

Scientific Note

**Phenology of the Blue Cactus Moth,
Melitara prodenialis (Lepidoptera: Pyralidae)**

Jesusa Crisostomo Legaspi¹, Ignacio Baez² and Benjamin C. Legaspi, Jr.³

¹ USDA, Agricultural Research Service, CMAVE / Florida A&M University
Center for Biological Control, Tallahassee FL

² USDA, APHIS, PPQ, CPHST, 1730 Varsity Dr., Suite 400, Raleigh, NC

³ Florida Public Service Commission, 2540 Shumard Oak Blvd, Tallahassee FL

The native blue cactus moth, *Melitara prodenialis* Walker (Lepidoptera: Pyralidae) has received relatively scant attention compared to another sympatric cactus moth, *Cactoblastis cactorum* (Berg) (Lepidoptera: Pyralidae). Like *C. cactorum*, *M. prodenialis* feeds on *Opuntia* cacti (Solis et al. 2004; Floyd and Madsen 2007; MSU-GRI/USGS 2005). Hight et al. (2002) conducted surveys for egg sticks and larval damage to *Opuntia* cacti along the Atlantic and Gulf Coasts in 2001. *Opuntia stricta* (Haw.) Haw. and *O. pusilla* (Haw.) Haw. were sampled in Florida at St. Marks National Wildlife Refuge, Dekel Beach, Keaton Beach and Steinhatchee. No *C. cactorum* was recorded; however, *M. prodenialis* was found infesting both cactus species at all locations except St. Marks. Subsequent surveys found no *C. cactorum*, but high numbers of *M. prodenialis* were found in St. George Island and St. Marks. In expanded surveys conducted in 2002, no *C. cactorum* was 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 (Hight et al. 2002). There is little information documented on population studies of *Melitara prodenialis*. Here we examined the phenology of *M. prodenialis* in St. Marks National Wildlife Refuge in St. Marks, Florida through field census counts.

Native cactus plants (*Opuntia stricta* (Haw.) Haw. [Cactaceae]) were visually surveyed weekly at a dike near the picnic pond at St. Marks National Wildlife Refuge, St. Marks, Florida (30.16 - 30° 1' N, -84.21 - 84° 1' W) from September 2006 to September 2007. Nine patches of plants (2-3 plants / patch and on average, 51 pads per plant and 49 cm plant height) were selected and checked for the presence of *M. prodenialis* (i.e., by looking for evidence of frass on the cactus pad and feeding damage). Any egg sticks on the pad were marked and the length (cm) was recorded. All egg sticks were then checked weekly thereafter for egg hatching. The numbers of eggs per

egg stick were estimated based on laboratory measurements (i.e., numbers of eggs per egg stick; diameter and height of an egg) recorded from samples taken near the field site. Larval counts were made by slicing the cactus pad sideways to avoid damaging the larvae. Old, dried pads near the plants were checked for pupae. The stage and numbers of immature *M. prodenialis* found in the plants were counted and recorded. All immature larvae were left inside or outside the cactus pad after data collection.

Sampling data for *M. prodenialis* suggest that the larger instars were more easily observed in the field (Fig. 1). *M. prodenialis* appears to undergo two generations in St. Marks: a Spring generation from October to April, and a fall one from May to September. Pupae are not shown because they are cryptic and difficult to sample. Adult counts are not available, but the fifth instars show peaks in the spring and fall seasons. In comparison, *C. cactorum* is known to undergo three generations in the same sampling location (Hight and Carpenter, in press; Legaspi et al., in press). Egg counts of *M. prodenialis* from our field surveys in St. Marks, FL showed an average length of the egg stick to be 11.08 mm \pm 0.94 SE and the number of eggs per egg stick was on average, 25.92 \pm 2.22 SE (n=26). In addition, the mean height of a disc-shaped egg was 0.4 mm \pm 0.0 SE and the mean diameter of an egg was 1.3 mm \pm 0.0 SE (n=26).

Heinrich (1956) recognized two species of *Melitara*: *M. prodenialis* in the eastern United States, and *M. dentata* (Grote) in the western United States and northern Mexico. In northern and western Arkansas, *Melitara prodenialis* was common in moderate to dense prickly pear cactus in 1988 – 1989 (Carlton and Kring 1994). Larval survival was best on cactus stressed by overgrazing or poor soil, and low on healthy cactus. The moth was bivoltine: the first generation completed by mid-summer, the second in early fall. *M. prodenialis* was also reported to be bivoltine in Texas (Mann 1969) and trivoltine in

