SCIENTIFIC NOTE

Natural Enemies of *Bemisia tabaci* (Gennadius) B Biotype and *Trialeurodes vaporariorum* (Westwood) (Hemiptera: Aleyrodidae) in Brasília, Brazil

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Neotropical Entomology 32(1):151-154 (2003)

Inimigos Naturais de *Bemisia tabaci* (Gennadius) Biotipo B e *Trialeurodes vaporariorum* (Westwood) (Hemiptera: Aleyrodidae) em Brasília, DF

RESUMO - Uma investigação foi conduzida em Brasília, DF, de janeiro de 1999 até março de 2001, sobre fumo, algodão, tomate, couve, soja, feijão, melão, jiló e a planta daninha *Emilia sonchifolia* DC, a fim de se obter inimigos naturais das moscas-brancas *Bemisia tabaci* (Gennadius) e *Trialeurodes vaporariorum* (Westwood). Ao todo, 14 predadores, 12 parasitóides e dois hiperparasitóides foram coletados. Entre os parasitóides, *Encarsia inaron* (Walker) ainda não havia sido registrada na América do Sul, e *E. basicincta* Gahan é um novo registro para o Brasil. *E. aleurothrixi* Evans & Polaszek é também registrada pela primeira vez parasitando *B. tabaci*. Os besouros *Nephaspis hydra* Gordon e *Delphastus davidsoni* Gordon são registrados pela primeira vez predando *B. tabaci*.

PALAVRAS-CHAVE: Mosca-branca, parasitóide, predador, hiperparasitóide

ABSTRACT - A survey was conducted in Brasília, DF, from January 1999 to March 2001, on tobacco, cotton, tomato, cabbage, soybean, bean, melon, eggplant and the weed *Emilia sonchifolia* DC, to collect natural enemies of the whiteflies *Bemisia tabaci* (Gennadius) and *Trialeurodes vaporariorum* (Westwood). Fourteen predators, twelve parasitoids and two hyperparasitoids were collected. Among the parasitoids, *Encarsia inaron* (Walker) is recorded for the first time in South America, and *E. basicincta* Gahan is a new record for Brazil. *E. aleurothrixi* Evans & Polaszek is recorded for the first time parasitizing *B. tabaci*. The lady beetles *Nephaspis hydra* Gordon and *Delphastus davidsoni* Gordon are registered for the first time preying on *B. tabaci*.

KEY WORDS: Whitefly, parasitoid, predator, hyperparasitoid

Although there are about 1200 species of whiteflies described, with less than 40 species being considered pests (Martin 1999), whiteflies have become a major problem for agriculture in tropical and subtropical areas of the world. *Bemisia tabaci* (Gennadius) and *Trialeurodes vaporariorum* (Westwood) cause the most severe losses (Byrne *et al.* 1990), and the occurrence of biotypes of *B. tabaci* has driven resources towards to the study of these insects (Martin *et al.* 2000).

B. tabaci adaptability has resulted in extending its geographical range in subtropical and tropical agricultural systems and has facilitated its dispersal and establishment in temperate climate areas. Year-round crop production has favored whiteflies and has probably led to their survival throughout the year and further adaptation to new hosts (Brown 1994). This species is now globally distributed, being found on all continents except Antarctica (De Barro & Hart 2000).

Whiteflies damage plants by feeding in large numbers, producing a sugary substance (honeydew) that accumulates on the leaves and fruits, on which sooty moulds develop, reducing photosynthesis and making the fruits inappropriate for commercialization (Hoelmer *et al.* 1994).

The occurrence of whiteflies in Brazil was first registered at the end of the 19th century (Göeldi 1886), but *B. tabaci* was only recorded in the 1930s (Bondar 1928). Occasional outbreaks of this species were described in the 1970s on bean, cotton and tomato (Costa *et al*. 1973). However, the strain or B biotype of *B. tabaci* was introduced into Brazil around 1991 through São Paulo State, possibly due to the commercialization of ornamentals (Lourenção & Nagai 1994). The B biotype rapidly spread in Brazil and now it occurs in 23 out of 27 states (Lima *et al*. 2000). The B biotype is found infesting a large number of crops and weeds, some of which have not been reported before (Oliveira *et al*. 2000).

B. tabaci is a cosmopolitan and highly polyphagous species,

feeding on approximately 540 host plants, belonging to 74 families (Mound & Halsey 1978, Basu 1995). In Brazil, *B. tabaci* has been colonizing new weed hosts as well as important crops.

