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Tachinobia sp. (Hymenoptera: Eulophidae) as parasitoid of *Peckia Sarcodexia*) *lambens* (Wiedemann, 1830) (Diptera: Sarcophagidae)

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Abstract

Insect parasitoids have an immature life stage that develops on or within a single insect host, ultimately killing the host, hence the value of parasitoids as natural enemies. This work reports the first occurrence of parasitoid *Tachinobia* sp. (Hymenoptera: Eulophidae) as parasitoid *Peckia* (*Sarcodexia*) *lambens* (Wiedemann, 1830) (Diptera: Sarcophagidae). The pupae were obtained by the flotation method. They were individually placed in gelatin capsules until the emergence of flies or their parasitoids. In November 2013, six pupae were obtained from *P. (S) lambens*, of which two pupae twelve specimens emerged *Tachinobia* sp. The percentage of parasitism was 33.3%. Most insect parasitoids only attack a particular life stage of one or several related species. The immature parasitoid develops on or within a pest, feeding on body fluids and organs, eventually leaving the host to pupate or emerging as an adult.

Keywords: Hymenoptera; Biocontrol; Natural enemy; Traps; First report

1 Introduction

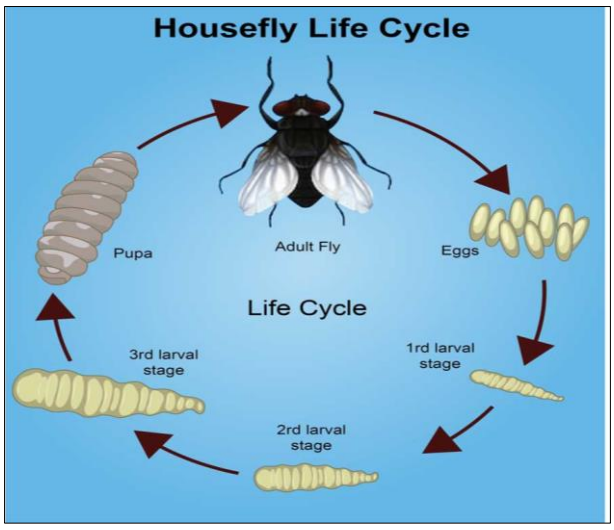

Figure 1 Pest Removal Warrior Housefly Life Cycle: various stages of development;

(Source: https://pestremovalwarrior.com/housefly-life-cycle-various-stages-of-development/)

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The flies included in the Cyclorrapha (Figure 1) have medical and veterinary importance, since they may produce myiasis and act in carrying pathogens to man and animals. They have been found to carry more than 100 species of disease-causing organisms such as bacteria, protozoa and helminthes [1].

Insect parasitoids have an immature life stage that develops on or within a single insect host, ultimately killing the host, hence the value of parasitoids as natural enemies. Adult parasitoids are free-living and may be predaceous. Parasitoids are often called parasites, but the term parasitoid is more technically correct. Most beneficial insect parasitoids are wasps or flies, although some rove beetles (see Predators) and other insects may have life stages that are parasitoids [2].

Parasitoids (Figure 2) are responsible for reducing the populations of flies that proliferate on various substrates. Evaluation of these species for natural control over these insects is important for enabling studies that aim towards subsequent selection of species for use in biological control programs [2].

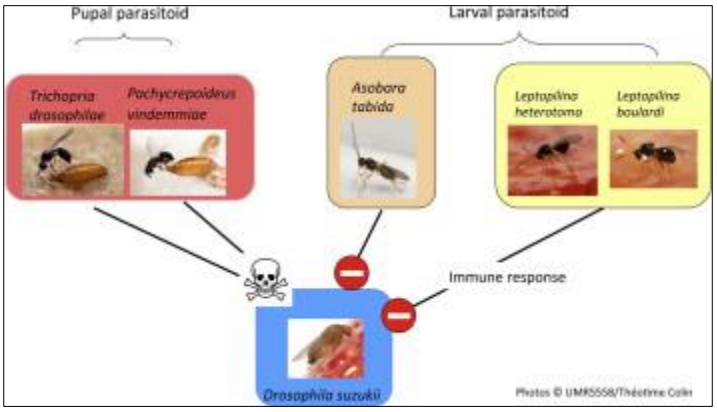

Figure 2 Parasitoid larva and pupae parasitoids

These insects are considered bioindicators of the biodiversity of ecosystems and are considered to be key species for maintaining the equilibrium of the communities in which they are included. In addition, since they are natural enemies of agricultural pests, they may be used in biological control programs (Figure 3) [3].

