



Pesquisa Agropecuária Tropical

ISSN: 1517-6398

ISSN: 1983-4063

Escola de Agronomia/UFG

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Pesquisa Agropecuária Tropical, vol. 53, e75902, 2023
Escola de Agronomia/UFG

DOI: <https://doi.org/10.1590/1983-40632023v5375902>

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Occurrence of *Dinarmus basalis* parasitizing *Callosobruchus maculatus* in *Vigna unguiculata* in the semiarid region of the Rio Grande do Norte state, Brazil¹

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ABSTRACT

Callosobruchus maculatus (Fab.) (Coleoptera: Chrysomelidae: Bruchinae) is the main pest of *Vigna unguiculata* (L.) Walp. during the grain storage period. This study aimed to report the occurrence of a natural enemy associated with *C. maculatus* in cowpea, in the semiarid region of the Rio Grande do Norte state, Brazil. For this, cowpea samples were collected and placed in closed plastic containers, where they remained until the emergence of adult insects. From the infested samples, adults of *C. maculatus* and of the *Dinarmus basalis* (Rondani) (Hymenoptera: Pteromalidae: Pteromalinae) parasitoid emerged. This is the first report of *D. basalis* parasitizing *C. maculatus* in the semiarid region of the Rio Grande do Norte state.

KEYWORDS: Cowpea, Bruchinae, Pteromalidae, biological control.

RESUMO

Ocorrência de *Dinarmus basalis* parasitando *Callosobruchus maculatus* em *Vigna unguiculata* no semiárido do Rio Grande do Norte, Brasil

Callosobruchus maculatus (Fab.) (Coleoptera: Chrysomelidae: Bruchinae) é a principal praga de *Vigna unguiculata* (L.) Walp. durante o período de armazenamento dos grãos. Objetivou-se relatar a ocorrência de um inimigo natural associado a *C. maculatus* em feijão-caupi, na região semiárida do Rio Grande do Norte, Brasil. Para isso, amostras de feijão-caupi foram coletadas e colocadas em recipientes plásticos fechados, onde permaneceram até a emergência dos insetos adultos. Das amostras infestadas, emergiram adultos de *C. maculatus* e do parasitoide *Dinarmus basalis* (Rondani) (Hymenoptera: Pteromalidae: Pteromalinae). Este é o primeiro relato de *D. basalis* parasitando *C. maculatus* na região semiárida do Rio Grande do Norte.

PALAVRAS-CHAVE: Feijão-caupi, Bruchinae, Pteromalidae, controle biológico.

Callosobruchus maculatus (Fab.) (Coleoptera: Chrysomelidae: Bruchinae) is the main pest of *Vigna unguiculata* (L.) Walp. cowpea during the grain storage period (Heidari et al. 2016, Medeiros et al. 2017, Silva et al. 2020). The damage related to the attack of this pest is due to the penetration and feeding of the larvae inside the grains, affecting their commercial and agronomic quality and making them unsuitable for human consumption and sowing (Oliveira et al. 2014).

The main method to control *C. maculatus* is chemical control with synthetic insecticides (e.g., organophosphates, pyrethroids and phosphine)

(Gusmão et al. 2013). In Brazil, the number of insecticides registered for the control of *C. maculatus* in cowpea is limited, being restricted to magnesium phosphide (Brasil 2003). However, the inappropriate use of these insecticides can cause several problems, e.g., intoxication of rural workers, residue accumulation in grains and emergence of resistant pest populations, among others (Pimentel et al. 2010, Hedjal-Chehheb et al. 2013).

Thus, the use of botanical insecticides (Hedjal-Chehheb et al. 2013, Izakmehri et al. 2013, Mbata & Payton 2013, Sousa Neto et al. 2019) and biological control with parasitoids (Amevoin et al. 2007) have

¹ Received: Apr. 17, 2023. Accepted: July 19, 2023. Published: Aug. 16, 2023. DOI: 10.1590/1983-40632023v5375902.

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been studied as alternatives to synthetic insecticides. Several parasitoids associated with *C. maculatus* have been reported worldwide, with the Pteromalidae family being the most diversified, with five species distributed in the genera *Dinarmus*, *Theocolax* and *Lariophagus* (Van Huis 1991). In a study carried out in west Africa, Amevoin et al. (2007) reported that, after the parasitoid *Dinarmus basalis* (Rondani) (Hymenoptera: Pteromalidae) was released, a significant reduction in the populations of *C. maculatus* in stored cowpea was observed, consequently resulting in lower losses, when compared to the control treatment.

In Brazil, information about the occurrence of natural enemies of the *Callosobruchus* genus is still scarce, with records in the states of Santa Catarina (Lima 1942), Pará (Ohashi et al. 1993) and São Paulo (Costa et al. 2007). Therefore, this study aimed to report, for the first time, the occurrence of a parasitoid associated with *C. maculatus* in cowpea, in the semiarid region of the Rio Grande do Norte state, Brazil.

A total of 20 cowpea samples of 200 g from the Mossoró region (5°11'S and 37°20'W) were taken to the laboratory at the Universidade Federal Rural do Semiárido, in 2013, where they were placed in plastic containers (6 cm high × 10 cm in diameter) closed at the top with voile fabric and kept in an air-conditioned room (25 ± 2 °C; 70 ± 10 % RH; 12-h photoperiod). The cowpea samples were inspected daily until the emergence of *C. maculatus* adults (± 20 days after collection) or parasitoids. Subsequently, the obtained insects were transferred to containers with 70 % ethyl alcohol and duly labelled (date and sampling location). The emerged parasitoids were identified according to Bouček & Heydon (1997) for genus and Rasplus (1989) for species. The Bruchinae specimens were sent to the Universidade Federal Rural de Pernambuco (UFRPE), in Recife, Pernambuco state, Brazil, for identification. The voucher specimens of the parasitoid were deposited in the entomological collection of the Instituto Biológico of São Paulo, whereas the *C. maculatus* specimens were deposited in the entomological collection of the UFRPE.

A total of 2,083 insects were collected from the cowpea samples, with 1,414 *C. maculatus* and 669 parasitoids belonging to *Dinarmus basalis* (Rondani) (Hymenoptera: Pteromalidae) (Figure 1). This parasitoid is a solitary idiobiont ectoparasitoid of immature insects and may be used for the biological control of *C. maculatus* (Amevoin et al. 2007). This parasitoid is the main natural enemy of bruchids in



Figure 1. Female of *Dinarmus basalis* (Rondani) (Hymenoptera: Pteromalidae) collected in Mossoró, Rio Grande do Norte state, Brazil.

cowpea grains (Sanon et al. 2011). *Dinarmus basalis* is originally from Africa and has dispersed throughout the Americas, Asia and Europe due to the trade in grains and seeds (Rasplus 1989).

In Brazil, *D. basalis* has already been reported parasitizing *Callosobruchus chinensis* (L.) associated with *Vigna radiata* (L.) in the Santa Catarina state (Lima 1942), *Acanthoscelides obtectus* (Say) in the Northeast region of Brazil (Oliveira 1948), *C. maculatus* associated with *V. unguiculata* in the Pará state (Ohashi et al. 1993) and *Callosobruchus analis* (F.) associated with *Glycine max* (L.) in the São Paulo state (Costa et al. 2007). However, this is the first report of *D. basalis* parasitizing *C. maculatus* associated with cowpea in the semiarid region of the Rio Grande do Norte state, Brazil.

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