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Scientific Note

Occurrence of the sugarcane aphid in sorghum crops in Pernambuco, Brazil

Maria L. T. Matheus, Cláudia H. C. Matos, Carlos R. F. de Oliveira, Astrogilda B. do Nascimento, Thieres G. F. da Silva

Universidade Federal Rural de Pernambuco, Serra Talhada, PE, Brazil.
Corresponding author: luizatavares13@gmail.com

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Abstract. The objective of this study was to record the occurrence of the *Melanaphis sacchari* Zehntner, 1897; *Melanaphis sorghi* Theobald, 1904 (Hemiptera: Aphididae) complex in sorghum cultivation areas in Serra Talhada, Pernambuco, Brazil. Sorghum samples were collected in the field to identify the specimens. In the laboratory, the specimens were identified, confirming the presence of *M. sacchari*/*M. sorghi*. This aphid is a pest that has been spreading in Brazil since 2019, causing significant damage to sorghum. This is the first record of *M. sacchari*/*M. sorghi* in Pernambuco, Brazil.

Keywords: *Melanaphis sacchari*, *Melanaphis sorghi*, *Sorghum bicolor*, sorghum pest.

The sugarcane aphid *Melanaphis sacchari* Zehntner, 1897 (Hemiptera: Aphididae) is a cosmopolitan species that is originally from Asia. It preferentially colonizes sugarcane and causes damage by transmitting sugarcane yellow leaf virus (Nibouche et al. 2018). However, it has become a major sorghum pest in several regions and has been detected in Africa, Asia, Australia, the Middle East, and parts of South and Central America (Singh et al. 2004), causing losses of more than 50% of crop yield (Wilson et al. 2020) and US$400 per hectare (Bowling et al. 2016).

In the United States, the pest was first detected in 1970. However, in 2013, an outbreak occurred in sorghum and a new *M. sacchari* population was reported to cause economic damage in Mexico, Puerto Rico, and the United States (Nibouche et al. 2018). Currently, all sorghum-producing regions in Mexico and approximately 20 U.S. states are experiencing heavy infestations of this aphid (Bowling et al. 2016).

In Brazil, the first occurrence of *M. sacchari* was reported in the 1960s in the state of São Paulo on sugarcane (Costa et al. 1972). It was first reported attacking sorghum crops in 2019 in various Brazilian regions, including Minas Gerais ("Triângulo Mineiro", "Noroeste" and "Alto Paranaíba"), Distrito Federal, Goiás, São Paulo, and Mato Grosso (Mendes et al. 2019). Its incidence has been reported to be higher than that of the green aphid *Schizaphis graminum* Rondani, 1952 and the corn aphid *Rhopalosiphum maidis* Fitch, 1856 due to the economic losses caused by its infestation (Fernandes et al. 2021). In 2022, *M. sacchari* individuals associated with sorghum were also observed in Uberlândia and Sete Lagoas in Minas Gerais (Sampaio et al. 2022).

The aphid *M. sacchari* has a high reproductive potential, with females capable of producing between 34–96 nymphs within 2–5 weeks of their lifespan (Singh et al. 2004). Morphologically, it has a matte yellow body, antennae with five or six segments, short to medium blackish cylindrical siphunculi and blackish tarsi. Winged females have wings with darkened venation and a doubly divided midrib (Peña-Martínez et al. 2017). Despite these striking features, identification is challenging. *Melanaphis* species associated with sugarcane and sorghum are believed to form a group comprising *M. sacchari*, *Melanaphis sorghi* Theobald, 1904, and *Melanaphis miscanthi* Takahashi, 1921 (Peña-Martínez et al. 2016), with the first two generally treated as single in the literature because their morphological characteristics do not allow accurate field identification. The only way to distinguish them is via DNA sequencing, which shows slight divergence in the EF1-α nuclear gene between species (Nibouche et al. 2021). However, since such analyses could not be performed in this study, the *M. sacchari*/*M. sorghi* complex was considered, as in most studies available in the literature.

