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Scientific Note

Confirmation of *Elaphria agrotina* (Guenée, 1852) (Lepidoptera: Noctuidae) feeding on sugarcane

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Abstract. This study reports the observation of *Elaphria agrotina* (Guenée, 1852) (Lepidoptera, Noctuidae) attacking sugarcane (*Saccharum* spp.). These specimens were collected in a sugarcane field under renovation while feeding on bait traps made from sugarcane stalks. Larvae were also detected within soil layers up to 6 cm deep, near to crop residues and rhizomes. Notably, they were found on sugarcane plants displaying 'dead heart' symptoms. The presence of this species in bait of sugarcane stalks raises concerns about potential secondary damage to the crop, which is already susceptible to other pests, and the possibility of it causing infestations in healthy plants.

Keywords: Elaphriini, Secondary Pest, Damage in Sugarcane, Crop, Soil Pest.

Sugarcane (*Saccharum* spp.) is an essential commodity produced in several countries for sugar production, biofuels, and bioenergy (Hamawand et al. 2021; Vandenberghe et al. 2022). Brazil is the world's largest producer, with production mainly concentrated in the southeast region, notably in São Paulo State (Conab 2023). However, significative percentage of the Brazilian production is lost by the pests' attack, resulting in a significant reduction in yield (Sushil et al. 2022; Ávila et al. 2023). The main pests associated with sugarcane crop in Brazil are the sugarcane borer, *Diatraea saccharalis* (Fabricius, 1794) (Lepidoptera: Crambidae), the spittlebug, *Mahanarva* spp. (Hemiptera: Cercopidae), as well as soil pests like the sugarcane weevil, *Sphenophorus levis* (Vaurie, 1978) (Coleoptera: Curculionidae), and the sugarcane hairy borer *Hyponeuma taltula* (Schaus, 1904) (Lepidoptera: Erebidae), which have caused great concern and recent losses (Borges Filho et al. 2019; Casteliani et al. 2020; Dinardo-Miranda et al. 2022; Pratissoli et al. 2022).

The growth of soil pest infestations can be explained by the expansion of cultivation areas, climate change, and the prohibition of sugarcane field burning before harvest by State Law No. 11,241/2002 starting in 2016 (São Paulo 2002), leading to the accumulation of "harvest remain" in the field, which has provided shelter and food for "opportunistic" pests (Mundim et al. 2009; Castro et al. 2019). This situation has raised concerns about the possibility of new pests infesting and causing problems in sugarcane fields.

In November 2022, black larvae were observed under sugarcane harvest residues during field experiments in the Barrinha county region (Fig. 1), located in São Paulo State, Brazil. Utilizing the methodology for collecting *S. levis* adults, 200 sugarcane traps (the stalk cut to approximately 30 cm and split in half) (Fig. 2A) were prepared and placed on the soil surface nearby the sugarcane plants (Martins et al. 2020). After 24 hours, black larvae specimens were collected and transported to the Insect Biology and Rearing Laboratory at the São Paulo State University, Jaboticabal, São Paulo, Brazil.

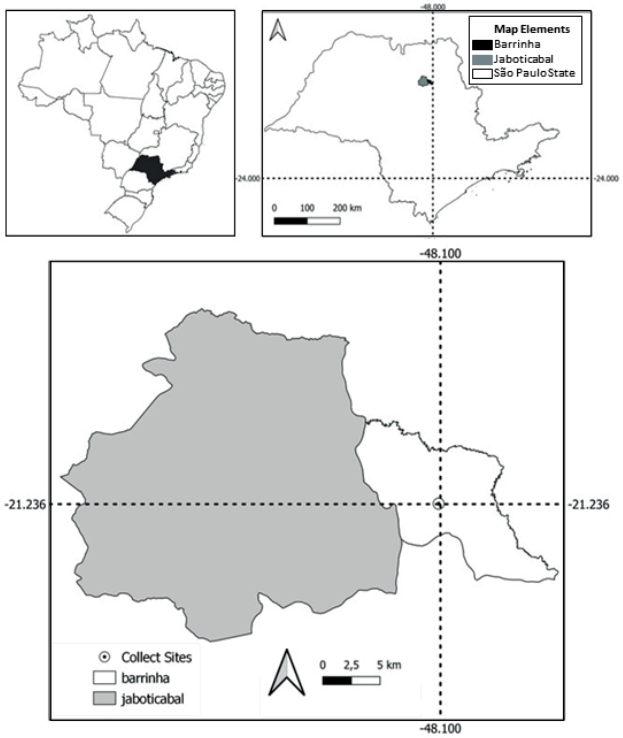

Figure 1. Location map of the study area.

