonstrate their use to local growers.

In addition to the projects and programs aimed at reducing pesticide use, the Plant Nutrition and Soil Management Program began projects aimed at reducing the over-use and mismanagement of fertilizers. The program collected soil samples that were analyzed off-island. Fertilizer recommendations have been made to over 20 farmers.

OUTCOME

Program development and implementation priorities were key issues to many of the programs related to goal 4. In the Plant Protection program, an IPM Technician training program was designed, developed, and delivered, through a 2-week program of classroom and field activities and lectures. Over 30 farmers, college staff, and government agency personnel participated in the program; nineteen passed the exams and satisfied the requirements to become IPM crop scouts and advisors through the program. Subsequent to the training program, monthly working visits to each island staff provided additional training and in-field practice to develop the crop scouting system, which is being implemented in 2001. This scouting system, with specially developed field data recording forms, was designed and field-tested in late 2000; evaluation of field methods and improvements of the system will be on going.

In the PAT project, NMC-CREES management and staff committed resources and manpower to a complete redesign and formalization of the PAT training programs and licensing through CNMI's Division of Environmental Quality (DEQ). Beginning in June 2001, four PAT programs were offered, starting with Category 5, Commercial pest control for structural, institutional, and public health pest control. A PAT trainer from the University of Guam was hired to deliver this program, while NMC staff learned the methods and contributed lectures and supporting information as needed. Three PAT programs for private pest control certification, mostly targeted at farmers and extension workers, were conducted over the following three months.

Due to high costs and dangers of pesticide use, the Neem Extract Management project focused on finding alternatives to the use of chemicals and pesticides. The Plant and Soil Nutrition Management Program provided recommendations to over twenty farmers on fertilizer use.

IMPACT

With the collaboration efforts between the NMC-CREES programs and various internal and external partners, over several thousand farmers and individuals were reached last year. In addition, stakeholders increased their clientele numbers because of our

collaborative efforts. In the PAT program, twenty-nine people are now qualified to apply for and be licensed to handle Restricted Use Pesticides (RUP). The requirements for passing the exams are much more stringent, requiring that those who desire to be licensed prove that they know their complete management system, including regulations, pesticide safety, handling, pest biology and recognition, and environmental (non-target) protection.

The Neem Extract management project has potential benefits that include the economic advantage of using locally available materials, ease in preparation and application within an integrated system, and the environmentally friendly use of a natural plant extract with proven non-toxicity to humans, animals, wildlife, and fish. This research will help anyone trying to provide alternatives to the synthetic, imported pesticides. The principal impact of the Plant Nutrition and Soil Management program is the detailed set of recommendations provided to 20 farmers on the most economical use of nitrogen and phosphorus fertilizers. Due to recent activity in all the programs involved, the major impacts and results are yet to be determined.

ASSESSMENT

All Agriculture Research and Extension activities are in line with the overall NMC-CREES Plan of Work. There were some changes that needed to be made to adapt to the changing needs of the community. For example various activities in the Plan of Work were started late or placed in a different year because of staff turnover.

Key Theme: Sustainable Agriculture (also found in Goal 1)

SITUATION

As a result of several one on one-client contacts, farmers on the islands of Rota, Tinian and Saipan have indicated an interest in Sustainable Agriculture (SA), and have incorporated sustainable farming techniques on their farms.

IMPACT

On Rota, two farmers have incorporated sustainable techniques into their farms. A farmer who has planted Neem and Chinaberry trees is using water extracts from these plants as a botanical pesticide. By growing his own insecticide, he has reduced the need for costly synthetic insecticides, which saves money and helps maintain the environment. The other farmer has intercropped approximately 300 betelnut palms between the rows of an existing banana plantation. Literature research indicates that this particular intercrop has a beneficial effect on soil chemistry and fertility. Furthermore, the mature bananas provide mulch, compost, and much-needed shade for the young betelnut palms. This practice significantly increases the land use ratio, (yields) while reducing several commercial inputs such as fertilizers, plastic mulch, and various pesticides. In four to five years, we expect this intercropped plantation to have a land use ratio of at least 50% higher than mono-cropped bananas and betelnut.

On Tinian, one farmer has indicated an interest to plant betelnut between bananas after having a catastrophic failure of approximately 1,000 betelnut seedlings exposed to direct

sunlight. He is currently planting the bananas and will not plant betelnut seedlings until after his bananas have become established.

On Saipan, four farmers have planted Neem and Chinaberry trees with the intent to use water extracts of seed and leaves as a botanical pesticide. Two farmers have indicated the complete elimination for the need of commercial insecticides in their plantations by spraying water extracted Neem and Chinaberry on a monthly basis. Many farmers in the CNMI spray their crops with commercial pesticides twice a week. One farmer has planted betelnut between rows of bananas. Ultimately, this plantation will be a multi-cropped system of bananas, betelnut, black pepper, coffee and papaya using both horizontal and vertical space in the cropping system. These sustainable farming techniques reduce costly commercial inputs while increasing the productivity and yields of their farms.

