

Small Island Agricultural Systems

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V(A). Planned Program (Summary)

1. Name of the Planned Program

Small Island Agricultural Systems

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	10%		10%	
216	Integrated Pest Management Systems	10%		10%	
315	Animal Welfare/Well-Being and Protection	10%		10%	
601	Economics of Agricultural Production and Farm Management	10%		10%	
Total		100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	19.8	0.0	7.0	0.0
Actual	14.0	0.0	8.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c 291926	1890 Extension	Hatch 752941	Evans-Allen
	0		0
1862 Matching 157755	1890 Matching	1862 Matching	1890 Matching
	0	34240	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 was maintained and propagated through tissue culture technique and field plantings to ensure a steady supply of planting materials. There were 6,475 tissue-cultured taro plantlets given to 223 farmers. Eleven taro hybrids received from SPC were evaluated for morphological characters, yield, incidence of pests and diseases and sensory evaluation. Three banana research and demonstration farms were maintained by fertilization, weeding, removal of diseased leaves and flower bunches. The treatment applied with fertilizer every two months consistently showed the best growth and yield compared to other treatments. *Marasmielus* disease of banana in the demonstration farms was alleviated through removal of diseased bracts and fertilizer application. The biological control agents for melon aphid, taro leafhopper and spider mites were cultured in the screen house and released on taro and cassava farms. Micropropagation of scab-resistant sweet potato varieties was started. A new research project on the biological control of the Siam Weed in Palau using *Pareuchaetes pseudoinsulata*, was approved. The larvae of this insect feed on the leaves of the weed. Fruit trees were planted in the sloping areas to make available fresh fruits and prevent soil erosion. Rainwater Catchments Maintenance workshops and water quality education campaign were conducted. Several students, parents and government officials visited the Dry Litter Waste Management System demonstration site. Youth and adults visited the farm at the Research and Development Station and exhibit booths set up during special events.

CMI: Three Hatch projects were approved and implemented. The agriculture extension program continued working on promoting container gardening with around 100 clients in the urban villages where space was a limiting factor with the technical support of ROC Taiwan Technical Mission. The container gardening concept was presented during several community events and announced on the prepared weekly radio programs. Bi-weekly visits to clients were made to assess crop growth. Out of the one hundred rainwater catchments that were tested for bacterial coliforms, 75% tested positive. The extension agent met with the owners and provided them with solutions on how to treat their water and to clean the area surrounding the catchments. Follow up results indicated that 90% of the water catchments tested negative for coliforms. A water quality fact sheet was produced, published and distributed to clients.

COM-FSM: Production and consumption of local produce were emphasized during workshops and awareness programs. Training modules were prepared for crop and livestock production. Basic techniques and knowledge on conventional farming including rows and raised-bed, backyard and container gardening, were key training components. Low input hydroponics system continued to be promoted in one of the four states in the FSM. Clients were provided with selective planting materials to start individual and community garden demonstrations. Some training activities were conducted in collaboration with the Secretariat of the Pacific Community. Extension agents visited and provided technical assistance and assisted to set up mini nurseries in the communities.

Multiplication of staple food crops through micropropagation and in vitro germplasm conservation continued to produce healthy and disease-free plant materials; assessment of in vivo and in vitro grafting for rapid production of elite grafted lime seedlings; and multiplication and distribution of banana, taro, sweet potato and noni are ongoing research focused on improving micropropagation protocols and nursery techniques for mass-multiplication of different varieties of banana, taro, citrus, kava and sweet potato. High efficiency protocols have been developed for rapid multiplication of different varieties of banana, sweet potato and taro. Initial grafting experiments on citrus are encouraging and showing positive results. Research work has also been initiated on kava multiplication and seedlings have been produced. During visits, technical assistance and support were provided to farmers on new and innovative farming techniques and practices.

Black pepper, citrus, and banana are cash crops being promoted with farmers and market outlets. Noni (*Morinda citrifolia*) is now being promoted as an alternative crop. Vitamin A sweet potato and Colocasia taro planting materials were made available as rapid recovery food for atoll gardens besides the swamp taro (*Cyrtosperma*).

2. Brief description of the target audience

PCC: Target audience included farmers growing root crops in Palau who were provided with planting materials and biological control agents to control pests of taro and cassava. Several elementary, high schools, college students, parents, teachers, government officials and the general public often come to the PCC R & D Station and viewed our exhibits during various civic and special events. They learned the current research activities and technologies such as tissue culture for mass propagation and in vitro conservation, biological control of pests, dry litter waste management, and water quality.

CMI: Community members such as traditional leaders, Mayors and local councils, church leaders, farmers, housewives, home owners, women's groups, retirees, youths, elementary, high school and college students, government and private employees.

