



## Natural parasitism of *Trichogramma pretiosum* (Hymenoptera: Trichogrammatidae) in *Neoleucinodes elegantalis* (Lepidoptera: Crambidae) eggs on tomato (Solanales: Solanaceae) in the Northeast region, Brazil

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The tomato fruit borer, *Neoleucinodes elegantalis* (Guenée, 1854) (Lepidoptera: Crambidae) is considered one of the main pests of the tomato crop, causing direct damage to the fruit, with losses ranging from 20% to 100% (Picanço et al., 2007). Its occurrence was observed in 1922 in the State of Ceará and in 1939 in São Paulo, and later it was found disseminated in almost all tomato producing regions of Brazil (Carneiro et al., 1998). The female of *N. elegantalis* preferably lays the eggs at the base of green fruits, after emergence, larvae rapidly penetrate and develop within the fruit (Eiras and Blackmer, 2003). Because of the insect habit, which makes its control difficult, a viable alternative is the use of *Trichogramma* spp. (Hymenoptera: Trichogrammatidae), because they parasitize the eggs, thus preventing the emergence of the larvae and the damage caused by them (Parra and Zucchi, 2004).

Successful commercial release biological control programs using *Trichogramma* spp. and others parasitoids, require researches that involves the collection, correct identification, selection of the best species and/or lineages best suited to the region (Parra et al., 2002; Pereira et al., 2011). Each species and/or lineage of *Trichogramma* spp. have particularities that make them unique and thus may present variations in the adaptation to the environment, parasitoid's ability to "search", parasitism capacity and overcome the mechanisms of pest defense, such as the physical barriers in the *Spodoptera frugiperda* (J.E. Smith, 1797) (Lepidoptera: Noctuidae) egg mass (Parra and Zucchi, 2004; Beserra et al., 2005; Colazza et al., 2010).

Studies on egg parasitoids in Northeast Brazil have been ignored in recent years (Souza et al., 2016). In Northeast, only three species were reported: *Trichogramma atopovirilia* Oatman & Platner, 1983 (Hymenoptera: Trichogrammatidae) in *Alabama argillacea* eggs (Hübner, 1818) (Lepidoptera: Noctuidae); *Trichogramma galloi* Zucchi, 1988 (Hymenoptera: Trichogrammatidae), in *Diatraea saccharalis* (Fabricius, 1794) (Lepidoptera: Crambidae) eggs; *Trichogramma pretiosum* Riley, 1879

(Hymenoptera: Trichogrammatidae) in *Spodoptera* spp., *Tuta absoluta* (Meyrick, 1917) (Lepidoptera: Gelechiidae) and *A. argillacea* eggs (Bleicher and Parra, 1989; Pratisoli and Parra, 2001; Querino et al., 2016). This being, until then, the only report of natural occurrence of *Trichogramma* spp. in the Ceara State. Carneiro et al. (1998) carried out a research with releases of *T. pretiosum* for the control of *N. elegantalis* in Tianguá-CE, however it was used *Trichogramma* strains from the region of Petrolina-PE.

Thus, the present study investigated the natural occurrence of parasitoids of the genus *Trichogramma* in *N. elegantalis* eggs in commercial tomato farms in the Ibiapaba region, Ceará, Brazil, one of the major producing area of vegetables in the Northeast. *N. elegantalis* eggs were collected in three tomato production areas, in the Serra da Ibiapaba region, Northwestern Ceará State, Guaraciaba do Norte (04° 10' S and 40° 44' W), Ubajara (03° 51' S and 40° 55' W) and Croatá (04° 24' S and 40° 54' W), from 2015 to 2017.

Eggs were randomly collected from tomato plants in areas of organic and conventional production systems. Fruits containing parasitized eggs were collected and sent to the "Laboratório de Entomologia Aplicada (LEA)" of the "Universidade Federal do Ceará (UFC)". Under a stereoscopic microscope, a small piece of the skin of the fruit containing the eggs was removed and inserted into a glass tube (8.5 x 2.5 cm), kept at 25.0 ± 2.0°C, 70 ± 10% relative humidity and 12h photophase, and observed until the parasitoids emerged or the larvae hatched. The adults were sexed and preserved in ethanol (70%) for later identification. *Trichogramma* males were prepared, mounted on slides and identified by Fabrício Fagundes Pereira, D. Sc., at the "Universidade Federal da Grande Dourados (UFGD)" with collaboration by Ranyse Barbosa Querino da Silva, D. Sc., at the "Empresa Brasileira de Pesquisa Agropecuária".

*Trichogramma pretiosum* (Hymenoptera: Trichogrammatidae) was the species obtained from the

**Table 1.** Natural parasitism of *Trichogramma pretiosum* (Hymenoptera: Trichogrammatidae) on tomato-borer *Neoleucinodes elegantalis* (Lepidoptera: Crambidae) eggs in tomatoes in the Ibiapaba region, Ceará State, Northeast, Brazil.

Year	Planting system	Municipality	Total of eggs	Parasitized eggs	Parasitism (%)
2015	Conventional	Ubajara	23	3	13.0
2016	Organic	Guaraciaba do Norte	67	10	14.9
2017	Conventional	Croatá	58	11	19.0

*N. elegantalis* eggs collected in tomato areas of conventional and organic production systems in the Ibiapaba region. The percentage of parasitism in conventional production areas was 13% and 19% in Ubajara and Croatá, respectively, whereas in the organic area, located in Guaraciaba do Norte, the average observed parasitism was 14.9% (Table 1). The present study is the first to report the natural parasitism of *T. pretiosum* on *N. elegantalis* eggs in the Northeast region of Brazil. This is an important information in the effort to reveal the occurrence of *Trichogramma* spp. in the region and an essential step for the conservation of these parasitoids and their use in programs of applied biological control.

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