

EXPANDING GEOGRAPHICAL RANGE OF *CACTOBLASTIS CACTORUM*  
(LEPIDOPTERA: PYRALIDAE) IN NORTH AMERICAS. D. HIGHT<sup>1</sup>, J. E. CARPENTER<sup>2</sup>, K. A. BLOEM<sup>3</sup>, S. BLOEM<sup>4</sup>, R. W. PEMBERTON<sup>5</sup> AND P. STILING<sup>6</sup><sup>1</sup>USDA-ARS, at Florida A & M University, CESTA, Center for Biological Control, Tallahassee, FL 32307<sup>2</sup>USDA-ARS-CPMRU, Tifton, GA 31794<sup>3</sup>USDA-APHIS-PPQ-CPHST-NBCI, at Florida A&M University, CESTA, Center for Biological Control, Tallahassee, FL 32307<sup>4</sup>USDA-APHIS-NBCI, at University of Florida, NFREC, Quincy, FL 32351<sup>5</sup>USDA-ARS, Invasive Plant Research Laboratory, Ft. Lauderdale, FL 33314<sup>6</sup>Department of Biology, University of South Florida, Tampa, FL 33620

Control of invasive prickly pear cacti, *Opuntia* spp. (Cactaceae), by the cactus moth, *Cactoblastis cactorum* Berg (Lepidoptera: Pyralidae), is often cited as a classic example of successful biological control (Dodd 1940, Moran & Zimmermann 1984). However, the unintentional arrival of *C. cactorum* in Florida (Habeck & Bennett 1990) raised concerns for the safety of native and rare *Opuntia* in the Florida Keys and for the potential spread of *C. cactorum* to *Opuntia*-rich areas of the western USA and Mexico. In addition to threatening cactus agriculture in the region and the biodiversity of native ecosystems, the negative publicity on such a well-known biological control agent could dampen public support for future weed biological control programs. In September 2000, a workshop was convened to evaluate the potential impact of *C. cactorum* in North America. The workshop proceedings, published in the Florida Entomologist (Dec. 2001 Volume 84), provide a thorough review of the subject.

The first record of *C. cactorum* in North America was from Big Pine Key, FL, in October 1989 (Habeck & Bennett 1990). Over the next decade the insect spread north along both Florida coasts (Johnson & Stiling 1998) and by 2000 was detected at Cedar Key along the Gulf Coast and at Sapelo Island, GA, along the Atlantic Coast (Fig. 1). It was not present at Horseshoe Point, Piney Point or Keaton Beach in September 2000. Colonization of *Opuntia* spp. in the Florida interior has been slower than along coastal areas, although infestations around Orlando in Orange and Osceola Counties have been reported (Fig. 1).

Surveys for larval damage and egg sticks along the Atlantic and Gulf Coasts were conducted in 2001 to improve our knowledge of the distribution of *C. cactorum* and to delimit the leading edge of its expanding range (Fig. 1). Numerous plants of *O. stricta* (Haw.) Haworth and *O. pusilla* (Haworth) Nuttall were sampled in Florida at St. Marks National Wildlife Refuge, Dekel Beach,

Keaton Beach and Steinhatchee in March 2001. No *C. cactorum* were found; however, a native cactus moth, *Melitara prodenialis* Walker (Lepidoptera: Pyralidae), was found infesting both species at all locations except St. Marks. In July 2001, *O. stricta* cacti were sampled at Big Lagoon State Recreation Area, Perdido Key, Pensacola, Destin, Panama City Beach, St. George Island, St. Marks, Adams Beach, Dekel Beach and Keaton Beach. No *C. cactorum* were found, but *M. prodenialis* larvae were present in large numbers at St. George Island and St. Marks. Surveys also were conducted at Jekyll and Tybee Islands, GA, and Hilton Head Island, SC. *Opuntia stricta* and *O. pusilla* throughout Jekyll Island and along the causeway connecting the island to the mainland were heavily infested with *C. cactorum* and to a lesser extent with *M. prodenialis*. *Opuntia stricta* on Tybee Island also were found infested with *C. cactorum*. No *C. cactorum* were detected on Hilton Head Island. Further surveys in August 2001 at Hilton Head, Kiawah Island, Charleston and Myrtle Beach revealed no *C. cactorum*.