COM-FSM: The majority of FSM citizens depend on local production for consumption and for traditional or cultural activities. Direct contact was maintained with the commercial farmers (bananas, vegetables, noni, root crops and citrus) as well as the subsistence sector. Individual farmer visits were the main link, however, adult group training, youth group activities and faith based and gender based training meetings were also used.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	600	3000	300	600
2008	1205	1744	680	1406

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

Patent Applications Submitted

Year Target

Plan: 0

2008: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	0	1	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

Expected Professional Journal Publications.

Not reporting on this Output in this Annual Report

Output #2

Output Measure

Expected Gray Literatures

Year	Target	Actual
2008	3	1

Output #3

Output Measure

Expected publications for lay use.

Not reporting on this Output in this Annual Report

Output #4

Output Measure

Conference presentations

Year	Target	Actual
2008	3	6

Output #5

Output Measure

Conference publications

Year	Target	Actual
2008	3	6

Output #6

Output Measure

Number of publications for lay use.

Year	Target	Actual
2008	6	2

Output #7

Output Measure

Number of conference paper publication/presentations.

Year	Target	Actual
2008	3	4

Output #8

Output Measure

Number of demonstration farms established.

Year	Target	Actual
2008	12	24

V(G). State Defined Outcomes

O No.	Outcome Name
1	Number of persons with increased knowledge on appropriate production technologies.
2	Number of program participants adopting recommended practices.
3	Number of established farms and farm related businesses by individuals and cooperatives.

Outcome #1

1. Outcome Measures

Not reporting on this Outcome for this Annual Report

2. Associated Institution Types

3a. Outcome Type:

3b. Quantitative Outcome

Year	Quantitative Target	Actual
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
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V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

PCC: Secretariat of Pacific Community (SPC) was still unable to provide the biological control agent for Mikania because of difficulty of mass producing them, hence causing a delay in the implementation of the project.

CMI: Due to constraint in logistics [unreliable airlines and shipping services to outer islands] we could not sustain our program evaluation/follow up with our clients in the outer islands. Unpredictable global economy, price increases and natural disasters hindered with the effective implementation, delivery and evaluation of some of the program activities.

COM-FSM: Frequent rain, at times, hindered field survey. Progress of the work is slow owing to lack of additional funding. Two research assistants are needed to carry out field surveys effectively. Land tenure and ownership disputes affect secure access to available properties and islands are dispersed over 1.5 million sq. miles of ocean.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

Before-After (before and after program)

Time series (multiple points before and after program)

Case Study

Comparisons between program participants (individuals,group,organizations) and non-participants

Evaluation Results

PCC: Farmers have been consistently requesting for tissue-cultured taro planting materials that they have found to be an essential component to increase taro production in their farms. In addition, biological control agents have effectively controlled pests of taro and cassava. An adequate fertilization scheme is also an essential component to ensure successful banana production. Dry litter is an effective system for the water conservation and prevention of piggery waste contamination of water sources and environment.

CMI: Clients were evaluated by before after and during for agriculture practices by observing how many clients actively took care and harvested vegetable and continued with replanting. Pre and Posttests were used to evaluate the water catchment homeowners to find out whether they adopted the safe drinking and water sanitary measures.

COM-FSM: Results of the survey periodically compared with similar survey results available from other Pacific Islands. Comparative evaluation helped to identify information about common plant parasitic nematodes. The extension activities have improved knowledge, created awareness and developed skills of participants in sustainable agriculture systems. The project activities have made extension agents capable of organizing trainings, teaching farmers and providing technical assistance, and apply gained knowledge and skills in the field. Ultimately the project has developed positive attitudes, zeal for learning techniques and farming aspects, and has changed the behavior of the participants.

Key Items of Evaluation

PCC: The tissue culture technique has been successful in providing continuous availability of taro planting materials to farmer clients all year round. In vitro conservation of taro germplasm has ensured its availability to the future generation. Biological control agents have been successful in controlling pests of root crops and invasive weeds in Palau. The Dry Litter Waste Management System is effective in water conservation and preventing animal waste and contaminants from polluting water resources and environment and providing a good source of compost for food production.

CMI: Homeowners on Majuro have adopted farming and container gardening practices. The observance of lots of locally grown produce available in stores and markets are testimonial to this fact. From clients' feedbacks, we negotiated to get more seedlings from our collaborators [ROC Taiwan Technical Mission and local Department of Agriculture] in a reliable and timely manner to provide to current and new clients. Due to the efforts of the water quality extension program, more homeowners were interested in getting their water catchments tested for bacterial coliforms.

COM-FSM: Nematodes can be controlled through management practices. There are differences in noni variety efficacy. High efficiency protocols have been developed for rapid multiplication of different varieties of banana, sweet potato and taro. Initial grafting experiments on citrus are encouraging and showing positive results. The extension activities have improved knowledge, created awareness and developed skills of the participants in sustainable agriculture systems.