V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Plant Health and Pest Management

☑ 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	5%		0%	
205	Plant Management Systems	10%		25%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%		0%	
212	Pathogens and Nematodes Affecting Plants	20%		0%	
213	Weeds Affecting Plants	5%		0%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	5%		0%	
215	Biological Control of Pests Affecting Plants	10%		50%	
216	Integrated Pest Management Systems	40%		25%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	0.5	0.0
Actual Paid	2.5	0.0	3.4	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**
143768	0	156474	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
96988	0	59168	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

The University of Guam Cooperative Extension Service's Plant Health and Pest Management group performed educational outreach to the public sector, private sector, and government agencies. Subject areas covered included pesticide application, Integrated Pest Management (IPM) strategies, plant propagation, insect identification, weed identification, plant disease identification, soil nutrition and fertilizers, invasive species, and grafting. The group also provided plant disease diagnostics and insect identification for the island through the Cooperative Extension Service's Plant Health Clinic.
To improve the flow of information regarding Guam's plant diseases among the scientific IPM communities and extension practitioners, an update of the Index of Plant Diseases in Guam was produced that was originally funded by a WSARE Professional Development Program grant EW-14-006 in 2014. With current CPPM/EIP funding this publication was updated through new reports and a new literature search and published in June 2018. The index can be found here:
http://cnas-re.uog.edu/wp-content/uploads/2018/07/Submitted_Index-of-Plant-Diseases-in-Guam-Version-2-07142018.pdf
The Guam Plant Health and Pest Management group was able to assist extension, research and University of Guam instructional program in plant diagnostic related activities. A total of 863 plant disease inquiries were made of the Center (579 were handed informally and another 284 were logged and handed formally). Clients included students, farmers, gardeners, landscapers, Guam Plant Quarantine, and researchers.
The Guam Plant Health and Pest Management group provided quick simplified answers on production and IPM issues for beginning farmers and gardeners. Three full page newspaper articles were published in a local newspaper to provide the basic information necessary to deal with Guam's most common disease. These articles concentrated on the disease anthracnose. The three articles vegetable emphasis was cucumber, papaya, and hot pepper, respectively. The IPM emphasis area was PAMS approach to IPM: Prevention, Avoidance, Monitoring, and Suppression. The three articles were placed in the printed version of the Guam Pacific Daily News. One of the articles was also placed in the online version and can be found here: https://www.guampdn.com/story/life/2018/08/21/home-garden-tips-combating-anthracnose-cucumber/1039854002/
An IPM workshop was performed for science students at a local high school. Students were taught the basics of gardening/farming and IPM practices to identify and manage pests and diseases. Pre and post-tests were given to the students to assess their knowledge gained. The average gain in knowledge was 33%. A six question evaluation questionnaire indicated the 90% "strongly agreed" that the workshop was worthwhile and successful.
In order bring greater awareness of Phellinus noxius brown root rot disease to the community of Guam

and the region, a newspaper article was submitted Guam Pacific Daily News. The article was published online and can be found here: (http://www.guampdn.com/story/life/2017/10/17/tree-killer-fungus-guam/7670030Tomato crops in Guam were surveyed to determine the presence or not of Ralstonia solanacearum (RS) and Tuta absoluta (tomato leaf miner). Surveys indicated that all fields were negative for Tuta absoluta and RS although RS was present in eggplant and pepper. Giant Cavendish bananas that are semi-resistant to Fusarium wilt were propagated at the WPTRC-Guam Department of Agriculture tissue culture facility and around 1000 plants were distributed to farmers.

