MEXICAN BROMELIAD WEEVIL REPORT
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During October-December 2012, we imported wild *Lixadmontia franki* from Honduras to invigorate our laboratory colony. Weevil larvae were collected in the field and the fly pupae that emerged from these larvae were collected and shipped to our facility. Seven shipments were made from 9 October to 5 December 2012, and 645 pupae were received.

Conditions for the fly colony are much improved. We built a room in one of the greenhouses with proper shading, temperature, and all-day exposure to sunlight, as well as a new fogger for humidity (Figure 1). The fly cage is on wheels, so the flies can be removed quickly from the greenhouse if climate controls fail and temperatures increase above the fly's ability to survive. Also, on Fridays, we roll the fly cage out of the greenhouse and into an interior room where it remains for the weekend when lab personnel are not present. If climate controls fail in the morning or evening, temperatures in the greenhouse will quickly go up, but temperatures in the interior room will not exceed what the fly can handle.

Since the colony of *L. franki* is improving so greatly, we anticipate making releases in the spring of 2013. Post-release monitoring will follow the releases.

Figure 1. Room and cage built for the *Lixadmontia franki* colony. Wooden boxes inside of the fly cage contain pineapple tops infested with 3rd-5th instar weevils to be parasitized by the flies.

Temperature-dependent studies on Mexican and Belizean weevil populations

We have two Mexican bromeliad weevil colonies in the quarantine facility. One colony was initiated from weevils collected in the wild in Florida, which originally came from Mexico. The other colony comprises descendants of weevils that were collected in Belize in 2010. Temperature-dependent studies are comparing two biological aspects of the two weevil populations. The Belizean population has a mean oviposition rate significantly lower than that of the Mexican population (Figure 2) and a significantly longer developmental time from egg to pupa (Figure 3). We will continue collecting data on temperature tolerance and adult longevity.

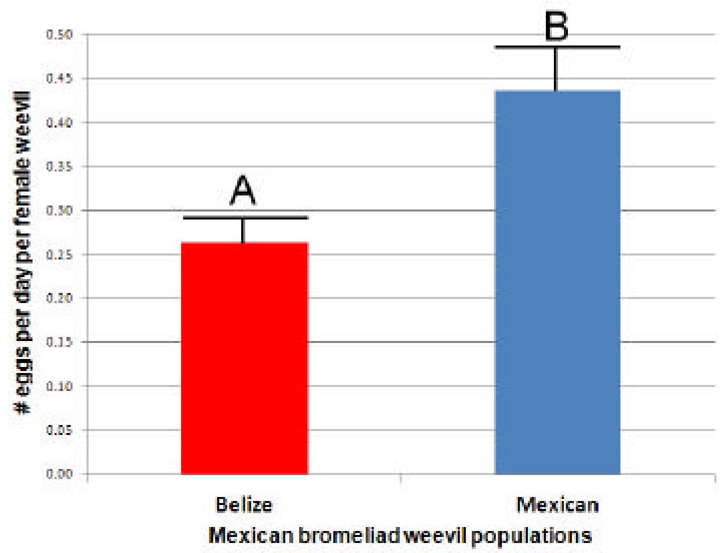

Figure 2. Mean oviposition rate of Belizean and Mexican *Metamasius callizona* in the laboratory on pineapple leaves.

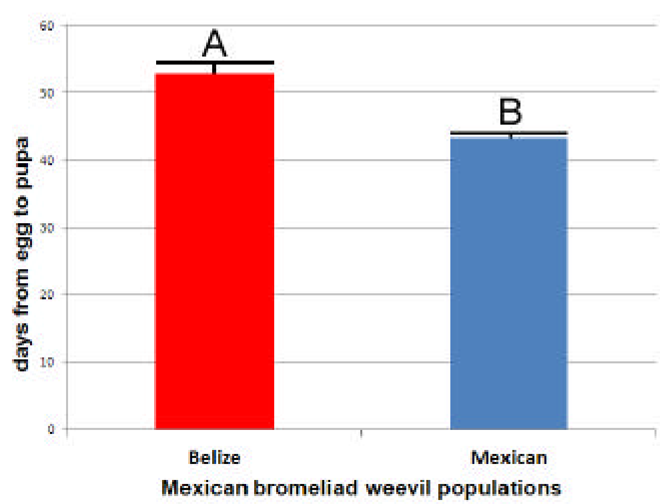

Figure 3. Development time from egg to pupa of Belizean and Mexican *Metamasius callizona* laboratory populations.

