

# 2007 University of Guam Research Annual Report

Status: Accepted  
Date Accepted: 06/04/08

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## I. Report Overview

### 1. Executive Summary

Guam, an unincorporated Territory of the United States, is located in the Western Pacific. It is the largest of 16 islands in the Mariana archipelago. It is approximately 3,600 miles west-southwest of the Hawaiian Islands and about 1,500 miles due east of Manila, Philippines. According to the 2000 census, Guam's population is 154,805. On June 22, 1972, the U.S. Congress passed Public Law 92-318, which designated the University of Guam as a member of the 1862 Land Grant institutions. In recognition of the University of Guam's land grant status, the Guam Legislature, through Public Law 13-47, assented to the federal provisions dealing with the research and extension functions of a land grant institution. In March 1974, the University of Guam Board of Regents created the College of Agriculture and Life Sciences (CALs) to facilitate the tripartite functions of the college: research, extension and teaching. On August 1, 2003, the University executed a major reorganization, which included consolidating five colleges into three major colleges. Agriculture Experiment Station became a component of College of Natural and Applied Sciences (CNAS). In 2007 AES was renamed to Western Pacific Tropical Research Center. This new name will more accurately reflect the division's broad mission and research priorities. The Dean of CNAS is simultaneously the Director of the Western Pacific Tropical Research Center (former AES). The primary mission of WPTRC is to conduct applied and basic research in agriculture and to protect the natural environment. The Hatch funds and their respective Government of Guam matching funds are used to maintain operations of the University of Guam Agriculture Experiment Station. These funds principally support the salaries of permanent personnel of WPTRC.

#### Total Actual Amount of professional FTEs/SYs for this State

Year:2007	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	9.0	0.0
Actual	0.0	0.0	9.0	0.0

## II. Merit Review Process

### 1. The Merit Review Process that was Employed for this year

- External University Panel
- Expert Peer Review

### 2. Brief Explanation

All new proposals have been subjected to peer review and selection procedures. Faculties of the College of Natural and Applied Sciences of the University of Guam submitted written proposals that were mailed by Associate Director to the outside institution for peer review. Peer reviewers evaluated submitted proposals and then sent them to Associate Director. Final funding decisions have been made after Director/Associate director consultation with faculty members.

## III. Stakeholder Input

### 1. Actions taken to seek stakeholder input that encouraged their participation

- Targeted invitation to traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to selected individuals from general public

#### Brief Explanation

For the most part, our professionals know the primary stakeholders in their particular disciplines, and interact with them regularly in the course of their normal university duties. Input from these interactions allows the faculty to tailor their programs to the unique needs of Guam's diverse community. Western Pacific Tropical Research Center's faculty within the College of Natural and Applied Sciences maintain regular contacts with Guam EPA, Northern and Southern Water District, and NRCS. Most of WPTRC scientists know the farmers' needs and make their programs relevant to the various University of Guam stakeholders' needs. We feel our informal and formal contact system with our stakeholders works quite well. Due to the close contact extension and research scientists maintain with local growers, and because of the breadth of experience on other islands in the region, UOG-CNAS scientists are able to identify, characterize and provide a rational method of management for insects, diseases and other problems.

**2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them**

**1. Method to identify individuals and groups**

- Open Listening Sessions
- Other (Guams stakeholders are well identified)

**Brief Explanation**

WPTRC stakeholders are well identified and have not changed substantially over years. Major stakeholders include local farmers, golf courses, individual homeowners, , Department of Agriculture, Customs and Quarantine, EPA, Guam Visitors Bureau, Guam Airport Authority as well as other UOG units and centers including WERI, Marine Lab and Cooperative Extension Service.

**2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them**

**1. Methods for collecting Stakeholder Input**

- Meeting with traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Meeting with invited selected individuals from the general public

**Brief Explanation**

For the most part, WPTRC scientists met our primary stakeholders personally. Research scientists maintain close contacts with local growers, landscapers and other stakeholders. Most of them are being invited to numerous university and collage functions, many participated in the recent faculty retreat. We know most our stakeholders by name and consider them our friends. They talk about their needs and concerns without hesitation which allows us to quickly identify emerging problems, characterize and provide advises or develop research programs addressing management of these problems.

**3. A statement of how the input was considered**

- In the Budget Process
- To Identify Emerging Issues
- Redirect Research Programs
- In the Action Plans
- To Set Priorities

**Brief Explanation**

Stakeholder input has been used extensively in developing the current Strategic Plan. As a result of the received input, WPTRC faculty modify their research plans to improve service and to provide specific opportunities for continued feedback. Information has been disseminated to communities through newsletters, local newspaper coverage, radio and television programs. Administrators use stakeholders input to prioritize resource allocations. Recommendations from various groups of stakeholders have been useful in developing research programs that reach the island community.

