

First record of Eucoilinae (Hymenoptera: Figitidae), parasitoids of African fig fly *Zaprionus indianus* Gupta (Diptera: Drosophilidae), in the Caatinga biome

Primeiro registro de Eucoilinae (Hymenoptera: Figitidae), parasitoides da Mosca-africana-do-figo *Zaprionus indianus* Gupta (Diptera: Drosophilidae), no bioma Caatinga

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Abstract

This study records the occurrence of eucoilines (Hymenoptera: Figitidae), parasitoids of the African fig fly *Zaprionus indianus* Gupta (Diptera: Drosophilidae), in the Brazilian semi-arid Caatinga biome. We obtained from mango (*Mangifera indica* L.) and guava (*Psidium guajava* L.) fruits Drosophilidae pupae, which developed into *Z. indianus* and two species of Eucoilinae parasitoids, *Dicerataspis grenadensis* Ashmead and *Leptopilina bouldardi* (Barbotin, Carlton & Kelner-Pillaut). This is the first record of the parasitoids *D. grenadensis* and *L. bouldardi* in the Caatinga biome.

Key words: Diversity. Natural enemies. Eucoilinae. Frugivorous flies. Semi-arid, Brazil.

Resumo

Este trabalho relata a ocorrência de eucoilíneos (Hymenoptera: Figitidae), parasitoides da Mosca-africana-do-figo *Zaprionus indianus* Gupta (Diptera: Drosophilidae), no bioma Caatinga, semiárido Brasileiro. De frutos de manga (*Mangifera indica* L.) e goiaba (*Psidium guajava* L.) foram obtidos pupários de Drosophilidae dos quais emergiram *Z. indianus* e duas espécies de parasitoides Eucoilinae, *Dicerataspis grenadensis* Ashmead e *Leptopilina bouldardi* (Barbotin, Carlton & Kelner-Pillaut). Este é o primeiro relato dos parasitoides *D. grenadensis* e *L. bouldardi* no bioma Caatinga.

Palavras-chave: Diversidade. Inimigos naturais. Eucoilinae. Moscas frugívoras. Semiárido.

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Parasitoids (Figitidae) are important natural enemies of frugivorous flies (Tephritidae, Lonchaeidae, and Drosophilidae) in the Neotropical Region (GUIMARÃES et al., 2003; NÚÑEZ-CAMPERO et al., 2014). Among the figitids, the subfamily Eucoilinae is the most diversified, comprising about 970 species distributed in 85 genera (BUFFINGTON, 2009; FORSHAGE et al., 2013).

In Brazil, about 60 species and 31 genera of eucoilines are known. In this group, 12 species are associated with larvae of Tephritoidea (GALLARDO et al., 2010; GUIMARÃES et al., 2003). Most of the studies about diversity and distribution of Eucoilinae are concentrated in the Southeast region of Brazil (GUIMARÃES et al., 2004); thus, there is a lack of knowledge on Eucoilinae in the other regions and biomes of Brazil.

The parasitism of Eucoilinae species helps to regulate the population of frugivorous flies, such as the African fig fly *Zaprionus indianus* Gupta, 1970 (Diptera: Drosophilidae), an introduced species in Brazil. This drosophilidae fly was reported for the first time in Brazil in 1999 in the State of São Paulo, infesting fruits of kaki (*Diospyros kaki* L.: Ebenaceae) and fig (*Ficus carica* L.: Moraceae) (COMMAR et al., 2012). *Zaprionus indianus* is a polyphagous species, and studies show that its distribution is rapidly expanding in Brazil, including the Caatinga biome (FERNANDES; ARAUJO, 2011). This biome is located in Northeastern Brazil, occupying 11% of the country, and is characterized by xerophytic vegetation and semi-arid climate (ALVES et al., 2009). This is the region where many tropical fruits are grown.

However, despite the importance of fruit production and the potential of *Z. indianus* as a pest in the Brazilian semi-arid region, not many studies have presented information on the natural enemies associated with *Z. indianus* in the Caatinga biome. Thus, this study was carried out to verify if there are Eucoilinae species associated with *Z. indianus* larvae in the Brazilian semi-arid Caatinga biome.

