

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Global Food Security and Hunger

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	10%		10%	
112	Watershed Protection and Management	10%		10%	
136	Conservation of Biological Diversity	10%		10%	
202	Plant Genetic Resources	10%		10%	
204	Plant Product Quality and Utility (Preharvest)	10%		10%	
205	Plant Management Systems	10%		10%	
212	Pathogens and Nematodes Affecting Plants	5%		5%	
216	Integrated Pest Management Systems	20%		20%	
315	Animal Welfare/Well-Being and Protection	10%		10%	
601	Economics of Agricultural Production and Farm Management	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	16.0	0.0	6.0	0.0
Actual Paid Professional	13.4	0.0	8.1	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
359903	0	395695	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
30553	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research and Extension activities will include field trials to test and evaluate crop varieties, cultural methods and ways to improve soil fertility. Research on livestock will include utilizing local feeds and how to improve management and bloodline. Other research activities will include tissue culture to develop efficient and reproducible micropropagation protocols and establish cultures of collected germplasm. Work in this area will include development of reliable micropropagation protocols and nursery management systems to produce elite seedlings for distribution and to conserve germplasm in vitro for future use.

Research-based extension materials will be developed and distributed among the farming communities to increase awareness and generate interest in agricultural systems. Workshops, group discussions, demonstrations, farm-visits and field days/fairs are other components of this program. Researchers will produce elite and disease-free seedlings through tissue culture and nursery techniques.

Trainings and demonstrations will be organized on food technology and food processing to increase shelf life of farm products and add value to agricultural produce thereby addressing food security issues.

2. Brief description of the target audience

Both crop, livestock and aquaculture farmers, potential farmers, researchers and extension agents, homemakers and students.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	750	1170	320	5900

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2012
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of demonstration farms established.

Year	Actual
2012	12

Output #2

Output Measure

- Number of publications for lay use.

Year	Actual
2012	2

Output #3

Output Measure

- Number of conference papers and publications/presentations.

Year	Actual
2012	2

Output #4

Output Measure

- Expected professional journal publications

Year	Actual
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2012 1

Output #5

Output Measure

- Expected gray literature.

Year	Actual
2012	1

Output #6

Output Measure

- Expected publications for lay use

Year	Actual
2012	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of persons with increased knowledge on appropriate production and processing technologies.
2	Number of program participants adopting recommended practices.
3	Number of established farms producing, utilizing, and/or selling produce and products.

Outcome #1

1. Outcome Measures

Number of persons with increased knowledge on appropriate production and processing technologies.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	895

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: Knowledge of best management practices and techniques to prepare new food products and prolong shelf life is essential to increase productivity and food security.

CMI: Soil fertility is an issue, organic composting is an alternative to commercial fertilizer.

Many people are not aware that constant testing of catchments is important to prevent water borne diseases. People lack the understanding on how to clean and treat water for safe usage.

COM-FSM: People lack knowledge and skills in organic soil enriching methods, integrated pest management (IPM) and proper solid waste management. Understanding of food preservation techniques and gardening is missing. These are obstacles to food production and security.

What has been done

PCC: Information on new varieties of crops, best management practices, biocontrol agents and publications were disseminated in schools and community. Six food technology trainings were conducted as a preparatory measure on food security.

CMI: Agriculture extension agents conducted workshops and trainings to the farmers and students. Workshops and trainings on organic composting using plant materials and copra cake were conducted in schools and community centers. Communities in remote atolls were visited and catchments were tested and demonstration was conducted on how to treat the contaminated water.

COM-FSM: Hands-on trainings to increase the participant's knowledge of improved crops,

breeds of chickens and pigs were organized. Food processing training sessions were held and demonstration farms to exhibit pig management, compost making and management practices were established.

Results

PCC: Visitors to the PCC R & D Station are now aware and understand the importance of root crops germplasm conservation, use of biocontrol agents to control pests of crops and invasive weeds, and current best management techniques to improve productivity and protect the environment. Participants in food technology trainings can prolong the shelf life of food products thus enhancing food security in the community.

CMI: Farmers are now aware that organic fertilizer by composting is a good alternative and more environmentally friendly. People in the communities learned that water borne diseases are caused by pathogen contaminated catchments and monitoring and treatment are crucial for healthy living.