In the laboratory, the larvae were individualized in flat-bottomed test tubes (8.0 cm x 2.0 cm), containing diet based on Degaspari et al. (1987) with modifications. The tubes were kept in a dark room and temperature of 25±2°C, with diet replaced weekly until pupation. Pupae were kept in plastic containers containing dampened filter paper

with deionized water until adults' emergence. The adults were then individually collected, mounted, and sent for taxonomic identification. Taxonomic identification was carried out by Dr. Eduardo Carneiro dos Santos, Associate Professor, Department of Zoology, Federal University of Paraná, Curitiba, Paraná, Brazil. A species found in the field was *Elaphria agrotina* (Guenée, 1852) (Lepidoptera: Noctuidae) (Figs. 2B-D) and adult specimens were deposited at the Insect Biology and Rearing Laboratory (LBCI), São Paulo State University, Jaboticabal, São Paulo, Brazil. Adults of *E. agrotina* having small-sized (approximately 18 mm wingspan), commonly known in Brazil as 'lagarta-das-folhas' (leaf caterpillar). Synonyms reported in the literature include *Celaena agrotina* Guenée, 1852 and *Monodes agrotina* (Guenée, 1852) (Rennwald 2022).

Figure 2. *Elaphria agrotina* in the field in Barrinha, São Paulo, Brazil. **A.** Sugarcane traps set up in the sugarcane field. **B** and **C.** *E. agrotina* larvae feeding on sugarcane stalk. **D.** *E. agrotina* larvae displaying typical curling behavior when disturbed.

Elaphria Hübner, 1818 comprises 127 described species, although many of these species have never been revised, and confirmation of the classification of this species is still necessary. The main diagnostic characteristics of *Elaphria* are related to the tribe Elaphriini Beck, 1996 (Kononenko & Han 2011). The Elaphriini (Noctuinae: Noctuidae), is composed of small moths, mainly found in tropical and subtropical regions. This tribe is distinguished by several distinctive characteristics in its larvae, such as the presence of a prominent subbasal protuberance. In males, the genitalia lack a sclerotized band behind the costal process of the valve, and the posterior part of the seventh genital segment features a prominent and strongly sclerotized antevaginal crest accompanied by a narrow, strongly sclerotized, and wrinkled or setose band in the ventral region (Kononenko & Han 2011; Han & Kononenko 2015). This tribe includes ten described genera.

Elaphria agrotina is distributed in the Americas (Tab. 1 and Tab. 2) and Silveira Neto et al. (1977) reported the presence of *E. agrotina* in Jaboticabal, Brazil for at least 46 years. The larvae of *E. agrotina* are polyphagous and spend most of their life cycle on the ground, feeding on crop residues and different plant structures of important crops (Fonseca-Medrano et al. 2019) (Tab. 2). Observations of Almeida et al. (2014) matching with Lafontaine (2004), who mentioned the great ability of several Noctuidae members to tease grasses' damage, with sugarcane being used as a food substrate.

Table 1. Comparison of *Elaphria agrotina* records in collections.

Specie	Capture location	Source
Elaphria agrotina	Florida, United States	Minno (1992)
	Havana, Cuba	Becker (2002)
	Guana Island, Virgin Islands	Becker & Miller (2002)
	Pelotas, Rio Grande do Sul, Brazil	Specht et al. (2004)
	Pico Bonito, Honduras	Miller et al. (2012)
	Tobago, Trinidad and Tobago	Cock (2017)

Table 2. Records of *Elaphria agrotina* and its host plants.

