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First record of Trigona spinipes damaging canola in Viçosa, MG

Canola is a crop with significant potential to contribute to the expansion of Brazilian agribusiness. It is well-suited as a second crop in Brazil's grain production systems and is recommended in crop rotation programs, agricultural diversification, and soil coverage in vegetable cultivation. In Brazil, the crop has assumed a prominent role in both human consumption and energy purposes. This study was conducted at the experimental unit of Horta Velha, at the Federal University of Viçosa, which documented the attack of the Stingless bee (Trigona spinipes) on different canola cultivars (Hyola 401, Hyola 432, Hyola 433, and Hyola 61). The bee caused injuries to leaves, flowers, and seedpods during the tropicalization studies of these cultivars.

Keywords: Stingless bee; Tropicalization; Brassica napus L.; Record.

Primeiro registro de Trigona spinipes danificando canola em Viçosa, MG

A canola é uma cultura com grande potencial para contribuir com a expansão do agronegócio brasileiro, por se adequar perfeitamente como cultura de safrinha nos sistemas de produção de grãos do Brasil além disso vem sendo recomendada em programas de rotação de culturas, diversificação agrícola e cobertura vegetal do solo. No Brasil, a cultura vem assumindo papel de destaque, tanto no consumo humano quanto com finalidades agroenergéticas. O presente trabalho foi conduzido na unidade experimental de Horta Velha, na Universidade Federal de Viçosa-MG, onde foi registrado o ataque de abelha-cachorro (Trigona spinipes), à diferentes cultivares de canola (Hyola 401, Hyola 432, Hyola 433 e Hyola 61) causando injúrias em folhas, flores e síliquas, em estudos de tropicalização dessas cultivares.

Palavras-chave: Abelha sem ferrão; Tropicalização; Brassica napus L.; Registro.

Topic: **Notas Científicas**

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INTRODUCTION

The cultivation of canola (*Brassica napus* L. *var. oleifera* Moench.) in Brazil has been gaining prominence due to the significance of its products, particularly for human consumption and energy purposes, owing to the quality of its oil and the high levels of protein in the meal and its derivatives (source). Commercial canola cultivation worldwide is concentrated in temperate climate regions with latitudes between 35 to 55 degrees, as the plant is adapted to cold regions (MCCLINCHEY et al., 2008; BOLIS, 2010). In Brazil, these thermal conditions are found mainly in the southern region during autumn, winter, and early spring, corresponding to the period of canola cultivation in these regions (DALMAGO et al., 2010). However, various studies suggest that this crop has the potential for tropical adaptation, i.e., cultivation in warmer climate regions such as northeastern Brazil, for both diversification and crop rotation purposes (PANOZZO, 2012).

According to Adegás et al. (1992), among the floral visitors recorded in the culture, those with the highest frequencies are *Apis mellifera mellifera* (Linnaeus, 1758) (Hymenoptera: Apidae) and *Trigona spinipes* (FABRICIUS, 1793) (Hymenoptera: Apidae). Even in species where self-fertilization occurs, such as canola, there is a considerable increase in production if the crop is visited by pollinating bees (DURÁN et al., 2010). According to Shakeel et al. (2013), natural pollination of *Brassica napus* L. and *B. campestris* L. (Brassicaceae) in Pakistan resulted in a 24.9% increase in the number of siliques per plant, a 26.7% increase in the number of seeds per silique, and a 33.9% increase in seed weight due to natural pollination compared to non-pollinated canola plants.

The genus *Trigona* belongs to the family Apidae, Subfamily *Meliponinae*, and Tribe *Meliponini*. *T. spinipes*, (FABRICIUS, 1793), commonly known as irapuá, arapuá, or dog bee, is a social insect belonging to perennial colonies with hundreds to thousands of workers. These bees construct their nests in trees and abandoned termite mounds. *Meliponini* nests are composed of plant particles and resins, consisting of a chamber or brood area with cells arranged in combs or clusters, as well as storage pots for pollen and honey, varying in size and shape, as observed in *T. spinipes* (CAMARGO et al., 2003).

The adult bee exhibits a black coloration, developed mandibles, transparent wings, and a vestigial stinger, hence referred to as stingless bees. They measure approximately 5 to 7.5 mm in length, this bee features ochre-colored legs and wings that are nearly black in the basal half and slightly lighter in the apical half. Typically, the bee is black and glossy, with only the corbiculae on the third pair of legs showing a slightly lighter, yellowish, or brownish color (ALMEIDA et al., 1988).

It is an extremely robust and resilient bee, found throughout almost all of Brazil, from Pará to Rio Grande do Sul, and occurring in parts of Argentina, Paraguay, and, according to the geographical distribution listed (ALMEIDA et al., 1988; FONSECA et al., 2010). It's possible find the specie in certain areas of Colombia, Guyana, and Peru.

The damages related to *T. spinipes* in the literature, can be observed in Table 1. The insect affects stems, leaves, flowers, shoots, branches, and fruits of these plants, exhibiting a diverse feeding behavior and

habit.

Table 1: Crops damaged by *Trigona spinipes* in Brazil.