COM-FSM: Target audiences learned soil enrichment methods, practical IPM in raising local crops and use of biodegradable solid wastes for composting. Extension activities have improved knowledge and skills of the backyard gardeners in the program. Egg production using some locally produced feed and improved piggery management using the deep litter system were demonstrated and learned. Local preferred varieties of certain crops were evaluated for resistance to specific pests.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
136	Conservation of Biological Diversity
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems
315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Number of program participants adopting recommended practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	550

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: Planting materials and control of pests and diseases greatly affect farm productivity. Farm produce can be prepared in many ways to enhance food security for the family.

CMI: Agriculture is still perceived with a negative image. Water contamination is still a problem for a lot of people.

COM-FSM: The public is concerned about few selections, low volume and irregular supply of good quality local produce and food processing supplies. Biodegradable wastes are dumped everywhere. Special clients like prisoners, youths and private farmers care about education in agriculture, conservation, biodiversity, watershed protection and erosion.

What has been done

PCC: Disease-free, high yielding planting materials were distributed to farmers to increase productivity. Food technology trainings were conducted to preserve foods.

CMI: Training and demonstration on composting and teaching the importance of farming for food security and good nutrition were conducted. Dry litter waste management system was also re-introduced to swine growers. Testing and treating water catchments were demonstrated during field visits.

COM-FSM: Training, demonstrations, community events and farm visits were conducted in topics ranging from crop production, livestock husbandry, nutrition and food processing and guidance in agriculture fairs. Simple and affordable appliances and solar drying techniques were used for value added food products. Seedlings were distributed to farmers.

Results

PCC: Participants of food technology trainings are now able to prepare new food products and preserve foods that will last longer. Food supply and production in Palau has been enhanced by improved yield of farmers who are growing disease-free and high-yielding planting materials of root crops and using biocontrol agents to control pests of crops.

CMI: Some farms already stopped using commercial fertilizers and shifted to organic composting. A number of farmers use dry litter in growing swine on their backyard. Enforcement of regulation on the use of commercial fertilizer was strengthened. People in outer islands started monitoring and treating their water catchments regularly.

COM-FSM: Several homemakers and store owners established their own gardens and sold produce. Composting biodegradable wastes increased. Clients who received training in vegetable farming established family-level vegetable gardens growing Chinese cabbage, cucumber, sweet pepper, garden beans on a regular basis. Clients managed soils effectively and adopted alternative methods such as raised bed and container gardening. Clients demonstrated improved confidence in small farm activities and now rely more on fresh garden produce. Twenty youths and adults started their farms. Ultimately extension activities changed the behavior of the participants. Planting materials of breadfruit, taro and other staple crops were distributed to atoll communities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
136	Conservation of Biological Diversity
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
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216	Integrated Pest Management Systems
315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management

Outcome #3

1. Outcome Measures

Number of established farms producing, utilizing, and/or selling produce and products.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	175

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: Best management practices should be adopted by farmers to improve productivity. Housewives should be capable of preparing new food products from their produce for food security of the family.

CMI: Land for farming is limited. Fruits and vegetables are difficult to grow because soil is poor in nutrients but using commercial fertilizer has a negative impact to ground water. Some agricultural products are destroyed by pests and invasive species. Many farmers had stopped tending their farms because of un-productivity and revenue loss. Water borne ailments continued to affect people in outer islands.

COM-FSM: Gardeners, homemakers and farmers want disease and pest resistant plant varieties of local produce for good health and nutrition and to make value added products.

What has been done

PCC: Proper cultural management and quality planting materials were adopted by farmers. Food technology trainings were conducted to enhance food security in the community.

CMI: Outer islands were visited and people were taught about the importance of agriculture for food security. Monitoring of water catchments in different atolls was continued.

COM-FSM: Demonstration farms have been assisted in all states. Improved planting materials and livestock varieties were distributed. Alternative food processing methods are demonstrated. The Piggery Advisory Council (PAC) was established with collaborating local agencies.

Results

PCC: Use of disease-free and high yielding planting materials and adequate fertilization were essential for high productivity of root crops. Practices showcased in the demonstration farms were adopted by farmers. Housewives are now able to prepare new food products from their produce for food security of the family.

CMI: More lands are utilized for farming and farmers are able to produce more local crops to supply the demand. Number of cases of water borne diseases in outer islands has been reduced.

