Agricultural pests of some parasitoids collected Brazil

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Abstract

The occurrence of different parasitoids of some insect pests were studied in southern Goiás and southern Minas Gerais, Brazil. The parasitoids were obtained from tomatoes, corn and fruits. Parasitoids of eggs, larvae and pupae were obtained.

KEY WORDS: Insecta, Diptera, biocontrol, Hymenoptera, Hemiptera

INTRODUCTION

Due to the negative aspects of insecticide use, many researchers have been considering alternative ways to control this pest and, since 1991, significant progress has been made in controlling this pest biologically (Michereff Filho and Vilela, 2000).

Parasitoids 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 (Marchiori et al., 2002).

The caterpillars of the genus *Lonomia* (Lepidoptera: Saturniidae), which were collected in this experiment, are important causative agents of skin problems in humans, especially for individuals who work in rural areas. These insects can be found associated with economically important crops, which often feed and/or perform your posture (Souza and Reis, 1992).

Among these pests, the tomato leaf miner *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) stands out (Gonçalves-Gervásio et al., 1999). *Tuta absoluta* presents high destructive potential and may attack plant parts in all developmental stages (Souza and Reis, 1992; Michereff Filho and Vilela, 2000).
*Leptoglossus zonatus*, known in Brazil as maize bug, also feeds on several other species (14 families of fructiferous, forage and ornamental plants) showing characteristics of polyphagia and adaptation to different feeding resources (Souza and Amaral Filho, 1999a; 1999b).

*Zaprionus indianus* Gupta (Diptera: Drosophilidae) seems to be the only species spreading out around the globe, mainly due to the international fruit trading. This Drosophilidae is probably from Africa, where it was registered in fruits of 74 plants of species. The first record published on the occurrence of this fly in the American continent some references on samples observed in persimmon fruit in Santa Isabel, São Paulo. Its poliphagy and relatively fast development in hot weather environment have contributed for its setting and dispersion through this. The fig production recorded a loss of 50% in the state of São Paulo due to this fly (Mcalpine, 1983; Tsacas, 1980; Lachaise and Tsacas, 1983; Vilela et al., 1999; Vilela et al., 2001).

The present study aimed to identify the parasitoids collected in insect pests in agricultural area in southern Goiás and in southern of Minas Gerais, Brazil.

2. MATERIAL AND METHODS

2.1. Experiment with maize.

The experiment was performed at the Agronomy School Farm and at the Santa Maria Farm from December 2001 to February 2002. Both farms are located in Itumbiara County, southern of Goiás, Brazil (18°25’S; 49°13’W). Hemiptera egg collections were carried out on a 44x20m maize plot, the Agronomy School Farm. At the Santa Maria Farm, an area of one hectare was divided into 44x20m plots for each of the seven samplings. Fifty ears of maize were randomly collected weekly on each farm, a total of 700 ears. These ears were collected on different plots. The ears were individualized in plastic bags and taken to the laboratory of the Instituto Luterano de Ensino Superior for collection of the naturally infested host eggs. All ears were individually checked for the presence of Hemiptera egg masses. These egg masses were then transferred, together with a small piece of maize foliar sheath, to glass flasks that were maintained in the laboratory, under room temperature, until the emergence of parasitoids and/or nymphs of the host insect.

2.2. Experiment with fruits.
This study was conducted from March to November of 2001 at the College of Agronomy (Faculdade de Agronomia) located in Itumbiara County, State of Goiás, Central Brazil (18º25´S; 49º13´W), Brazil. Flies were attracted to traps made of dull black tin foil cans (19 cm tall and 9 cm in diameter) with two blinders-like openings, located at the 1/3rd bottom part to allow flies entry. To the upper part of each can nylon funnel with opened extremities and base turned down was attached. These traps were then wrapped with plastic bags, which after removal would allow the capture of dipterous and parasitoids.

Fruits (divided banana, apple and pear) were replaced weekly and deposited on top of a soil layer, were placed as baits inside each can. Five of these traps were randomly hung on Eucalyptus sp. trees at 1 m above the soil level, 2 m apart from each other and 50 m away from a domestic garbage deposit. The specimens collected were taken to the laboratory, killed with ethyl ether and stored in 70% ethanol for further identification. After removal of insects, the content of each trap was individually placed into plastic containers layered with sand to serve as substrate for larvae and pupae development. After remaining 15 days in the field these substrata were sifted for extraction of pupae obtained under natural environment. Pupae were then individually transferred to gelatin capsules (number 00) to obtain dipterous and/or parasitoids.

2.3. Experiment with Tuta absoluta
The study was carried out using an area of 20 m2 in a greenhouse belonging the Federal University of Lavras, in Lavras County (21º14’43”S; 44º59’59”W), southern of Minas Gerais. From August 2001 to February 2002, parasitoids were obtained from T. absoluta pupae collected on 35 out of a total of 120 tomato plants, cv. Santa Clara. Tomato seedlings were planted in PVC pots with 20-liter capacity and maintained in the greenhouse at 27ºC and 60 ± RH. When plants reached 40 days, the leaves containing pupae were cut with scissors and transferred to the Biological Control Laboratory. Pupae were then retrieved with the aid of tweezers, counted, and individualized in glass flasks until emergence of Lepidoptera or parasitoid adults. These were identified under stereomicroscope and then preserved in 70% ethanol.

