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	Diseases 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: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	16.0	0.0	6.0	0.0
Actual Paid	11.5	0.0	8.9	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**
435267	0	375648	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
37820	0	12484	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

PCC: The root crops germplasm collection being maintained at the research station continued to be a reliable source of planting materials for the food security of the Palauan people. Mass propagation and conservation of the taro, cassava and sweet potato germplasm has been a major activity. A total of 7,621 planting materials of sweet potato, cassava, taro and fruit trees were distributed to 212 farmers. In addition,72 farmers affected by Typhoon Haiyan were assisted in establishing vegetable gardens to ensure food security. Mass propagation and conservation of the taro, cassava and sweet potato germplasm has been a major activity.

CMI: Small scale and urban gardening methods were presented to students at the post-secondary level. Presentations were at hand during World Food Day activities sponsored by the government, college and NGOs. Different demonstrations showcasing simple methods of farming where harvesting of fruits and vegetables decrease greatly, within four to six month periods. Replanting was done right after harvest and therefore food was available sustainably.

COM-FSM: Traditional 'nature and culture integrated' farming systems has sustained Islanders including remote atoll dwelling populations since earliest times. These smallholder systems have profound influence on the landscape ecology, capacity of supporting soil fertility, crop protection, high cultivar diversity, and provided the island communities with food resources that made them among the most self-sufficient and well-nourished peoples in the region. However, things have changed. Appropriate research and extension intervention in innovative climate-smart agriculture strategies will help island communities adapt to the new situations to develop and sustain small farm enterprises for food security and income. School-base programs, training on food production and processing techniques for food security and value adding and translated educational materials were provided during the year. Collaboration with other agencies, stakeholders, community groups, and individuals ensured support for workshops, farm visits, and demonstrations.

In vitro and in vivo screenings are continued to study salt tolerance level in collected and tissue culture maintained germplasm. In vitro conservation of selected salt tolerant germplasm for mass multiplication in future has been initiated. Two books (sweet potato cultivation guide and soft taro cultivation guide) have been published. High yielding sweet potato varieties based on field performance evaluations were propagated and demonstrated. Intercropping cassava with okra and long beans was promoted as a means for food security and additional income.

2. Brief description of the target audience

PCC: Our target audiences are scientists, extension agents, agriculture students and professionals, federal, state and national agencies, conference publications, and scientific journals. Farmers, students, parents, state and federal government officials and private individuals are also beneficiaries of our extension programs.
CMI: Implementation efforts reached schools government offices as well as the general public.
COM-FSM: Scientists, extension staff, agricultural professionals, agriculture students, federal, state and national agencies, conference publications, and scientific journals are target audiences for research activities. Farmers, community leaders, producers and exporters, homemakers, teachers and students, policy makers, extension colleagues, NGOs and other members of the community who are involved in the agriculture sector are target audiences for extension activities. Internships are being provided to college agriculture students at Agricultural Experiment Stations and Cooperative Extension Services.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2355	6084	919	1783

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	1	1	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of demonstration farms established.

Year	Actual
2014	20

Output #2

Output Measure

- Number of publications for lay use.

Year	Actual
2014	15

Output #3

Output Measure

- Number of conference papers and publications/presentations.

Year	Actual
2014	6

Output #4

Output Measure

- Expected professional journal publications

Year	Actual
2014	2

Output #5

Output Measure

- Expected gray literature.

Year	Actual
2014	8

Output #6

Output Measure

- Expected publications for lay use

Year	Actual
2014	5

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
2014	3155

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
PCC: Knowledge of best management practices, high yielding planting materials and techniques to prepare new food products and prolong shelf life is essential to increase productivity and food security.

CMI: Clients were not aware of the issues concerning storage of food and its implications.

COM-FSM: There is a lack of knowledge among youths and adults about farming, food processing and security, and management practices to adapt to new realities of climate and cultural changes and economic pressures.

What has been done
PCC: Workshops were conducted and information on new varieties of crops, best management practices, biocontrol agents and publications were disseminated. Four food technology trainings were conducted as a measure on food security.

CMI:Small and urban gardening were conducted in schools and in the communities.

COM-FSM: Hands-on demonstrations, one-on-one sessions, workshops and educational sessions were conducted to increase the participant?s knowledge of integrated small farm activities.

Results

PCC: Techniques to improve crop productivity and the environment such as best management practices and use of biocontrol agents have been disseminated during workshops conducted and also to visitors to the Research and Development Station. Participants in food technology trainings can prolong the shelf life of food products thus enhancing food security in the community.

CMI: Trained participants have increased their knowledge and have strongly recommended the program to others.

COM-FSM: Program participants are more knowledgeable about the methods involved in home gardening activities using improved soil management practices, vegetable production methods and livestock production and management. In one state, 144 participants improved knowledge on food production and processing methods as indicated by follow-up interviews. Another 46 farmers developed awareness of improved practices due to extension activities. In another state, participants across six municipalities including the outer islands, gained knowledge from 32 trainings/workshops provided.

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	Diseases 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
2014	471

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
PCC: Limited 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:Clients were not cognizant of the small and urban gardening methods.

COM-FSM: Despite outreach efforts that was made with youths and adults, there is still limited adoption of sustainable farming practices due to lack of motivation, poor soil and unavailable garden space or lack of resources to address this socioeconomic situation.

