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Dispersal records of the sugarcane aphid, *Melanaphis sacchari* (Zehntner) (Hemiptera: Aphididae), through the Midwest Suction Trap Network

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The sugarcane aphid, *Melanaphis sacchari* (Zehntner) (Hemiptera: Aphididae), is distributed worldwide (Singh et al. 2004). In the United States, this pest was first reported in Florida in 1978 (USDA 1978a, b), then in Louisiana in 2001 (White et al. 2001). Since then the distribution of this species has expanded to several southeastern and central states including reports as far north as Illinois and west to Kansas (Bowling et al. 2016; Medina et al. 2017). The host plants of *M. sacchari* reside in the family Araceae (*Arum* and *Caladium*) as well as Poaceae including *Andropogon*, *Arthraxon*, *Avena*, *Echinochloa*, *Hordeum*, *Oryza*, *Oryzopsis*, *Panicum*, *Pennisetum*, *Saccharum* (preferred host plant), *Setaria*, *Sorghum*, *Themeda*, *Thysanolaema*, *Triticum*, and *Zea* (Singh et al. 2004; Blackman & Eastop 2006; Plantwise Knowledge Bank 2017). Because the sugarcane aphid is a threat to several economically important crops, including sorghum and sugarcane, dispersal surveillance of this pest is warranted. To address the need for such monitoring, as well as other invasive species of agronomic crops, the Midwest Suction Trap Network was created. The Midwest Suction Trap Network was first established in Illinois in 2001 and later expanded in 2005 to most midwestern states (Lagos-Kutz & Voegtlin 2016). Suction traps used in the Midwest Suction Trap Network were originally designed by Allison and Pike (1988), and followed the design used in western states to monitor the movement of the Russian wheat aphid, *Diuraphis noxia* Kurdjumov. Here, we present records of *M. sacchari* collected in the Midwest Suction Trap Network from 2015 when it was first identified in a trap to 2017. Over those 3 years it was found in 10 locations out of 33 trap locations examined.

Each suction trap in the Midwest Suction Trap Network consisted of an approximately 6 m vertical tube (diameter at top 30.5 cm and bottom 38.0 cm) with an electric fan drawing air at 10 m³ per min. Suction fans were operated daily from 7:00 AM to 8:00 PM and collection jars were replaced weekly in each location. Captured winged insects were collected into 250 ml Nalgene™ polypropylene jars with 70 mm caps (Thermo Scientific, Waltham, Massachusetts, USA), filled one-third with a mixture of 50% propylene glycol and 50% water. Between 2015 and 2017, suction traps operated from the middle of May through the end of Oct. In 2016, Columbia and Portageville (Missouri) suction traps were added to the Midwest Suction Trap Network with only the Columbia site providing data through 2017. A suction trap was added from Chase, Louisiana (the most southern trap in the Midwest Suction Trap Network), that started operation in spring 2016, continued through the end of Nov, and then resumed weekly collections on 3 Feb 2017. All

suction trap samples were mailed to D. Voegtlin in 2015 and D. Lagos-Kutz in 2016 and 2017 for identification using the taxonomic key of Voegtlin et al. (2003). Voucher specimens were mounted on slides and deposited in the Illinois Natural History Survey Insect Collection while the remainder of specimens were stored in 95% ethanol at -20 °C.

Locations of suction traps where sugarcane aphids were caught are listed in Table 1. In 2015, only 2 locations collected sugarcane aphids. Midwest Suction Trap Network records indicated that *M. sacchari* abundance was high for Manhattan (Kansas) with fewer aphids counted in the Antigo (Wisconsin) trap. The suction trap in Manhattan collected aphids from 11 Sep through 6 Nov with peak collections occurring through the middle of Oct. In Antigo, 14 specimens were captured on 25 Sep.

In 2016, the suction trap from Manhattan caught 3 specimens of sugarcane aphid on 3 May but did not catch another specimen until the beginning of Sep (Fig. 1). Seasonal peak abundance of this species occurred from 23 Sep through the middle of Oct. The suction trap located in Chase (Louisiana) captured *M. sacchari* from the middle of May through 22 Jul and late Sep through 4 Nov. There were 2 distinct peaks at this location. One peak occurred at the end of Jul and first wk of Aug and the other peak from the middle of Aug until the middle of Sep. The suction trap located in Columbia (Missouri) caught sugarcane aphids from the end of Aug until the end of the season (i.e., 21 Oct). This location had a small peak on 16 and 23 Sep 2016 compared with the locations above. The suction trap located in Portageville (Missouri) collected sugarcane aphids from the end of Aug until 23 Sep when samples collection ceased. At this location *M. sacchari* collections peaked on 9 Sep. Few sugarcane aphids were caught in Orr (Illinois) on 23 Sep and 7 Oct, and a single specimen was caught in Kellogg (Michigan) on 17 Jun. There was no record of *M. sacchari* from Antigo for 2016.

