

**Title:** Biocontrol Foreign Exploration Final Report  
**Date:** September 1, 2012  
**Organization:** Hawai'i Department of Agriculture  
**Award:** \$40,000



**Introduction:** The Plant Pest Control branch of the Hawai'i Department of Agriculture is dedicated to the control of invasive pest species that threaten the environment and agricultural industries of Hawai'i. Key components to fulfill this mission are pest detection programs, taxonomic identification programs, and rapid response and biological control programs. The Plant Pest Control branch is unique in Hawai'i as it engages in classical biological control of weed and arthropod pests.

### **Achievements in FY12**

**Natural Enemy Collection:** [In this section, list the deliverables from your FY12 HISC proposal and describe how you met each deliverable. Use your stated measures of effectiveness, where possible, to demonstrate how deliverables were met. Use your best judgment on how to best display your deliverables and measures of effectiveness. For more complex deliverables or achievements, feel free to use bullet-point format to separate out the components of your achievement.]



*Senecio madagascariensis* or fireweed, a serious range land pest and target for biocontrol

HISC funding was utilized to send PPC Exploratory Entomologist Mohsen Ramadan to Africa. While in Africa, the following pest species were targeted:

- *Senecio madagascariensis*, Fireweed
- *Pennisetum setaceum*, Fountain Grass
- *Hypothenemus hampei*, Coffee Berry Borer
- *Athenia tumidia*, Small Hive Beetle

The three month exploration included collection trips in South Africa, Swaziland, Tanzania, and Madagascar. The trip was extremely productive with insect natural enemies collected for everything but the small hive beetle. Unfortunately, no diseases were collected.

### **Natural Enemy Evaluation:**

All nine agents collected for fireweed were suitable for evaluation based on field observations and previous work. Based on biology and long term strategizing, the following natural enemies were selected for further testing:

- *Gasteroclisus*, a stem boring weevil
- *Pycitodes* sp., a flower feeding moth
- *Secuio extensa* will undergo additional host range testing against various sunflower cultivars used in Hawai'i.



Feeding damage of *Gasteroclisus* on fireweed

Also undergoing evaluation are the following:

- A chrysomelid beetle feeding on skunk-vine, *Paederia foetida*. Testing is approximately 40% complete.
- *Aprostocetus nitens*, a predator of the Erythrina Gall Wasp (EGW), *Quadrastichus erythrinae*. Testing has been temporarily suspended although it can be quickly completed as competition studies with *E. erythrinae* is the only testing that needs to be evaluated.

Colonies of six other insect species are being maintained for future evaluation.

**Environmental Assessments:** No new environmental assessments were produced, however, progress has been made towards obtaining a permit for the release of a defoliating caterpillar of fireweed, *Secusio extensa*.

**Natural Enemy Release:** In conjunction with the US Forest Service, *Tectococcus ovatus*, a scale insect which attacks the strawberry guava, *Psidium cattleniaum* was release on Hawai'i Island in the Volcano region. Multiple releases have been conducted and it appears that the scale insect has become successfully established.

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#### **Other Activities in FY12**

**Post-release monitoring of *Eurytoma erythrinae*:** Funding was used to conduct post release monitoring of *E. erythrinae* for evaluating its ability to control the EGW. It appears that this wasp predator has been successful in controlling EGW on existing trees. However, it continues to negatively impact flowers and seed set. In conjunction with insects that attack Erythrina seeds, the long-term future of *Erythrina sandwicensis* requires close monitoring to determine if seed borer parasitoids or a second natural enemy against EGW needs to be released.

**Post-release monitoring of *Aprostocetus nitens*:** Funding was utilized to conduct field release monitoring for the wasp parasitoid, *A. nitens* against the stinging nettle caterpillar, *Darna pallivitta*. This natural enemy has proven to be highly successful and has established quickly, spread quickly and has been highly effective in controlling well established populations of the stinging nettle caterpillar. A hyper-parasitoid was found attacking it but at levels that are insignificant.

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#### **Additional Information**

No additional funding from the HISC was pursued for FY13 for the biological control program as existing funding from other sources meets current capacity needs. However, the following gaps have been identified:

**Increased Staffing Capacity:** Half-way through the African Exploratory Trip, it became apparent that existing staff was insufficient for the work load of running existing programs, handling incoming insects, establishing the new insects and conducting evaluations. One technician was re-allocated at 70% FTE to assist with the work. In addition, approximately 10 to 12 hours of overtime work per week is needed to conduct the experiments. In a programmatic evaluation, it was determined based on these numbers and examining existing limitations that one additional entomologist and two technicians would allow for maximal use of existing facilities.

**Facility Needs:** The current facilities for biocontrol are antiquated. The plant pathogen facility, the only of its kind in the state, is in serious need of repairs and is currently undergoing capital improvements to its air handling systems. The engineers, however, have identified serious design flaws that have impacted the ability to maintain stable temperatures and humidity within the facility. The insect containment facility is of an “open” design format with a heavy emphasis on primary containment. This design does not allow for isolation of projects, thereby increasing the risk of cross contamination of experiments. Like the pathogen facility, there is considerable variability in temperature and humidity. New facilities are needed for both insect and pathology containment. Based on recent new facilities constructed on the mainland an initial evaluations by Hawai'i Department of Agriculture Staff, a new containment facility would cost approximately \$20 million and will allow up to 10 projects to be run simultaneously. This will also allow for the use of natural enemy species which are currently not approved for testing in existing facilities.

**Long term, stable funding for Classical Biocontrol:** Classical biocontrol requires a stable source of funding. In recent years, funding for foreign exploration, natural enemy evaluation and post-release monitoring has been heavily dependent upon special funds. Dedicated funding between \$75 to 100K a year will allow for 1 foreign exploration trip, equipment and supplies for host range testing and interisland trips for staff to conduct field releases and post release monitoring.

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