Crop	Location of Attack	References
Passion Fruit	Leaf, floral bud, stem, fruits	Boiça Junior et al. (2004)
Banana	Fruits	Borges et al. (2011)
Grapevine	Berries (fruits)	Botton et al. (2003)
Blueberry	Leaves, fruits	Silveira et al. (2010)
Mango	Fruits	Silva et al. (2003)
Jatropha	Fruits	Nascimento et al. (2011)
Dragon Fruit	Fruits	Marques et al. (2011)
Barbados cherry	Fruits	Alves et al. (1996)
Citrus	Flowers	Zucchi (1993)

The present study aims to report the first occurrence of the stingless bee *T. spinipes* attacking canola plants in Viçosa, Minas Gerais. This research was conducted in the experimental area of Horta Velha, Department of Crop Science at the Federal University of Viçosa (UFV), located in the state of Minas Gerais (MG). The city is situated at latitude 20° 75' S, longitude 42° 85' W, and an altitude of 690 meters (m) (INMET, 2012). The climate, according to Köppen, is classified as a highland tropical climate. Precipitation is concentrated from October to March, with an annual average of 1,165 millimeters, and the mean annual temperature is 19.4°C (INMET, 2012). Daily meteorological data, including precipitation and maximum, mean, and minimum temperatures, were collected from a weather station located 10 meters (m) from the experimental unit. The injuries caused by *T. spinipes* occurred on canola plants of the hybrids Hyola 432, Hyola 433, Hyola 401, and Hyola 61, as can be seen in Figure 1.

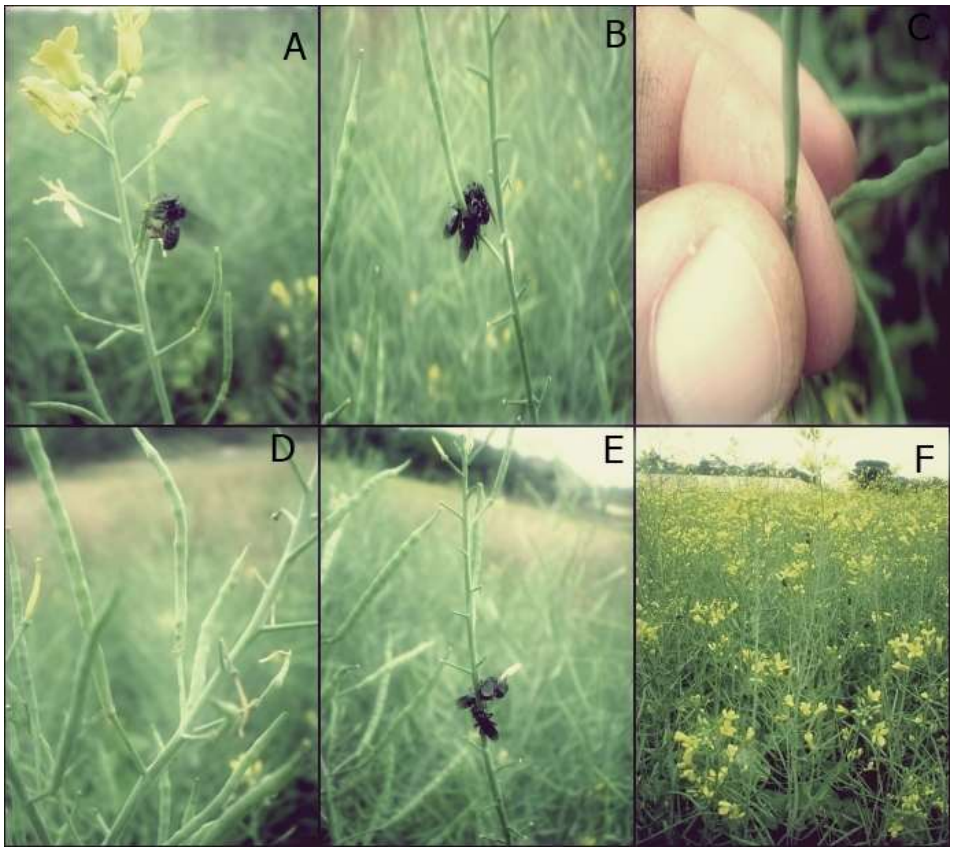

Figure 1: Damages caused by *T. snipines* in different pictures: (A) cutting flowers, (B) Cutting siliques, (C) cutting stem, (D) Leaves cutted, (E) a couple cutting siliques and leaves and (F) record of 10 bees cutting different parts of the plant.

Arapuá bees, actively foraging on aloe flowers, are noteworthy for their distinctive behaviors and ecological adaptations. Despite lacking a stinger, these stingless bees display defensive tactics, such as flying around potential threats and nipping them with their mandibles. This response has evolved as a defense mechanism against predators, including mammals and birds, that target bees, honey, or colony components. Intriguingly, they may even attempt to enter openings like ears or nostrils and entangle in hair or fur to deter intruders from their hive (GIANNINI et al., 2015a).

Communication within the arapuá bee community is a fascinating aspect, involving intricate forms of signaling during foraging recruitment. Workers employ scent trails, intermittent buzzing, and nuanced movements, such as zigzagging and semicircular patterns, to convey the direction and distance of food sources. Their adaptability is evident in their ability to build external nests, allowing them to colonize degraded habitats and disperse over long distances (GIANNINI et al., 2015b).

Observations hint at a potential kleptobiotic behavior, though conflicting information suggests this may occur sporadically, particularly when natural nectar, pollen, and resin sources are scarce. Notably, the bee's documented habit of cutting certain plant species for resin or nectar extraction, potentially causing harm to fruit growers, is context-dependent. It appears to be a limited issue in areas with diverse plant sources, where the arapuá bee contributes significantly to pollination. However, in monoculture or areas lacking melliferous and resinous plants, the bee resorts to alternative methods to secure essential resources. This study sheds light on the behavior of *T. spinipes* in Viçosa-MG, providing valuable insights into its ecological role and adaptation strategies.

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