

FIRST RECORD OF *Numia terebintharia* GUENÉE (LEPIDOPTERA: GEOMETRIDAE) IN *Ziziphus joazeiro* MART. (RHAMNACEAE) IN BRAZIL¹

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ABSTRACT - Geometridae is one of the most diverse Lepidoptera families; however, little information about Geometridae species is found, even regarding their distribution and basic biology, which are in general restricted to type locality. Lists of species and their host plants are not found for the Semiarid region of the Northeast of Brazil. The present note reports the occurrence of caterpillars of the species *Numia terebintharia* Guenée consuming leaves of evergreen trees of *Ziziphus joazeiro* Mart. in a site with xerophilous deciduous Caatinga vegetation in that region. Some trees had approximately 90% of their leaves with injuries. This is the first record of *N. terebintharia* caterpillars occurring in Brazil and the first record of *Z. joazeiro* as their host plant.

Keywords: Ennominae. Caatinga. Herbivory. Folivory. Juazeiro.

PRIMEIRO RELATO DE *Numia terebintharia* (LEPIDOPTERA: GEOMETRIDAE) EM *Ziziphus joazeiro* MART. (RHAMNACEAE) NO BRASIL

RESUMO – Geometridae é uma das famílias mais diversificadas de Lepidoptera e o conhecimento sobre a distribuição e biologia básica de suas espécies é muito limitado, restringindo-se em muitos casos à localidade-tipo. Não há nenhum inventário das espécies ocorrentes no semiárido do Nordeste do Brasil e das suas plantas hospedeiras. Neste trabalho é registrada a ocorrência da espécie *Numia terebintharia* Guenée em uma área de caatinga dessa região, avaliada a importância desse registro no quadro do conhecimento da distribuição das espécies do gênero e documentada a planta hospedeira de suas lagartas e as injúrias às suas folhas. Algumas árvores de *Ziziphus joazeiro* Mart. apresentavam cerca de 90% de suas folhas com injúrias. Esse é o primeiro registro da *N. terebintharia* para o Brasil e o primeiro de sua planta hospedeira.

Palavras-chave: Ennominae. Caatinga. Folivoria. Herbivoria. Juazeiro.

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¹Received for publication in 04/17/2020; accepted in 08/14/2020.

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INTRODUCTION

Lepidoptera is one of the most diverse insect orders, which encompasses moths and butterflies; Geometridae stands out as one of the three most diverse among its 71 families, with more than 23 thousand described species (VAN NIEUKERKEN et al., 2011; DUARTE et al., 2012). About 5,000 of these species occur in Brazil, which are within one of the following five subfamilies: Ennominae, Geometrinae, Larentiinae, Oenochrominae, and Sterrhinae (DUARTE et al., 2012). Almost half of the species of the family Geometridae in the world belong to the subfamily Ennominae (PITKIN, 2002), which has a worldwide distribution but greater diversity in neotropical regions (BREHM et al., 2016). According to Vargas et al. (2010), most neotropical species of Geometridae are known only for the type material and original descriptions, thus, little information is found about their immature stage, host plants, and even geographic distribution.

Geometridae caterpillars can be involved in several interactions, whether in natural or anthropogenic environments, and are commonly recognized for their herbivory; they may be highly abundant in some plants (BODNER et al., 2010; VARGAS, 2014). Some species of Geometridae in Brazil are studied as insect pests that use forest species, such as eucalyptus crops, as hosts, e.g. *Thyriniteina arnobia* Stoll, *Glena* spp., *Sabulodes caberata* Guenée, *Oxydia apidania* (Cramer), and *O. vesulia* (Cramer) (ZANUNCIO et al., 2014). However, only 79 records of this family in Brazil were found in the World Lepidopteran Hostplants database (Natural History Museum London, accessed on 03/04/2020), with 35 nominal species cited. In addition, some inventories for local faunas had been carried out in Brazil, among them: Januário et al. (2013), who reported 25 species collected in northern Mato Grosso state in the Amazon rainforest; Diniz, Morais and Camargo (2001), who cited 22 caterpillar species in the Cerrado biome in the Federal District; and Marconato, Dias and Penteado-Dias (2008), who recorded 22 caterpillars species associated with plants of the species *Erythroxylum microphyllum* A. St.-Hil. (Erythroxylaceae) in the Cerrado biome in the state of São Paulo. Thus, information on diversity of species of the family Geometridae in Brazil is limited, as well as records of their distribution and host plants, and such information is largely concentrated on species of agricultural importance.

Information on diversity of Lepidoptera in the Semiarid region of the Caatinga biome is even more limited when compared to that in other regions of Brazil, even when considering butterflies, which are the most studied species of Lepidoptera (ZACCA; BRAVO, 2012; LIMA; ZACCA, 2014). In the case

of moths, the single local fauna inventory found refers to the family Sphingidae (DUARTE JR; SCHLINDWEIN, 2005), and no other work on species of Geometridae in the Caatinga biome appeared in searches in the Google Scholar or in journals in the database of the Brazilian Coordination for the Improvement of Higher Education Personnel (CAPES) <<https://www.periodicos.capes.gov.br>>.

