



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 January 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:

- Checked 118 pheromone traps and identified moths from Arizona (104 traps, nurseries, APHIS), Puerto Rico (2 traps, APHIS), and Mississippi (Grand Bay Savannah NWR). *Cactoblastis cactorum* were present in traps from Puerto Rico.
- Specimens of cactus moth from Mexico and other localities forwarded to Thomas Simonson for sequencing.

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, contact of 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.

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:

- *Opuntia* records from the University of Tennessee herbarium (TENN) were examined, and some locations revisited. All of the populations represented in TENN, except for one from the western portion of the state are believed to be *O. aff. grandiflora*, as determined by D. Pinkava. This discovery expands the confirmed range of *O. aff. grandiflora*. It is likely, based on descriptions of "*O. humifusa*" from other parts of the eastern US (AL,

GA, NY) that this species is even more widespread than has been confirmed to date. The one specimen from a population in Fayette County, in west TN, was verified as *O. humifusa*.

- An *Opuntia* purchased during summer 2006 from the Starkville, MS Wal-Mart garden center has been identified as *Opuntia leucotricha*. This is a Mexican species from states such as San Luis Potosi that can grow to large shrub or tree size. Another *Opuntia* purchased at the Starkville Lowe's Home Center during summer 2006 was found to be *O. quitensis*, a South American species with a fairly small native range in Peru and Ecuador. Specimens of both are growing in the MSU *Opuntia* collection.
- Mapping and data collection trips in GA, MS, S. AL, and TN.
- Developing potential sentinel site personnel in Columbus, NM and throughout OK.

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:

- Data analysis continues

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:

- Brochures on the cactus moth were distributed at annual meeting of Entomological Society of America.

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:

- Planning for transition to version 9.2 of ESRI's products.
- Added additional associate species to the system.

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:

- Participated in the Invasive Species Working Group teleconference on January 25, 2007.

Presentations

"Tracking an invasion: Phylogeography of the invasive cactus moth, *Cactoblastis cactorum* (Lepidoptera: Pyralidae) in the southeastern USA based on the mitochondrial gene COI." Thomas J. Simonsen, Richard L Brown, and Felix Sperling. Annual meeting of the Entomological Society of America, Indianapolis, IN. Dec. 10, 2006.

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