

Exclusive Use of Hollies as Male-Specific Hosts of Twolined Spittlebug (Hemiptera: Cercopidae)¹

Punya Nachappa², L. Paul Guillebeau and S. Kristine Braman³

Department of Entomology, University of Georgia, Athens, Georgia 30602 USA

J. Entomol. Sci. 41(3): 261-263 (July 2006)

Key Words *Prosapia bicincta*, *Ilex opaca*, *I. cornuta* Burfordii, alternate hosts

Prosapia bicincta (Say), the twolined spittlebug, is reported from Florida to Maine and as far west as Arkansas and Texas in the United States (Byers 1965, *In* Georgia Agric. Exp. Sta., Univ. Georgia Coll. Agric. Tech. Bull. N.S. 42: 26 pp.). Adults and nymphs of *P. bicincta* are xylem feeders (Weigert 1964a, Am. Midl Nat. 71: 422-428; Pass and Reed 1965, J. Econ. Entomol. 58: 275-278) with a broad range of grass hosts (Vittum et al. 1999, *In* Turfgrass insects of United States and Canada. second Edition, Cornell Univ. Press, Ithaca). Only adults cause economic damage on ornamental hollies, *Ilex opaca* L (American holly) and *I. cornuta* Burfordii De France (Burford holly) (Braman and Ruter 1997, J. Environ. Hort.15: 211-214).

Host plant selection by adult spittlebugs is influenced by factors such as habitat (Weaver and King 1954, Res. Bull. Ohio Agric. Exp. Sta. 741: 1-99; Weigert 1964, Ecol. Mongr. 34: 217-241), plant morphology (Hoffman and Mc Evoy 1985, Ecol. Entomol. 11: 415-426), and plant physiology (e.g., concentration of amino acids) (Horsfield 1977, Ecol. Entomol. 2: 259-266; Thompson 1994, Ecol. Entomol. 19: 391-394). Peck (1998, Biotropica 30: 639-644) reported the exclusive use of alternate host plants by adult male spittlebugs in the Monteverde region of Costa Rica including hosts that are taxonomically and morphologically different from its usually reported grass hosts. However, Peck (1998) reported no proof of male-specific use of alternate hosts for *P. bicincta*.

From May to August 2004, we observed adult male *P. bicincta* feeding on the underside of holly leaves planted in landscapes. This coincides with the emergence of two generations of *P. bicincta* in southeastern United States. We first observed adults as early as 5 May 2004. Adults were observed on two main holly species, *I.*

¹Received 04 November 2005; accepted for publication 24 January 2006.

²Address enquiries (E-mail: pn16@ksu.edu); Current address: Kansas State University, Department of Entomology, 123 West Waters Hall, Manhattan, KS 66502-4004.

³Department of Entomology, University of Georgia, UGA Griffin Campus, Griffin, Georgia 30223.

opaca and *I. cornuta* Burfordii. The observations on *I. opaca* were made in residential areas with established stands of centipedegrass in Griffin (Spalding Co.), GA. Observations on *I. cornuta* Burfordii trees were made at the University of Georgia, Research and Education Garden (UGA Griffin Campus, Griffin, GA). *Prosapia bicincta* adult males were found feeding on the underside of the holly leaves, with the number of males varying from 1-14 on a single holly tree (Table 1).

These field observations confirm previous reports of the use of ornamental hollies as alternate hosts of *P. bicincta* adults. Absence of nymphs on these hosts could be attributed to the fact that spittlebug nymphs are less mobile than adults and only move to different locations on the stem during molts. Nymphs hatch in soil or under turfgrass thatch, as high relative humidity is critical for nymphal development. Moreover, nymphal host selection is based on host characteristics such as stem tissue hardness, trichomes (Hoffman and Mc Evoy 1986, Ecol. Entomol. 11: 415-426) and leaf axil width (Mc Evoy 1986, Ecology 67: 465-478). Mc Evoy (1986) noted that hardening of the plant tissue impedes stylet penetration and is probably the most important factor preventing nymphs from feeding on harder plant tissues.

Females were absent on hollies but were found on centipedegrass (*Eremochloa ophiuroides* Munro Hack) around the base of the hollies (Table 1). Seasonal light-trap captures indicate that number of males exceeds that of females at greater heights (157-274 cm above ground) with the ratios of males to females being more equal as traps were lowered to 15.2 cm above ground (Beck and Skinner 1963, J. Econ. Entomol. 65: 110-114; Fagan and Kuitert 1969, Florida Entomol. 52: 199-206).

We support Peck's (1998) hypothesis that *P. bicincta* adult males are likely to obtain defensive secondary compounds from the holly hosts. Peck (2000, Ann. Entomol. Soc. Am. 93:1186-1194) reported that *P. bicincta* adults reflex bleed from the pretarsi when disturbed to repel enemies with noxious or distasteful chemicals in the hemolymph. Gramineous species, the usual hosts of spittlebugs, are not known for secondary defensive chemicals. Yet, ornamental hollies contain saponins, triterpenes (West et al. 1977, Phytochem. 136: 790-808; Potter and Kimmerer 1986, Oecologia

Table 1. Sex ratios of *Prosapia bicincta* adults on alternate hosts, *I. opaca* and *I. cornuta* Burfordii

Observations	<i>I. opaca</i>		<i>I. cornuta</i> Burfordii	
	Sites*	Males:Females	Sites*	Males:Females
5 May 2004	1**	6:0	4**	4:0
8 June 2004	—	—	4**	11:0
20 June 2004	1**	2:0	—	—
7 July 2004	3	1:0	4	1:0
24 July 2004	2**	14:0	—	—
5 August 2004	1**	1:0	4**	7:0
14 August 2004	2	4:0	—	—

* 1-3 Residential sites in Spalding Co., GA; 4 = Research and Education Garden (UGA Griffin Campus, Griffin, Spalding Co., GA).

** Sites at which adult female *P. bicincta* were observed on centipedegrass but not on hollies

69: 217-224; 1989, *Oecologia* 78: 322-329; Kreuger and Potter 1994, *Am. Midl. Nat.* 132: 183-191) and phenolics (Gargiulo and Stiles 1991, *J. Chem. Ecol.* 17: 1091-1106) and could be a potential source of defensive chemicals in the hemolymph of adult male spittlebugs. Regardless of the cause, this evidence for male-specific use of alternate hosts is a unique phenomenon among spittlebugs.

Acknowledgment

The authors thank Daniel Peck for valuable discussion on this research topic and two anonymous reviewers for their comments improving the manuscript.