

NOTA BREVE/BRIEF NOTE

FIRST REPORT OF *Chalepus dorni* (Coleoptera: Chrysomelidae: Cassidinae) IN MAIZE CROPS OF MINAS GERAIS, BRAZIL

Primer reporte de *Chalepus dorni* (Coleoptera: Chrysomelidae: Cassidinae) en cultivos de maíz en Minas Gerais

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ABSTRACT

Chalepus dorni larvae were observed in commercial maize crops in the central region of the state of Minas Gerais, Brazil, during 2006-2007, 2008-2009 and 2010-2011 harvests. Early symptom of attack was characterized first by mines in the lower leaves of maize plants and later by the formation of necrotic areas. Although, there are reports of genus *Chalepus* in maize, this is the first record on the presence of *C. dorni* in maize in Minas Gerais, Brazil.

Keywords: leaf-mining beetle, necrotic leaf, *Zea mays*.

RESUMEN

Se observaron larvas de *Chalepus dorni* en los cultivos comerciales de maíz en la región central de Minas Gerais durante los ciclos agrícolas 2006-2007, 2008-2009 y 2010-2011. El síntoma inicial se caracterizó por la presencia de minas en las hojas inferiores de plantas de maíz y la formación de áreas necróticas. Aunque existen informes de la presencia del género *Chalepus* en maíz, este es el primer registro de *C. dorni* en maíz en Minas Gerais, Brasil.

Palabras clave: escarabajo minero, necrosis foliar, *Zea mays*.

Leaf mining insects which belong to the orders Coleoptera, Lepidoptera, Diptera and Hymenoptera are herbivorous species specialized in feeding on internal leaf tissues (Gillot, 2005), with frequent specific relationship between plant and insect (Herrera and Pellmyr, 2002). Although leaf miner larvae may be found between the upper and lower epidermis throughout the whole development stage, they abandon the leaf to pupate in the external environment. Since the larvae feed on the internal tissues of the leaf, a tunnel (mine) is inscribed on the leaf surface (Herrera and Pellmyr, 2002) and, consequently, the whole foraging event during the larval phase remains registered on the surface.

There is a lack of information, especially in Brazil, on leaf mining insects, their hosts and natural enemies. In the case of maize, no register is extant in the literature on the occurrence of leaf mining insects on leaves.

As maize is a widespread crop in the Americas and foliar injuries can compromise production, know the symptoms of attack of leaf-mining insects, susceptible phenological stage of the maize and favorable conditions of occurrence are determinants for the definition of management strategies.

In the 2006-2007, 2008-2009 and 2010-2011 harvests, symptoms of an attack by a mining insect on commercial maize crops in the municipalities of Matozinhos and Pains,



central region of the state of Minas Gerais, were reported. This specific mining insect was previously unknown on the maize crops.

Larvae were initially reported (Fig. 1a) feeding inside the mines, causing death to the local tissue and necrosis in the region. In fact, all foliar tissues were consumed during feeding, and only the two epidermis were left (Fig. 1b). The attack symptoms were observed after florescence, between 65 and 80 days after crop emergence, with first appearance in the lower leaves and later in the upper ones in some plants.

Follow-up of larvae development on the leaves collected in the field evidenced that the pupae (Fig. 1c) remained inside the mines until the emergence of the adults, identified as beetles of the species *Chalepus dorni* Uhmann 1930 (Chrysomelidae: Cassidinae: Chalepini) (Fig. 1d).

The family Chrysomelidae comprises 19 subfamilies and approximately 37,000 species (Chaboo, 2007). It has worldwide distribution with most species in the tropics,

mainly in South America (Borowiec and Świetojska, 2017). The subfamily Cassidinae Gyllenhal (1813) is the second largest in the number of species, after Galerucinae. It comprises 6,000 species, with about a thousand registered in Brazil. The insects from the subfamily Cassidinae are called “tortoise beetles” in North America, because they have an oval- or round-shaped body, generally distinctly convex dorsally and flattened ventrally, with flat and dilated elytra and pronotum margins (Costa Lima, 1955; Chaboo, 2007).

Morphologically, *C. dorni* is highly similar to *Chalepus robusticornis* Pic, 1931, as a dichotomous key (Uhmann, 1936). Differences lie in the pattern of spots on the elytra and in the shape of the antenna. Whereas the geographic distribution of *C. dorni* in Brazil is the state of São Paulo (Staines, 2015), *C. robusticornis* has been registered in the Brazilian states of Santa Catarina, Minas Gerais and Bahia, and in Bolivia, Paraguay and Argentina.



a)



b)



c)



d)

Figure 1. a) Larva of *Chalepus dorni* inside a mine in maize leaf; b) Larva outside the mine; c) pupae, dorsal view (left) and ventral (right), d) adult.

In addition to *C. dorni*, the genre *Chalepus* currently comprises 93 species which are distributed from Canada to Argentina (Staines, 2002; Staines, 2015). Passoa (1983) mentioned that *Chalepus verticalis* (Chapuis, 1877) was registered in maize *Zea mays* L. in Honduras, although the species was not registered in Brazil. There are other Poaceae which are the host plants for species *Chalepus*: *Bambusa*, *Brachiaria*, *Digitaria*, *Oryza*, *Dichantherium*, *Chusquea*, *Hystrix*, *Lasiacis*, *Olyra*, *Panicum*, *Paspalum* and *Valota* (Staines, 2015).

Chalepus dorni is an uncommon species in agricultural areas. It is believed that high rainfall rates in January in the Central Region of the state of Minas Gerais (averaging 300 mm) have been a key to the occurrence of the insect. In fact, the phenomenon did not repeat itself in other harvests characterized by low precipitation during the same period.

Data on the biology of *C. dorni* is absent in the literature. Information is extant on the biology of *Chalepus dorsalis* Thunb. (Needham *et al.*, 1928). Eggs of *C. dorsalis* have been found in groups, between three and five, and covered with faeces. One larvae of the first instar after the hatch made an orifice in the leaf, which was subsequently used by the other larvae to enter into the common tunnel. All the larvae abandoned the mine in two to four days, and separately sought new leaves to burrow a solitary mine (with an increase in foliar injury). The larvae period lasts around three weeks, while the pupa phase has a duration between seven and ten days, and occurs inside the mine. There is also a description by Monrós and Viana (1947) for the Tribe Chalepini. According to the authors, the eggs may be placed on the upper and on the lower face. Larvae are miners and feed on the mesenchyme foliar. They remain throughout the entire development of the leaf till it provides sufficient nourishment; otherwise, they migrate to another leaf.

Due to the scantiness of the species, biological and behavioural information is still considerably scarce. Notwithstanding, monitoring is important since a high infestation rate by the larvae of *C. dorni* results in loss of the photosynthetic plant area with economic loss, depending on the phenological stage of the maize.

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CONFLICT OF INTEREST

The authors declare that they have not conflict of interest.

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