



Cactus Moth Detection and Monitoring Network on Public and Private Lands in the United States. A partnership between USDA-APHIS, USGS, and Mississippi State University
Progress Report March 2007

Webpage: http://www.gri.msstate.edu/cactus_moth

Introduction. Cactus moth (*Cactoblastis cactorum*), one of the most successful biological control agents in history, has been transported around the world in various prickly pear cactus control programs. By 2002, free-living populations of the moth had spread from the Florida Keys to the Florida Panhandle and South Carolina. It now poses a serious threat to native prickly pear cactus populations in the American Southwest, as well as the cactus industry and desert ecosystems in Mexico.

A research, extension, and coordination effort to monitor the spread and develop integrated control of cactus moth has been developed as part of collaborative research between USGS and Mississippi State University, with assistance from USDA-APHIS. This project has the following components: Early Detection and Reporting of Cactus Moth, Distribution of Prickly Pear Cactus, in the Region, Modeling of *Opuntia* Distribution, Cactus and Cactus Moth Extension Information, Web-Based Database of Cactus and Cactus Moth Locations, and Regional Coordination

I. Early Detection and Reporting of Cactus Moth. Task Description: Cactus moth detection techniques will be tested to find an optimal approach for detection, and a network of detection sites at known cactus locations will be implemented. The MSU insect collection will develop instructional information for potential volunteer monitors at the selected monitoring sites, and provide for moth species verification and vouchering.

Summary of Objectives:

1. Develop and test techniques for (a) detecting cactus moth infestations, (b) delimiting infested areas, and (c) determining effectiveness of control actions.
2. Develop a cactus moth detection network in the project area.
3. Develop protocols for monitoring native and ornamental cactus populations.
4. Develop protocols for reporting and verifying suspected cactus moth infestations.

Progress this month:

- Three species of *Opuntia* were checked at Bon Secour NWR, AL. Cactus moth larvae and egg sticks were found on *Opuntia stricta*, but not *O. pusilla*, at Fort Morgan. *Opuntia pusilla* and *O. humifusa* at Perdue Unit (about 12 miles east) were negative for cactus moth.
- *Opuntia pusilla* at site near Meridian, MS were negative for cactus moth, but heavily infested with native species.
- Larvae of native species were collected and histologically fixed for sectioning and transmission electron microscopy to determine if new organ on the larval head, also present in larvae of cactus moth, has glandular tissue.

II. Distribution of Opuntia in the Region.

Task Description: MSU staff, natural resource agency professionals, and volunteers will be used to search for populations of *Opuntia* cactus in the region. Native cactus populations will be located using herbarium records, contacting federal, state, and NGO biologists, and surveys. The location and description of all *Opuntia* cactus populations in the region and of cactus moth monitoring sites will be placed on a web-accessible database, as part of extension efforts listed below.

Summary of Objectives:

1. Develop and test methods to locate and map populations of cactus in support of surveys to detect and delimit cactus moth infestations in the region
2. Utilize professionals and volunteers to survey cactus locations in the Southeastern region.

Progress this month:

- Located several populations of *Opuntia ammophila* from 3 counties in central Florida and collected material for MISSA herbarium and live collection.
- Gathered larval *Melitara* from Georgia, Alabama, and Mississippi for TEM work by G. Baker and R. Brown
- Conducted mapping and data collection trips in GA, MS, and AL.

III. Modeling of Opuntia Distribution in the Region.

Task Description: We will develop spatial models to predict cactus distribution in a GIS framework.

Summary of Objectives:

1. Develop cactus distribution prediction models

Progress this month:

- Environmental and species occurrence datasets are being assembled for analysis, for presentation at the cactus moth conference in May.

IV. Cactus And Cactus Moth Extension Information.

Task Description: We will develop web-based information to aid in the identification of cactus and the cactus moth.

Summary of Objectives:

1. Web-based educational materials on cactus and the cactus moth
2. Educational program on cactus moth, including on-line and printed fact sheets and brochures.

Progress this month:

- Met and trained data collection and sentinel site personnel in northeast GA.
- Cactus moth information provided at garden and patio shows in Biloxi, Jackson, and Hattiesburg, MS to the public with an estimated 20,000 attending all three shows.
- The brochure "The Cactus Moth: An Invading Pest" was revised.

V. Web-based database for cactus and cactus moth distribution.

Task Description: We will develop a web-based avenue for reporting suspected locations on the web, and web GIS database to display the movement of the moth and locations of natural cactus populations. Webpage:

http://www.gri.msstate.edu/cactus_moth

Summary of Tasks:

1. Operational web database for locating and mapping cactus and cactus moth populations.

Progress this month:

- The background map has been modified to enable viewing of cactus moth infestations outside of the United States, and the road map modified to improve viewing at lower resolutions.

VI. Coordination.

Task Description: A collaborative project of this size involving multiple agencies requires a concerted effort to coordinate activities and agree on the tasks to be done and data to be collected.

Coordination activities this month:

- Presentation of SEM work on *Opuntia* pollen, glochids, and spines delivered at the Southeastern Ecology and Evolution Conference in Orlando, FL by M.S. student Lucas Majure.
- A second call has been made for establishment of Cactus Moth Sentinel Sites on public and private conservation lands from NC to CA.
- Several project investigators will participate at the upcoming International Cactus Moth Workshop, to be held at the Desert Botanical Garden in Phoenix, Arizona, in Mary, 2007.

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