Effect of host bromeliad on the growth and development of *M. callizona*

Preliminary studies have begun to understand the effect of host bromeliads on *M. callizona*. Host bromeliads being tested include a Florida form of *Tillandsia utriculata*, a Central American form of *T. utriculata*, *Tillandsia fasciculata* from Florida, and pineapple. We are interested in comparing the two forms of *T. utriculata* because the Central American form does not suffer the high rate of mortality from the weevil compared to the Florida form of *T. utriculata*. *Tillandsia fasciculata* is of interest because in Florida it has a range and distribution that is similar to *T. utriculata* but suffers lower mortality rates from the weevil than *T. utriculata*. Pineapple is tested because we use pineapple stems and leaves to rear the weevil in the laboratory.

The oviposition rate in pineapple leaves was greater than in all other host types (Figure 4). The oviposition rate in Central American *T. utriculata* was similar to that in both the Florida *T. utriculata* and *T. fasciculata*, but the oviposition rate was greater in Florida *T. utriculata* than in *T. fasciculata*. The oviposition rate in *T. fasciculata* was comparable to that of the female that received no leaves.

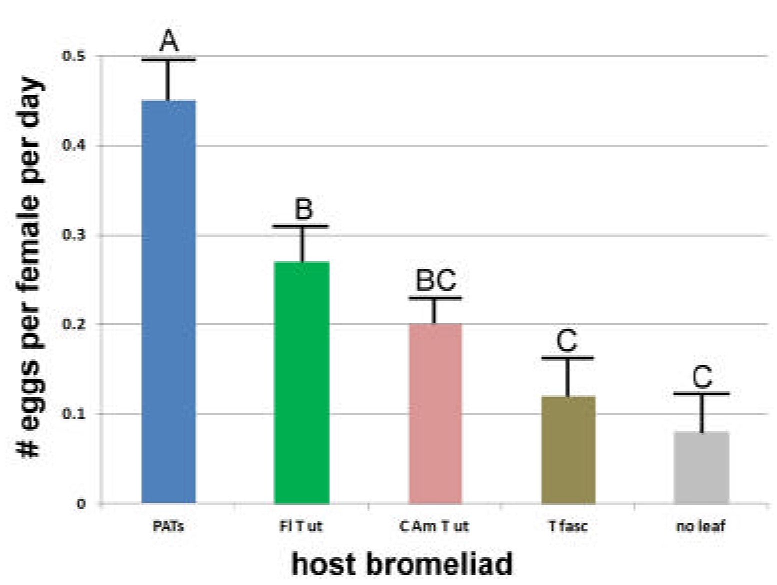

Figure 4. Oviposition rate of *Metamasius callizona* on four host bromeliads. PATs = pineapple; Fl T ut = Florida *Tillandsia utriculata*; C Am T ut = Central American *T. utriculata*; T fasc = *Tillandsia fasciculata*; no leaf is the control.

All host bromeliads had a similar proportion of larval hatch from eggs (Figure 5). Only larvae on pineapple leaves and Florida *T. utriculata* survived to pupation and adult emergence. None of the larvae that were fed the Central American *T. utriculata* or *T. fasciculata* developed past third instar, and none pupated.

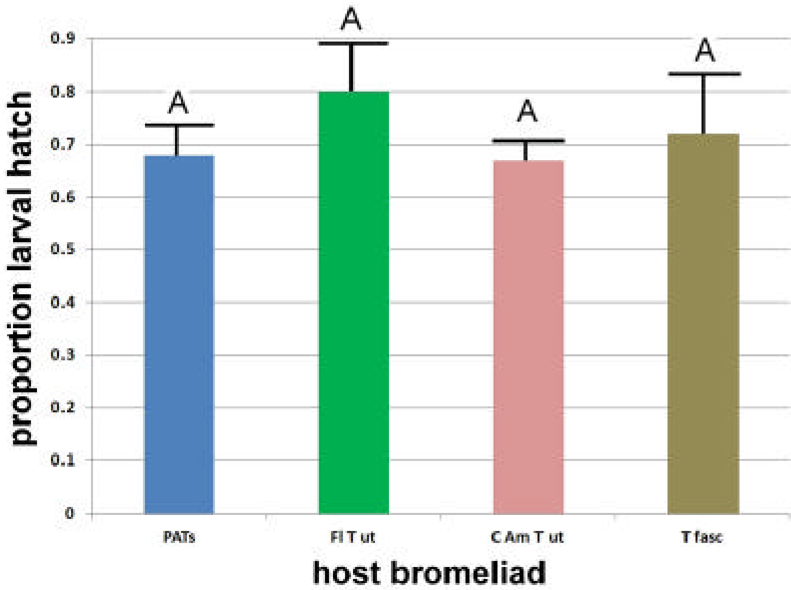

Figure 5. Proportion of larval hatch for *Metamasius callizona* on four host bromeliads. PATs = pineapple; Fl T ut = Florida *Tillandsia utriculata*; C Am T ut = Central American *T. utriculata*; T fasc = *Tillandsia fasciculata*.