Specie	Host plants	Capture Location	Source
Elaphria agrotina	Cotton	French Guiana	Silvain & Thiberville (1983)
	Pasture	Altamira, Pará, Brazil	Almeida et al. (2014)
	Corn	Mato Grosso, Brazil	Specht et al. (2014)
	Soybean	Planaltina, Brasilia, Brazil	Luz et al. (2019)
	Soybean, Corn and Wheat	Planaltina, Brasilia, Brazil	Fonseca-Medrano et al. (2019)
	Soybean and Hop	Cristalina, Goiás, Brazil	Ligoski & Cabral (2022)

For the first time, we observe *E. agrotina* associated with bait traps represented by fresh sugarcane stalks placed on the ground with the cut end in contact with the soil (Figs. 2A-C). In addition, observations made indicated that the sugarcane plants exhibited tillers with symptoms of 'dead heart', a common symptom of some soil pest infestations. Plants displaying these symptoms were selected for uprooting through the excavation of soil trenches, identifying and collecting associated insect species. The presence of *E. agrotina* was observed, in association with the rhizome of symptomatic plants (Fig. 2D).

Our study not only reported the presence of *E. agrotina* in sugarcane crops but also identified this pest as specifically associated with sugarcane itself. This observation goes beyond merely documenting the presence of the insect in sugarcane cultivation to highlight its direct association with the crop. Our study not only reported the presence of *E. agrotina* in sugarcane crops but also identified this pest as specifically associated with sugarcane itself. This observation goes beyond merely documenting the presence of the insect in sugarcane cultivation to highlight its direct association with the crop. While Specht et al. (2014) compiled some host plants of the pest from the literature and mentioned sugarcane, our research emphasizes the insect's affinity for sugarcane as a host plant.

The identification of this species attacking sugarcane in fresh stem traps raises an alert for potential crop damage, especially considering that sugarcane is already targeted by other soil pests (Fig. 3). Furthermore, the presence of larvae in soil layers, along with crop residues and the rhizomes, raises the possibility that the species may damage healthy plants and promote new infestations. In this regard, reporting the occurrence of *E. agrotina* in sugarcane, in the current scenario of increasing soil pest infestations and the scarcity of scientific publications, is important to alert the sugarcane industry to the risk of severe infestations.

Based on our observations, we conclude that *E. agrotina* is an insect pest associated with sugarcane cultivation in Brazil particularly in the state of São Paulo. While its presence has been noted in practically all regions of the country, indicating potential occurrence in sugarcane fields nationwide. Further studies are necessary to describe the species' biology, behavior, infestation potential, and potential economic damage in the sugarcane agroindustry.

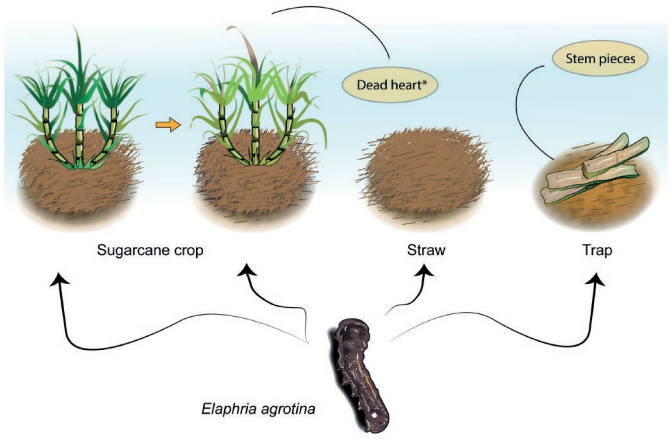

Figure 3. Locations of the larvae of *E. agrotina* in the field. *Characteristic symptom of sugarcane plants where the larvae were found.

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Authors' Contribuition

VFN: Conceptualization, project administration. VFN, LBL, PGP, DGR: Writing original draft. VFN, LBL, SADB: writing review & editing. DGR, GFM: Methodology, resources. VFN, LBL, PGP, JMS: Visualization. VFN, LBL, PGP, DGR, JMS, SCS, SADB: Investigation, data curation, writing review & editing. SADB: Supervision.

Conflict of Interest Statement

The authors declare that there is no conflict of interest.

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