These locations were surveyed again in 2002 and the search expanded to include areas north of Savannah, GA, along the Atlantic Coast and areas west of Cedar Key, FL, along the Gulf Coast (Fig. 1). In addition, virgin female-baited sticky traps (Pherocon 1-C) were deployed in selected areas to supplement survey efforts in areas with low population densities. *Cactoblastis cactorum* was detected as far north as Folly Island, near Charleston, SC. Larvae were collected from *O. stricta*, *O. pusilla*, *O. humifusa* (Raf.) Rafinesque and *O. ficus-indica* (L.) Miller on the South Carolina Islands of Hunting, Edisto and Folly. No *C. cactorum* were found at locations north of Charleston (Bull Island, Pawleys Island, Huntington Beach, Surfside Beach and Myrtle Beach), although *M. prodenialis* was collected at all locations. Surveys in 2002 of previously uninfested sites along the Gulf Coast identified the presence

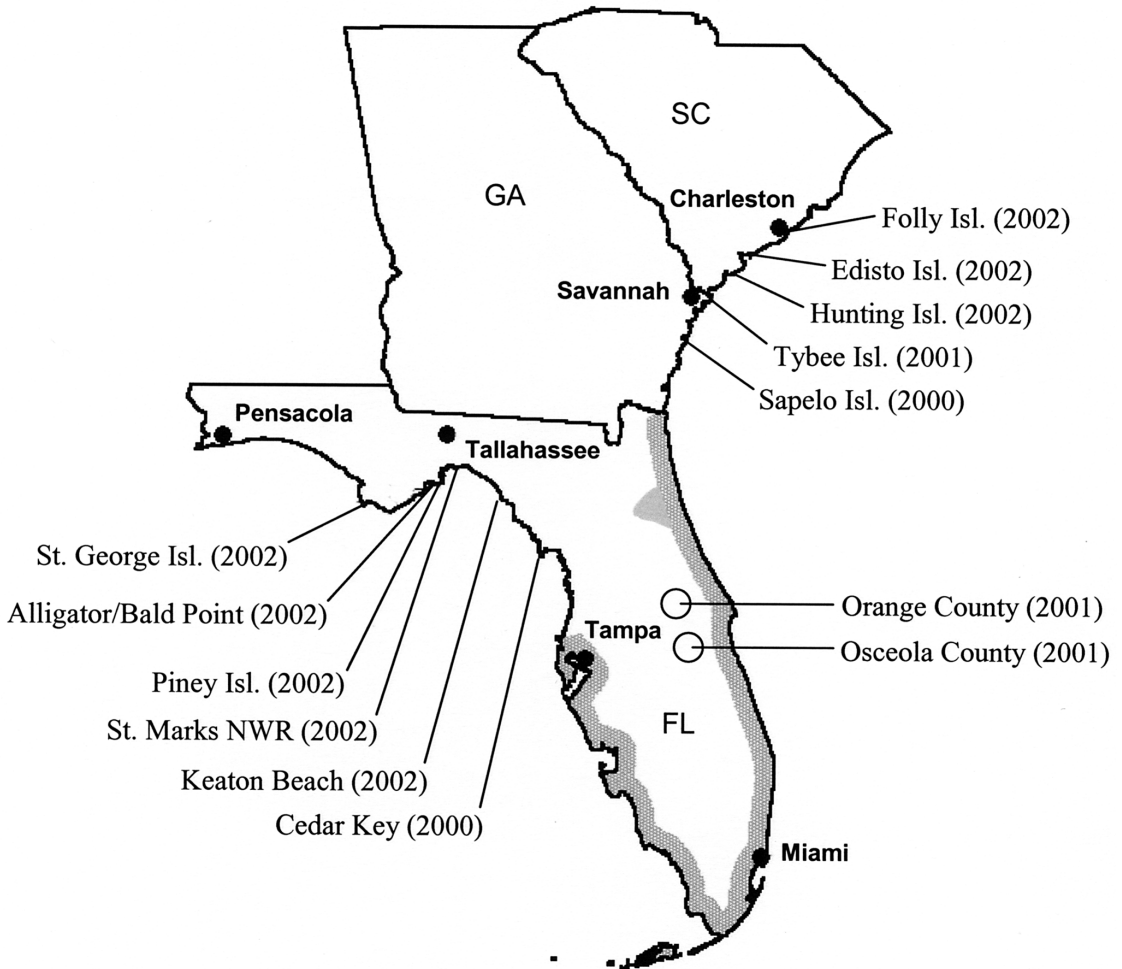


Fig. 1. The currently known distribution of *Cactoblastis cactorum* in North America, delineating new infested areas detected since 2000. The gray shaded area represents the known distribution to 1999.

of *C. cactorum* on *O. stricta* at Keaton Beach and St. Marks. Additional westward surveys found *C. cactorum* established at St. George Island.

