HOMOPTERA ASSOCIATED WITH SUGARCANE FIELDS IN TEXAS

ROBERT L. MEAGHER, JR.,[1] STEPHEN W. WILSON,[2] H. DERRICK BLOCKER,[3]
RANDI V. W. ECKEL,[4] AND ROBERT S. PFANNENSTIEL[5]
[1]Texas A&M University, Texas Agricultural Experiment Station
2415 East Highway 83, Weslaco, TX 78596

[2]Department of Biology,
Central Missouri State University, Warrensburg, MO 64093

[3]Department of Entomology,
Kansas State University, Manhattan, KS 66506

[4]Department of Entomology,
North Carolina State University, Raleigh, NC 27695-7634

[5]Department of Entomology,
University of Kentucky, Lexington, KY 40546

ABSTRACT

Sugarcane fields sampled during 1989 and 1990 yielded 36 homopteran species, including 9 aphid, 16 cicadellid and 7 delphacid species. Species were also collected from the families Cicadidae, Cixiidae, Membracidae and Psyllidae. Although sampling techniques were different, our study documented 6 aphid, 13 cicadellid, and 5 delphacid species different from those collected in a Florida sugarcane study (Hall 1988). The potential pest species *Sipha flava* (Forbes) (Aphididae), *Saccharosydne saccharivora* (Westwood) (Delphacidae) and *Perkinsiella saccharicida* Kirkaldy (Delphacidae) were collected during both years. Several potential sugarcane disease-producing virus vectors were collected, including aphids, cicadellids, and delphacids. Surprisingly, no cercopids have been documented nor were any collected, although members of the genera *Aeneolamia* and *Prosapia* are serious pests of sugarcane in the neotropics.

Key Words: Aphididae, Cicadellidae, Delphacidae, *Saccharosydne*, *Perkinsiella*, *Saccharum*.

RESUMEN

Se encontraron 36 especies de homópteros, las cuales incluyen 9 afidos, 16 cicadelidos y 7 especies de delfacidos colectadas mediante el muestreo de campos de caña de azucar realizado durante 1989 y 1990. Se colectaron también especies de la familis Cicadidae, Cixiidae, Membracidae y Psyllidae. Aunque algunas técnicas de muestreo fueron diferentes, nuestro estudio documentó 6 especies diferentes de afidos, 13 especies de cicadelidos y 5 especies diferentes de delfacidos que aquellos colectados en un estudio de caña de azucar en Florida (Hall 1988). El potencial de las especies plaga, *Sipha flava* (Forbes) (Aphididae), *Saccharosydne saccharivora* (Westwood) (Delphacidae) y *Perkinsiella saccharicida* Kirkaldy (Delphacidae) se colectaron durante ambos años. Se colectó también varios vectores potenciales de virus de caña de azucar, los cuales incluyen áfidos, cicadelidaos, y delfacidos. Sorpresivamente, no se encontraron cercopidos, aunque algunos miembros del genero *Aeneolamia* y *Prosapia* son plagas serias de caña de azucar en el neotropico.

Sugarcane (interspecific hybrids of *Saccharum*) has been commercially grown in a three-county area of southern Texas (Lower Rio Grande Valley, LRGV) since 1972. A relatively small sugarcane industry began operation in 1830 and peaked in 1913 with five sugar mills. The industry declined after 1913, and the early 1920's marked the end of production. Sugarcane research resumed in the 1960's, and the first commercial production season was in 1972-1973 (Cowley & Sund 1973). Although stalkboring pyralids [Mexican rice borer, *Eoreuma loftini* (Dyar), and the sugarcane borer, *Diatraea saccharalis* (F.)], have been the most serious insects pests of the modern industry (Pfannenstiel & Meagher 1991), other insects could reach pest status if management strategies used to control pyralids (e.g., heavy reliance on chemical control using synthetic pyrethroids) alter existing natural control mechanisms.

