Suppression to Cuban Slug (*Veronicella cubensis*) (Pfieffer) Using Selected Practices Pest Identification Workshop 2010, Saipan

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Abstract

The Cuban slug (*Veronicella cubensis*) has recently risen in prominence as an agricultural, ornamental and nuisance pest on the island of Rota, Commonwealth of the Northern Marianas Islands (CNMI). This study examines and demonstrates the most effective suppressing practice to *V. cubensis*, testing three available management practices in the field. Results proved the three practices, Ducks Feeding on Cuban Slug, Neem (*Azadirachta indica*) Extract and Using Slug Pellets (Deadline M-Ps) to be effective in suppressing the population of Cuban slug that penetrated into the treated area. The results of the field trials indicate that using ducks feeding on Cuban slug, Neem extract and Slug pellets should be effective at controlling *Veronicella cubensis*.

To date, two other studies have examined the efficiency of various molluscicide formulations against *V. cubensis* (Hata et al 1997). In these studies the efficiency of molluscicides containing metaldehyde, metaldehyde plus carbaryl, metaldehyde plus methiocarb, and methiocarb against *Vaginula pleiba* and *V. cubensis* was examined. All of the tested molluscicides formulations caused significant mortality to *V. cubensis,* apparently irrespective of formulation or active ingredients.

Introduction

The Cuban slug (*Veronicella cubensis*) (Pfieffer) (Stylommatophora: Veronicellidae) was originally described from collections made in Cuba in 1840 (Pfieffer 1840). It is believed to have been introduced to the West Indies islands - Antigua, St. Kitts, Nevis, Barbados, and Dominica (Robinson and Hollingsworth 2004). Subsequent introductions have been detected in the Pacific Basin islands of Hawaii, American Samoa, Guam, and most recently to Rota.

The Cuban slug has become established in Guam as early as 1994 and in Rota in 1996. It has become a serious pest for agricultural crops and ornamental landscapes in Rota. Approximately 30 host plants, including some economically important crops and ornamental plants have been identified as being attacked by Cuban slug (Robinson and Hollingsworth 2004).

Cuban Slugs are newly introduced. They represent major threats to garden crops and subsistence agriculture, and to human and animal health.
Of greatest concern is the Cuban slug – *Veronicella cubensis*.

The Cuban slug is so variable in external appearance that it may be surprising to some that all the slugs shown above belong to a single species. All were photographed in Guam.

- The Cuban slug was first introduced into the Pacific Basin to the Hawaiian Islands in the mid 1980's, but initially mis-identified; the opportunity to eradicate it was thus lost.
- Introduced to Guam prior to 1993 (first confirmed identification).
- Introduced to Rota, CNMI, in 1997.
- Our 2005 survey of Rota confirmed that the island is very heavily infested. In August 2007, our surveys showed the species is even more widespread.
- Not yet introduced to Saipan or Tinian, or other islands in the Northern Mariana chain.
- Introduced to American Samoa in about 1994; again mis-identified – specimens submitted to us in 2004 were the first confirmed samples of *Veronicella cubensis* from American Samoa.
- Our surveys of American Samoa in 2005 showed Tutuila in particular to be heavily infested.
- Due to the limited extent of active agriculture in American Samoa, the problem appears to have been ignored.
- Not yet introduced to Samoa (as of our 2005 surveys).
- Our 2006 surveys detected small populations of the Cuban slug in Pohnpei and Kosrae (FSM), but we do not believe it has yet been introduced to Yap or Chuuk.
- The Cuban slug is also a vector of disease.

Immature Cuban slugs feeding on a fallen starfruit in Songsong, Rota.

- On the island of Rota, in the Northern Mariana Islands, the effect of the Cuban slug reportedly has been devastating, with agricultural losses estimated at 30-70%.
- We have reports that the slug attacks a wide variety of garden and subsistence crops including: banana, cabbage, breadfruit, cassava, various *Citrus* species, coffee, eggplant, hot and bell pepper, hibiscus, mango, lily, various melons and pumpkins, Mexican fire plant, lada (or noni), okra, papaya, orchids, passionfruit, philodendron, pickle tree, soursop, starfruit, sweet potato, Polynesian arrowroot, taro, thunbergia, angel trumpet flower, vinca, and yam, as well as a number of medicinal plants important to Chamorro culture such as pot popot.

A mass of *Veronicella cubensis*, numbering well over a hundred individuals , in leaf litter under a papaya tree after a night's feeding, Gagani, Rota. Such large aggregations have not been observed elsewhere within the known distribution of this species.

Cuban slug infestation in Rota, CNMI: (at left) large numbers of slugs on the grounds of a local hotel and (at right) the product of a day's cleanup

[photos courtesy of Leatigaga Mark J. Bonin]

Materials and Methods

Studies were conducted during November 2009 in Rota, Commonwealth of the Northern Mariana Islands. All the three trials were conducted simultaneously in three different production areas. Fifty ducklings were purchased at the University of Guam through Dr. Manny Dugies. Deadline M-Ps (Trademark) (EPA Reg. No. 64864-38), Chemical Family: Metaldehyde. Neem seedlings were collected on Sam Palacios Farm in Tinian Island. Certified head cabbage seeds (Japanese variety) needed for the project was purchased at Ace Hardware locally as well as brooding supplies, commercial feeds, fertilizers, sprayers, pellets spreader and blender. Chicken wire was used instead of screen cloth to confine ducks in an open field.

