

## Scientific Note

# First report and injury of *Delia sanctijacobi* (Bigot, 1885) (Diptera: Anthomyiidae) on tomato crop in Brazil

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**Abstract.** The root maggot fly, *Delia sanctijacobi* (Bigot, 1885) (Diptera: Anthomyiidae), is an emerging pest of many vegetables. In this note, we report for the first time the occurrence of *D. sanctijacobi* damaging the tomato (*Solanum lycopersicum* L.) culture in Brazil. The occurrence was recorded in a tomato field located in the municipality of Coronel Freitas, Santa Catarina. The damage was characterized by roots consumption, opening of galleries in the stem and plant stand reduction. The first detection of *D. sanctijacobi* on tomato in Brazil brings an alert to growers and the need of future research about population dynamics and development of management strategies for this species.

**Keywords:** root maggot fly, *Solanum lycopersicum* L., emerging pest.

The tomato (*Solanum lycopersicum* L.) is one of the most produced vegetables worldwide, and has a significant socioeconomic relevance (FAO 2024). Basically, all tomato structures can serve as feed, shelter and reproductive microhabitats for several herbivorous insects (Wakil et al. 2017). Thrips, aphids, whiteflies, caterpillars and mites are among the most harmful pests in the tomato crop (Michereff Filho et al. 2022). The species *Delia sanctijacobi* (Bigot, 1885) (Diptera: Anthomyiidae) is an insect native from South America, with registered occurrence in Argentina, Brazil, Chile, Peru and Uruguay (Gomes et al. 2022). Studies carried in Argentina report that several economically important plants such as brassicas, melon, pumpkin, onion, garlic, eggplant, tomato, beans, alfalfa, sunflower, flax, corn and wheat can serve as host for *D. sanctijacobi* (Molinari 1942; Quintanilla 1969; Hamity & Roman 1987).

In Brazil, *D. sanctijacobi* was for a long time misidentified as *Delia platura* (Meigen, 1826) (Diptera: Anthomyiidae) (Gomes et al. 2022). Outbreaks of this insect have become common in brassica, garlic, onion and beans in the states of Santa Catarina and Paraná (Geremias et al. 2022; Gomes et al. 2023). Larvae of *D. sanctijacobi* are popularly known as root maggot fly, have white to yellowish color and measure about 6-8mm. The initial damage caused by larvae in plants is characterized by roots consumption, and in cases of high infestation, they can open galleries in other vegetative structures as bulbs and stem of seedlings (Geremias et al. 2022; Gomes et al. 2023).

The occurrence of *D. sanctijacobi* damaging tomato crop was already reported in Argentina (Molinari 1942; Quintanilla 1969), however in Brazil, there's no record of this species occurrence in tomato plants so far. Therefore, this study aimed to report for the first time the occurrence of *D. sanctijacobi* damaging tomato crop (*S. lycopersicum*) in Brazil.

On August 23<sup>rd</sup>, 2023, samples of damaged young tomato plants and soil were collected and sent to Plant Health Laboratory from 'Centro de Pesquisa para Agricultura Familiar' (CEPAF) - Epagri, Chapecó, SC for diagnosis. The samples were collected from a tomato field of 0,35 ha with the cultivars Guará and Atary in the municipality of Coronel Freitas, Santa Catarina (26°54'23.2" S, 52°37'17.4" W). Soybean (*Glycine max* L.) was the predecessor crop in the area, and it was harvested in the second half of May 2023 (approximately 2.5 months before tomato seedlings transplanting). Seedling transplant from nursery to field

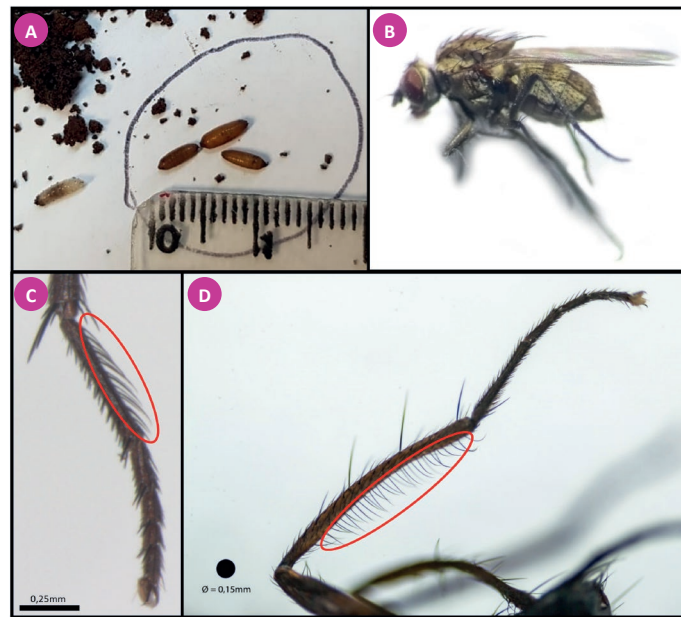
occurred on August 4<sup>th</sup>, 2023, so samples were collected 19 days after transplant. No insecticide treatment was carried on seedlings before transplant. The climate in the site is classified according to Köppen-Geiger climate classification as humid subtropical, with hot summers (Cfa). On August, the average minimum and maximum temperatures are 9°C and 23°C, respectively, the relative air humidity is around 75%, and the average precipitation is 150 mm (Pandolfo et al. 2002).