**Brief Explanation of what you learned from your Stakeholders**

Long lasting personal relationship between stakeholders and WPTRC scientists provides support not only to agricultural programs but to the entire university. Guam's residents generally trust WPTRC researchers more than private industry and consider us more reliable experts. .

**IV. Expenditure Summary**

<b>1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)</b>			
<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
0	0	1479039	0

<b>2. Totaled Actual dollars from Planned Programs Inputs</b>				
<b>Extension</b>			<b>Research</b>	
	<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
<b>Actual Formula</b>	0	0	1479039	0
<b>Actual Matching</b>	0	0	1323539	0
<b>Actual All Other</b>	0	0	0	0
<b>Total Actual Expended</b>	0	0	2802578	0

<b>3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous years</b>				
<b>Carryover</b>	0	0	0	0

**V. Planned Program Table of Content**

<b>S. NO.</b>	<b>PROGRAM NAME</b>
1	Sustain, Protect, and Manage Guam's Natural Environment and Resources.
2	Development and Protection of Guam's Diversified Tropical Plant Systems, and Aquaculture.

**Program #1**

**V(A). Planned Program (Summary)**

**1. Name of the Planned Program**

Sustain, Protect, and Manage Guam's Natural Environment and Resources.

**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			55%	
111	Conservation and Efficient Use of Water			5%	
403	Waste Disposal, Recycling, and Reuse			40%	
	<b>Total</b>			100%	

**V(C). Planned Program (Inputs)**

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

Year: 2007	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	2.0	0.0
<b>Actual</b>	0.0	0.0	2.0	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
0	0	379039	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	323539	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**

Researchers at Guam Western Pacific Tropical Research Center studied management of eroded soils for enhancement of productivity and environmental quality. Accelerated erosion as a consequence of poor soil quality threatens both the soil resource base and downstream environment in the island of Guam. The challenge therefore is to develop restoration strategies that improve the quality of these soils and address crop production needs within a framework of increasing environmental and financial constraints. Compost application as soil amendment can have a significant impact on increasing soil organic matter and enhancing the soil quality of these degraded soils and preventing erosion in southern Guam. The objectives of this work were to evaluate the use of composted organic waste as soil amendments for the enhancement and maintenance of soil quality, and also to evaluate the use of composted organic waste on crop productivity. Results from this experiment indicated that the organic matter content of the soils receiving composted organic waste were the highest as compared to the control treatments. The project was continued and sweet corn was replaced by the field-corn in to evaluate the effect of different application rates on soil quality and field corn production. Results have indicated that organic matter content was the highest for the plots under 120 tons per acre of compost application. Corn yield however was shown to be the highest under 60 tons per acre of compost application. In humid tropical, the warm, humid climate obviously causes a more rapid decomposition of crop biomass hence depleting the organic content of the soil. Additional biomass provided from composted organic waste is often needed to maintain or increase soil organic matter levels. Conducting studies such as this is urgently needed to improve soil quality and maintain the sustainability of the agricultural lands in Guam as well as the islands of the pacific region. Our results have shown that using compost can help build good soil structure, and qualities that enable soil to retain nutrient, moisture, and air for the support of healthy crop growth. Compost also helps control erosion that otherwise would wash topsoil into waterways. The educational impact of this project has proven to be of a great value to the farmers as well as other members of the communities of the pacific islanders whom are concerned about the degradation of soils and the natural resources of the island.

An integrated approach was designed to evaluate the effect of conservation tillage, crop rotation with leguminous plant for organic matter build up, and residue management for soil re-habilitation and restoration of the badlands in Southern Guam. In our companion study we are using composted organic waste not only as organic amendments for enhancement and maintenance of soil quality and productivity but also for reducing the erodability of these degraded soils. Considering that, this is a long term project and the effect of various conservation tillage treatment specially with No-Till management will become evident only after at least 5 years of continuous no-till management we are anticipating however, that the results of these two companion studies not only provide good database for assessing the extent of soil erosion but the data will provide information on effectiveness of the restoration techniques being applied for soil conservation on these and other similar soil condition in the Western Pacific islands.

The educational impact of these projects already have proven to be of a great value since some farmers started to consider rotating their corn crop with sunnhemp and use sunnhemp as green manure and cover crop during the rainy season. Also some farmers have started using compost as soil amendments and are pleased with the results. The educational impact of this investigation will prove to be of great value not only to farmers but also to ranchers and the other members of the communities of the pacific islanders whom are concerned about the degradation of soils and the natural resources of these islands.