Using Ducks Feeding On Cuban Slugs

Lead producer Mr. Jack Manglona was responsible for operating the 38 duckling's parent stock, (brooding, growing to laying stage). The producer was responsible for feeding, train ducks to feed on collected Cuban slugs, maintain and sustain the parent stock. The location chosen for the study was characteristic of natural conditions where the producer normally has to treat abundant populations of *V. cubensis.* Four treatment plots with 3ft. X 40ft. area, and 3ft. apart covered with weed blocker within the ducks confinement 3 feet wide fenced with chicken wire in the perimeter. Plots were planted with head cabbage seedling and treated weekly with Deadline M-Ps. Weekly monitoring of dead individuals were counted, recorded, removed from the experimental arena and discarded immediately.

Ducks in the greenhouse






Using Slug Pellets (Deadline M-Ps)

The test that will demonstrate the efficacy in the field through the ability of the formulation; Deadline M-Ps to withstand breakdown of pellet due to rainfall, effectiveness, safeness and sustainability of baiting slug was conducted at Nurul Islam Paeda in Sabana Area. This area has an abundant population of Cuban slugs due to its topography and farming activity. Four treatment plots

3ft. X 40ft. and 3ft. apart covered with weed blocker within the perimeter of surrounding slug baiting stations using wooden pallets with tin covers laid 5ft. apart. Plots were planted with head cabbage and tomatoes and treated weekly with Deadline M-Ps. Baiting stations were treated with Deadline M-Ps weekly and replenishment was being done as needed. Weekly monitoring by treating the plots with Deadline M-Ps, dead individuals were counted, recorded, removed from the experimental arena and discarded immediately.

Limiting Factors and Benefits

Using Neem Extract

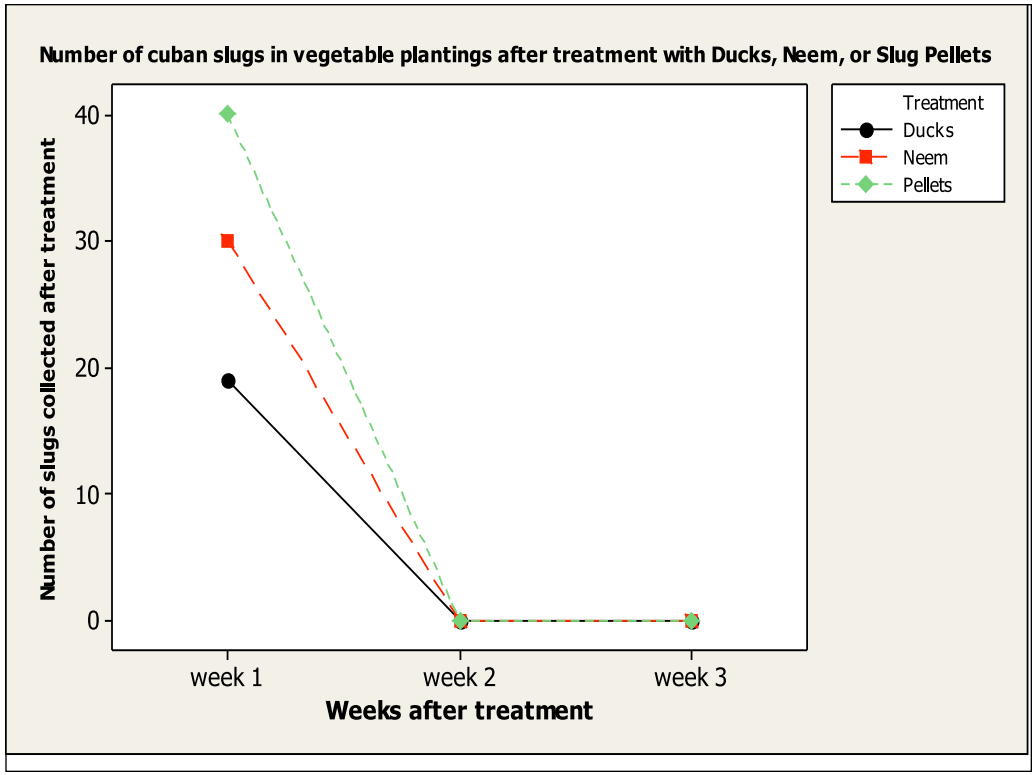
Brian Richards's farm in Santa Cruz, Rota was established as a source of Neem as organic pesticide for slug. Neem was planted in one row in the perimeter 10 ft. apart designed for windbreak and soil erosion control. Treatment plots were also established similar to both practices. Treatment of the perimeter 3 ft. wide was done from the dilution of 1 liter of Neem leaf extract with 9 liters of water. Add 100ml of soap. Stir well and sprayed evenly to repel slug (Prakash; Rao, 1997: pp. 35-103) from intrusion in the plots with crops. Weekly monitoring by treating the plots with Deadline M-Ps, dead individuals were counted, recorded, removed from the experimental arena and discarded immediately.

Data Analysis

Mortality data were analyzed based on the weekly average of mortality of slugs intruded in the treated area. Testing of the treatments in this study is not an experimental design.

Results and Discussion

Mortality to Cuban slug was highest average recorded in the first week of treatments, and it did not cause more mortality than in the following weeks of monitoring. Figure 1 shows the weekly average mortality. The preliminary results of the three practices in field trials indicate that any of this practice should be effective at controlling Cuban slugs.


Number of cuban slugs in vegetable plantings after treatment with Ducks, Neem, or Slug Pellets
Number of slugs collected after treatment
40
30
20
10
0
week 1
week 2
week 3
Weeks after treatment
Treatment
Ducks
Neem
Pellets

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