



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 Template

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:

- As a result of discussions that were held at the International *Cactoblastis cactorum* Conference in Phoenix, Arizona, in mid-May, 2007, USGS and MSU are cooperating with Doria Gordon (TNC, Florida), and Jim Bergen (TNC, Texas) to establish Cactus Moth Sentinel Sites on TNC Preserves from NC to SC, and south. The first Cactus Moth Sentinel Site on TNC lands was established on the Charles Deaton Ecological Preserve, in southeastern Mississippi in 2005.
- A new Cactus Moth Sentinel Site has been established at the Organ Pipe National Monument of the National Park Service, in southern Arizona. Charles Conner, Invasive Species Coordinator for the park, is setting up the site, and has agreed to assist USGS and MSU in setting up similar sites on other public lands in the Southwest.
- Alix Rogstad of the Arizona/Sonora Desert Museum of Tucson, AZ has established a sentinel site at the Museum.
- Collaboration with Dr. Barron Rector of Texas Cooperative Extension Service has been established to provide training to volunteers and establish sentinel sites in southern Texas.
- Populations of *Opuntia humifusa* were checked at Fall Line Sandhills Natural Area (Taylor Co., GA) and Big Hammock Natural Area (Tattnall Co., GA).

- Populations of several *Opuntia* species were checked in Arizona: Santa Cruz Co. (Madera Canyon); Pima Co. (Santa Rita Experimental Range; Winkelman); Maricopa Co. (Sycamore Creek).
- Six pheromone traps from Galveston, Texas were negative for cactus moth.

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, 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:

- A visit to Horn Island on November 24-25 indicated that *Opuntia* were the liveliest plant species on the island. Considerable *O. humifusa* and *O. pusilla* were present on the eastern half of the island. However, *O. stricta* were observed in only one location, close to the pier just north of the ranger station. Those *Opuntia stricta* seemed to be fairly heavily impacted by the hurricane but were recovering nicely.
- Conducted mapping and data collection trips in AZ, LA, NM, S. MS, and TX.
- Established sentinel sites in AZ, S. MS, and TX.

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:

- Results of a study examining the dispersal of cactus and, possibly, cactus moth by storms were presented at the International *Cactoblastis cactorum* Conference.

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:

- We are sharing extension information with Texas Cooperative Extension Service, to be modified to include TCES as the initial contact.

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:

- Developed software to identify reports that are in the wrong locations.
- Developed maps showing locations of cactus based on species.

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:

- The project was well represented at the International *Cactoblastis cactorum* Conference in Phoenix, AZ on 7-10 May 2007; organized by USDA APHIS. Presentations included:
 - Victor Maddox, Distribution of *Opuntia* spp. in the Southeastern United States
 - Richard Brown, Taxonomy and Morphology of *C. cactorum* and Other *Opuntia*-Feeding Lepidoptera in the United States
 - John Madsen, US Geological Survey Cactus Moth Detection Network
 - Gary Ervin and Lucas Majure, Habitat Modeling for *Opuntia* spp. in the Southeastern United States
 - Majure, L. C., G. N. Ervin., and P. Fitzpatrick. Storm-driven maritime dispersal of prickly pear cacti (*Opuntia* species).
 - Majure, L. C. and G. N. Ervin. Microstructural morphology of *Opuntia* species (Cactaceae) based on scanning electron micros
- Participated in the monthly Invasive Species Working Group teleconference, Thursday 31 May 2007.

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