2. Brief description of the target audience

The target audience for this program includes extension personnel, researchers, local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, teachers, University of Guam students, school children, and government agencies.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2758	51150	505	2900

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	2	3	5

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # of research papers

Year	Actual
2018	5

Output #2

Output Measure

- # of research citations

Year	Actual
2018	150

Output #3

Output Measure

- # of extension fact sheets or articles

Year	Actual
2018	11

Output #4

Output Measure

- # of workshops/trainings/classes

Year	Actual
2018	13

Output #5

Output Measure

- # of brochures

Year	Actual
2018	2

Output #6

Output Measure

- # of research or new technology reports

Year	Actual
2018	2

Output #7

Output Measure

- # of one-on-one interventions

Year	Actual
2018	535

Output #8

Output Measure

- # of surveys

Year	Actual
2018	56

Output #9

Output Measure

- # of focus groups

Year	Actual
2018	1

Output #10

Output Measure

- # of news media activities (TV and radio)

Year	Actual
2018	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	% of participants gaining skills in identification of insects and related pests
2	% of participants gaining skills in identification of plant diseases
3	% of participants gaining skills in identification of weeds
4	% of participants gaining knowledge about pesticides and their application
5	% of participants reducing indiscriminate use of chemical pesticides
6	% of participants adopting some established IPM practices

Outcome #1

1. Outcome Measures

% of participants gaining skills in identification of insects and related pests

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, students, teachers, government agencies and the general public. Identification is essential in determining the difference between beneficial insects and pests, and to insure that proper management practices for IPM and pesticide application are employed. These practices lead to improved plant health and crop yield, and reduce negative impacts on human and wildlife health and the environment.

What has been done
A National Plant Diagnostic First Detector training was held which included insect identification.

Results
One hundred percent of the trainees passed the First Detector training and received certificates.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

Outcome #2

1. Outcome Measures

% of participants gaining skills in identification of plant diseases

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, teachers, students, government agencies and the general public. Plant disease identification of biotic and abiotic caused diseases is essential to insure that proper management practices for IPM and pesticide application are employed. These practices lead to improved plant health and crop yield, and reduce negative impacts on human and wildlife health and the environment.

What has been done
A National Plant Diagnostic First Detector training was held which included identification of plant diseases.

Results
One hundred percent of the trainees passed the First Detector training and received certificates.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems

Outcome #3

1. Outcome Measures

% of participants gaining skills in identification of weeds

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, teachers, students, government agencies and the general public. Identification of specific weeds is essential to insure that proper management practices for IPM and pesticide application are employed. These practices lead to improved plant health and crop yield, and reduce negative impacts on human and wildlife health and the environment.

What has been done
A National Plant Diagnostic First Detector training was held which included identification of Weeds.

Results
One hundred percent of the trainees passed the First Detector training and received certificates.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #4

1. Outcome Measures

% of participants gaining knowledge about pesticides and their application

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	90

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, teachers, students, government agencies and the general public. Knowledge of pesticides and their application is crucial for the health and safety of the applicator, consumers of produce, the health of humans and wildlife, and the environment.

What has been done
Farmers and home gardeners were given instruction on pesticide application over the course of the year.

Results
Ninety percent of participants showed a gain in knowledge.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
216	Integrated Pest Management Systems

Outcome #5

1. Outcome Measures

% of participants reducing indiscriminate use of chemical pesticides

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	95

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, teachers, students, government agencies and the general public. Correct application in this area leads to improved plant health and crop yield, savings on pesticide purchases, and reduces negative impacts on human and wildlife health and the environment.

What has been done
Farmers were given instruction and monitored for reducing pesticide application during farm visits by Extension personnel.

Results
Ninety-five percent of participants showed a change in action.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

Outcome #6

1. Outcome Measures

% of participants adopting some established IPM practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	95

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, teachers, students, government agencies and the general public. Correct application of IPM practices leads to improved plant health and crop yield, and reduces negative impacts on human and wildlife health and the environment.

What has been done
Farmers were given instruction and monitored for establishing IPM practices during farm visits by Extension personnel.

Results
Ninety-five percent of participants showed a change in condition.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants

216 Integrated Pest Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other (None)

Brief Explanation

No external factors affected outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation is based on internal review of the Plant Health and Pest Management group, stakeholder input, and pre/post testing.

Key Items of Evaluation

Invasive species and disease are a continued and ever-present threat to food and and environment systems. Plant health and diagnosis are increasingly important to production and containment.