**2. Brief description of the target audience**

This program does not have formal extension component.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

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

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	0	0	0	0
2007	0	0	0	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2007 :	0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>			
2007	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Conference Presentations

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2007	4	5

**Output #2**

**Output Measure**

- Journal Publications

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2007	4	4

**Output #3**

**Output Measure**

- Newspaper, magazine and other non peer reviewed publications.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2007	4	7

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	



**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.)
- Appropriations changes

**Brief Explanation**

There were no serious deviations from planned outcomes.

**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- Before-After (before and after program)
- During (during program)

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #2**

**V(A). Planned Program (Summary)**

**1. Name of the Planned Program**

Development and Protection of Guam's Diversified Tropical Plant Systems, and Aquaculture.

**V(B). Program Knowledge Area(s)**

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
202	Plant Genetic Resources			20%	
211	Insects, Mites, and Other Arthropods Affecting Plants			15%	
212	Pathogens and Nematodes Affecting Plants			15%	
215	Biological Control of Pests Affecting Plants			30%	
216	Integrated Pest Management Systems			10%	
307	Animal Management Systems			5%	
601	Economics of Agricultural Production and Farm Management			5%	
<b>Total</b>				100%	

**V(C). Planned Program (Inputs)**

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

Year: 2007	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	6.0	0.0
<b>Actual</b>	0.0	0.0	6.0	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
0	0	1100000	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1000000	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**

Vegetable horticulturist conducted research on plant genetic resources conservation and utilization. The main activity of the project was to collect germplasm of hot peppers for the field trials. .

A related project "Evaluation of hot pepper genotypes for growth and potential processed products in tropical islands" was conducted in 2007. More than 70 accessions are being evaluated.

Scientists at Guam Western Pacific Tropical Research Center researched germplasm collection for improvement of local crop production. The project was initiated to collect local and international plant germplasm and to propagate selected cultivars by seed and tissue culture.

Scientists at Guam Western Pacific Tropical Research Center investigated response of vegetable crops to mycorrhizal inoculation in tropical limestone soils. Composting materials are being collected and aged at a compost bin for future experiment. The study demonstrated the benefit of this VAM fungus on papaya and green onion seedlings grown in Guam cobbly clay soil in pot culture.

New project was conducted by scientists from WPTRC along with University of Florida investigated *Corynespora cassiicola* and its impact on quarantine regulations. They have been analyzed for differences that can be directly related to geographic location (biotypes). Data have been used to construct a *Corynespora* isolate diversity map for the Caribbean and Pacific Basins.

Collection, evaluation and culture of ornamental plants in Guam were studied by horticulturist. Selected plant material was evaluated for use in Guam. Key factors for consideration are tolerances to wind, nutritional deficiencies and pest problems

Scientist at Guam Western Pacific Tropical Research Center conducted a disease survey and marketing prospects for SPF shrimp production on Guam. The lack of an on-going disease monitoring program on Guam also means that the general health status of the local industry is not known and the risks to the industry from seedstock imported from Taiwan or from other sources can not be determined.

A new tenure-track faculty researcher was hired to assist with the shrimp breeding and biosecurity issues involved in development of an SPF broodstock industry.

Plant Scientist at Guam Western Pacific Tropical Research Center investigated photosynthetic recovery rates of *Ipomoea*. This project was designed to determine the limitations on photosynthetic rates at the canopy level, and how the rate of foliar development and specific physiological characteristics help optimize yields during times of environmental limitations. Defoliation is the essential reason the species recovered rapidly from typhoon damage.

WPTRC Scientist has been addressing issues related to phenology and toxicology of the Guam cycad. This project is the first to look at cycad secondary metabolites in relation to plant and habitat characteristics. All field work and biochemistry analyses have been completed. We have determined sterile glycoside and sterol levels in pollen samples from four habitats. The results validate for the first time that pollen from the Guam cycad is loaded with these neurotoxic glycolipids.

Management of the causal agent of arecanut bud rot on Guam was studied by plant pathologist. This project was conducted to address an outbreak that started to kill arecanut trees (*Areca catechu*) in Southern Guam. Thousands of trees have died as a result of this disease. Progress has been made.

Development of PRV resistance was studied by plant pathologist. Papaya Ringspot Virus resistance was found and successfully transformed from transgenic plants. Follow-up research is in progress.

## **2. Brief description of the target audience**

No extension, this is research Plan of Work only.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

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

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	0	0	0	0
2007	0	0	0	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2007 :	0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>			
2007	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Journal publications

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2007	12	15

**Output #2**

**Output Measure**

- Newspaper, magazine, and other non peer reviewed publications.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2007	15	16

**Output #3**

**Output Measure**

- Abstracts and conference presentations.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2007	12	16

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	

**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.)
- Appropriations changes

**Brief Explanation**

there were no external factors which affected outcomes.

**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- During (during program)

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}