BioOne COMPLETE

TEMPORAL OCCURRENCE OF PODISUS MACULIVENTRIS (HEMIPTERA: HETEROPTERA: PENTATOMIDAE) IN NORTH FLORIDA

Authors: Herrick, Nathan J., and Reitz, Stuart R.

Source: Florida Entomologist, 87(4) : 587-590

Published By: Florida Entomological Society

URL: https://doi.org/10.1653/0015-4040(2004)087[0587:TOOPMH]2.0.CO;2

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

TEMPORAL OCCURRENCE OF *PODISUS MACULIVENTRIS* (HEMIPTERA: HETEROPTERA: PENTATOMIDAE) IN NORTH FLORIDA

NATHAN J. HERRICK AND STUART R. REITZ
USDA-ARS-CMAVE, 6383 Mahan Dr., Tallahassee, FL 32308

Podisus maculiventris (Say) is a generalist predator of over one hundred species of insects, including approximately fifty different crop pests. Its primary prey items are larval Coleoptera and Lepidoptera (Warren & Wallis 1971; McPherson 1980; Wiedenmann et al. 1994), and it can have a significant impact on pest populations in these orders (DeClerq et al. 1998). In greenhouse studies, DeClerq et al. (1998) report a reduction of tomato looper *Chrysodeixis chalcites* (Esper) populations of 40% in 48 h and a 65% decrease in leaf-feeding damage after 1 week when fourth instar *P. maculiventris* were released at a predator:prey ratio of 1:3.3. Adults and nymphs of *P. maculiventris* can be found in a variety of agroecosystems such as soybean, alfalfa, corn, potato, apple, grape, and brassica, and in other plants and plant communities such as goldenrod, shrubland, deciduous forest, hemlock, and pine (Culliney 1986; Wiedenmann et al. 1994). Adults overwinter under ground debris or under the bark of trees. *Podisus maculiventris* occurs from Quebec to British Columbia and south to Florida and Arizona (McPherson 1982). However, the occurrence and activity of this species may vary throughout its distribution.

The objective of this study was to determine the temporal occurrence of *P. maculiventris* at a site in northern Florida. This type of information can be valuable when assessing the potential predator guild of an insect pest throughout the growing season of a crop in a specific area. Moreover, understanding the occurrence of a predator species can be useful when integrating pest management tactics in agricultural systems.

The study took place at the Florida Agricultural and Mechanical University, Viticulture and Small Fruit Research Center, Tallahassee, Florida. The site is located in north Florida at a latitude of approximately 30°28'70"N and longitude of 84°10'31"W, 62 m above sea level. From west to east the site consisted of grape *Vitis rotundifolia* Michx, mowed grass, golden rod *Solidago* L. spp., small trees and shrubs, and large trees.

Six mesh screen funnel traps contained within a plastic container (19.5 cm in height, with a 14-cm diameter funnel ending in a 4-cm diameter entrance hole 8 cm deep, and a removable sealed bottom) (Fig. 1) were hung on small trees between the grape vineyard and large trees. The traps were 45 m apart and placed 1-1.5 m above ground level. Traps were baited every two weeks with a synthetic male sex pheromone formulation of 3478 µl (*E*)-2-hexenal, 193.6 µl benzyl alcohol, and 4246 l (±)-α-terpineol (Aldrich et al. 1984; Aldrich 1988). This pheromone blend attracts males and females of *P. maculiventris* (Aldrich et al. 1984; Aldrich 1988). Baiting the traps every two weeks allowed the majority of the pheromone to evaporate and allowed some pheromone to remain in the trap to maintain its attractiveness. Each trap contained a 10-ml glass vial with a cotton wick and approximately 7 ml of pheromone. For each season, traps were set or inspected at approximately 11:00 AM EDT. In 2001, 2002, and 2003 traps were set on 7 June 2001, 1 March 2002, and 28 February 2003. Sampling began three days after trap placement. Traps were inspected twice a week from 10 June 2001-26 October 2001, 4 March 2002-17 June 2002, and 3 March 2003-16 June 2003. Data are plotted with moving average trend lines for visual interpretation (Fig. 2).

