Mexican Bromeliad Weevil Biological Control Report
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Ronald D. Cave[1], J. Howard Frank[2], and Alonso Suazo[1]
[1]Indian River Research & Education Center, Ft. Pierce, FL
[2]Entomology & Nematology Department, Gainesville, FL

The colony at the Panamerican School of Agriculture continues to be strong and produce a large number of *Lixadmontia franki* puparia. The funding cycle for maintaining the colony terminated on October 31, 2006. A new 1-year budget was negotiated for the amount of $13,030, which covers workers' salaries, use of vehicle, gasoline and vehicle maintenance, and supplies. $9,000 are being provided by the FCBS Weevil Fund and $4,030 from R. Cave's research funds.

Research at the Biological Control Research & Containment Laboratory in Ft. Pierce has emphasized establishment of a *L. franki* colony. We received 7 shipments containing a total of 564 puparia from the rearing facility in Honduras. Emergence of adults from puparia was good (75%) to excellent (95%). However, adult fly mortality was initially very high; most flies died in less than 6 days. We suspected food, humidity, sunlight intensity, treated wood, and disease to be causes until it was discovered that metal screen constituting the cages was the lethal factor. After using cloth and plastic cages and removing all metal screen from wooden frame cages, mortality improved significantly so that flies are now surviving 3-5 weeks. After solving this problem, our caged fly population grew to well over 150 active individuals. However, this population has begun going down due to no shipments from Honduras during the holiday period. Shipments of puparia will be resumed on January 15.

Multiple quantities of Mexican bromeliad weevil larvae have been exposed to flies in various ways. Most larvae were exposed individually in a portion of pineapple core or *Tillandsia utriculata* stem placed in a plastic cup. Two new methods were tested and proved successful. Method 1 consisted of placing 3-6 weevil larvae in a pineapple top with the leaves cut very short. This "artichoke" method resulted in parasitized larvae but two problems were detected. The "artichoke" was so attractive to flies that multiple fly larvae in a single host (=superparasitism) resulted in many host larvae dying prematurely before fly maggots completed their development. In the surviving hosts, fly larva development was quite variable, from 2 to 4 weeks.

A second method used an artificial diet for weevil larvae based on Spanish moss (*Tillandsia usneoides*), a readily available resource. Spanish moss leaves are washed and finely chopped then compacted into a plastic cup or mixed with agar then dispensed into a plastic cup. Weevil larvae in Spanish moss alone grew very well and reached the pupal stage in 6 weeks, comparable to development in pineapple. Development in Spanish moss plus agar was slower (7 weeks). In December, cups with larvae in these two media and in pineapple cores were exposed to flies. No larvae in Spanish moss alone were parasitized but 80% of the larvae in Spanish moss+agar were parasitized; only one larva in a

pineapple core was parasitized. These results indicated that the Spanish moss+agar medium is highly attractive to the flies and is appropriate for obtaining parasitized larvae. This experiment is being conducted, in part, with a high school student from St. Lucie Co., who will use the results in a science fair project.

The type of adult food appears to be an influential factor in the parasitism of weevil larvae. Twenty-five flies were released in each of three tent-like cages; one cage had shading and hummingbird food, a second cage had no shading with hummingbird food, and a third cage had shading with honey as a food source. Weevil larvae were parasitized only in the cage with honey, no parasitism was detected in the cages with hummingbird food. Given these results, we now supply honey and hummingbird food to flies in the parasitism cages.

Research during the January-March trimester will look at **1)** development time of the fly larva in hosts feeding on different foods (Spanish moss+agar, pineapple, *Tillandsia*), **2)** optimal stage of the weevil larva (3^{rd}, 4^{th} or 5^{th} instar) to expose to flies, **3)** optimal exposure time of weevil larvae to flies that results in a high rate of parasitism but minimizes excessive superparasitism that results in premature death of the host, **4)** rates of parasitism in pineapple versus Spanish moss+agar, and **5)** basic biology of the fly.

Additional data for non-target testing with *Metamasius mosieri* are needed for publication of results. Redevelopment of the *M. mosieri* colony is progressing very well such that testing may be able to proceed in February.

In search of insect parasitoids that could serve as additional biocontrol agents for *M. callizona*, Howard Frank, Dennis Giardina, and Tim Andrus explored in Guatemala for 8 days in November 2006. Their search was concentrated in and around a coffee farm called Los Tarrales owned by Andy Bunge, a lifetime BSI member. This farm is on the Pacific slope, south of Volcan Atitlan. Epiphytic bromeliads grow on forest trees and trees that are conserved to shade the coffee plants. *Metamasius dimidiatipennis* adults, *M. nudiventris* pupae, and about 50 *Metamasius* weevil larvae especially in *Tillandsia flabellata* and *T. polystachya* were collected. All living specimens were shipped from Guatemala via Miami to Ft Pierce under USDA-APHIS permit. Ron Cave received them in quarantine and checked them for any evidence of parasitoids. Unfortunately, no parasitoid insects emerged from any of them.

A proposal for release of *L. franki* from quarantine was submitted to a University of Florida IFAS committee and the Dean of Research for consideration and approved. The field release proposal has now been submitted to the Florida Department of Agriculture and Consumer Services, and simultaneously to the US Fish and Wildlife Service, and Florida Department of Environmental Protection. As required, the USDA Animal and Plant Health Inspection Service has been informed of this submission.

A talk on the bromeliad weevil was presented at the Marine Resources Council in Melbourne.

Publications:

Suazo, A., D. Pú Pacheco, R.D. Cave, and J.H. Frank. 2006. Longevity and fecundity of *Metamasius quadrilineatus* (Coleoptera: Dryophthoridae) females on a natural bromeliad host in the laboratory. Coleopterists Bulletin 60: 264-270.

Cave, R.D., P.S. Duetting, O.R. Creel & C.L. Branch. 2006. Biology of *Metamasius mosieri* (Coleoptera: Dryophthoridae), with a description of the larval and pupal stages. Annals of the Entomological Society of America 99: 1146-1153.

***Lixadmontia franki* feeding on honey**

Lixadmontia franki* on pineapple core containing larvae of *Metamasius callizona

***Lixadmontia franki* on "artichoke" form of pineapple containing weevil larvae**