The present note reports the first record of occurrence of the species *Numia terebintharia* Guenée (1858) in an area with xerophilous Caatinga vegetation in the Semiarid region of the Northeast of Brazil, and its importance is assessed in the context of previous information on the distribution of species of the *Numia* genus. In addition, the first record of the host plant and the characterization of injuries caused by *N. terebintharia* caterpillars to the plant leaves is presented.

MATERIAL AND METHODS

Field observations were carried out from February to March 2020, corresponding to the beginning of the rainy season, at the Tamanduá Farm (7°1'30.3"S, 37°24'22.5"W), in the municipality of Santa Terezinha, Sertão region of the state of Paraíba, Brazil. The municipality is in the Sertaneja Northern Depression region, and the study area had a typical deciduous xerophilous Caatinga vegetation. The region's climate is BSh, a hot and semi-arid climate according to the Köppen classification (ÁLVARES et al., 2013).

During this observation period, caterpillars were found on leaves of five juazeiro (*Ziziphus joazeiro* Mart.) trees that were at the vegetative phenological stage, producing foliage. The caterpillars were reared in laboratory (Forest Entomology Laboratory of the Federal University of Campina Grande, Patos campus, Paraíba, Brazil) at room temperature and fed with leaves of the same plant species. Newly emerged adults were killed, fixed with entomological pins, and deposited at the entomological collection of the laboratory. Adult individuals were identified by a moth taxonomist specialist (see acknowledgments).

RESULTS AND DISCUSSION

The caterpillars found were of the inchworm-type, presenting two pairs of false abdominal legs (Figure 1A) and typical locomotion of species of the family Geometridae. The pupae were obtect (Figure 1B). The adults had approximately 2.5 cm wingspan and both wing pairs were predominantly green. They

were identified as *Numia terebintharia*, subfamily Ennominae. Adult females usually had a large, well-defined apical spot on each of the anterior wings (Figure 1C); however, in some individuals, such spot

was little or absent (Figure 1D). Males had bipectinate antennae (Figure 1E), and females had filiform antennae.

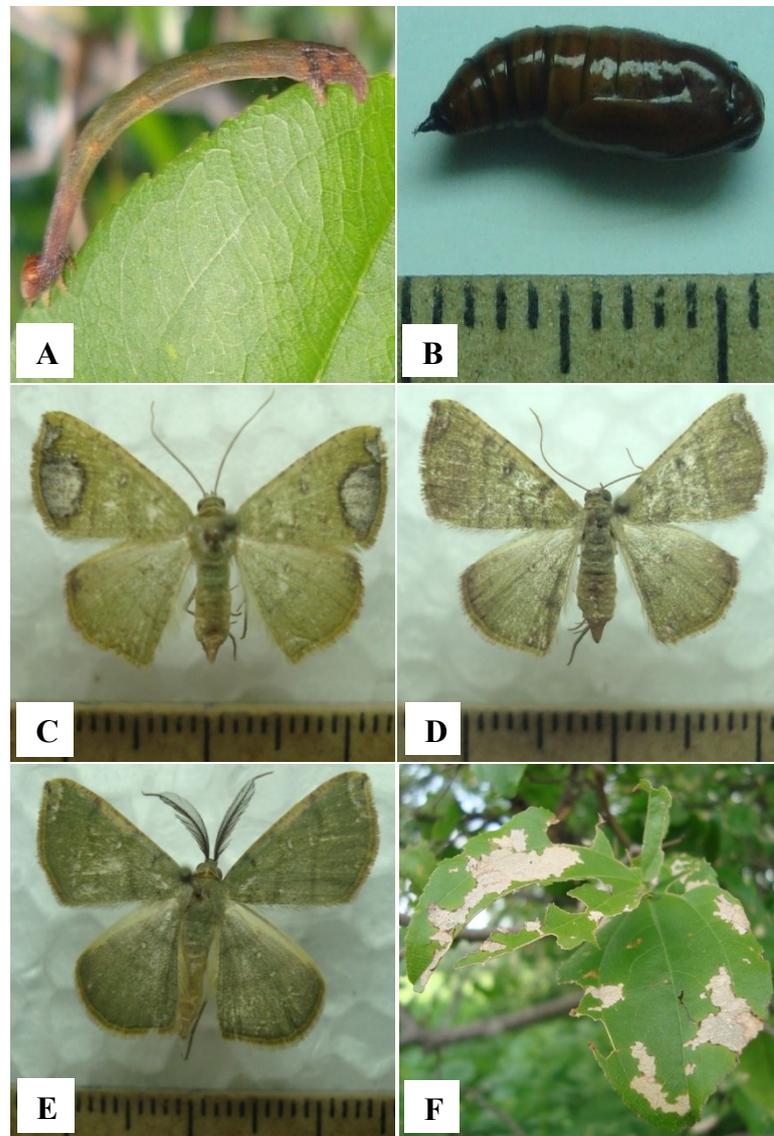


Figure 1. Caterpillar (A), Pupae (B), female (C and D), and male (E) of *Numia terebintharia* moths (Lepidoptera: Geometridae), and injuries caused by them in leaves of *Ziziphus joazeiro* trees (F).