Source of Federal Funds: Smith-Lever

Scope of Impact: CNMI Wide

Key Theme: Integrated Pest Management (IPM)

SITUATION

The foundation of IPM is built upon sound decision-making for the use of toxic pesticides. These training programs empower pesticide users to understand if, when and how to use which pesticides, and to make the decisions based on economics and environmental safety. In addition, proper and minimal application of toxic chemicals will minimize the risk of contaminating the vulnerable water resources of the CNMI. Appropriate training in pesticide application is thereby required. This is a very important management skill for IPM practitioners to have, and will greatly improve their chances of success. Closely tied into the IPM program is the Pesticide Applicators' Training program (PAT). It is designed to promote the understanding of pesticide regulations, pesticide handling and application.

IMPACT

Except for when all were expired, the 29 people who are now qualified to apply for and be licensed to handle the dangerous Restricted-Use Pesticides (RUP) are the lowest number in recent history. The requirements for passing the exams are much more stringent, requiring that those who desire to be licensed prove they know their complete management system, including regulations, pesticide safety, handling, pest biology and recognition, and environmental (non-target) protection.

Source of Federal Funds: Hatch, Smith-Lever 3(d), State-local matching

Scope of Impact: CNMI Wide

Key Theme: Weed Control (also in goal 1)

SITUATION

Most agricultural pests in the CNMI are invasive species, and include all the insects, diseases, and most of the weedy plants. This program advises and teaches technicians and farmers how to deal with them. This includes biological control agent augmentation and protection when possible. The NMC-CREES IPM program has started a major effort in 2001 to investigate the possible control of a very aggressive alien invasive vine, *Coccinia grandis*, or ivy gourd, also called scarlet-fruited or scarlet gourd. It is a major agricultural and environmental pest species on Saipan, harboring agricultural insect pests and destroying native habitats and endemic plants, causing loss of biodiversity in many parts of Saipan.

IMPACT

A survey of Saipan conducted in August 2001, determined that the vine has increased its coverage of Saipan by at least 6 to 10-fold, in the past 4 years, now covering an area of about 1200 acres. The impact of this alien invasive vine is severe, and getting worse. The IPM team introduced the use of Garlon ® (triclopyr) herbicide to control scarlet gourd. The most effective method is either to use syringes to inject Garlon ® into the bark of scarlet gourd, or dip the vines in a 50% kerosene/ Garlon ® mixture. The possible impact of controlling the scarlet gourd vine would be immense. The CNMI Division of Agriculture now has a team of a half dozen workers that are controlling the scarlet gourd with Garlon ®. The IPM team tried to introduce a biocontrol parasite against scarlet gourd. The Division of Fish and Wildlife has mandated further testing to show the biocontrol agent will not damage a local vine related to scarlet gourd. If and when permission is granted, the biocontrol agent will be introduced to the CNMI and Guam. The biocontrol agent has been a great success in Hawaii.

Source of Funds: Funding from Smith-Lever and USEPA funds.

Scope of impact: State Specific

Key Theme: Nutrient Management (also in goal 1)

SITUATION

The Plant, Nutrition and Soil Management program focuses on the fertilizer and plant nutrient recommendation needs of CNMI farms. Some projects include Coconut water analysis: Twenty-five coconut trees throughout Tinian were sampled, by collecting the water, or juice, of immature coconut fruits for sulfate analysis, with the assistance of the water quality laboratory at the University of Guam. Coconut water has been used elsewhere in the Pacific for sulfate analysis, because sulfur, an essential plant nutrient, is not usually analyzed in soil nutrient laboratories, but water quality laboratories routinely analyze sulfate.

Kagman watershed nutrient management recommendations - Some notable information has come out of this work: One fact is that, unlike most other CNMI soils, Kagman

Agriculture Park soils are deficient in phosphorus more often than not, probably because of thirty years of continuous cultivation without adding sufficient phosphorus back to the soil. A third observation was that, unexpectedly, some local soil samples (one from Kagman, one from Marpo Valley on Tinian) are indicating magnesium deficiency.

IMPACT

Five farmers growing coconut were recommended to use ammonium sulfate to supply both nitrogen and sulfur. Twenty farmers in the Kagman Agricultural area were recommended to use a complete 16-16-16 fertilizer instead of only nitrogen fertilizer.

Source of Federal Funds: Hatch, Smith-Lever 3(d), State-local matching

Scope of Impact: CNMI Wide

Key Theme: Sustainable Agriculture

SITUATION

The Sustainable Agriculture Program noticed that for numerous reasons, wet season production of tomatoes and peppers in the CNMI was non-existent. Using engineering practices that enable the off-season production of tomatoes and peppers will benefit both producers and consumers by providing the consumers locally available tomatoes and peppers and allowing the producers to sell their products at a premium price.

IMPACT

One farmer in the Kagman area of Saipan has adopted the use of rain shelters for wet season tomato production.

Source of Federal Funds: Hatch, Smith-Lever 3(d), State-local matching

Scope of Impact: CNMI Wide

ON-GOING AND PLANNED RESEARCH & EXTENSION PROGRAMS

SITUATION

The NMC-CREES Communications Program collaborated with the Integrated Pest Management program to produce web pages, press releases and other media services in order to increase awareness of environmental issues throughout the CNMI. The CNMI learned about the various benefits and/or damaging effects that the CNMI's environment has been undergoing throughout the year.

