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:
- Pheromone traps from Arizona (44, nurseries) and Texas (8, Galveston) were screened. All were negative.
- Visual observations were made of Opuntia species at two sites in Emanuel Co., Georgia and data entered into monitoring network.
- Manuscript on phylogeography of the cactus moth based on COI gene was completed by T. Simonson, R. Brown, and F. Sterling.

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:
- Mapped pricklypear cactus locations in MS, AL, and FL.

- Visited sites from Dauphin Island over to Big Lagoon to verify present status of sites from the CMDMN database and record new locations for *Opuntia*.

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:
- Collected *Opuntia* tissue and soil samples from Dauphin Island to begin building tools for population-level ecological analyses of the *Opuntia-Cactoblastis* system.

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:
- Bibliography of cactus moth references with abstracts was compiled for literature published since 1970.

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:
- Corrections were made in code dealing with image submission to the system.
- Initiating redesigning portions of the underlying code.

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:
- Attended and presented 'Mississippi State University Cactus Moth Detection and Monitoring Network Accomplishments' at the FY08 Cactus Moth Budget and Planning Meeting, 16-17 Oct 2007, Florida Dept. of Agriculture and Consumer Services-Division of Plant Industry building auditorium, Gainesville, Florida.

Professional Publications and Presentations

Baker, G.T. and R.L. Brown. 2007. Sensory structures of larval mouthparts of *Cactoblastis* and *Melitara* (Lepidoptera: Pyralidae). Mississippi Entomological Association Annual Meeting. (Poster)

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