In 2017, the suction trap located in Chase contained sugarcane aphids from 7 Apr until 20 Oct, with peak collections occurring in middle Aug (Fig. 1). The suction trap located in Manhattan caught sugarcane aphids from 8 Sep until 13 Oct. Seasonal abundance was lower at this location compared with previous years' collections. The suction trap located in Columbia contained 5 specimens on 15 Sep. The suction trap located in Urbana-Champaign (Illinois) collected 2 specimens for the first time on 8 Sep and then single specimens on 15 and 22 Sep. No sugarcane aphids were collected from Orr in 2017. The suction trap located in South East Purdue Agriculture Center (Indiana) caught sugarcane aphids from the first wk of Sep until 13 Oct. In North East Purdue

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Table 1. Suction trap locations, geographic coordinates and years of operation where *Melanaphis sacchari*, the sugarcane aphid, was identified.

State/city	Location name	Collector	Coordinates	Years of operation	
Illinois	Orr	Orr Agricultural Research and Demonstration Center, University of Illinois	M. Vose	39.806°N 90.824°W	2001–2017
	Urbana-Champaign	Crop Sciences Research and Education Center, University of Illinois	C. Montes	40.042°N 88.232°W	2007–2017
Indiana	Butlerville	Southeast Purdue Agriculture Center, Purdue University	J. Wahlman	39.035°N 85.529°W	2005–2017
	Columbia City	Northeast Purdue Agriculture Center, Purdue University	P. Walker	41.105°N 85.399°W	2005–2017
Kansas	Manhattan	North Agronomy Farm, Kansas State University	B. McCornack	39.208°N 96.594°W	2011-2017
Louisiana	Chase	Sweet Potato Research Station, Louisiana State University Agricultural Center	J. Ronsonet	32.101°N 91.703°W	2016–2017
Michigan	Hickory Corners	W. K. Kellogg Biological Station, Michigan State University	C. Bahlai, J. Perrone	42.410°N 85.373°W	2005–2017
Missouri	Columbia	Campus, University of Missouri	D. Finke	38.907°N 92.281°W	2006–2013 2016–2017
	Portageville	Delta Research Center, University of Missouri	M. Jones	36.402°N 89.615°W	2007–2011 2016
Wisconsin	Antigo	Andy Merry private farm	A. Merry, K. Gallenberg	45.178°N 89.209°W	2006–2017