SITUATION

The Aquaculture and Fisheries Development Program conducted more studies with kangkung (*Ipomoea aquatica*) for both its nutritional value and its nitrate uptake ability. To maximize productivity, kangkung and two leafy-lettuce varieties were cultured in two Aquaponics troughs. Adding kangkung into both troughs, reduced nitrate levels from an average of 128 mg/L to 50 mg/L. Chlorosis, a nitrogen-deficiency indicator, was observed in approximately 90% of the lettuce. Because of its efficiency in nitrate uptake, kangkung will be further tested as a component to a low-cost filtration system. To

increase protein content in kangkung, leaves were dried and fed to tilapia. However, the tilapia did not respond favorably to dried kangkung leaves, due to low palatability. Because of the lack of equipment to mix and extrude feed using dried kangkung leaves, raw leaves will be the only option at this time. Utilization of kangkung in a filtration system will maximize productivity by allowing farmers to grow fish and vegetables simultaneously; promote high nutrient density vegetable consumption; and reduce negative impact on the environment by removing high levels of nitrates, and other nutrients, in the water.

SITUATION

Previous work on the Neem Extract Management project reported on the successful use of ethanolic extracts as a prophylaxis treatment against the fungi, *Colletotrichum gloeosporioides* and *Phomopsis mangiferae*, on mango. Subsequent work focused on the use of ethanolic and aqueous extracts only on *C. gloeosporioides*, the causal agent of Mango anthracnose, and the most important limiting factor to commercial mango production in the Northern Marianas Islands. The program continues to promote alternatives to synthetic and imported pesticides.

FTEs & Program Cost for Goal 4:

FTEs - 5	Program Cost – \$312,859
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**Goal 5:
Enhanced economic opportunity and quality of life for
Americans**

EXECUTIVE SUMMARY:

OVERVIEW

For 13 years, NMC-CREES through its Family and Consumer Science and the Agriculture Research and Extension programs has worked hard to help CNMI youths, families, limited resource individuals, and agriculturists enhance their economic opportunities and improve their overall quality of life. The educational programs deliver research-based information and education in the home, classroom, farms and community group settings to address and help improve their economic opportunities and face the social challenges that they face daily. The results are well informed, economically prepared individuals who use the skills, tools and newly learned knowledge to improve their overall quality of life and seek economic opportunities.

The Family and Consumer Science and Agriculture Research and Extension programs that address the health needs of families, individuals and youth in the CNMI are the Aquaculture Development Program, Family Development and Resource Management Program, Farm Safety Programs, Pineapple Research and Pilot Production Project, Plant Protection and Crop Production programs.

EDUCATING A DIVERSE AUDIENCE

In the past year, FCS and Agriculture extension agents have developed culturally appropriate educational materials that are used as supplemental information to pre-existing curriculums and introduced new methods of obtaining economic opportunities, which provided information on economic practices and non-labor intensive practices. Many of these educational resources, economic opportunities and non-labor intensive practices have been made available to homemakers, school-aged children, limited resource individuals and farmers.

A variety of different workshops and training sessions in the areas of aquaculture and hydroponics development, summer youth programs, farm safety, farm management, family resource management, and a 4-H sports camp were conducted in the classroom or on site in order to promote means of economic opportunities and improve their quality of life. News releases and the traditional word of mouth approach on economic programs, practices, workshops and training were used to attract interested individuals and the general public. Additionally, the NMC-CREES official web site was created to serve as another form of outreach to the community.

The Pineapple Research and Pilot Production project focused on increasing the availability of pineapples and focusing on a “niche market” that could eventually bring additional revenues into the CNMI’s economy. Prior to the research, pineapple was only imported and was usually poor in quality. Now the CNMI can produce good quality pineapples and eventually export it.

OUTCOME

Through collaborations with the Division of Environmental Quality, the Nutrition Assistance Program (NAP), the Public School System, the Department of Public Health, and the Department of Lands and Natural Resources, Sports Trainers, Farmer Cooperatives, FCS and ARE has reached over 7000 families, individuals and youth throughout the CNMI. The creation of new jobs, employment opportunities and businesses in the fields of landscaping or aquaculture is now high in demand. In addition, more and more students and youth are now more enthused to learn about NMC-CREES and how they can become a member of our diverse programs.

Youth farm safety programs are being implemented with the help of the 4-H clubs of the CNMI. Farm safety and workforce safety programs work hand in hand to protect individuals from committing farm work related accidents and are used to teach the laborers the proper and safe techniques of operating farm machinery. Additionally, the 4-H program took a new approach to enticing students and volunteers into their programs. As a result of a focus group conducted on a variety of islands, youths and adult volunteers interested in the 4-H program were more willing to participate if there were more sports activities and cultural preservation orientated activities.

Additionally, FCS extension agents conducted workshops to promote the integration of money-management education into the current public school system’s curriculums. As a

result, participants (mostly students, public schoolteachers and administrators) learned ways to include money management education into their lesson plans and daily lives. The parenting and limited resources sewing programs help families find ways to prolong the use of their limited resources and how to spend money wisely.

