

**V(A). Planned Program (Summary)****Program # 2****1. Name of the Planned Program**

Plant Protection Program

**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

<b>KA Code</b>	<b>Knowledge Area</b>	<b>%1862 Extension</b>	<b>%1890 Extension</b>	<b>%1862 Research</b>	<b>%1890 Research</b>
211	Insects, Mites, and Other Arthropods Affecting Plants	30%		20%	
212	Pathogens and Nematodes Affecting Plants	30%		40%	
213	Weeds Affecting Plants	10%		10%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	10%		10%	
215	Biological Control of Pests Affecting Plants	10%		10%	
216	Integrated Pest Management Systems	10%		10%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

<b>Year: 2009</b>	<b>Extension</b>		<b>Research</b>	
	<b>1862</b>	<b>1890</b>	<b>1862</b>	<b>1890</b>
Plan	3.3	0.0	4.3	0.0
Actual	1.5	0.0	0.5	0.0

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

<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
53599	0	61345	0
<b>1862 Matching</b>	<b>1890 Matching</b>	<b>1862 Matching</b>	<b>1890 Matching</b>
0	0	0	0
<b>1862 All Other</b>	<b>1890 All Other</b>	<b>1862 All Other</b>	<b>1890 All Other</b>
0	0	0	0

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

NMC-CREES is conducting research to identify and control plant parasitic nematodes and other invertebrate pests. The department plans to make an illustrated list of the nematodes of the Mariana Islands. Biocontrol of invasive weeds, and invertebrates will continue to be a priority. The weed, *Coccinia grandis*, came to Saipan in the 1980's, and spread throughout the island of Saipan, Tinian and Rota. This invasive species has inundated forest areas climbing and covering vegetation, including indigenous plants. In Hawaii, this invasive species is controlled by two beetles (*Acythopeus coccinae* and *A. burkhardtorum*) and a moth (*Mellitia oedipus*). The two species of weevils were introduced in 2002; however only *A. coccinae* has become established and is causing severe defoliation. In August 2007, we introduced *Mellitia oedipus* moth into Saipan and into Rota in October 2007. In Saipan the moth is established, but the population is still low. We aim to continue research on this weed and its parasites. Another example is the recently introduced Cuban slug, *Veronicella cubensis*, into the island of Rota, where it

established, multiplied and has spread throughout most of the farm areas causing extensive damage to many crops. It has become a major agriculture pest and it has also become a threat to other islands in the CNMI where this pest is not present. In August 2007, a USDA Malacologist and accompanying staff conducted experiment on various molluscacides to determine how best to control this pest. In March 2006, the Papaya Mealybug (*Paracoccus marginatus*) was detected in Tinian, and in June and August 2007, we introduced three (3) parasitoids to control this pest. In October 2006, we found *Erythrina* gall wasp (*Quadrasticus erythrinae*) infesting *Erythrina variegata* in Saipan. Upon further survey, we found the gall wasp also infesting *Erythrina* in Tinian and Rota. In September 2006, a single specimen of the Coconut Rhinoceros Beetle (CRB) was collected in a warehouse on cement pallet at the Charley Dock in Saipan. We surveyed the coconut palms and potential breeding sites in the vicinity, but we found no sign of other CRB. Interestingly, in September 2007, the CRB was detected in Tumon, Guam. Infestations include adult beetle damage to coconut palms and larvae breeding in dead coconut stumps and debris. We will continue surveillance of this pest in the CNMI, particularly since it is established in Guam, which is only 40 miles south of the island of Rota. There have been additional sightings in 2009, but they were not confirmed. Our surveys and traps have not lead to a find. We intend to continue to apply the best management methods of control and to find natural enemies to supplement other methods of control. There pest that require continuous application of best management methods. We will continue to improve on these methods and to extend the knowledge to our stakeholders. We will also continue to collect arthropods of economic importance, expand and enhance the economic insect collection, and the general invertebrate collection for reference, for taxonomic studies, and for educational purposes.