In the 2001 season, adults of *P. maculiventris* were captured within the first three days after trap placement, indicating that adults were already active. Adults were most abundant in June and peaked on 22 June 2001 (Fig. 2A). Captures remained low (<2.0 ± 0.3 adults/trap) from 4 July 2001-26 October 2001 (Fig. 2A). In the 2002 and 2003 seasons, sampling began in early March, before *P. maculiventris* were active. During both seasons, overwintering adult *P. maculiventris* became active in March, with populations peaking in May. Adult populations peaked on 13 May 2002 and 23 May 2003. Populations decreased in late-May during the 2002 and 2003 seasons and increased, to a lesser extent, in mid-June (Figs. 2B and 2C). Large decreases in adult captures in May likely indicate the end of the first generation offspring from the progeny of overwintering adults. The presence of all life stages explains the delay in adult populations during the second generation. Reduced activity in adult populations during the summer months also could be caused from decreased survival of various developmental stages at higher temperatures (DeClercq & Degheele 1992). Adult activity from March through September and peaks of adult activity in May and June are similar to results found by Aldrich et al. (1984) at a site in Geneva, NY.

The overall sex ratio of adults captured was 1:2 males:females (n = 297). Using a similar pheromone formulation, Aldrich (1988) reports a ratio of approximately 2:1 males:females. This difference could be due to differences in trap type, frequency of rebaiting the traps, location, and/or pheromone blend (Aldrich et al. 1984; Aldrich

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use



Fig. 1. Funnel trap.

1988). Overwintering adult captures from the first trap catch in 2002 through 29 April 2002 revealed a male:female of 1:1. Similarly, overwintering adult captures from the first trap catch in 2003 through 28 April 2003 revealed a male:female of 1:1. Adult tachinids, most likely the endoparasitoid *Hemyda aurata* Robineau-Desvoidy, were only captured on three occasions.

We thank Ryan Stype, Ricardo Smith, and Byron Franklin, Jr. for assistance. We also thank Stephen Hight, USDA-ARS and Kenneth Bloem, USDA-APHIS for helpful reviews of this manuscript. This research was supported in part by the USDA-Sustainable Agricultural, Research and Education grant RD309-040/3581407 and by cooperative agreement 58-6615-8-022 UDSA-ARS and Florida A&M University.

Summary

In northern Florida, *P. maculiventris* emerge in March-April and begin overwintering in October-November. The data indicate that *P. maculiventris* has a bimodal phenology, with peak abundance in May and a second less prominent peak in June. Comparisons of trap collections in northern Florida and central New York suggest little deviation in adult seasonal activity of *P. maculiventris* between the northeastern and southeastern USA.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