The genus *Numia* has traditionally been included in the tribe Caberini; however, taxonomic changes and changes in the concept of this tribe due to a recent phylogenetic study on Neotropical Geometridae species require to reevaluate its positioning (BREHM et al., 2019). *Numia* species are strictly Neotropical, occurring from southern USA and Caribbean to Argentina (PITKIN, 2002), but the records of distribution of the eight recognized species in the genus are limited and largely restricted to the type locality of the nominal species.

The only previous record of the genus in Brazil refers to the type locality of *N. lermia* Schaus (1901), which appears on the label [Bnito Prov./

Pernambuco/Brzil] (see <https://www.gbif.org/pt/occurrence/1319320953>). This location probably refers to the municipality of Bonito, in the state of Pernambuco, Northeast region of Brazil (approximately 8°28'S, 35°43'W, and 443 m altitude, at 80 km from the Atlantic coast). This municipality is in the eastern slope of the Borborema plateau, which presents predominantly a semideciduous tropical forest vegetation (MARANGON et al., 2010), therefore, near the limits of the Caatinga domain.

The species *N. terebintharia* was described based on specimens from Haiti, later cited for other locations in the Caribbean, Florida (USA)

(HEPPNER, 2003), and Costa Rica (PITKIN; MORA; SCOBLE, 1996). According to V. Becker (personal information), this species has a wide distribution, occurring mainly in dry biomes. The database in the Global Biodiversity Information System (GBIF) (accessed on 03/25/2020) shows three probable records in Peru, South America (source: iBOL), but they are cited as *N. cf. terebintharia*, which may refer to another species, since *N. profugaria* (Herrich-Schäffer, 1855) was described in Ecuador. However, this combination should be confirmed because Pitkin (2002) transferred it to the genus *Numia* with little assurance, since the type specimen was not examined. Thus, the present record of *N. terebintharia* is surely the first in Brazil.

The record of *Ziziphus joazeiro* as a host plant for *N. terebintharia* caterpillars allowed the proposal of the hypothesis of a certain specialization of this species of Geometridae in leaves of plants of the family Rhamnaceae, since Janzen and Hallwachs (2001) reported specimens of this species on plants of *Ziziphus guatemalensis* Hemsl., in Costa Rica. According to Brehm (2002), species of the tribe Caberini (considering PITKIN, 2002) are specialized in different botanical families, with records for host plants of the family Rhamnaceae in Malaysia and in a neotropical region (BREHM, 2002).

In the present study, the five *Z. joazeiro* plants evaluated showed lesions on young and mature leaves, reaching approximately 90% of leaves of each plant. The lesions were of the external type with free feeding, i.e., the insect removes parts of the leaf blade from the edge (CARRANO-MOREIRA, 2014), scraping the epidermis, which becomes dry and straw-yellow (Figure 1F). Only the veins remained in the most attacked leaves.

The host species (*Z. joazeiro*), locally known as juazeiro, is native to the Caatinga biome, occurring in the north of the state of Minas Gerais and in the Northeast region of Brazil; it presents ecological importance and potential for medicinal use (SILVA et al., 2011; DANTAS et al., 2014; MARQUES; NASCIMENTO; TORRES, 2017; SOUSA et al., 2018). *Ziziphus joazeiro* is a perennial tree species, one of the few that remains green throughout the year in deciduous Caatinga forests. Despite *Z. joazeiro* plants are frequently found in Caatinga landscapes, information regarding the entomofauna associated with this species is limited, found in studies on floral visitors in the literature (NADIA; MACHADO; LOPES, 2007; FERNANDES et al., 2013) and in records of species of Drosophilidae in fruits (FERNANDES; ARAÚJO, 2011), but with no records of insects attacking its leaves.

Considering that the genus of this host plant (*Ziziphus* Mill.) is diverse in the Americas (ARA; HASSAN; KHANAM, 2008), nine species of this genus and another 14 genera of the family

Rhamnaceae with 42 species are found in Brazil (FLORA DO BRASIL, 2020), and preliminary information indicated the possibility of feed preference of *Numia* caterpillars for plants of this family, it is suggested that observations of leaf-eating insects should be undertaken for this species of *Ziziphus* in other regions and for other plant species of the family Rhamnaceae in the Caatinga and other biomes, thus facilitating the obtaining of data and minimizing the gap of information on the distribution of *Numia* species in South America and on their feed preference.

CONCLUSION

This is the first record of caterpillars of the species *Numia terebintharia* occurring in the Semiarid region of the Northeast of Brazil and the first record of *Ziziphus joazeiro* as their host plant.

ACKNOWLEDGEMENTS

The authors thank Mr. Pierre Landolt, owner of the Tamanduá Farm, for granting access to the area; and Dr. Vitor Osmar Becker for the identification of the moth species.

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