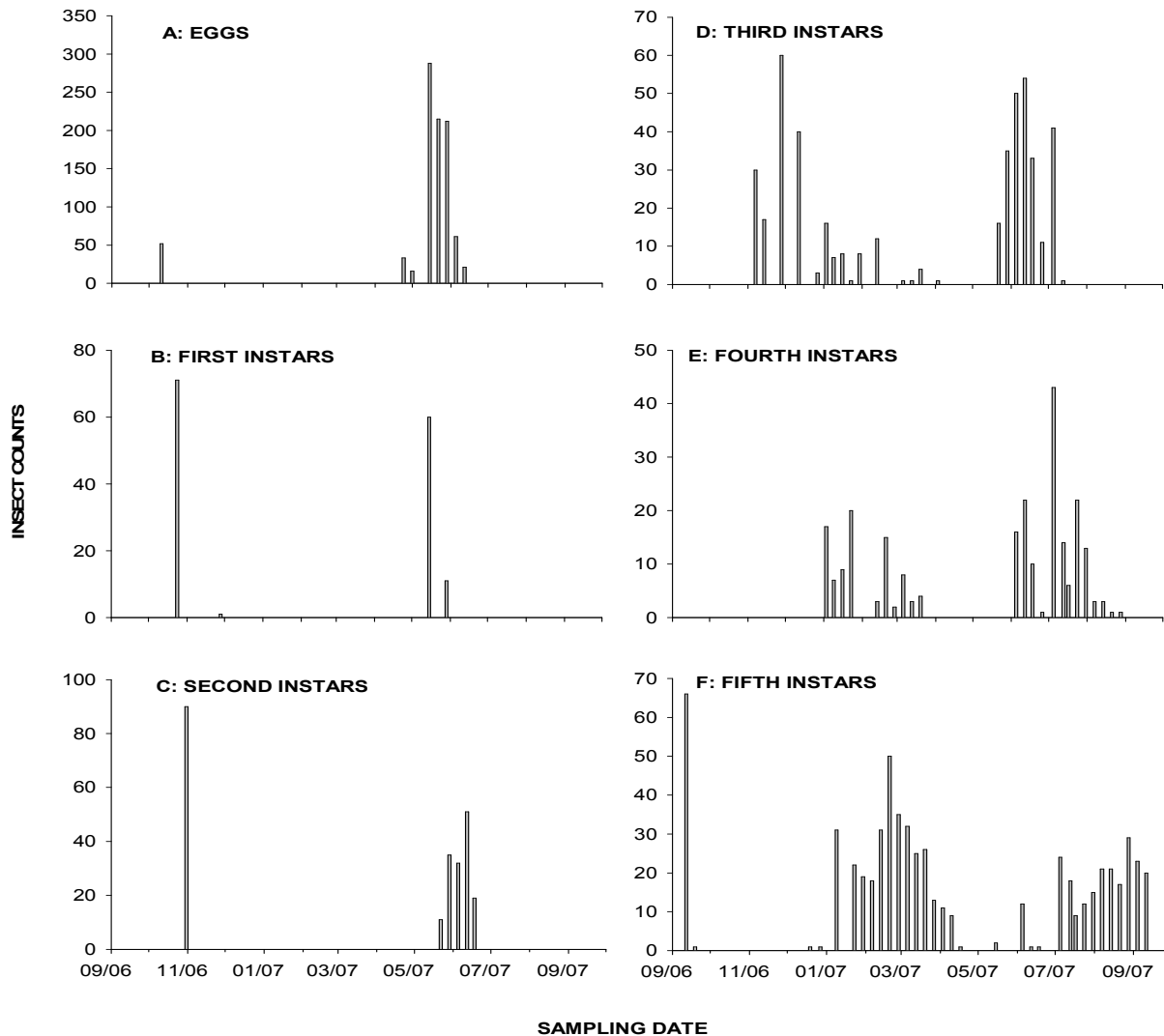


Fig. 1. Field counts of *Melitara prodenialis* by life stage at St. Marks National Wildlife Refuge, St. Marks, Florida during the 2006 – 2007 field sampling season.

southern Florida (Hamlin 1925). Of 15 species of Pyralidae that are associated with *Opuntia*, only the seven species of *M. prodenialis* (listed in Floyd and Madsen 2007) have been reported as feeding inside cactus cladodes (Brown and Madsen 2005).

Because *M. prodenialis* and *C. cactorum* are broadly sympatric in Florida and share many species of common host plants, they also share common natural enemies and control measures effected against one species will most likely impact the other. In Florida, only three endemic natural enemies are known to attack *C. cactorum*: *Brachymeria ovata* Say, *B. pedalis* Cresson (both Hymenoptera: Chalcididae) and an unidentified species of *Trichogramma* (Bennett and Habeck 1992; Pemberton and Cordo 2005). *Brachymeria ovata* attacked 55% of *C. cactorum*

pupae at one site. While *B. ovata* has a wide host range, *B. pedalis* may be limited to cactus moths. Pemberton and Cordo (2001) speculated that *B. pedalis* may have originally been a parasitoid of *M. prodenialis* before adapting to *C. cactorum* as a new host. The differences in host specificity suggest that inundative biological control using *B. ovata* can potentially impact beneficial Lepidoptera, whereas the impact of releases of *B. pedalis* may be limited to cactus moths. Pemberton and Cordo (2001) suggest that releases of specialized parasitoids of *M. prodenialis* may be effective against *C. cactorum* in Florida. Conversely, *M. prodenialis* would be most vulnerable as a non-target host in biological control programs against *C. cactorum*.