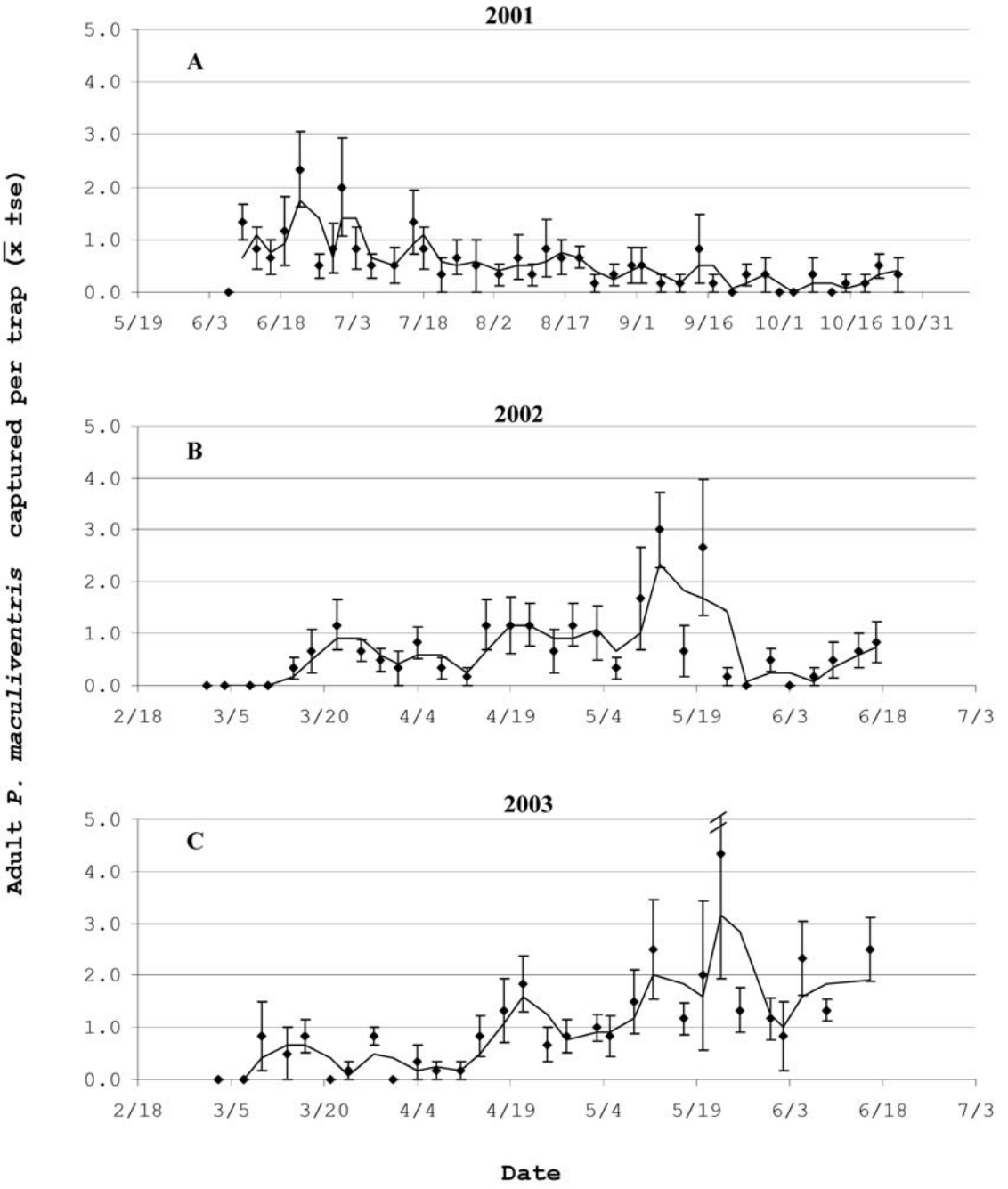


Fig. 2. Adult *Podisus maculiventris* captured per trap (mean ± se) during the 2001, 2002, and 2003 sampling seasons. Lines are moving average trendlines.

References Cited

ALDRICH, J. R. 1988. Chemistry and biological activity of pentatomoid sex pheromones, pp. 417-431 *In* H. G. Cutler [ed.], Biologically Active Natural Products: Potential Use in Agriculture, American Chemical Society, Washington, D.C.

ALDRICH, J. R., J. P. KOCHANSKY, AND C. B. ABRAMS. 1984. Attractant for a beneficial insect and its parasitoids: Pheromone of the predatory spined soldier bug, *Podisus maculiventris* (Heteroptera: Pentatomidae). Environ. Entomol. 13: 1031-1036.

CULLINEY, T. W. 1986. Predation on adult *Phyllotreta* flea beetles by *Podisus maculiventris* (Hemiptera:

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

Pentatomidae) and *Nabicula americolimbata* (Hemiptera: Nabidae). Can. Entomol. 118: 731-732.

DECLERCQ, P., AND D. DEGHEELE. 1992. Development and survival of *Podisus maculiventris* (Say) and *Podisus sagitta* (Fab.) (Heteroptera: Pentatomidae) at various constant temperatures. Can. Entomol. 124: 125-133.

DECLERQ, P., F. MERLEVEDE, I. MESTDAGH, K. VANDENDURPEL, J. MOHAGHEGH, AND D. DEGHEELE. 1998. Predation on tomato looper *Chrysodeixis chalcites* (Esper) (Lep., Noctuidae) by *Podisus maculiventris* (Say) and *Podisus nigrispinus* (Dallas) (Het., Pentatomidae). J. Appl. Entomol. 127: 93-98.

MCPHERSON, J. E. 1980. A list of the prey species of *Podisus maculiventris* (Hemiptera: Pentatomidae). Great Lakes Entomol. 13: 17-24.

MCPHERSON, J. E. 1982. The Pentatomoidea (Hemiptera) of Northeastern North America. Southern Illinois University Press, Carbondale and Edwardsville. 240 pp.

WARREN, L. O., AND G. WALLIS. 1971. Biology of the spined soldier bug, *Podisus maculiventris* (Hemiptera: Pentatomidae). J. Georgia Entomol. Soc. 6: 109-116.

WIEDENMANN, R. N., J. C. LEGASPI, AND R. J. O'NEIL. 1994. Impact of prey density and facultative plant feeding on the life history of the predator *Podisus maculiventris* (Heteroptera: Pentatomidae), pp. 95-118 *In* O. Alomar and R. N. Wiedenmann [eds.], Zoophytophagous Heteroptera: Implications for Life History and Integrated Pest Management. Entomol. Soc. of America, Lanham, MD.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use