Due to a limited number of extension agents, every program is required to share resources and clientele. As a result of the program's redirection, NMC-CREES program participants developed more knowledge and skills to be productive members of the family and the community. Multitudes of services are now available to the participants.

IMPACT

With the collaboration efforts between FCS and Agriculture Research and Extension and various internal and external partners, over 60 students now have economic opportunities by operating and maintaining their own aquaculture facility. Through the aquaculture program, students, families and farmers that have facilities not only produce their own fish, but also can grow their own vegetables through the aquaponics system.

Memorandums of Understandings with partnering agencies have provided access to many limited resource families to participate in the limited resource-sewing program. Farmers on the islands of Tinian and Rota are working on establishing a "niche" pineapple industry in the CNMI.

Participants who completed the various NMC-CREES programs are now more financially and economically aware individuals with the skills to be a productive member of the family and society. After changing their approach, the 4-H program has seen a more enthused and diverse audience.

ASSESSMENT

All Family and Consumer Science and Agriculture Research and Extension activities are in line with the NMC-CREES Plan of Work. Various activities in the Plan of Work had to be placed in a different year because of staff turnover. Impacts and results for recently approved programs will be reported next fiscal year.

Key Theme: Family Resource Management

SITUATION

The FCS sewing program teaches the importance of prolonging the family's resources within the household. The program teaches participants about the basics of sewing and mending, recycling materials within the home, creating crafts from recycled materials, and the importance of reusing materials instead of purchasing new.

IMPACT

Out of the program, one class graduated in November of 2000 and the second class in April 2001. In all, the program had a total of nine clients who learned and demonstrated the basics of sewing and mending, recycling materials within the home, creating crafts from recycled materials, and the importance of reusing materials instead of purchasing new. 100% of the graduates claimed that by learning these new skills, they were able to save their family some money, found a new source of income in craft making and recycled products to produce the decorative crafts. In addition, due to numerous requests from the community, a new and official limited resource sewing class on the island of Tinian was created and has graduated nineteen clients. 98% of the clients on the island of Tinian claimed that by learning these new skills, they were able to save their family some money, found a new source of income in craft making and recycled products to produce the decorative crafts.

Source of Funds: Smith Lever

Scope of Impact: Saipan and Tinian

Key Theme: Farm Safety

SITUATION

At the outset of this project there were no statistics on the numbers or severity of farm related injuries occurring in the CNMI. Similarly there was no evaluation of the degree of concern in the community over this issue. Landholders often employ contract workers of different ethnic and linguistic backgrounds. Laborers are usually unskilled in modern farming technologies and are susceptible to accidents. Information and training programs from the mainland are not always relevant to the CNMI situation and must be interpolated to fit the needs of the local farmers.

IMPACT

Through collaborations with the Department of Lands and Natural Resources, and 4-H clubs, over 300 children learned and demonstrated how to identify hazardous situations in the home and on the farm through poster campaigns and presentations. Highlights were relevant situations such as heat dangers, small/mechanized tools, large animals and pesticides. Posters indicate an improved awareness of what are hazardous situations and their resolutions.

Six heavy machinery operators on the island of Rota attended a farm safety workshop. All six passed the course and learned about tractor hazards, fatigue, heat exhaustion, extra rider hazards, rollovers and highway hazards. In addition, they recognized and demonstrated the knowledge of how to prevent hazards involving these situations.

Source of Funds: Smith Lever

Scope of Impact: CNMI Wide

Key Theme- Workforce Preparation-Youth and Adult

SITUATION

Through the Workforce Investment Agency (WIA) and NMC Career Center, the Aquaculture Development Program began accepting college and high school students for work-study and summer employment opportunities. Three high school students were hired under WIA during the summer, and one college student was hired under work-study through the NMC Career Center.

IMPACT

As a result, one high school student has enrolled at a college in Washington State and has declared that he would pursue a degree in Aquaculture. The college student remained with the program and has gained substantial knowledge in Aquaculture.

Source of Funding: Smith-Lever 3b&c

Scope of Impact: CNMI Wide

Key Theme- Youth Development /4-H

SITUATION

The Aquaculture Development Program began working closely with the high school on Tinian by assisting in the development of curriculum. The Tinian 4-H program conducted a series of workshops on topics such as water quality, feed management, broodstock management, and system set up.

IMPACT

An Aquaculture class was created through the 4-H program. About 40% of the students who attended the workshops became members of the Tinian Aquaculture and Hydroponics Authority (TAHA). These students now operate their own fish tank and continue to raise funds to upgrade their existing aquaculture system. In addition, public awareness has increased and has sparked interest in aquaculture amongst local farmers.

Source of Federal Funds: Smith-Lever 3b&c

Scope of Impact: Island of Tinian.

Key Theme- Youth Development /4-H

SITUATION

The Family Development and Resource Management Program held its second phase of a pilot project in the summer of 2001. The four-week pilot project called the NMC-CREES Summer Youth Program provided alternative educational experiences with little or no costs to fifteen youth with limited resources, between the ages six through thirteen. The youths were exposed to the following NMC-CREES programs: Crop Improvement, Aquaculture, Craft making, EFNEP, Food preparation and Safety, Sewing basics, Money Management, and Nutrition. In addition, the youth were treated to free services from the community including physical fitness activities, horseback riding, golf cart riding, a tour of the Division of Youth Services Detention Facilities and a tour of the Commonwealth Health Center's Diabetes Dialysis Unit.