Melitara prodenialis was the subject of much research interest during the search for an effective control agent against prickly pear in the 1920s (Carlton and Kring 1994). At least two releases of the moth were conducted in Australia, neither resulting in establishment. The subsequent success of *C. cactorum* in controlling prickly pear led to a loss of interest in *M. prodenialis* as a control agent. Because *M. prodenialis* attacks similar host plants and appears to exhibit a wider geographical distribution, there may be the need to renew research interest in this moth, this time as a pest of cactus. Phenology studies such as the one reported here may be useful in devising control measures against *M. prodenialis*.

ACKNOWLEDGMENTS

We thank Stephen Hight (USDA, ARS, CMAVE, Tallahassee, Florida) for helpful discussions. Elizabeth Aninakwa, Marcus Edwards, Keith Marshall, Jr., Sofia Baez, John Mass, Chris Albanese (USDA, ARS, CMAVE, Tallahassee, Florida), and Shawanna Henderson and William Zeigler (Florida A&M University, Tallahassee, Florida) assisted in field sampling. We are grateful to Joe Reinman (Wildlife Biologist, St. Marks National Wildlife Refuge, St. Marks, Florida) for facilitating our field surveys at the refuge. Helpful reviews were provided by Janice Peters (FAMU), James Carpenter (USDA, ARS, Tifton, Georgia), and S. Hight.

This article presents the results of research only. The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the United States Department of Agriculture or the Agricultural Research Service of any product or service to the exclusion of others that may be suitable.

LITERATURE CITED

Bennett, F. D. and D. H. Habeck. 1992. *Cactoblastis cactorum*: a successful weed control agent in the Caribbean, now a pest in Florida?, pp. 21-26. In E.S. Delfosse & R.R. Scott [eds.]. Proc. 8th International Symposium on Biological Control of Weeds, Canterbury, New Zealand, CSIRO, Melbourne, Australia.

Brown, R. L. and J. Madsen 2005. Task 3.1.A. Early detection and reporting of cactus moth: sensory structures of larvae. pp. 92 – 95 In [MSU-GRI/USGS] Mississippi State University – GeoResources Institute / US Geological Survey 2005. Research to support integrated management systems of aquatic and terrestrial invasive species. Annual Report.

Carlton, C. E. and T. J. Kring. 1994. *Melitara prodenialis* Walker on prickly pear in Arkansas. Southwest. Entomol. 19: 23 – 30.

Floyd, J. and J. D. Madsen. 2007. Survey information for the national cactus moth (*Cactoblastis cactorum*) detection and monitoring network. Mississippi State University.

Hamlin, J. C. 1925. Important *Opuntia* insects of the United States, biological notes on the moth borers. Pan Pac. Entomol. 2: 1 – 11.

Heinrich, C. 1956. American moths of the subfamily Phycitinae. U.S. Nat. Mus. Bull. 207: viii + 281pp.

Hight, S. D., J. E. Carpenter, K. A. Bloem, S. Bloem, R. W. Pemberton and P. Stiling. 2002. Expanding geographical range of *Cactoblastis cactorum* (Lepidoptera: Pyralidae) in North America. Fla. Entomol. 85: 527 – 529.

Hight, S. D. and J. E. Carpenter. in press. Flight phenology of male *Cactoblastis cactorum* along a latitudinal gradient. Fla. Entomol.

Legaspi, J. C., I. Baez and B. C. Legaspi, Jr. in press. Phenology and egg production of the cactus moth (Lepidoptera: Pyralidae): comparison of field census data and life stage development in the field. J. Entomol. Sci.

Mann, J. 1969. Cactus-feeding insects and mites. U.S. Nat. Mus. Bull. 256.

[MSU-GRI/USGS] Mississippi State University – GeoResources Institute / US Geological Survey 2005. Research to support integrated management systems of aquatic and terrestrial invasive species. Annual Report.

Pemberton, R. W. and H. A. Cordo. 2001. Potential and risks of biological control of *Cactoblastis cactorum* (Lepidoptera: Pyralidae) in North America. Fla. Entomol. 84: 513 – 526.

Solis, M. A., S. D. Hight, and D. R. Gordon. 2004. Tracking the cactus moth, *Cactoblastis cactorum* Berg., as it flies and eats its way westward in the U.S. News Lepidopterists' Soc. 46: 3 – 7.