



MISSISSIPPI STATE UNIVERSITY



Cactus Moth Update



Volume 3, Issue 3

September 2011

The End of a Project, But Not of a Program

By John D. Madsen
Geosystems Research Institute

Before y'all think we are going away, I want to assure you that the programs we have started at Mississippi State University are

include reports on cactus moth, as well as other invasive species projects.

With the federal budget problems of the past few years, we realized it was inevitable that the funding for our federal-university partnership was in jeopardy. On behalf of everyone involved at Mississippi State University and the state and regional beneficiaries of this project, I want to express our gratitude to the U.S. Geological Survey Invasive Species Program and the (now eliminated) National Biological Information Infrastructure, Invasive Species Information Node for their support and partnership, and personally to the program managers since 2004: Bill Gregg, Sharon Gross, and Annie Simpson. I also want to thank the many staff members with whom we have worked at USGS, but in particular Liz Sellers and the indefatigable Randy Westbrook. All of you care deeply for the mission of managing invasive species and preserving the natural resources of the country. I also want to thank the many partners at federal and state agencies with whom we have worked on this project.



Figure 1. Victor Maddox of GRI (right) with USDA APHIS PPQ staff visiting a Mississippi barrier island in 2008, searching for pricklypear cactus and the cactus moth.

not disappearing, and we will be online for the foreseeable future. The researchers and extension personnel working on this project are dedicated to the invasive species mission, as well. We will be continuing our research and outreach activities.

The Invasive Species Update newsletter will become an annual update; the next issue will be at the end of 2012, unless another large project would need more frequent reporting. The Invasive Species Update will

The Cactus Moth Update newsletter will be discontinued as a separate publication after this issue, unless a large cactus moth-specific project requires more frequent reporting.

All of our webpages for invasive species (Invasive Plant Atlas of the MidSouth, Cactus Moth Detection and Monitoring Network, and Invasive Species Program), will not only continue to be available, but will be maintained and improved as funding permits.

The latest on:

- Cactus moth spread
- The search for cactus moth
- Cactus Moth Detection and Monitoring Network
- Other cactus moth research

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The Cactus Moth Detection and Monitoring Network: A Volunteer Network in Times of National Economic Trouble

By Victor Maddox
Geosystems Research Institute

The road ahead in the battle to prevent cactus moth from moving into Texas may be difficult. As federal cuts continue, so does the threat of the cactus moth. In difficult economic times, even more emphasis is focused on non-government resources to combat invasive species like cactus moth.

The need still exists, while personnel and funds are diminished. It is during these times that strong volunteer and partnership networks may be most critical.

The establishment of the Cac-

tus Moth Detection and Monitoring Network (CMDMN) (www.gri.msstate.edu/cactus_moth) was initiated just a few years ago with a multi-faceted goal that included a network of collaborators to assist in a common goal of combating the cactus moth. With the system established and functional, the greatest test may lie ahead in the face of difficult economic times. With budget cuts at the federal level, many agencies are looking for ways to reduce personnel and programs and cactus moth programs are no exception.

The road ahead may be the most challenging for the CMDMN since its inception only a short while ago. With an

initial investment in training volunteers strategically across the southern U.S., the real test lies ahead in maintaining volunteer connectivity, maintenance, and a response team with little or no funding. These may be trying times for networks of this type, but time will tell if they can fill in the voids left by federal cuts in personnel and programs. This is a time to look within ourselves and ask what we can do for our country.

Volunteer networks can empower us to do more than we could do alone by allowing us to be part of a larger effort. Now is the most critical time to volunteer, because government cannot do it alone.

With budget cuts at the federal level, many agencies are looking for ways to reduce personnel and programs and cactus moth programs are no exception.



Figure 1. Pricklypear (*Opuntia sp.*) near Devils River on land Managed by The Nature Conservancy where Corbin Neill monitors pricklypear for cactus moth as part of a larger network. Image by Corbin Neill, TNC.

Biology Graduate Student Examines Dietary Influences of North American *Opuntia* on Native and Invasive Cactus Moth Fitness

By Tyler Schartel, Christopher Brooks and Gary N. Ervin

Department of Biological Sciences

In order to better understand how host plants influence the spread of cactus moths, we are planning to conduct experiments to evaluate the demographic responses of cactus moths to various aspects of host quality. These experiments will focus on the influence of macronutrients (proteins, lipids and carbohydrates) on moth survivorship and reproduction. Our goal is to develop the experimental approach using a native cactus moth before we implement our approach with *Cactoblastis cactorum*.

We have begun to rear the native eastern cactus borer (*Melitara prodenialis*) in our laboratory space in order to obtain the eggs necessary for our experimental design (Fig. 1). Rearing is occurring in our laboratory space in Harned Hall, and we have already collected our first group of egg sticks. Moths have been reared on *Opuntia pusilla* which was



Figure 1. Laboratory-reared adult *Melitara prodenialis* mating inside a mesh butterfly enclosure kept in the Brooks/Ervin lab.

collected in July and August 2011 at Town Creek Campground, West Point, Mississippi (33.60667°N, 88.49195°W). Plants were dissected and a total of 91 *M. prodenialis* larvae were collected, with up to 9 individuals observed within one cladode (cactus stem segment).

