

**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

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
211	Insects, Mites, and Other Arthropods Affecting Plants	30%		20%	
212	Pathogens and Nematodes Affecting Plants	20%		30%	
213	Weeds Affecting Plants	10%		10%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	5%		5%	
215	Biological Control of Pests Affecting Plants	20%		20%	
216	Integrated Pest Management Systems	15%		15%	
	<b>Total</b>	100%		100%	

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

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	4.3	0.0	5.3	0.0
Actual	2.0	0.0	1.8	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
135357	0	123450	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	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**

Biological and other methods of control against invasive weeds, insect pests, mollusks and plant diseases were used this past year. As an example, the weed, *Coccinia grandis*, which came to the island of Saipan in the late 1980's, has since spread throughout the island of Saipan and recently found its way to the islands of Tinian and Rota. On Saipan, this invasive species has inundated even the forest areas climbing and covering all types of vegetation, including indigenous plants. In Hawaii, this invasive species is controlled by two species of beetles (*Acythopus coccinae* and *A. burkhartorum*) and a species of moth (*Melittia oedipus*). The two species of weevils were introduced in 2002; however only *A. coccinae* has become established and exerting some control on *Coccinia grandis*. In August 2007, we introduced *Melittia oedipus* moth into Saipan and into Rota in October 2007, monitoring is ongoing and *A. coccinae* and *Melittia oedipus* is established. A Psyllid has been introduced for control of the invasive weed *Mimosa diplotricha*, its establishment is being monitored. Control of the Cuban slug, *Veronicella cubensis*, in the island of Rota, is ongoing. 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, this pest has not been a problem since. 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, a permit from USDA-APHIS has been acquired to import its biological control, additionally, we have secured funding for this work. In September 2006, a single specimen of the Coconut Rhinoceros Beetle (CRB) (*Oryctes rhinoceros*) 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 are monitoring this pest in the CNMI, since it is established in Guam, monitoring traps have been placed in ports of entry, and hotels. We intend to continue to apply the best management methods of control and to find natural enemies to supplement other methods of control. There are many more existing weeds, arthropods and other crop pests and diseases 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. Nematodes in banana, pineapple, and other important crops have been identified. Knowledge has been given to our stakeholders through workshops. Preparation of publications is ongoing. Nematodes of Casuarina tree have been identified.

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

- Farmers, other crop producers and farm helpers
- Business operators that promote or sell farm products
- Grade schools, high schools and college students interested in further knowledge in agriculture
- Adult Volunteer Leaders (4-H Clubs)

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

### **1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	500	1000	500	1000
<b>Actual</b>	500	1500	600	1000

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

**Patent Applications Submitted**

Year: 2010  
 Plan: 0  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Plan</b>	0	1	
<b>Actual</b>	2	0	2

**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)

Year	Target	Actual
2010	2	3

**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 clients learning Pesticide Safety

## **Outcome #1**

### **1. Outcome Measures**

Number of farmers using Integrated Pest Management to control invasive species

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	3	20

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Farmers in the CNMI generally have low knowledge of pest identification or biology, so most problems are solved using insecticides such as Seven or Malathion, even though the problem might not be an insect it might not be the best time for spray. This results in low effectiveness and high impact on non-targets, especially biological control and pollinators.

Nematodes, such as Meloidogyne and Helicotylenchus are common problems in farms. Farmers were unaware of them being below the soil. The damage is extensive.

#### **What has been done**

Workshops on pest identification and integrated pest management have been conducted. Farmer visits are frequent. Pheromone traps for sweet potato weevil and melon fly are provided. Neem trees have been distributed to farmers and education on how make the extract with Neem and dish washing soap have been provided. Effectiveness demonstrations are common at fairs, open house, workshops and farm visits. Brochures and videos are provided to achieve success at different levels.

For Nematodes, workshops have been provided on best management practices, brochures and videos are currently being produced.

#### **Results**

Farmers have greater knowledge of pest identity and management. The pheromone traps are in high demand. Neem extract is a common pest management method used as a result of our continuous outreach efforts.

A number of farmer now know what nematodes are and are interested in using the management practices recommended. Seeds of Sunnhemp cover crop are being distributed. Sunnhemp has nematocidal properties.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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 Extension
- 1862 Research

### **3a. Outcome Type:**

Change in Condition Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	30	30

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

The Cuban slug is a serious problem in Rota and poses a threat to the other neighboring islands'. It consumes most agricultural plants and is a possible vector of the rat lungworm. Farmers do not have management strategies for this new invasive pest.

The Melon fly is another devastating problem affecting cucurbit crops, especially bitter melon. Management practices are difficult and somewhat labor intensive, such as the bagging of fruits. Because of the infestation of the invasive weed scarlet gourd, which is also a host for melon fly, the numbers of melon fly is high and cannot be reasonably controlled.

The Sweet Potato Weevil is the worst pest of sweet potato in the CNMI. It is widely distributed, and because a great part of its life is below the soil in the sweet potato, it is not easy to control with common insecticides.

#### **What has been done**

For Cuban Slug, duck have been introduced and trained as predators of cuban slugs, Neem extract and baits are used and have been effective in controlling the problem.

Pheromone traps for melon fly and sweet potato weevil are provided to farmer and they provide some control. In addition other management practices are recommended.

#### **Results**

The populations of these pest are controlled in the farm areas and this makes it possible for farmers to grow their crops.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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 #3**

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

Number of clients learning Pesticide Safety

Not Reporting on this Outcome Measure

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

##### **External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities

##### **Brief Explanation**

Many of the problems that we are tackling as a program require time in which can not be listed in one reporting period. Efforts are underway, yet results are still years away from being realized. As such, many of the impacts we expect are not quite available for reporting.

#### **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**