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

- Agriculture professionals and scientist - Farmers and farm helpers - Pesticide applicators - General Public - Students K-12 and College. We would like them to learn how to be better stewards of our natural resources and get them interested in the Agricultural and Natural Sciences. - Business that promote or sell farm products - 4-H club leaders and students

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

**1. Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	500	1000	500	1000
<b>Actual</b>	600	3000	600	2000

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

**Patent Applications Submitted**

Year: 2009  
 Plan: 0  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2009	Extension	Research	Total
<b>Plan</b>	0	1	
<b>Actual</b>	0	1	1

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

**Output Target**

**Output #1**

**Output Measure**

- Number of Research Projects completed on Invasive Species such as scarlet guard, melon fly, papaya mealy bug, and Cuban slug)

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	2	2

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of farmers using Integrated Pest Management to control invasive species
2	Decrease the population of the various invasive species (Cuban Slug; Melon Fly; Sweet potato Weevil; Whiteflies infestation) by certain percentage:
3	Number of farmers able to identify some of the invasive species causing damage to their farm crops

**Outcome #1****1. Outcome Measures**

Number of farmers using Integrated Pest Management to control invasive species

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	2	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Multiple farmers apply pesticides to crops to control invasive pest without rotating the pesticides or following an IPM strategy. Illegal pesticides from China are often use by farmers. The soil in shallow and below the soil the rock is porous coral limestone. Pesticides, fertilizers and pollutants quickly move to the ground water and the reef. Additionally, negligent use of pesticides can limit the efficacy of biocontrol agents and have negative health effects on people and the environment.

**What has been done**

The farmers are educated with workshops, farm visits, pesticide safety education courses, and extension publications.

**Results**

Multiple farmers are following recommendations. Neem has been promoted as an safe effective bio pesticide to control multiple invasive insect pest. Neem trees have been distributed around the islands and farmers have been informed on how to extract and apply Neem.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
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 #2****1. Outcome Measures**

Decrease the population of the various invasive species (Cuban Slug; Melon Fly; Sweet potato Weevil; Whiteflies infestation) by certain percentage:

**2. Associated Institution Types**

- 1862 Research

### 3a. Outcome Type:

Change in Condition Outcome Measure

### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	30	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

These pests are negatively impacting agriculture in the CNMI. They significantly reduce yield in crops. The Cuban slug is a vector of lung worm disease to humans, therefore creating a health concern. The Melon fly is a quarantine issue and prevents the CNMI from exporting their produce.

#### What has been done

Cuban slug: site demonstrations of various control practices have been conducted in the island of Rota. These practices are, the use of predatory ducks to feed on the slugs, chemical slug baits, and Neem extract. Data was collected based on the mortality of the treated plots of vegetable crops. Before choosing the slug bait used, research was conducted to identify the efficacy of different formulations on the mortality of Cuban slug.

Melon Fly: monitoring and suppression program is ongoing. Sweet Potato weevil: male annihilation program is ongoing. Whiteflies: monitoring with yellow sticky traps and biocontrol introductions is being contemplated for the future.

#### Results

Cuban slugs: the three practices tested have been recommended and multiple individuals have adopted the control practices recommended.

Melon fly: This pest is still abundant in the CNMI, a more aggressive approach is needed. A plan is being developed for greater control.

Sweet potato weevil: Extension agents continue to educate farmers with the use of traps and lures and with further education on best management practices.

Whiteflies: IPM methods have been recommended to the farmers and when applied provide acceptable control.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
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 #3

#### 1. Outcome Measures

Number of farmers able to identify some of the invasive species causing damage to their farm crops

#### 2. Associated Institution Types

- 1862 Extension

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	4	60

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

In order to apply appropriate control measures, knowledge of the pest identity is essential.

#### What has been done

Farmers have been educated regarding identification of invasive pest with workshops, farm visitations, extension publications such as pest alert advisories, posters, farmers meetings, newspaper articles and TV news.

#### Results

This has increased the number of farmers that can identify invasive species. It has also resulted in greater awareness in the general public.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
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

### V(H). Planned Program (External Factors)

#### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)
- Other (staff limitation)

#### Brief Explanation

The plant protection team needs more staff

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

#### 1. Evaluation Studies Planned

- Time series (multiple points before and after program)

### Evaluation Results

## Key Items of Evaluation