Interest in homopteran fauna of sugarcane in LRGV began when the potentially serious sugarcane pest *Perkinsiella saccharicida* Kirkaldy (Delphacidae) was discovered in 1989 (Meagher et al. 1991). When sampling for *P. saccharicida*, other homopterans were collected. Although insect faunal studies have been completed in other US sugarcane-producing areas (Hall 1988), this type of research is lacking in Texas. The objective of this study was to document homopterans collected from sugarcane fields.

Materials and Methods

Twenty sugarcane fields were surveyed during March and April (early season) and May and June (mid-season) 1989 and 1990 in Cameron, Hidalgo and Willacy Counties using the methods of Meagher et al. (1991). Samples were taken using a D-Vac suction sampler (D-Vac, Riverside, CA) at four locations within each field. The D-vac sampler was turned on for approximately 30 s and a 10-m sugarcane row sampled. This sampling method was biased towards collection of non-sedentary homopteran species. Specimens were placed in plastic bags and frozen. In the laboratory, samples were sorted, placed in 70% ethanol and pinned later if appropriate. Insect specimens were sent to appropriate specialists for identification. Voucher specimens were deposited in the Kansas State University Insect Collection, the Central Missouri State University Insect Collection and in the Insect Collection, Department of Entomology, Texas A&M University.

Results and Discussion

Number of specimens and frequency of collection (percentage of fields in which a given species was collected) are presented in Table 1. Generally, insect numbers and frequencies of collection were lower in 1990 than 1989, probably due to a severe freeze that occurred in December, 1989. Insects were collected from the families Aphididae, Cicadidae, Cicadellidae, Cixiidae, Delphacidae, Membracidae and Psyllidae.

Aphididae

Nine aphid species (totalling 392 individuals) were identified. Blackman & Eastop (1984) listed 10 aphid species from sugarcane. Three of these species, *Hysteroneura setariae* (Thomas), *Rhopalosiphum maidis* (Fitch) and *Sipha flava* (Forbes) were collected in our study. Hall (1988) collected *H. setariae*, *R. maidis* and *S. flava*, as well as *Melanaphis sacchari* (Zehntner) from sugarcane in Florida. Four aphid species, *Aphis craccivora* Koch, *A. maidiradicis* Forbes, *Hyperomyzus lactucae* (L.) and *R. padi* (L.), were probably collected incidently from weedy hosts in the sugarcane field or else were alate (winged) specimens that were collected as they passed through the field in search of a suitable host.

TABLE 1. NUMBER OF SPECIMENS AND FREQUENCY OF COLLECTION (% FIELDS) DURING EARLY AND MID-SEASON SAMPLING OF SUGARCANE, 1989 AND 1990, LOWER RIO GRANDE VALLEY, TEXAS.

