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OCCURRENCE OF THE COTTON FLEAHOPPER IN A PREVIOUSLY UNREPORTED EARLY-SEASON HOST IN CENTRAL TEXAS

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Abstract

The cotton fleahopper continues to pose early-season threats to developing cotton in Central Texas and in other areas of the Cotton Belt. Blooming native weed species were sampled year-round to monitor plant bug populations in Central Texas. Cotton fleahoppers were collected from *Rapistrum rugosum* during the early spring in Central Texas. *Rapistrum rugosum*, commonly known as turnipweed, has not been previously reported as an early-season host plant in the region. Capture data provided documentation of cotton fleahopper adults and nymphs on this host. The mean proportion of adults that were females was typically less than 0.50. These findings are being used in additional research avenues addressing cotton fleahopper movement and migration. Results from the current study, in conjunction with dispersal studies, should provide insight into factors which can influence the development and movement of early-season cotton fleahopper populations.

Introduction

The cotton fleahopper (*Pseudatomoscelis seriatus* (Reuter)) continues to be an early-season pest of cotton in Central Texas and in other regions of the Cotton Belt. Overwintering fleahopper eggs hatch during the spring and nymphs feed on available plant material (Reinhard 1926; Thomas 1936; Hixson 1941; Almand et al. 1976). Cotton is not a preferred host of the cotton fleahopper but, as preferred weed hosts senesce, fruiting cotton is susceptible to infestation (Thomas and Owen 1937; Fletcher 1940; Hixson 1941).

Coordinated efforts for boll weevil control and implementation of transgenic cotton varieties have led to a reduction of insecticide applications in cotton, including those normally applied during the early season. These early-season applications traditionally contributed to the control of the cotton fleahopper. In the Blacklands Region of Central Texas, early-planted cotton required multiple insecticide applications for fleahopper control (Adamczyk and Burris 2004). Presumably, these infestations originated from senescing early-season native weed hosts. The numbers of known weed hosts for the fleahopper vary but estimates range from 50 to 138 plant species (Thomas 1936; Hixson 1941). Nonetheless, there is agreement that preferred weeds include croton, horsemint, ragweed, broomweed, bitterweed, *Parthenium*, and primrose (Reinhard 1926; Thomas 1936; Hixson 1941; Almand et al. 1976).

The primroses (*Oenothera* spp.) have been identified as primary early-season hosts in the Lower Rio Grande Valley and Central Texas (Reinhard 1926; Thomas and Owen 1937; Fletcher 1940; Schuster et al. 1969; Almand et al. 1976), Oklahoma (Hixson 1941), and the Mississippi Delta (Snodgrass et al. 1984). In Central Texas, cotton fleahoppers were collected from *Rapistrum rugosum* (L.) All. (Capparales: Brassicaceae) during the early spring. *Rapistrum rugosum*, commonly known as turnipweed or annual bastardgrass, has not been reported as an early-season host in Texas or Oklahoma (Reinhard 1926; Thomas and Owen 1937; Fletcher 1940; Hixson 1941; Schuster et al. 1969; Almand et al. 1976). Turnipweed occurs in the Edwards Plateau, Gulf Prairies and Marshes, and the Blackland Prairies regions of Texas (Hatch et al. 1990). Herein, data are presented documenting the occurrence of cotton fleahoppers in this previously unreported host. Because turnipweed occurs in regions normally associated with cotton production (e.g. Southern Rolling Plains, Texas Gulf Coast and the Blacklands regions), these observations will improve the current knowledge base regarding early-season host plant utilization by the cotton fleahopper.

Materials and Methods

Blooming turnipweed was sampled during the early spring along fence lines, roadsides, and in pecan orchards in Burleson County, TX. Two and three different sites of blooming turnipweed were sampled during 2003 and 2004, respectively. Sites were sampled twice weekly, usually at 3- to 4-day intervals. At each site, three 50-sweep samples (150 sweeps/site) were collected using a standard 38.1-cm sweep net. Each 50-sweep sample was placed in

individual Ziploc bags and returned to the laboratory for processing. Adults and nymphs were counted, and adults were sexed. Sampling continued until sites were mowed or plants naturally senesced.

The PROC MEANS procedure (SAS Institute 2001) was used to generate summary statistics of mean numbers of adults captured and the mean proportion of adults that were female. Voucher specimens of *Rapistrum rugosum* are housed at the S. M. Tracy Herbarium, College Station, TX.