Larvae in pineapple leaves had a greater pupation rate than larvae in Florida *T. utriculata* (Figure 6a), but larvae in these two host bromeliads had similar rates of reaching adulthood (Figure 6b). Larvae developed almost twice as fast on pineapple leaves than on leaves from Florida *T. utriculata* (Figure 7a); developmental times were similar for pupae (Figure 7b). Adults reared on pineapple leaves were significantly larger, both in length (Figure 8a) and width (Figure 8b), than those raised on Florida *T. utriculata* leaves.

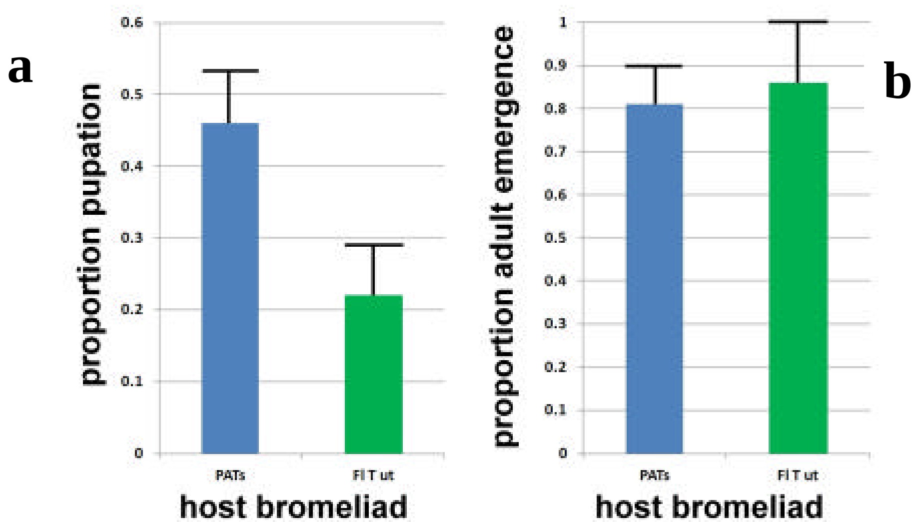

Figure 6. Proportion of larvae that pupated (a) and adult emergence (b) for *Metamasius callizona* on two host bromeliads. PATs = pineapple; Fl T ut = Florida *Tillandsia utriculata*.