In the collected soil and plants, larvae and pupae with approximately 0.4 cm (Fig 1A) were found and then incubated at 24±2°C, humidity 70±10% and 14 photophase for adults emergence (Fig 1B). Upon adults emergence, insects were sent to the Entomology Laboratory of 'Estação Experimental de Caçador' (EECD) - Epagri, Caçador, SC and analyzed in a binocular stereomicroscope. The insects were identified as the species *D. sanctijacobi*. The identification was based on the main diagnostic characters of males presented by Gomes et al. (2022): first tarsomere of midleg with a brush of long setulae (longer than tibia width) on its dorsal surface (Fig 1C) and row of 32-45 posteroventral setae on hind tibia longer than tibia width (Fig 1D).

The incidence of this pest was randomly distributed on the tomato field, with an estimative of around 10% of plants attacked, according to a general visual inspection in the all area (total of 7,350 plants). The damage on tomato seedlings was characterized by consumption of roots and opening of galleries in the stem basis by larvae feeding, causing wilting and death of transplanted seedlings and consequent reduction of plant stand in field (Fig. 2).

The occurrence of *D. sanctijacobi* in tomato brings an alert to growers, since this species can cause severe damages in the early stages of the crop, right after seedlings transplant. The two hypothesis for explaining the occurrence of this insect on the observed area are: (1) the insect was already established in the area in the predecessor crop (soybean) and remained in the area feeding and sheltering in crop residues after harvest or (2) a previous contamination of tomato seedlings from the nursery. Larvae from the root maggot fly species *D. platura* are reported to feed on soybean (Hammond 1995; Bosnyákné et al. 2016), and it's presumable that *D. sanctijacobi* can also explore this leguminous crop as a host. In order to prevent high incidences, it's important to monitor the presence of this pest in the predecessor crop, and soil tilling with incorporation of crop residues is recommended to

reduce damage on the subsequent crop (Hammond 1995). The use of yellow sticky traps is effective for adults monitoring, and can help to better know this pest population in the cultivation (Lasa et al. 2024).



**Figure 1.** *Delia sanctijacobi* morphological aspects. (A) Larva and pupae collected in soil and plant sample; (B) General view of emerged adult (female); (C) first tarsomere of male midleg with a brush of long dorsal setulae longer than tibia width (circled in red); (D) row of 32-45 posteroventral setae on male hind tibia longer than tibia width (circled in red). Images: Rodolfo V. Castilhos (A), Leandro D. Geremias (B), Lucas R. P. Gomes (C) and André A. Sezerino (D).



**Figure 2.** Damage of *Delia sanctijacobi* on tomato plants. (A) Roots consumption (plant of the right); (B) Galleries on the stem basis of seedlings (circled in red); (C) Wilting of seedling due damage on the stem (pointed with red arrow); (D) Loss of seedlings after transplantation with loss on plant stand. Images: Rodolfo V. Castilhos (A and B) and Ivan Tormem (C and D).

The control of the root maggot fly *D. sanctijacobi* in the tomato crop is challenging, due its peculiar biology and behavior. Since it is considered an occasional pest in many crops, the scientific literature about this species management is scarce. At the moment, there are no strategies specifically recommended for *D. sanctijacobi* management in Brazil, and most of growers make use of insecticides. Currently, there are 397 commercial insecticides from several chemical groups registered for use in tomato, however, any of them are specifically recommended for *D. sanctijacobi* control (Agrofit 2024). It is reasonable to consider that insecticides such as neonicotinoids, carbamates, organophosphates and pyrethroids used in tomato for other primary pests may have a satisfactory control of the root maggot fly if the

spray reaches the plant stem basis, nonetheless, the use of this insecticides must be parsimonious, especially when broad spectrum active ingredients are involved. *Delia sanctijacobi* is an emerging pest from several vegetables of agricultural importance, and since its first detection in tomato, the incidence and population fluctuation in this crop must be observed in the coming years in Brazil in order to better develop management strategies for this pest.

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## Authors' Contributions

RVC: Conceptualization, Investigation, Writing-original draft, Writing review & editing; JCLJ: Investigation, Writing-original draft, Writing review & editing; JPS: Investigation, Writing review & editing; LRPG: Investigation, Writing-original draft, Writing review & editing.

## Conflict of Interest Statement

The authors declare no conflict of interest.

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