IMPACT

The fifteen youths who participated learned and demonstrated their newly acquired skills by completing projects and lessons on sewing basics, handicrafts, nutrition, money management, food preparation and safety as well as food planting (farming). In addition, the youth combined their acquired skills to conduct three fund raising activities in which they sold the products they created and as a team provided a party for their mentors in honor of their experiences.

Source of Funds: Smith Lever

Scope of Impact: CNMI Wide

Key Theme- Youth Development /4-H

SITUATION

The Rota 4H program is taking on a different emphasis. The 4-H program coordinator recruits and helps the adult volunteers in the organizing of specific training as identified in the community. Independent "clubs" focusing on special interests are being formed by community volunteers to reach specific youth.

IMPACT

The Rota baseball club is one independent club that has helped changed the lives of seventeen youths ranging between the ages of seven through thirteen on the island of Rota. Through the Rota 4-H program, the youths received access to one of the CNMI's top baseball coaches. The coach volunteered his time to teach the youth on the proper techniques of the sport. With relatively no experience of any type, the players learned how to field, catch, throw, pitch, and hit baseballs. Through proper training, 95% of the seventeen youths demonstrated proper fielding, catching, throwing, pitching and hitting techniques. In addition, the youth were taught the importance of nutrition when playing sports. Through an oral survey, all of the participants claimed that after eating the nutritious foods and drinks provided in the nutrition demonstrations, they felt stronger and demonstrated to be much more energized.

Key Theme- Supplemental Income Strategies

SITUATION

The Crop Improvement program conducted trials to test which crops grew best in the CNMI. Once the results were found, the program introduced local farmers to these various crops. Research showed that these crops withstood all the environmental aspects of the CNMI and showed to be strong, tasty, abundant and valuable enough to produce a profitable market.

IMPACT

As a result of the research, twenty local farmers are now selling these varieties of vegetables, primarily tomatoes and bell peppers, in local markets. In particular, Mr. James Chua, a local farmer, reported a successful harvest of 20,000 pounds of Johnny 361 tomato. This variety of tomato was considered the best variety to be grown in the NMC Horticulture trial and throughout the CNMI.

Source of Federal Funds: Hatch, Smith lever 3d

Scope of Impact: CNMI Wide

Key Theme: Supplemental Income Strategies (also found in goal 4)

SITUATION

The Sustainable Agriculture Program noticed that for numerous reasons, wet season production of tomatoes and peppers in the CNMI was non-existent. Using engineering practices that enable the off-season production of tomatoes and peppers will benefit both producers and consumers by providing the consumers locally available tomatoes and peppers and allowing the producers to sell their products at a premium price.

IMPACT

One farmer in the Kagman area of Saipan has adopted the use of rain shelters for wet season tomato production.

Source of Federal Funds: Hatch, Smith-Lever 3(d), State-local matching

Scope of Impact: CNMI Wide

Key Theme: Supplemental Income Strategies (also found in goal 1)

SITUATION

The pineapple industry development program is designed to jump-start a commercial-scale industry in the CNMI by distributing to interested farmers planting materials of pineapple crowns ('Smooth Cayenne' variety) from Hawaii. Three batches of crowns have been distributed on Tinian and Rota over the past three years, totaling approximately 13,000 crowns to approximately 50 recipients.

IMPACT

We now have a core of six commercial producers on Tinian and Rota. When new plantations begin harvest in the next one or two years, this number should double. Although still small, a commercial industry supplying fresh pineapple to the local economy now exists. Given the facts that the pineapple plant grows well on the better sites of Tinian and Rota, its fruit is obtaining good market prices and is hyper-competitive with fresh pineapple imports. Marketing intact fruits ripened on the plant is not a problem. Consumers on Tinian and Saipan quickly buy-out fruits at current production levels, with prices for top-quality fruits consistently ranging from \$1.00 to \$1.25 per pound.

Source of Funds: Hatch, Smith Lever 3b,c

Scope of Impact: Pineapple producers on Tinian and Rota.

ON-GOING AND PLANNED RESEARCH & EXTENSION PROGRAMS

SITUATION

The NMC-CREES Communications Program continues to help promote all programs, projects and activities related to NMC-CREES. Within the past year, the Communications Program created a Communications Committee to help NMC-CREES promote program related projects and activities to a wider audience within NMC-CREES and throughout the CNMI. The program made headway with a local newspaper, "The Saipan Tribune," to have a full-page coverage of one NMC-CREES program every week. In addition to all other media outlets, the Communications program hosts the website entitled crees.org (<http://www.crees.org>). This web site promotes all the programs at NMC-CREES, educational material, our staff, and links to local and federal agencies, our events and activities.