COM-FSM: Public safety garden continue to provide nutritious and fresh crops to the prisoners? menu daily. Two farms are established and they are producing, selling and exporting their farm produce. Ultimately extension activities have changed economic condition of the participants. 10 farmers set up compost bins in order to minimize use of commercial fertilizer, reduce waste and improve soil fertility and the environment and to increase production. Pohnpei State funded a swine improvement project with frozen semen from USA yielding 27 high-performance piglets by year?s end. With the assistance of Japanese Senior Volunteer on Agro-

processing, farmers are able to process reject cucumber and long chili pepper into vinegar, thus increasing income.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
136	Conservation of Biological Diversity
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)
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V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

PCC: None

CMI: Accessibility is one of the main constraints in delivering services to Atolls outside Majuro. College of the Marshall Islands Cooperative Research and Extension continue to confront with many challenges that obstructed projects to move forward smoothly to meet targeted outcome results. Often times these important services are unmet because of many stumbling blocks. It ranges from extreme weather conditions, climate change, unreliable outer islands' shipping services, tidal surges, water contamination, not enough supplies to complete a demonstration or an outreach activity, researcher supplies not available on island, land erosion and many sources of food trees that are victims of Sea Level rise making these valuable trees falling into the sea, wasting of resources, no coordination in implementing the same project which create confusion to public and difficulty of recruiting qualified researchers.

COM-FSM: Pests in the gardens affected production of main ingredients needed for

value added products such as chili pepper and limes. Drought, heavy rains and low government budget for agriculture hampered the delivery of efficient services especially to far-flung villages outside the lagoons due to non-availability/lack of travel money. Local populace looked down on farming as a dirty and low-paying job. Wildfire during hot days caused crop losses in affected areas. Additionally, transportation, extreme bad weather, scheduling of field trip boats to the outer islands with no advance notice of ship scheduling, and scheduling conflict were all limiting factors.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

PCC: The root crops germplasm collection at PCC R & D Station has been a reliable source of high yielding varieties of taro, sweet potato and cassava which are essential components to increase productivity. Biocontrol agents have effectively controlled pests of taro and cassava. Participants in the food technology trainings were excited in preparing the new food products.

CMI: Youths who have been dropping out from formal education. They had gained experience and skills in developing small scale farms through trainings that were provided. With the short term survival skills training, young families can now support their own families by selling products, the trade they pick-up as a result of the skills learned. Activities on water quality have proven to save many lives from water borne diseases.

COM-FSM: Experiments are showing positive results and farmers are showing increased interest in developing agricultural farms. The extension activities have improved knowledge, created awareness and developed skills of participants in sustainable agriculture systems. Improved knowledge in food preparation and storage techniques, and careful application on personal hygiene by using gloves when preparing food helps improve food storage. Ultimately extension activities have developed positive attitudes, zeal for learning techniques and farming aspects, and have changed the behavior and economic condition of the participants. The recent proclamation of the Chuuk Governor declared a state of emergency for NCD's. This serves as the focal point for increased importance of food security in reducing this health problem statewide. Community, family and school gardens utilize organic wastes from composting of kitchen refuse, backyard wastes from plants and other municipal wastes. There is more collaboration between the agencies, NGOs and farmers/schools with free sharing of traditional knowledge and skills to complement new technologies and practices.

Key Items of Evaluation

PCC: The tissue culture technique has been successful in providing a continuous supply of taro and banana planting materials to farmer clients. Biocontrol agents have been successful in controlling pests of root crops and invasive weeds in Palau. Housewives are now able to prepare new food products from their produce for food security of the family.

CMI: One hundred eighty farmers from have acquired the basic skills in farming and organic composting. This year they had worked together as an association to establish a farmer's market and the plan got underway very successfully. With the active participation

of the officers, establishment of more markets is being proposed as they realized it is another avenue to bring revenue to the farmers that brings prosperity and good fortune to the farmer's family. Farming method is an ongoing project in communities as well as educational systems in the outer islands.

COM-FSM: Collaboration with multi-sector agencies is effective in promotion of programs that are cross cutting such as community health, hygiene or environmental awareness. There is a growing understanding and willingness to see agriculture as sustainable and as a security issue. Climate change is affecting Food Security noticeably in the low-lying atoll islands. Increased production of local foods is important as a food security issue and to combat the incidence of Non-communicable diseases or lifestyle diseases currently in crises in Micronesia. Governments and citizens are becoming more aware of the effect humans have on the environment and there is a growing willingness to use more sustainable techniques to produce food.