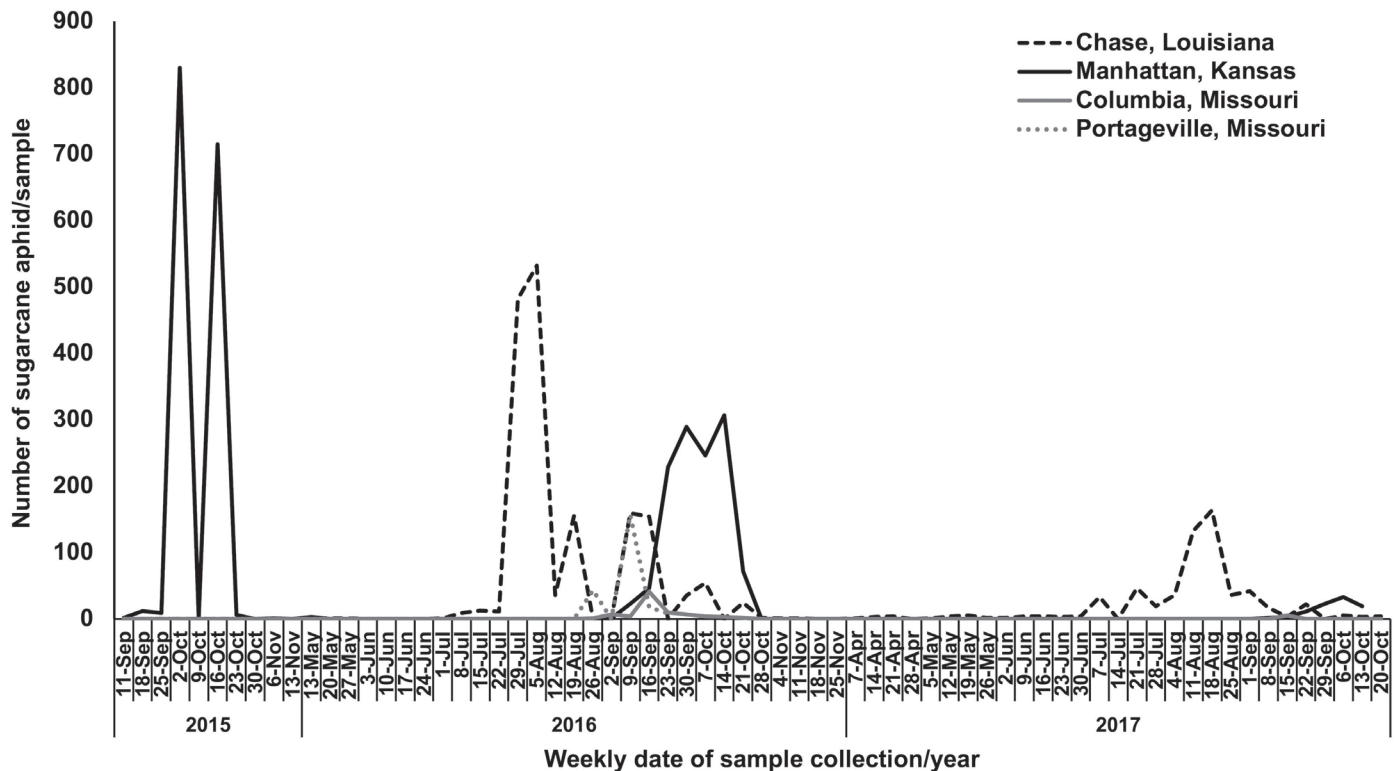


Fig. 1. Seasonal population dynamics of the sugarcane aphid, *Melanaphis sacchari*, collected between 2015 and 2017 from selected states in the Midwest Suction Trap Network.

Agriculture Center (Indiana) 2 specimens were captured on 9 Sep. In 2017, there was a single collection of sugarcane aphid in Kellogg on 29 Sep and in Antigo on 14 Jul.

Previously, an outbreak of sugarcane aphid was reported infesting sorghum during 2013 (Bowling et al. 2016; Brewer et al. 2017) but the Midwest Suction Trap Network did not detect this pest until 2015. Our trap records of *M. sacchari* from Manhattan (Kansas; located in the northeastern part of the state) were consistent with reports by Bowling et al. (2016). They reported that economic threshold levels had been reached on sorghum in central and eastern Kansas in 2015. In subsequent years, we have observed that *M. sacchari* population peaked earlier in our trap located in Chase (Louisiana) compared with Manhattan.

In Florida, previous reports by Hall (1987) indicated that peak populations of the sugarcane aphid generally occurred in the middle of Jul with percentages of winged females very low during that time. Generally, abundance of winged females increases with crop senescence causing aphids to migrate; this may be the reason why winged females from our northern Midwest Suction Trap Network traps (i.e., Illinois, Indiana, Michigan, and Wisconsin) were sporadic. In Illinois, Bowling et al. (2016) previously reported new records of sugarcane aphids on sorghum from Sep 2015. However, in 2017 the only field record we received in this immediate geographic area (Columbia, Missouri) was from B. Puttler (personal observation), who shared his observations on grain sorghum (milo) plantings in the area. He stated that winged females of the sugarcane aphid were first detected on 5 Sep 2017 indicating dispersal from southern locations. Furthermore, the suction trap located in Columbia caught few winged females on 15 Sep. Based on trap catches, sugarcane aphids appear to arrive late in the growing season in the northern states and are only minor pests at those locations. We will continue to monitor the dispersal of *M. sacchari* through the Midwest Suction Trap Network in order to alert researchers, extension agents, and producers of this agronomically important pest.

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Summary

Melanaphis sacchari (Zehntner) (Hemiptera: Aphididae), the sugarcane aphid, is an invasive species in the United States. This species is a threat to crops of economic importance including sorghum and sugar cane. Therefore, monitoring dispersal of this pest is necessary to document its geographic expansion. Based on trap catches obtained from the Midwest Suction Trap Network during 2015 to 2017, sugarcane aphids arrived late in the growing season as far as northern Wisconsin. We will continue to monitor the dispersal of this aphid species through the Midwest Suction Trap Network in order to provide information to researchers, extension agents, and producers regarding this agronomically important pest.

Key Words: host plant; Poaceae; winged females; monitoring; distribution

Sumario

Melanaphis sacchari (Zehntner) (Hemiptera: Aphididae), el pulgón de la caña de azúcar, es una especie exótica en los Estados Unidos. Esta especie es una amenaza para cultivos de importancia económica como el sorgo y la caña de azúcar. Por lo tanto es necesario monitorear su dispersión para documentar su expansión geográfica. Basados en los individuos colectados a través de la red de trampas de succión del medio oeste de Estados Unidos, desde 2015 hasta 2017, el pulgón de la caña de azúcar llegó tardíamente en la época de crecimiento en los estados norteros incluyendo los conteos del norte de Wisconsin. Vamos a continuar monitoreando esta especie a través de la red de trampas de succión del medio oeste de Estados Unidos y mantendremos informados a investigadores, agentes de extensión, y productores acerca de la dispersión de esta especie de pulgón que es una amenaza para los cultivos.

Palabras Clave: planta hospedera; Poaceae; alados; monitoreo; distribución

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