SITUATION

Implementation of IPM practices by client farmers will enhance their record keeping, as they learn to record their management practices with the IPM scouts/advisors. The IPM program teaches them to make sound crop protection and cultural management decisions, based on assessed needs, rather than tradition or time of the calendar for expensive chemical use. This will improve their decision-making processes, resulting in better farm economics. In addition, training programs provided through the IPM program teach client farmers and laborers to handle farm chemicals safely. Training for safe and reduced use of agricultural chemicals enhances the safety of the farm laborer work force. In addition, publicity on landowners and contractors requirements to provide for worker safety are improved by recent laws which support the IPM program demonstrations of safe and "use only when necessary" lessons about agricultural chemicals.

SITUATION

The MIS program was improved over the past year and now provides much more realistic estimates and forecasts of vegetable production on each of the islands of the CNMI. The information generated was combined with information collected from hotels and food retailers, on prices paid to farmers for vegetable produce, to prepare a paper entitled: "Potential Agricultural Production and Market Value in the CNMI 1998-2000". The

paper gives closer estimates of the amounts of vegetables produced, acres harvested, potential value of crops harvested (if all of the estimated production was sold) and value per acre, for 30 of the most important vegetable crops grown on each of the islands of Rota, Tinian and Saipan

SITUATION

Previous work reported on the successful use of ethanolic extracts as a prophylaxis treatment against the fungi, *Colletotrichum gloeosporioides* and *Phomopsis mangiferae*, on mango. Subsequent work focused on the use of ethanolic and aqueous extracts only on *C. gloeosporioides*, the causal agent of Mango anthracnose, and the most important limiting factor to commercial mango production in the Northern Marianas Islands. This project was begun in response to a request from several government agencies, state legislators, and growers in order to address the problems of diversifying the agriculture production in response to a serious economic downfall in the Commonwealth.

FTEs & Program Cost for Goal 5:

FTEs - 15.33	Program Cost – \$489,526
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B. Amendments to the NMC-CREES 5-Year Plan of Work

i. COMMUNITY RESOURCES DEVELOPMENT PROGRAM

ISSUES

The Asian economic crisis continues to affect the Commonwealth of the Northern Mariana Islands' (CNMI) economy, therefore creating a CNMI economic crisis. Despite the CNMI economic crisis, its population continues to increase at a tremendous rate. The CNMI houses many temporary residents mostly from the Philippines, China, Thailand, Korea, Bangladesh, the Federated States of Micronesia, the mainland USA, and the Republic of Palau. Most are primarily in the CNMI for temporary employment. These temporary residents far out-number the indigenous people of the CNMI. The CNMI is an Island Nation with extreme diversification of ethnicities and cultures.

PERFORMANCE GOALS

The Community Resources Development Program (CRD) will focus on Goals number three (3) and five (5): a healthy population with enhanced economic opportunity and quality of life.

The CRD program will enable a common understanding among the community's diverse ethnic, racial, and social groups in order to improve access to and the utilization of various CRD services. These services will be provided to our indigenous and limited resource populations, as well as persons with disabilities and foreign laborers.

The CRD program will assist parents, especially single parents, in obtaining skills and knowledge in money management, education and provide resources so their families can

raise capable and healthy children. In addition, the program aims to reduce the impact of stress and isolation of parents.

The Community Resources Development Program (CRD) will develop and provide more activities for senior citizens in the CNMI, including recreational, educational, social, health, cross-cultural and Youth Intergenerational programs.

The CRD program will provide services to limited resource families (low-income) and at-risk youths. Services will include general counseling and skill building lessons to enhance their opportunities for success in education and employment. Lessons will be provided in order to increase youth awareness on the means to access educational and career opportunities, develop leadership and communication skills and develop positive race and cultural awareness and relations amongst each other.

The Community Resources Development Program (CRD) will collaborate with the Division of Youth Services, Public School System, Public Health and Family Court to decrease the incidences of sexual assaults and domestic violence.

OUTPUT INDICATORS

1. CRD Program Leader and staff will attend training and workshops on MONEY 2000, a Cooperative Extension System program that is designed to help participants increase their net worth significantly through better spending and saving habits.
2. CRD Program Leader will facilitate and train FCS staff on the islands of Rota, Tinian and Saipan on knowledge gained, proper application and implementation requirements in conducting the MONEY 2000 workshop.
3. CRD Program Leader will conduct numerous, informal mini-workshops on Money Management, in schools, villages and in homes (one-to-one basis), using the MONEY 2000 Cooperative Extension System program.
4. CRD Program will collaborate with external agencies in identifying and developing a directory listing names of indigenous people in the CNMI who are utilizing medicinal plants for healing. The list will include those with knowledge and skill in Chamorro and Carolinian traditions of arts and crafts plus catering Fiesta Foods and Pastries etc.
5. CRD Program will conduct mini-workshop to CNMI Caregivers for Senior Citizens using the materials from the Senior Series that is an Extension Program for Elderly Adults. The workshops will cover the following: 1) Tips on Communicating with a Doctor. 2) Medicare Experts will educate participants on their Rights and Responsibilities, Hospital Coverage, Medical Coverage, Coverage Limitations, Changes in Medicare Coverage. 3) The Six Steps to Manage Stress, from Exercise and Stress Reduction Techniques, Stress Reducing Breathing Techniques, Relaxation Techniques and walking (A simple, healthy and fun way to ease tension) and 4) Legal Considerations Facing Older Adults. This workshop will enable participants to understand the usage of the Power of Attorney, the various steps in making a Will, how to understand the rights and limitations of a "Living Will," how to understand

the rights and responsibilities under Guardianships and to know the Legal Protections available to ensure patient's Medical Rights.