	Number of Specimens				Frequency (%)			
	1989		1990		1989		1990	
Family/Species	early	mid	early	mid	early	mid	early	mid
Aphididae								
Acyrthosiphon pisum (Harris)	0	0	1	0	0	0	5	0
Aphis craccivora Koch	0	0	8	0	0	0	5	0
Aphis maidiradicis Forbes	0	1	0	0	0	5	0	0
Hyperomyzus lactucae (L.)	1	0	1	0	5	0	5	0
Hysteroneura setariae (Thomas)	8	1	0	0	5	5	0	0
Myzus persicae (Sulzer)	1	0	2	0	5	0	5	0
Rhopalosiphum maidis (Fitch)	8	0	2	0	15	0	5	0
Rhopalosiphum padi (L.)	0	1	0	0	0	5	0	0
Sipha flava (Forbes)	62	223	56	16	55	100	20	35
Cicadellidae								
Agallinae:								
Aceratagallia sp.	4	2	3	2	5	10	10	5
Cicadellinae:								
Carneocephala sagittifera (Uhler)	2	0	0	0	10	0	0	0
Draeculacephala portola Ball	141	203	42	94	85	85	30	50
Homalodisca insolita (Walker)	1	0	2	2	5	0	5	5
Deltocephalinae:								
Balclutha neglecta (DeLong & Davidson)	1	2	0	0	5	5	0	0
Balclutha rosea (Scott)	17	26	46	82	25	70	55	65
Balclutha saltuella (Kirschbaum)	0	3	0	0	0	5	0	0
Exitianus picatus (Gibson)	7	4	0	2	25	15	0	5
Graminella nigrifrons (Forbes)	1	4	0	0	5	20	0	0
Graminella plana (DeLong)	41	45	22	43	45	60	40	55
Graminella sonora (Ball)	62	44	7	15	50	65	30	45
Ollarianus strictus (Ball)	1	2	0	0	5	5	0	0
Planicephalus flavicosta (Stal)	1	2	0	2	5	10	0	5
Polyamia obtecta (Osborn & Ball)	1	0	0	0	5	0	0	0
Stirellus sp.	1	0	0	0	5	0	0	0
Typhlocybinae:								
Empoasca sp.	2	3	11	1	10	15	40	5
Cicadidae								
Diceroprocta delicata (Osborn)	0	0	0	2	0	0	0	10
Pacarina puella (Davis)	0	1	0	0	0	5	0	0
Cixiidae								
Oliarus texanus Metcalf	5	5	0	0	15	5	0	0
Delphacidae								
Delphacodes sp.	0	1	0	0	0	5	0	0
Delphacodes pacifica (Crawford)	8	10	3	6	20	20	5	10
Neomegamelanus lautus (Metcalf)	0	0	2	0	0	0	5	0
Perkinsiella saccharicida	3	4	5	10	5	15	5	30

TABLE 1. (CONTINUED).

Family/Species	Number of Specimens				Frequency (%)			
	1989		1990		1989		1990	
	early	mid	early	mid	early	mid	early	mid
Kirkaldy								
Prokelisia salina (Ball)	1	0	0	0	5	0	0	0
Saccharosydne saccharivora (Westwood)	85	345	1	0	75	95	5	0
Toya propinqua (Fieber)	3	4	7	12	10	5	35	35
Membracidae								
Micrutalis malleifera Fowler	3	0	1	1	5	0	5	5

Several species collected are documented viral vectors. *Acyrthosiphon pisum* (Harris), *Myzus persicae* (Sulzer) (Abbott & Charpentier 1963), *H. setariae* (Ingram & Summers 1936) and *R. maidis* (Brandes 1920) have been shown to transmit the potyvirus sugarcane mosaic virus (found in LRGV), and *R. maidis* has been reported to transmit the causal organism of grassy shoot disease (not present in the Western hemisphere) (Chona et al. 1960).

The yellow sugarcane aphid, *S. flava*, was the most frequently collected aphid species. This aphid has occasionally caused serious injury to sugarcane in Puerto Rico (Medina-Gaud et al. 1965) and to seedling sorghum, *Sorghum bicolor* (L.) Moench, in Texas (Breen & Teetes 1986 a, b, 1990). It has been documented recently in Hawaii where it potentially threatens the sugarcane industry (Ota & Chang 1989). Currently, host plant resistance appears to provide the best management prospects for this pest (Webster 1990, White 1990).

Cicadellidae

Sixteen leafhopper species totalling 999 individuals were collected. The most commonly collected leafhopper was *Draeculacephala portola* Ball. This leafhopper was reported to be a vector of chlorotic streak in sugarcane (Abbot & Ingram 1942), but this report was refuted (Abbott et al. 1961). This leafhopper was commonly collected in Florida sugarcane (Hall 1988). The next most frequently collected leafhoppers were *Balclutha rosea* (Scott), *Graminella plana* (DeLong) and *G. sonora* (Ball). *Balclutha rosea* has been reported from sugarcane, although it was not collected in Florida (Hall 1988). Other leafhopper species collected included *G. nigrifrons* (Forbes), the blackfaced leafhopper, which has been collected from sweep net samples in young sugarcane (Hall 1988) and was the most abundant leafhopper found in Florida rice fields (Cherry et al. 1986). Its biology is reviewed by Stoner & Gustin (1967). *Homalodisca insolita* (Walker) is a possible vector of phony peach disease in the southeastern US and is also reported from Johnson grass (*Sorghum halepense* (L.) Persoon). It was collected in Florida sugarcane (Hall 1988), and its range extends south into Central America. *Carneocephala sagittifera* (Uhler) has been reported from bermudagrass (*Cynodon dactylon* (L.) Persoon) and other hosts.