In *Sorghum bicolor* L., *M. sacchari*/*M. sorghi* feeds on phloem, causing leaf damage and subsequent nutrient loss, water stress, leaf chlorosis, reduced photosynthesis, decreased forage yield, and a lower grain quantity and quality (Singh et al. 2004). As the aphid feeds on sap, it excretes honeydew, which serves as food source for other insects, including bees and wasps (Fernandes et al. 2021), and as a substrate for sooty mold, a fungal disease that darkens leaves and reduces photosynthetic rates (Bowling et al. 2016; Mendes et al. 2019; Fernandes et al. 2021). It can also cause leaf necrosis, dwarfism, delayed panicle emergence, wilting symptoms, and even early plant death (Bowling et al. 2016).

Populations of *M. sacchari*/*M. sorghi* in sorghum crops in Serra Talhada-Pernambuco, Brazil, were monitored by the Centro de Referência Internacional de Estudos Agrometeorológicos de Palma e Outras Forrageiras (CentroREF), located at the Universidade Federal Rural de Pernambuco, Unidade Acadêmica de Serra Talhada (UFRPE/UAST), Serra Talhada, PE (07°59'00.0"S 038°15'00.0"W, 431 m.a.s.l.).

The studies were conducted in both monocultures of sorghum (*S. bicolor*) and mixed crops with millet (*Pennisetum glaucum* L.) at CentroREF, from July 2021, when the first aphid colonies were observed, to August 2022, covering four consecutive crop cycles. Specimens were collected, preserved in 70% alcohol and brought to the laboratory for identification under a binocular stereomicroscope, using the taxonomic key of Peña-Martínez et al. (2017), who classify the sorghum yellow aphid as a *M. sacchari*/*M. sorghi* complex.

Thus, the presence of the sugarcane aphid *M. sacchari/M. sorghi* was confirmed in Serra Talhada-Pernambuco. Collected specimens exhibited a yellowish color ranging from pale to bright yellow, with dark tarsi, short conical blackish siphunculi that are slightly smaller than the tail, and dark antennae toward the apex in apterous females (Fig. 1A); with five or six segments, consistent with observations by Peña-Martínez et al. (2017) in cereals in Mexico, Fernandes et al. (2021) on

sorghum in Brazil, and Schlickmann-Tank et al. (2021) on sorghum in Paraguay. Apterous (Fig. 1A) and winged (Fig. 1B) individuals were observed.

At the beginning of the infestation, aphids were located on the abaxial surface of sorghum leaves (Fig. 1C), in both monocultures and intercropped fields. As the infestation progressed, they were also observed on the adaxial leaf surface, stem, and panicle, confirming observations by Bowling et al. (2016) in North America. Nymphs were scattered on the leaves and clustered together upon reaching maturity (Fig. 1C).

Winged individuals appeared during periods of high colonization, driven by the need to move to new plants in search of food (Fernandes et al. 2021). Specimens had wings with prominent veins, forewings with a median vein branching twice and abdominal dorsum with sclerotized fringes variably joined on segments II to VI (Fig. 1B) (Peña-Martínez et al. 2017), a feature distinguishing the *M. sacchari*/*M. sorghi* complex from other species (Schlickmann-Tank et al. 2021).

Regarding sorghum, plants infested by *M. sacchari*/*M. sorghi* exhibited yellowish leaf spots (Fig. 1D), indicative of chlorosis (Singh et al. 2004) and a sticky, shiny appearance due to honeydew presence (Fernandes et al. 2021). The incidence of sooty mold, which darkens leaves, increased alongside aphid population growth and honeydew production (Fig. 1E).

The detection of *M. sacchari* in sorghum crops in Serra Talhada-Pernambuco is of utmost importance, as it alerts producers to implement measures to control this pest in the region.