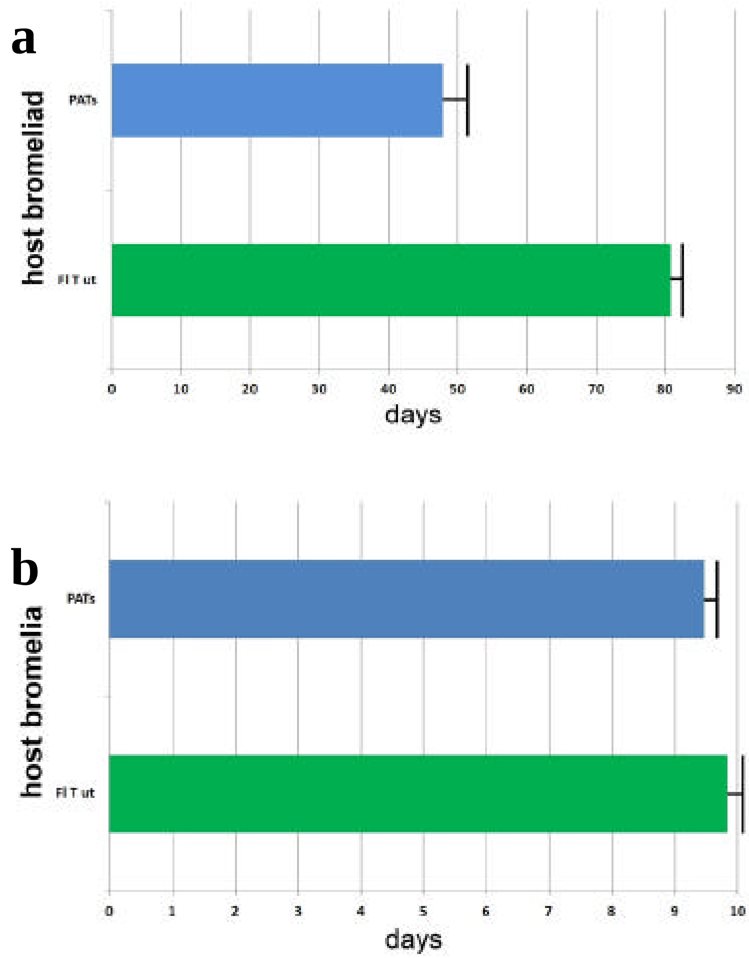

Figure 7. Developmental time of larvae (a) and pupae (b) of *Metamasius callizona* on two host bromeliads. PATs = pineapple; Fl T ut = Florida *Tillandsia utriculata*.

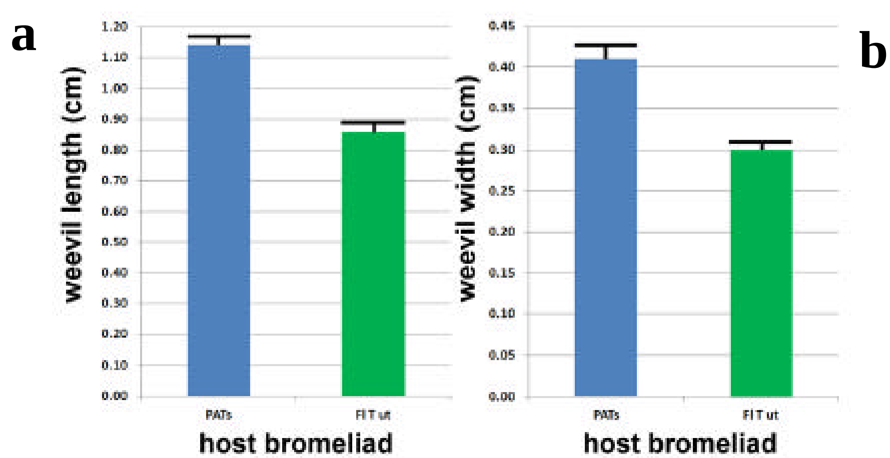

Figure 8. Length (a) and width (b) of *Metamasius callizona* reared on two host bromeliads. PATs = pineapple; Fl T ut = Florida *Tillandsia utriculata*.

Pineapple leaves and *T. utriculata* Florida leaves had similar percent sugar contents, which were significantly greater than the percent sugar content for the Central American *T. utriculata* and *T. fasciculata*, which were similar (Figure 9).

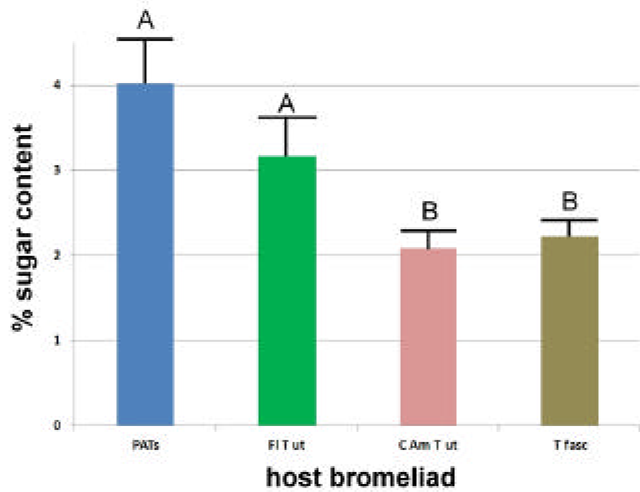

Figure 9. Percent sugar content in four bromeliads. PATs = pineapple; Fl T ut = Florida *Tillandsia utriculata*; C Am T ut = Central American *T. utriculata*; T fasc = *Tillandsia fasciculata*.

This research shows that the host bromeliad influences the reproduction and development of *M. callizona*. We will continue this research to look at the development of the weevil on whole plants instead of cut leaves, to perform more nutritional analyses of the plants, and to conduct oviposition choice tests.

Publications

Cooper, T. M., J. H. Frank, and R. D. Cave. Loss of *Tillandsia utriculata* and its phytotelmata in the Enchanted Forest Sanctuary (Florida, USA) due to an invasive bromeliad-eating weevil and the effect on forest ecosystems. Acta Oecologica (In Press).

Presentations

Cooper, T. M., R. D. Cave, and J. H. Frank. Growth and development of *Metamasius callizona* on four host plants. Entomological Society of America annual meeting. Knoxville, TN. November 2012.