In Florida, *C. cactorum* threatens one of the rarest plants in North America, *Opuntia corallicola* (Small) Werderm., a species endemic to the Florida Keys (Austin et al. 1998). By the time *C. cactorum* was detected in Florida only one small population of 13 mature *O. corallicola* was known to exist at Little Torch Key (Gordon & Kubisiak 1998). By 1990 several plants were infested with *C. cactorum* and one plant was killed (Stiling & Moon 2001). Since that time, the Nature Conservancy's effort to detect and remove the moth's egg sticks has enabled this cactus population to persist (Higgins 2001).

The status of *O. corallicola* brightened in December 2001 when a vigorous population was discovered at Swan Key, 100 miles north of Little Torch

Key (Bradley & Woodmansee in press). This population consists of approximately 570 plants, including many of reproductive size. In February 2002, we examined 228 plants to estimate the level of attack by *C. cactorum*. Twenty-five mature *O. stricta* growing on Swan Key also were examined. No evidence of *C. cactorum* frass or larval head capsules was found in either species, even when dead and hollow *O. corallicola* cladodes were dissected. Future efforts should concentrate on the development of a management plan to monitor the Swan Key *O. corallicola* population to detect invasion by *C. cactorum*. *Cactoblastis cactorum* has been recorded on Key Largo and at Cape Florida on Key Biscayne, 14 miles south and 22 miles north of Swan Key, respectively, as well as on the mainland, which is 5 miles to the west. The absence of *C. cactorum* at Swan Key suggests some heterogeneity in the moth's geographic occurrence in southern Florida.

Surveys for *C. cactorum* will continue along the Atlantic and Gulf Coasts at new and previously visited sites beyond the leading-edge of the infestation, as will surveys to evaluate the spread of the moth to the interior of Florida and adjacent states. Detection of *C. cactorum* infestations using virgin female-baited sticky traps will also continue. This method was effective at detecting *C. cactorum* at one site where no larval damage was evident.

#### SUMMARY

Observational surveys and virgin female-baited traps have identified the continued spread of *Cactoblastis cactorum* from the Florida Keys northward along the Atlantic and Gulf Coasts of the USA. The moth has infested native and ornamental cacti north to Charleston, SC, and west to St. George Island, FL. A newly discovered population of endangered *Opuntia corallicola* was surveyed in southern Florida and found free of moth infestation.

#### REFERENCES CITED

- AUSTIN, D. F., D. M. BINNINGER, AND D. J. PINKAVA. 1998. Uniqueness of the endangered Florida semaphore cactus (*Opuntia corallicola*). *Sida* 18: 527-534.
- BRADLEY, K., AND S. WOODMANSEE. In press. A significant new population of the rare prickly pear cactus - *Opuntia corallicola* (Small) Werderm. *Sida*.
- DODD, A. P. 1940. The Biological Campaign Against Prickly-Pear. Commonwealth Prickly Pear Board Bulletin, Brisbane, Australia. 177 pp.
- GORDON, D. R., AND T. L. KUBISIAK. 1998. RAPD analysis of the last population of a likely Florida Keys endemic cactus. *Florida Sci.* 61: 203-210.
- HABECK, D. H., AND F. D. BENNETT. 1990. *Cactoblastis cactorum* Berg (Lepidoptera: Pyralidae), a Phycitine new to Florida. Florida Department of Agriculture and Consumer Services. Division of Plant Industry. Entomol. Circular 333.
- HIGGINS, A. 2001. Cactus Caretakers 101: Monitoring the Endangered Semaphore Cactus, *Opuntia corallicola*. The Nature Conservancy, Key West, FL. 10 pp.
- JOHNSON, D. M., AND P. D. STILING. 1998. Distribution and dispersal of *Cactoblastis cactorum* (Lepidoptera: Pyralidae), an exotic *Opuntia*-feeding moth, in Florida. *Florida Entomol.* 81: 12-22.
- MORAN, V. C., AND H. G. ZIMMERMANN. 1984. The biological control of cactus weeds: achievements and prospects. *Biocontrol News and Infor.* 5: 297-320.
- STILING, P., AND D. C. MOON. 2001. Protecting rare Florida cacti from attack by the exotic cactus moth, *Cactoblastis cactorum* (Lepidoptera: Pyralidae). *Florida Entomol.* 84: 507-509.