These larvae then were placed in a growth chamber to continue development. A total of 24 larvae died prior to pupation. Of the surviving individuals, 5 larvae are preparing to overwinter within their respective cladodes. The remaining 62 live individuals

began to pupate, were removed from the growth chamber, and were placed in a mesh butterfly enclosure inside the laboratory. To date, a total of 16 adult moths have eclosed and they have produced 10 eggsticks, totaling 213 eggs.

In addition to these adult moths, a total of 19 parasitoid wasps (*Temelucha sinuata*) have also been collected from within the enclosure (Fig. 2). The collection of these parasitoids represents the first record of *T. sinuata* occurring in Mississippi, and one of two collections east of the Mississippi River (the other having been collected by Travis Marsico as a part of this project in 2009). We currently are working on a manuscript with Dr. Marsico to report these new parasitoid records and the observed levels of parasitism in the field.



Figure 2. Male parasitoid wasp (*Temelucha sinuata*) that emerged from a field-collected parasitized *M. prodenialis*. These parasitoids emerged in approximately equal numbers as adult *M. prodenialis* moths.

These experiments will focus on the influence of macronutrients (proteins, lipids and carbohydrates) on moth survivorship and reproduction.



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Kudos to Victor Maddox

Dr. Victor Maddox has resigned from his position as Postdoctoral Research Associate in the Geosystems Research Institute to become a Senior Research Associate in the Department of Plant and Soil Sciences, working with Dr. John Byrd on invasive plants in noncrop areas and rights-of-way.

Since Victor will retain his office in Dorman Hall, retain his e-mail and phone number, continue working with GRI on invasive species issues, and continue as Coordinator of the Mississippi Cooperative Weed Management Area, it is not exactly obvious what the change entails other than not worrying about the source of his salary and exchanging a

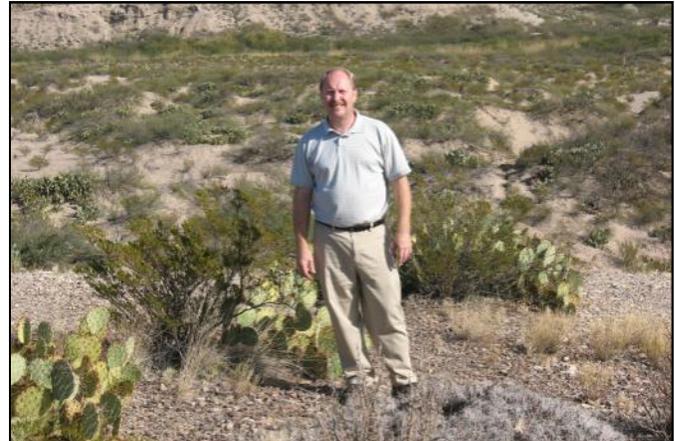


Figure 1. Victor Maddox photographed with pricklypear cactus along the Rio Grande River in December 2007. Victor would be a Diamond Level Frequent Driver, if Mississippi State University had a mileage program.

grouchy but frequently absent supervisor for a jolly but frequently absent one (you two

know who you are).

Congratulations to Victor.

Publication July — September 2011

Peer-Reviewed Journals

Brooks, C. P., G. N. Ervin, L. Varone, and G. Logarzo. 2011. Native ecotypic variation and the role of host identity in the spread of an invasive herbivore, *Cactoblastis cactorum* (Berg). *Ecology*, Accepted.

Conference Presentations

Garcia, B. M., S. A. del Alto, T. P. Fera, A. Felicisimo, J. Goulo-

vob, G. N. Ervin, and C. P. Brooks. 2011. Potential distribution of the Prickly-pear moth *Cactoblastis cactorum* in south Texas and north Mexico. 96th Meeting of the Ecological Society of America, Austin, TX, August 8-12, 2011.

Marsico, T. D., Ervin, G. N., & Brooks, C. (2011). Putting Hypothesized Native-Range Phylogeographic Patterns of *Cactoblastis cactorum* to the Test using Genetic and Climatic

Data. Fifth International Biogeography Society Meeting, Heraklion, Crete, Greece.

Professional Presentations

Ervin, G. N. (2011). Combining Biological Databases and Predictive Modeling in Conservation Planning. Department of Biological Sciences, Arkansas State University, Jonesboro, AR.

Collaboration July — September 2011

John Madsen attended the inaugural workshop on developing a new bioinformatics

initiative at the US Geological Survey, tentatively entitled Biodiversity Informatics for

Serving Our Nation (BISON), held September 27 to 29 in Reston, VA.