

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Plant Protection Program

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 |
|---------|---------------------------------------------------------|-----------------|-----------------|----------------|----------------|
| 211 | Insects, Mites, and Other Arthropods Affecting Plants | 20% | | 20% | |
| 212 | Pathogens and Nematodes Affecting Plants | 15% | | 15% | |
| 213 | Weeds Affecting Plants | 15% | | 15% | |
| 214 | Vertebrates, Mollusks, and Other Pests Affecting Plants | 15% | | 15% | |
| 215 | Biological Control of Pests Affecting Plants | 15% | | 15% | |
| 216 | Integrated Pest Management Systems | 20% | | 20% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

| Year: 2012 | Extension | | Research | |
|--------------------------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 4.3 | 0.0 | 5.3 | 0.0 |
| Actual Paid Professional | 1.8 | 0.0 | 0.8 | 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 |
| 63190 | 0 | 12301 | 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

The CNMI although viewed as "paradise" due to its year round warm weather also serves as a perfect home for the likes of bacteria, fungus, viruses, insects, arthropods, mollusks, and invertebrates. Being one of very few in the United States Land Grant system where our interests lay in tropical agriculture, it is an evergrowing challenge to address the likes of invasive species, insect and pathogen population increases. The Plant Protection Program for this reporting period focused on two main aspects:

1. **Continue** efforts at formulating strategies at identifying and using biological control methods to combat invasive species (ie. *Coccinia grandis*, *Memosa diplothrica*, *Veronicella cubensis*);
2. **Continue** serving clients as the CNMI's resource authority in the area of Integrated Pest Management (IPM);

Biological Strategies:

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 the forest areas climbing and covering vegetation, including indigenous plants. In Hawaii, this invasive species is controlled by two beetles (*Acythopeus coccinae* and *A. burkhartorum*) and a species of moth (*Mellitia oedipus*). The two species of weevils were introduced in 2002; however, only *A. coccinae* has established well. Sight visits performed this fiscal year, around the island of Saipan indicate a 60% gourd defoliation, thus showing an improvement in our choice of biological suppression efforts. As an ecological means of suppression in most cases is a slow process, shortly after institution of *A. coccinae*, program personnel introduced *Mellitia oedipus* in Saipan (Aug. 2007) and in Rota (Oct. 2007) to further our goal at controlling this noxious weed. As *A. coccinae* took almost ten years to establish, it is too early to make predictions on *M. oedipus* effectiveness on *C. grandis*. Early scouting thus far indicates that its introduction on Saipan displays much promise as the moth has spread well enough for us to report its establishment although the population remains fairly low when compared to *A. coccinae*. The program aims to continue to monitor this weed and its parasites.

As in last year's submission, the battle continues against the recently introduced Cuban slug, *Veronicella cubensis*, in the CNMI's southernmost island of Rota. It 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 currently not present. Because of relatively short distances to other islands within the Marianas archipelago, *V. cubensis* poses as a major ecological havoc as well as a potential public health epidemic threat as this mollusk is known to be a host for the rat lung worm disease (*Angiostrongylus cantonensis*). Through funding made available by USDA

Animal and Plant Health Inspection Service (APHIS) and Western Sustainable Agriculture Research Education (WSARE) our program was able to increase create greater awareness of the cuban slug. As a result, of this concerted effort we are witnessing a dramatic decrease in the population of the slugs. Much of our success has been through stakeholder understanding and the active participation and successful adoption of recommended best management practices in controlling this pest.

As much of our role is related to the prevention and early detection of potentially problematic pests, program staff continue to set up traps and routinely monitor such for fruit fly and Rhino beetle in particular. The areas of greatest concern as funding for such efforts remain limited as we do not pose a direct threat to the contiguous United States. These areas have been identified as being where most of the CNMI's commerce takes place (sea port and airport facilities).

Other note worthy activities include:

- Continued efforts at informing the general public on the concept of Integrated Pest Management;
- Cooperatively worked with the University of Guam on surveying the CNMI for the presence of the

highly invasive red imported fire ants (**Solenopsis invicta**) and little fire ant

(**Wasmannia auropunctata**). As none were found during surveillance efforts in the CNMI, our current focus is now geared at the early detection through the implementation of rapid response strategies with emphasis on entry prevention.

- Staff promoted the use of various alternative pest treatment methods including biopesticides (neem, home-made dish soap concoctions, etc.)
- Program faculty attended various stakeholder venues (schools, environmental expo's, head start parent meetings) giving insight on the identification of natural enemies as an alternative to spraying. We will continue to improve on these methods and to extend the knowledge to our stakeholders.
- The Crop Protection division sponsored workshops at various junctures within the year (Rota Sweet Potato festival, Tinian Pika festival, etc.)
- Program faculty attended professional development sessions (WSARE Agriculture Infrastructure Conference, IPM Symposium, Rat Lung Worm Conference, etc.)