INTERNAL AND EXTERNAL LINKAGES

Internal Linkages – CRD Program will collaborate with NMC Instructors, Program Specialists and ARE and FCS Program Leaders in an effort to cosponsor workshops, training, seminars and conferences beneficial to the CNMI in general.

External Linkages – CRD Program will collaborate with the Office of Aging Program, Office of Women's Affairs, Indigenous Affairs, Carolinian Affairs, Public School System, Public Health Services, Division of Youth Services, Commonwealth Council for Arts and Cultural Programs, Job Training Partnership Act, Northern Marianas Housing Corporation, Census Bureau, Labor and Immigration, Marianas Visitors Authority, Tanapag Action Group, CNMI Business Community and the Office of the Mayors from Saipan and Northern Islands, Rota and Tinian.

TARGET AUDIENCES

The primary targets are Youths, Caregivers, Adults, Senior Citizens, families with limited resources and the general public.

PROGRAM DURATION

This program will continue for the four-year life of this plan.

ii. SOIL AND WATER QUALITY MANAGEMENT PROGRAM

ISSUES

Water Quality Assessment and Monitoring

Like most coastal areas, the CNMI near-shore marine environment, estuaries, and lagoons are under increased risk of water quality impairment due to soil erosion and anthropogenic stresses (e.g. unregulated development, agricultural runoff, land disturbances, and Non-point source (NPS) pollution). Poor water quality results in an impaired fishing and tourist industry, the mainstay of island subsistence and our economic livelihood. Therefore, environmental assessment and water quality monitoring is tantamount to understanding watershed quality and implementing the most effective Best Management Practices (BMP).

At present only chemical, physical and microbiological monitoring tests are available, which require further statistical analysis to predict whether or not water bodies have diminished health, or pose a health threat to marine life. Therefore the introduction of a biomonitoring test that can easily identify impaired water bodies without further modeling would greatly enhance our environmental assessment capabilities on island. Furthermore, biomonitoring has the added benefit of allowing watershed managers to quickly determining whether or not a newly implemented remediation measure (e.g. introduction of BMPs, change in user behavior, and use of new pesticide application methods, etc.) has indeed improved the health of a water body.

Near Shore Water Quality Protection

Our anthropogenic influences on near shore environments and aquatic ecosystems can be lessened through voluntary stakeholder and community efforts. Once individuals learn how their actions make a substantial impact on the environment, they can be taught to make small behavioral changes, which will significantly diminish their effect on the environment.

Information about erosion prevention, NPS management, and water preservation techniques will be provided to the public, small communities, and private businesses through media campaigns, publications, and innovative extension projects.

Improving Potable Water Availability and Quality

Our island community is faced a diminishing potable water supply. Therefore, individuals would greatly benefit from learning about how to collect rainwater on island and how to disinfect or treat rainwater once it is collected. Such extension efforts will increase both the quality and the quantity of available potable water, a necessity for sustaining a health population.

PERFORMANCE GOALS

Projects will focus primarily on Goal 4, *Greater harmony between agriculture and the environment*, Goal 5, *Enhanced economic opportunity and quality of life for Americans*, and Goal 3, *A healthy, well-nourished population*, respectively.

An Environmental Laboratory will be constructed and equipped to conduct research on adapting a US EPA biomonitoring method, the Sea Urchin Fertilization Toxicity (SUFT) test, for use with indigenous species. Once the test is successfully established it will be used to conduct environmental assessments of our islands' watersheds. Findings will then be shared with the Interagency Watershed Committee, which is tasked with prioritizing watersheds in need of protection or remediation as mandated by the US EPA Clean Water Action Plan.

The Environmental Laboratory will also be used as an independent teaching facility, and as a non-profit reference center for government and private agencies requiring water testing or environmental assessments. The Laboratory testing service will be expanded to provide other analyses as new testing needs are identified.

The Soil and Water Program will also devote time to educating the public about the importance of protecting our coastal resources and increasing the quantity and quality of our potable water supplies.

OUTPUT INDICATORS

1. Complete Laboratory construction and carry out research on the SUFT test method using indigenous tropical sea urchin species.

2. Establish the NMC-CREES Environmental Lab as a reference and teaching facility for the Pacific Region by providing workshops on laboratory and research methods.
3. Provide water quality findings to the Watershed Committee for use in prioritizing watershed protection and remediation, and to monitor the efficacy of implemented BMPs.
4. Determine what is required in the way of laboratory services and research needs for the public and private sector that is not already being provided by other agencies.
5. Provide information to the public and private sector on the ways in which we can limit our impact on our near-shore environment, water quality, and aquatic ecosystems.
6. Provide workshops for the private and public sector demonstrating how to collect, disinfect, and maintain a rainwater catchment system.