Results and Discussion

Cotton fleahoppers were collected at both sampling sites during 2003 (Table 1). Fleahoppers had been observed on previous sample dates for Site 5, but count data were not collected because of previous emphasis on tarnished plant bugs. Unfortunately, this site was mowed before the next sample date. Site 12 was subsequently identified and average numbers of cotton fleahopper adults per sample date ranged from 21.3 to 51.7 (Table 1). The mean proportions of adults that were females on each sample date ranged from 0.25 to 0.41. Although, females occasionally approached 0.50 of adults in individual samples (Table 1). Reproductive status of the females was not determined, but the low numbers of nymphs suggested that at least some of these adults were probably migrants into this turnipweed site.

Two turnipweed sites were sampled on 7 dates between 5 March and 1 April 2004, but fleahoppers were not collected in the samples. However, these collections were conducted before *Oenothera speciosa* Nutt., a previously reported key early-season host, was blooming in sufficient quantities for sampling. Collections of fleahoppers in *O. speciosa* were substantially lower during 2004. Mean numbers of adults per 50 sweeps ranged from 265.3 – 792.7 on three sample dates during 2003, however, the mean numbers of adults only ranged from 0.0 – 81.0 per 50 sweeps during 2004 in *O. speciosa*. During both years, significant numbers of fleahoppers were first detected about 15 April in *O. speciosa*. Thus, the absence of fleahoppers in the two turnipweed sites sampled during March 2004 may have been because of temporal sampling, as well as the cyclic nature of feral fleahopper populations and climatic conditions. During 2004, conditions were cooler and the study area received more rainfall than in 2003. Nonetheless, when fleahoppers were present in *O. speciosa*, fleahoppers were also detected in turnipweed. Site 59 was along a roadside, and unfortunately was mowed after the 29 April sample when an increase in fleahopper adults was observed. Similar to 2003 collections, the proportion of adults that were female occasionally reached or exceeded 0.50 in individual samples (Table 1). Because of the location of this site, and the absence of nymphs, it is likely that these adults were also migrants.

Cotton fleahopper overwintering emergence begins to increase dramatically during mid-March through mid-April (Reinhard 1928). In Central Texas, Suh et al. (2004) observed fleahopper activity in cotton after mid- to late-April and suggested that fleahoppers moved into cotton after an adjacent weedy pasture was mowed. Suh et al. (2004) did not identify the plant species composition in the pasture. However, previous visual examination of the pasture by this author indicated turnipweed was predominant in the pasture. These observations indicate that turnipweed availability coincides with emerging cotton fleahoppers and fruiting cotton. Sampling data presented here indicates *R. rugosum* can occur before other previously reported hosts in Central Texas, and the low numbers of nymphs suggest that this plant serves primarily as a feeding host. Additionally, this report presents previously unavailable sex ratio data associated with weed hosts. These findings have spurred additional research on fleahopper movement and dispersal (Westbrook et al. 2005). An additional season of sampling is planned to complement movement and dispersal studies.

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Disclaimer

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Table 1. Occurrence of cotton fleahoppers in *Rapistrum rugosum* in Central Texas during 2003 and 2004.

Date	Site	Mean per 50-sweep sample[a]		Mean proportion of adults that were female (range)
		Adults	Nymphs	
14 Apr 2003	05	60.0	0.0	0.41 (0.36 - 0.46)
17 Apr 2003	12	51.0	0.7	0.38 (0.27 - 0.50)
21 Apr 2003	12	49.3	0.3	0.26 (0.20 - 0.32)
24 Apr 2003	12	21.3	0.0	0.25 (0.14 - 0.35)
28 Apr 2003	12	51.7	0.0	0.40 (0.35 - 0.47)
01 May 2003	12	26.0	0.3	0.35 (0.21 - 0.44)
05 Apr 2004	59	0.0	0.0	---
08 Apr 2004	59	2.7	0.0	0.33 (0.0 - 0.67)
13 Apr 2004	59	0.0	0.0	---
15 Apr 2004	59	2.7	0.0	0.07 (0.0 - 0.20)
19 Apr 2004	59	0.3	0.0	0.0
22 Apr 2004	59	1.0	0.0	0.25 (0.0 - 0.50)
26 Apr 2004	59	3.0	0.0	0.53 (0.50 - 0.60)
29 Apr 2004	59	39.3	0.0	0.35 (0.26 - 0.50)

[a] Three 50-sweep samples per site on each date.