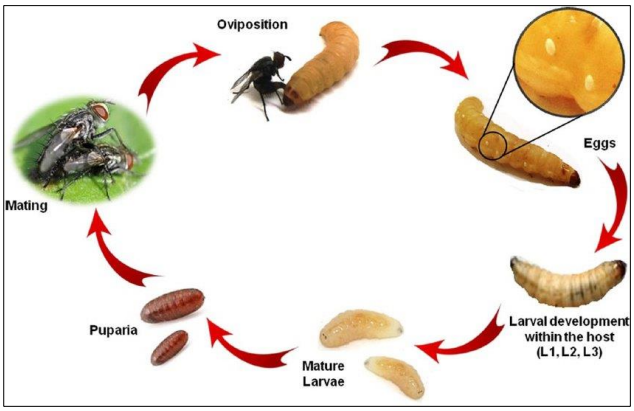

Figure 3 Scheme of the life cycle of *Tachinobia* sp. (pupal parasitoid); Source: file:///C:/Users/Sti/Downloads/Oviposition_Strategies_of_Tachinid_Parasitoids_Two%20 (2).pdf

Tachinobia (Figure 4) species behave as gregarious parasitoid pupal of Lepidoptera and Diptera. Gregarious parasitoid several larvae of the parasitoid complete their development in each individual host, in some cases hundreds of them, and all of them reach full development. Pupal parasitoid is the parasitoid that develops in the host's pupa [4, 5].

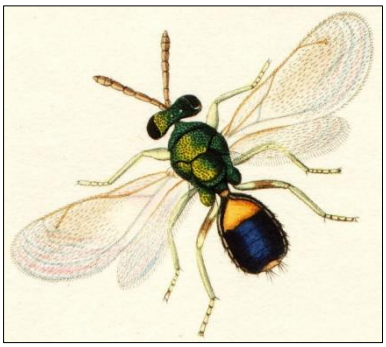

Figure 4 Eulophidae family; (Source: https://alchetron.com/Eulophidae)

The aim of this study is to describe the first report of *Tachinobia* sp. (Hymenoptera: Eulophidae) as parasitoid of *Peckia (Sarcodexia) lambens* Walker (Wiedemann, 1830) (Diptera: Sarcophagidae).

2 Material and methods

The study was conducted between November 2013 and January 2014, at the Universidade Federal de Goiás, region central of Goiás, Brazil. The experiment was carried out at the Federal University of Goiás farm in the central region of Goiás, Brazil (Figure 5). Every fortnight, ten black plastic containers (Figure 6). containing bovine feces were exposed for fifteen days in the pastures. After this period, the feces were sent to the laboratory for pupae extraction. Pupae were removed with the aid of a sieve, counted and stored individually in glass jars. The flies that emerged were identified morphologically.

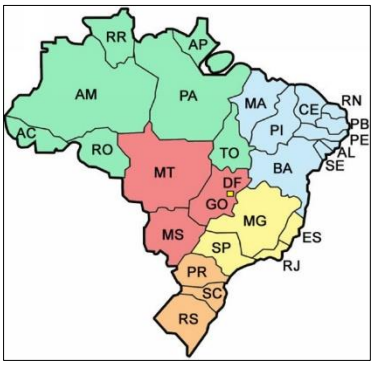

Figure 5 Map of Brazil: State of Goiás (GO); (Source: https://br.pinterest.com/pin/576320083551631769/)

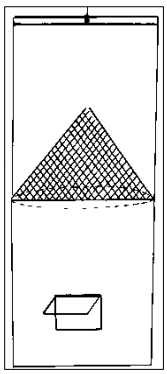

Figure 6 Black plastic containers

The percentage parasitism was calculated as the number of parasitized pupae divided by the total number of pupae collected, and multiplied by 100.

3 Results and discussion

In November 2013, six pupae were obtained from *S. lambens*, of which two pupae twelve specimens emerged *Tachinobia* sp. (Figure 7). The percentage of parasitism was 33.3%.

Figure 7 General appearance of the parasitoid *Tachinobia* sp

The parasitism successful rate can be influenced by the availability of resources, density hosts and to the searching capacity of the parasitoids.

The Sarcophagidae are distributed worldwide and contains about 2600 known species [6]. Are present in all biogeography regions, but mostly concentrated in tropical climate to warm temperate [7]. The Neotropical fauna of Sarcophagidae is very diverse, with over 750 described species, and although despite this, little is known about the biology of the group in this region [7].

Considered *Peckia* as a senior synonym of *Sarcodexia*, maintained the latter as a valid subgenus and redefined the new generic combination *Peckia* (*Sarcodexia*) *lambens* (Wiedemann, 1830) ((Figures 8 and 9). This species, ranging from the southern United States to Argentina is a nonspecific parasite and has been recorded parasitizing birds, mollusks, scorpions and insects being documented as myiasis-causing fly in some species of vertebrates), including men). This species has also been recorded as host of other parasitic insects [8]

Figure 8 *Peckia (Sarcodexia*) lambens (Wiedemann, 1830) Back view; (Source: hrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/)

Figure 9 *Peckia* (*Sarcodexia*) *lambens* (Wiedemann, 1830) Side view; (Source: https://sarcophagidae.myspecies.info/taxonomy/term/1955/media)

As a possibility to control these flies certain groups of parasitoids, agents responsible for reducing flies can be used [9].

4 Conclusion

Among the means for controlling flies, chemical insecticides are the most widely used. However, these may lose their efficiency as populations gradually become insecticide-resistant. The resistance to insecticides shows the growing need to introduce alternative insect control programs, for instance the biological control. It is possible to control these insects, by using the natural regulators such as parasitoids, which are the responsible agents for the reduction of the insects pests populations.

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