2.4. Experiment with Lomonia sp.
During the period August to November 2002 100 plants were inspected Coffee arabica, in a culture of conventional type system located at the Federal University of Lavras, southern of MG. Larvae were collected with the aid of tweezers, individualized in glass tubes and brought to the laboratory Reception and Screening of Insects Entomology Department of the Federal University of Lavras, where they remained until the
emergence of adults and/or their parasitoids, which were subsequently identified.

3- RESULTS AND DISCUSSION

A total of 113 eggs of L. zonatus were collected from January to February 2002, from which 40 nymphs (35.4%) of the host species and 64 parasitoids (56.6%), from five different species, emerged (Table 1). Nine of the eggs (8.0%) did not produce either nymphs or parasitoids.

Among the parasitoids collected, Gryon gallardo (Brethes) (Hymenoptera: Scelionidae) was the most frequent species representing 79.6% of the specimens, probably influenced by the seasonal variation. Gryon gallardo is also a parasitoid of eggs of other Hemiptera belonging to the Coreidae family that, in Brazil, attack rice, potato, tobacco, tomato and papaya (Loiacono, 1980).

The parasitism also reported in the genera Gryon, Neolele (Hymenoptera: Eurytomidae), Ooencyrtus (Hymenoptera: Encyrtidae) and Anastatus (Hymenoptera: Eupelmidae) on eggs of L. zonatus (Jones, 1993).

Between March to November of 2001, 285 specimens of Pachycrepoideus vindemmiae (Rondani) (Hymenoptera: Pteromalidae) were obtained from 963 pupae of Z. indianus (Table 1). P. vindemmiae is considered a solitary parasitoid of numerous Diptera from the families Anthomyiidae, Calliphoridae, Muscidae, Tachinidae and Tephritidae, among others. P. vindemmiae was the most collected species with 98.9%, probably due to their ability to search.

Between March and November 2001, 03 specimens of Leptopilina boulardi (Barbotin et al. (Hymenoptera: Figitidae) collected in the months of September (two specimens) and November (one specimen) of 2001 in the spring, were obtained from 139 pupae of Z. indianus (Table 1).

Species of the genus Leptopilina, well-known parasitoids of Drosophilidae, may also be reared from rotting fruit (Wharton et al., 1998).

During the study, from 500 T. absoluta pupae obtained, emerged parasitoids of the species Bracon sp. (Hymenoptera: Braconidae), Earinus sp. (Hymenoptera: Braconidae), and Conura sp. (Hymenoptera: Chalcididae). Bracon sp. was the most collected species with 60.0 (Table 1), due to its greater efficiency in searching for the host or to the
influence of seasonal variation. Tomato plant infestation inside the greenhouse occurred because the windows allowed both pests and parasitoids insects to enter.

The natural occurrence of the genera *Bracon*, *Earinus*, and *Conura* inside the greenhouse suggests a close interaction among these species and their tomato leaf miner host. The nature of this relationship, however, has to be further studied in order to better evaluate the impact of these parasitoids on the insect pest population. Since these parasitoids are natural enemies of insect pests, the feasibility of their use as biological control agents in the tomato crop should be investigated.

Larvae belonging to 40 species were collected *Lonomia* sp., Of which seven Hymenoptera were parasitized by ectoparasites being four per *Anastatus* sp. (Eupelmidae) and three *Aprostocetus* sp. (Eulophidae) was the most frequent species *Anastatus* sp. to 57.1% (Table 1). Given the importance of this lepidopteran, there is a great need for knowledge of their biogeographically distribution, as well as their enemies natural, which may be part of biological pest control programs (Oliveira Júnior et al., 2007).

The nature of this relation, however, has to be deeper studied in order to permit a better evaluation of the impact of these parasitoids on the insect pest population. Since these parasitoids are natural enemies of insect pests, the feasibility of their use as biological control agents on the fig is an encouraging possibility.

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| Insects pests     | Specie of parasitoids                                      | Number of specimens |
|-------------------|------------------------------------------------------------|---------------------|
| Lomonica sp.      | **Eupelmidae:** Aneisata sp. Aprostocetus sp.              | 04 03               |
|                   | **Leptoglossus zonatus**                                    |                     |
|                   | **Eupelmidae:** Aneisata sp. Braxena sp. Scelionidae Gryon galleoidi Trissolcus sp. | 05 02 41 06         |
| Tuta absoluta     | **Braconidae:** Bracon sp. Earnus sp. Conura sp.           | 21 01 13            |
| Zaprius indicus   | **Figitidae:** Leptopilina boulardi Pteromalidae Pachycrepoides vindemii | 03 285             |