Although *Z. indianus* is not a primary invasive insect of mango (*Mangifera indica* L.: Anacardiaceae) and guava (*Psidium guajava* L.: Myrtaceae), infestation of larvae of *Z. indianus* was observed in these fruits on the ground. Thus, we collected samples of mango (32 kg/60 fruits) and guava (106 kg/1,331 fruits) from the Caatinga biome, in the municipalities of Baraúna (5°7'33.4" S; 37°37'13.1" W) and Mossoró (5°5'23" S; 37°23'50" W) in the State of Rio Grande do Norte and the municipality of Limoeiro do Norte (5°8'56.6" S; 38°6'9.2" W) in the State of Ceará, from May 2011 to November 2013. The collected fruits were packed in paper bags and transported to the Laboratory. In the laboratory, the fruits were counted, weighed, placed in plastic trays with a layer (5 cm) of vermiculite, and covered with *voile* cloth, to obtain the pupae of flies. The obtained pupae of *Z. indianus* were placed in Petri dishes covered with plastic wrap and maintained in a room at 26°C, 60 ± 10% RH, and 12 h photophase, until the emergence of adults. The association between *Z. indianus* and its parasitoids was confirmed because in the samples with eucoilines, only *Z. indianus* emerged. The parasitoids and flies were identified following Guimarães et al. (2003) and Commar et al. (2012), respectively.

From the collected fruits, 93 pupae of *Z. indianus* were obtained, which 64 adult flies, seven *Dicerataspis grenadensis* Ashmead, 1986 (Hymenoptera: Figitidae: Eucoilinae) and two *Leptopilina boulardi* (Barbotin et al., 1979) (Hymenoptera: Figitidae: Eucoilinae) emerged. *Dicerataspis* and *Leptopilina* are commonly associated with larvae-pupae of drosophilids and are important natural enemies of dipterans (GUIMARÃES et al., 2003).

The genus *Dicerataspis* comprises only one species, *D. grenadensis* (GALLARDO et al., 2010). In Brazil, this species was reported in the States of Pará and Minas Gerais, but with no record of the host (GUIMARÃES et al., 2004). In the State of São Paulo, *D. grenadensis* as *Dicerataspis flavipes*

was shown to be associated with *Z. indianus* in different fruit trees (GUIMARÃES et al., 2004). *Leptopilina* species are distributed worldwide and are always associated with drosophilid larvae (FORSHAGE et al., 2013; NOVKOVIC et al., 2011), and *L. boulardi* is commonly associated with *Drosophila melanogaster* (Meigen, 1830) (Diptera: Drosophilidae) (FLEURY et al., 2009). However, in Brazil, this species was reported to parasitize *Z. indianus* in the Cerrado biome in the State of Goiás (MARCHIORI et al., 2003). In addition, the occurrence of *L. boulardi* has been observed in the States of São Paulo, Rio de Janeiro, Minas Gerais, Amapá, Bahia, and Rio Grande do Norte, with no clear record of its host (GUIMARÃES et al., 2003, 2004).

Thus, this is the first study showing *D. grenadensis* and *L. boulardi* in the Caatinga biome. Moreover, this is the first study to show eucoilines parasitizing *Z. indianus* in the Caatinga biome. Further, *D. grenadensis* obtained in mango fruits in Baraúna and *L. boulardi* obtained in guava fruits in Mossoró and Limoeiro do Norte show new geographic distributions of these two eucoilines in Brazil.

The details presented in this study show that parasitoids Figitidae (Eucoilinae) associated with the invasive species *Z. indianus* are present in the Brazilian semi-arid Caatinga biome. This information is important because it shows the expansion and distribution records of eucoilines in Brazil, and also shows that these parasitoids can be potentially used in the integrated management of *Z. indianus*, if it reaches pest status in fruits grown in the semi-arid region. However, further studies must be conducted to improve the knowledge of the bionomics of these natural enemies and their importance in the regulation of *Z. indianus* population in the Caatinga biome.

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