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:Trainings and demonstrations were carried out to new farmers and families with little space around homes. Training on composting methods also was initiated for continued sustainability of the food crops.

COM-FSM: Technical assistance and hands-on trainings organized for youths and adults in soil management, nursery production and animal husbandry were provided, including follow- up visits to encourage participants.

Results
PCC: Participants of food technology trainings were able to prepare new food products and preserve foods. 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: There is an increased number of families? established urban gardening methods in the urban areas. Students who took part in the training are now completing their last course

requirements and will be joining others in pursuing their four year degree program.

COM-FSM: Sixty seven clients in one state have successfully adopted one or more integrated small farm practices involving vegetables, poultry or pigs. Feedbacks indicated participants adopted recommended production and food processing practices. In another state, 34 gardens were established. Twenty youths and adults established farms and are cultivating different crops. Twenty-eight pepper growers continued to receive technical assistance; Early Childhood Education (ECE) centers, community groups and families have established small garden plots. Ultimately extension activities changed the behavior of the participants.

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	Diseases 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 #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
2014	399

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

CMI: Availability of dietary food was not realized and taken into account by many of the clients.

COM-FSM: Vegetable and livestock production is limited owing to resources availability or government support to farmers and pest problems. High living cost and limited income with lack of opportunities are major issues.

What has been done

PCC: Proper cultural management and quality planting materials were adopted by farmers. Participants acquired new skills and prepared new products learned from the food technology classes.

CMI: Continued trainings and knowledge sharing to unaware students and families were done affectively during scheduled times. Monitoring and evaluating of the mentioned gardening methods were done throughout the process, information sharing of each plant development was crucial in identifying successes and failures.

COM-FSM: Technical assistance has been given to farmers in establishing and expanding integrated farming activities combining vegetable and livestock production.

Results

PCC: Demonstration farms showcasing best management practices such as use of disease-free and high yielding planting materials and adequate fertilization led to high productivity of root crops. Families prepared and have new food products from their produce for food security.

CMI: With successful partnerships and trainings there were increased number of urban gardening sites in school campuses and in three condense urban communities.

COM-FSM: Four commercial growers in one state provided a variety of vegetables for gross sales of about $26,000 in the market. Seven families engaged in egg production meet about 30 percent of daily demand in one state. Marketing of processed food by two program participants earned $3,500.00 in another state and 20 farmers are producing, selling and exporting their farm produce. ECE centers are harvesting and incorporating garden vegetables in school meals; livestock farmers have more egg production and increased litter sizes for sale. Ultimately extension activities have changed economic condition of the participants.

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: Crops are destroyed during typhoons, heavy rains and salt water intrusion and inundation so raw materials for food processing is inadequate.

CMI: Climate change will be a continued challenging factor as water sources are limited. Population density will still be a major issue with a small island setting. High humidity and salt spray in the air continued impacting the performance of the food crops.

COM-FSM: Establishments of plot demos in atolls and distant islands were affected by inclement weather, irregular availability of water transportation and high fuel costs. Sometimes transportation, fuel, extreme bad weather, and conflict of activities within the communities and funerals are constraints at all sites of the country.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

PCC: The root crops germplasm collection at the research 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 very eager to prepare new food products they have learned.

CMI: There is an increased number of clients interested in pursuing the gardening methods as a supplement for their food supply. Availability of nutritious diet will greatly

impacted people's health, with less reliability on unhealthy diet.

COM-FSM: Integrating nutrition information about crops to be introduced and their recommended practices is effective in convincing communities to establish their own gardens, consume and preserve them for their families. Family and school practiced container garden, using local basket and banana stem techniques. Compost and home-made pesticides are also practiced. Two program participants are generating family income by selling value-added products. Experiments are showing positive results and audiences are showing increased interest in developing farms. The extension activities have improved knowledge, created awareness and developed skills of participants in sustainable agriculture systems.

Farmers, community leaders, teachers, and parents are willing to test new innovative technologies in order to improve on current practices and management styles. There are more collaboration between the Farmers/Schools and free sharing of traditional knowledge and skills to complement new technologies and practices. 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.

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. Families are now able to prepare new food products from their produce for food security.

CMI: With the knowledge acquired through these methods of small scale and urban gardening, it will be an excellent and impending rigorous effort. Food will be better presented if programs of cooking also included and established in order to have different cooking methods also be shared.

COM-FSM: Increasing number of communities appreciated the importance of maintaining their own gardens for availability of healthy and fresh produce and for healthy physical fitness. " Eating the Rainbow" slogan seemed easy to remember by people in growing and producing healthy local produce.

There are increased numbers of container gardens and increased number of people involved in the program. Participants produce and sell value-added products and generate family income. Research now provides increased germplasm types and increased seedling production, to increased number of farmers. Those farmers work an increased number of farms, adopted best practices and technologies resulting in increased yields, reduced inputs, increased efficiency, increased economic return, and conservation of resources as a result of extension activities. Extension activities resulted in improved knowledge, created awareness and developed skills of the participants in sustainable agriculture systems and provided fresh produce to be donated to vulnerable populations for consumption. Researchers presented results of research and extension projects during scientific conferences and meetings, and developed publications related with the projects.