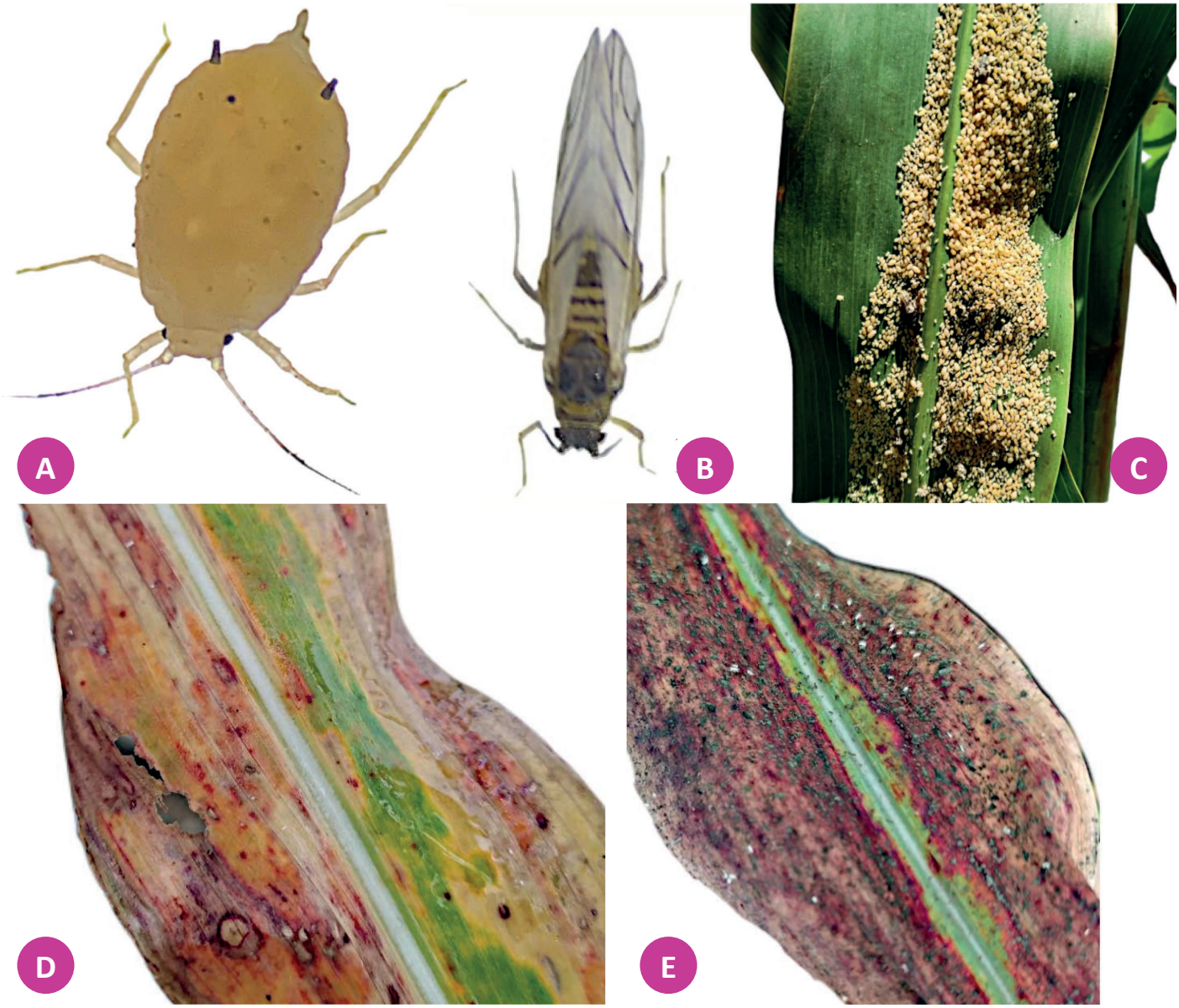

Figure 1. A, apterous *Melanaphis sacchari* Zehntner, 1897 / *Melanaphis sorghi* Theobald, 1904 aphid; B, winged aphid; C, appearance of infested sorghum leaf; D, chlorosis caused by aphids; E, sooty mold on sorghum leaf.

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Authors' Contributions

MLTM: Conceptualization, Identification; Methodology; Writing - original draft, Writing - review and editing. CHCM: Conceptualization; Identification; Supervision; Funding acquisition; Writing - review and editing. CRFO: Conceptualization; Identification; Supervision; Funding

acquisition. ABN: Conceptualization, Identification; Methodology. TGFS: Conceptualization; Supervision; Funding acquisition.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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