2. Brief description of the target audience

Agriculturists, farmers, 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) and the general public

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

| 2012 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---------------|------------------------|--------------------------|-----------------------|-------------------------|
| Actual | 300 | 1500 | 1000 | 2500 |

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

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

| 2012 | Extension | Research | Total |
|--------|-----------|----------|-------|
| Actual | 0 | 0 | 0 |

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Research Projects completed on invertebrate pest, such as nematodes, invasive species such as scarlet gourd, melon fly, papaya mealy bug, and Cuban slug).
Not reporting on this Output for this Annual Report

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, and nematodes) 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

| Year | Actual |
|-------------|---------------|
| 2012 | 20 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

As the general public is becoming more aware of human influence on environment, there is a strong move for environmentally safer alternatives to growing our food.

What has been done

In response to such a behavioral change by our stakeholders, program personnel engaged clients with the ideals and strategies focused in an IPM system (biological control, neem, monitoring in regards to an established economic threshold, farm scouting, crop rotation, sanitation, mass trapping, etc.

Results

As a result of our continuous efforts at educating the general public on alternative strategies in dealing with agricultural pests, Rota sweet potato farmers are now practicing post harvest sanitation to reduce the spread of the sweet potato weevil that once was considered a major pest due to the poor appearance of the tuber.

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, and nematodes) by certain percentage:

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2012 | 3 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Due to the presence of the cuban slug, melon fly, sweet potato weevil, whiteflies, and nematodes agricultural production in the CNMI, we have witnessed a set back in the overall marketable quality which has severely affected yield,sales,and most especially consumer confidence.

What has been done

The use of on-farm demonstrations such as neem and sum hemp production geared towards suppressing nematode and Cuban slug population. Duck production was conducted on multiple farm sites to feed on the Cuban slugs. Male annihilation technique was implemented as IPM tool to control the Melon fly population. Sweet potato post harvest sanitation was used in response to weevil population growth.

Results

Cuban Slug & Nematodes---As a result of farmers using trained ducks to prevent Cuban slug damage to crops, we recorded a 15% growth in the production of chinese cabbage. As an unanticipated result of such an adoption, 2 farmers reported that the ducks used also became an additional commodity which increased farm sales;

Sweet potato weevil---By disposing of field debris (used as animal feed) as a post harvest practice, growers report a 10% increase in the viability of the harvested tubers.

Melon flies---By using male annihilation methods coupled with increased efforts in sanitation (removal of damaged fruits),resulted in higher yields of cucurbits (watermelon, bitter melon, zucchini, etc.) when compared to prior years.

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 clients learning Pesticide Safety

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2012 | 23 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

As many of our farm hands in the CNMI are non-residents with very limited English speaking skills, there is very little means of testing their understanding of the dangers pesticides pose on their overall health.

What has been done

Program faculty have taken measures at soliciting volunteers from the different ethnic groups to serve as translators during one on one sessions with farm hands. In addition to working with the Non-English speaking farm hands, staff continue to work with an array of individuals on the concepts related to adopting the IPM system.

Results

As a result of soliciting the assistance of community partners, there is an indication of greater acceptance and overall trust by participating farm hands in the advice given (crucial protective gear, mixing calculations, calibrating equipment, etc.) from extension personnel.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|----------------|-----------------------|
|----------------|-----------------------|

| | |
|-----|---------------------------------------------------------|
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |
| 212 | Pathogens and Nematodes Affecting Plants |
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| 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

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

Brief Explanation

As the CNMI is known as "typhoon alley," we too are surprised that we have not experienced any major disruptions in our weather system. Agriculture professionals in the CNMI alike credit much of our positive results in this year's report to somewhat fair weather.

Although we experienced such a welcomed outcome as far as the pests are concerned, there is still a growing fear by faculty, administrators, and stakeholders alike on the effects of the the Consolidated Natural Resources Act (CNRA) on our ability to fill our Plant pathologist and Entomologist positions respectively. These positions were vacated by the previous individuals as a direct result of the uncertainties associated as this is the first implementation of such in the U.S.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Program personnel continue to collect data at this juncture. We foresee reporting on such findings in future assessments conducted by USDA-NIFA. Current methods of evaluation include the following:

- Pre and Post testing during workshops;
- Insect trap monitoring for population counts;
- Client satisfaction surveys;

Key Items of Evaluation