OUTCOME INDICATORS

1. An Environmental Laboratory is constructed, equipped, and certified by the Division of Environmental Quality (DEQ) to provide drinking water quality compliance testing services.
2. NMC students, laboratory professionals, and other stakeholders receive hands-on training in water quality monitoring techniques and research methods.
3. The public and private sector are provided with water quality testing services for their potable water supplies.
4. Watershed Committee uses Laboratory findings for updating the CNMI Water Quality Assessment 305(b) Report and determining the efficacy of newly introduced BMPs.
5. The Environmental Laboratory expands testing services and research capabilities to meet the needs of the CNMI and Pacific Region.
6. Research findings show a positive change in beach-usage habits (e.g., reduction of vehicular beach traffic, less littering, etc.), decrease in coastal dumping, increase in coastal vegetation, increase in the use of erosion control methods by the public and private sectors, and ultimately an increase in marine water quality.
7. Research findings show an increase in the number of homes and businesses collecting rainwater to supplement water supplied by the local utility company and an increase in the number of homes and businesses that regularly disinfect and test water catchment tanks and distribution systems.

KEY PROGRAM COMPONENT (S)

1. Research will be conducted in developing standard operating procedures for the SUFT test using indigenous sea urchin species.

2. Extension information concerning simple measures one can make to reduce near shore environmental impacts, e.g. soil erosion, water quality impairment, habitat destruction, etc., will be gathered and delivered to several target audiences in the community through media campaigns, publications, and lesson plans for school teachers.
3. Extension information concerning the collection, treatment, and maintenance of rainwater catchment systems will be gathered and disseminated at the community level, and to the private and business sector, in easy to grasp workshops.

INTERNAL AND EXTERNAL LINKAGES

Internally, this project will be linked with the FCS Program, which provides families with information on ways to improve personal health.

NMC-CREES researchers will also remain active in protection and improvement efforts with the Interagency Watershed Committee, and continue to work closely with the National Resource Conservation Service, and the Division of Environmental Quality.

TARGET AUDIENCES

Target audiences include public and private stakeholders interested in gaining new water quality testing capabilities and/or requiring a certified reference laboratory to conduct compliance monitoring of water systems.

Also, our residents, guest workers, low income communities, and businesses whose quality of life would be enhanced by learning how to secure a more abundant and safer potable water supply.

PROGRAM DURATION

This program will continue for the five-year life of this plan.

C. STAKEHOLDER INPUT PROCESS

NMC-CREES utilizes a number of forums, conferences and periodic meetings with stakeholders, to solicit advice and discuss agricultural research and extension needs and priorities. Periodic meetings attended by NMC-CREES staff include the monthly: Tinian Soil and Water Conservation District Meeting; Saipan and Northern Islands Soil and Water Conservation Meeting; Luta (Rota) Soil and Water Conservation District Meeting, and the CNMI Interagency Watershed Committee Meeting. Other less regularly held meetings attended, which provide inputs from stakeholders on research and extension needs, include the General Farmers' Meetings, the Farmers' Association Meetings, the Food and Nutrition Council meetings, and others.

On the island of Rota, an Agricultural Advisory Committee continues to provide stakeholder input to our programs. The committee is composed of vegetable, fruit and livestock farmers, businessmen (involved in marketing agricultural products and in supplying inputs), educators, the Director of the Department of Land and Natural Resources a representative from the Soil Conservation Service, an agricultural educator, religious and other leaders. The council meets monthly and provides advise on priority program and staffing requirements, highlights problem areas of immediate concern and provides assistance in forming multi-agency cooperation and agreements on joint activities.

More formal and objective methods of involving stakeholders in the process are as follows:

- 1) Problem identification.
- 2) Estimation of problem importance
- 3) Problem diagnosis
- 4) Assessment of research and extension priorities
- 5) Program and project planning
- 6) Program and project implementation
- 7) Program evaluations will be developed, implemented and explained in updates to the 5-year plan of work.

D. PROGRAM REVIEW PROCESS

NMC-CREES holds formal Merit/Peer reviews of each federally funded research and extension project proposal, prior to submission. Since the number of NMC-CREES staff members is relatively small, all of the professional level staff members are encouraged to participate in Merit or Peer reviews. Senior employees from the Department of Land and Natural Resources, stakeholders and others are encouraged to also participate in the reviews.

The review process is carried out in two steps. To begin with, a draft of the proposal to be reviewed is e-mailed to all of the NMC-CREES staff and other participants for suggestions and comments, well before the review meeting. The draft of the proposal is revised, based on the comments and suggestions received. The revised proposal is made available to all of the participants, prior to the merit/peer review meeting.

The second step in the review process is the peer/merit review meeting. All available professional research and extension staff, the Director of NMC-CREES and anyone else interested, participates in the review meeting.

During the review we assess:

- 1) The priority or importance of the proposed project
- 2) The review of literature
- 3) The completeness of the proposal
- 4) The relevance of the proposal
- 5) The quality and scientific value of the proposed research or extension activities and
- 6) The opportunities for cooperation with others.

The proposals are revised to incorporate the suggestions given and agreed upon during the merit/peer review meeting. The Director assures that the agreed upon suggestions are made. The proposal is then submitted to the President of the Northern Marianas College for concurrence. After the concurrence of the President is received, the proposal is then submitted to the appropriate funding agency.

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Submitted by email on April 30, 2002 to:

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