Cicadidae

The two cicadas collected, *Diceroprocta delicata* (Osborn) and *Pacarina puella* (Davis), have been collected in LRGV since the early 1930's (specimens located in the Insect Collection, Department of Entomology, Texas A&M University), however, no host plant information has been given for these collections. Cicadas are not generally considered crop pests, although seven species have been noted as sugarcane pests (Wilson 1987).

Cixiidae

The only cixiid species found was *Oliarus texanus* Metcalf. Undetermined species from this genus have been collected from LRGV (specimens located in the Insect Collection, Department of Entomology, Texas A&M University). The related species *O. complectus* Ball and *O. oryzae* Matsumura have been found associated with sugarcane plants and roots (Sein 1932, 1933, Tsaur et al. 1988).

Delphacidae

Seven species, totalling 510 individuals, of delphacid planthoppers were collected. *Saccharosydne saccharivora* Westwood is found throughout the southeastern US, Caribbean and Mexico (Riess & Flores 1976) and was noted destroying sugarcane plantations as early as the 1830's (Box 1953). It has been recorded from Texas (Hidalgo Co., 1986), Louisiana (Charpentier 1970), Georgia and Florida (Hall 1988). Its native hosts are apparently species of *Andropogon* (Metcalfe 1969).

Delphacodes pacifica (Crawford) has been recorded from Mississippi and from Illinois west to California, as well as Venezuela; its host plant is unknown. *Toya propinqua* (Fieber) has been collected in the LRGV from Rhodes grass (*Chloris gayana* Kunth). It occurs throughout much of the southern United States as well as Africa, Europe and Asia. It feeds on bermudagrass and is a vector of Cynodon chlorotic streak virus, a pathogen of this plant (Lockhart et al. 1985).

Sugarcane delphacid, *Perkinsiella saccharicida* Kirkaldy, was documented earlier from sugarcane in southern Texas (Meagher et al. 1991) and was first noted from the United States by Sosa (1985); it was found to be the second most common delphacid collected in Florida rice fields (Cherry et al. 1986). *Perkinsiella saccharicida* can cause severe economic damage (Wilson 1987), and is a vector of *Fijivirus* sp., causal agent of Fiji disease of sugarcane (Francki & Grivell 1972, Egan et al. 1989). Fiji disease is presently found only in the Eastern Hemisphere, and is restricted to southeastern Asia, Madagascar and the southern Pacific (Ricaud et al. 1983). Meagher et al. (1991) further described the distribution and economic injury potential of this delphacid.

Membracidae

Micrutalis malleifera Fowler was the only membracid collected and is the only known vector of pseudo-curly top virus, a minor disease of tomatoes in southern Florida (Mead 1986).

Psyllidae

Six unidentified specimens were collected.

Other Homoptera

Other homopterans documented in Texas sugarcane, but not collected in this study, include the pseudococcids *Saccharicoccus sacchari* (Cockerell) and *Dysmicoccus boninsis* (Kuwana) (collected 1970, located in the Insect Collection, Department of Entomology, Texas A&M University) and the coccid *Pulvinaria elongata* Newstead. All three species have been collected in Florida sugarcane (Hall 1988), but we did not expect to collect these sedentary species because of our sampling method. Surprisingly, no cercopids have been documented nor were any collected in Texas sugarcane, although members of the genera *Aeneolamia* and *Prosapia* are serious pests of sugarcane in the neotropics (Fewkes 1969).

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