T. vaporariorum is also cosmopolitan and polyphagous, and although it is considered one of the main greenhouse pests, in Brazil it is considered to be a secondary pest. However, *T. vaporariorum* has been recorded on 162 plant species, belonging to 40 families, in greenhouses in Brazil (Oliveira 1995).

The aim of this paper was to present a preliminary list of *B. tabaci* and *T. vaporariorum* natural enemies collected in Brasília, DF, emphasizing the new occurrences. The study was not intended to provide quantitative data.

Surveys of natural enemies were conducted from January 1999 to March 2001 on *Nicotiana tabacum* L. (tobacco), *Gossypium hirsutum* L. (cotton), *Lycopersicon esculentum* Mill. (tomato), *Brassica oleracea* L. (cabbage), *Glycine max* Merr. (soybean), *Phaseolus vulgaris* L. (bean), *Cucumis melo* L. (melon), *Solanum gilo* Raddi (eggplant) and the weed *Emilia sonchifolia* DC. The colonies of whiteflies were reared in two greenhouses, one containing *B. tabaci* and other infested by *T. vaporariorum*, at Embrapa Recursos Genéticos e Biotecnologia. The host plants were kept altogether both in rows measuring 10 x 5 m and in mesh houses measuring 1.2 x 1.2 x 1.2 m, both in greenhouses.

Besides the colonies kept in greenhouses, an external area measuring 24 x 25 m, distant about 50 m from the greenhouses, and containing the same host plants mentioned above was also investigated periodically for natural enemy detection. In this area, the host plants were also disposed in rows. Weekly, 10 host plants leaves were randomly chosen and cut off. In the laboratory, the abaxial surfaces of the leaves were inspected and those infested by whitefly nymphs or containing predator larvae were kept in petri dishes and maintained in climatic chamber (25 ± 1ºC, 70 ± 10 RH, 14L:10D photoperiod) until adult emergence of predators and parasitoids. The adult specimens were fixed in 70% alcohol or pinned and sent to specialists for identification.

Fourteen predators, twelve parasitoids and two hyperparasitoids were recorded attacking *B. tabaci* and *T. vaporariorum* (Table 1). *Encarsia formosa* Gahan was

Table 1. Natural enemies of the whiteflies *B. tabaci* and *T. vaporariorum* in Brasília, DF.

B. tabaci	*T. vaporariorum*
Predators	Predators
Coleoptera: Coccinellidae	Coleoptera: Coccinellidae
Cycloneda sp.	*Nephaspis gemini* Gordon
C. sanguinea (L.)	
Delphastus davidsoni Gordon	Parasitoids
Eriopis connexa (Germar)	Hymenoptera: Aphelinidae
Hippodamia convergens Guérin-Méneville	*Encarsia* sp.
Nephaspis gemini Gordon	*E. basicincta* Gahan
N. hydra Gordon	*E. desantisi* Viggiani
	E. formosa Gahan
Diptera: Syrphidae	*E. hispida* De Santis
Allograpta exotica (Wiedemann)	*E. luteola* Howard
Ocyptamus mentor (Curran)	*E. lycopersici* De Santis
Toxomerus lacrimosus (Bigot)	*E. nigricephala* Dozier
Neuroptera: Chrysopidae	Hyperparasitoids
Ceraeochrysa cincta (Schneider)	Hymenoptera: Signiphoridae
C. claveri (Navás)	*Signiphora aleyrodis* Ashmead
Chrysoperla defreitasi Brooks	*S. flavopalliata* group
C. externa (Hagen)	
Parasitoids	
Hymenoptera: Aphelinidae	
Encarsia aleurothrixi Evans & Polaszek	
E. formosa Gahan	
E. hispida De Santis	
E. inaron (Walker)	
E. lutea (Masi)	
E. luteola Howard	
E. nigricephala Dozier	
*E.*cf. *porteri* (Mercet)	
Hyperparasitoid	
Hymenoptera: Signiphoridae	
Signiphora aleyrodis Ashmead	

found in 40.2% of the samples, followed by *E. hispida* De Santis, which occurred in 7.1% of the samples. Both parasitoids were found parasitizing *B. tabaci* and *T. vaporariorum*. The remaining parasitoids occurred in 2.5% of the samples. All the parasitoids were observed parasitizing 3rd- and 4th-instar whitefly nymphs, except *E. lycopersici* De Santis that was sometimes detected in great number parasitizing *T. vaporariorum* second instar nymphs.

The following parasitoids are new records: *Encarsia inaron* (Walker), which had not yet been registered in South America, and *E. basicincta* Gahan, not yet detected in Brazil (Polaszek *et al.* 1992, Schuster *et al.* 1998, D. Gerling, pers. comm.). *E. aleurothrixi* Evans & Polaszek is registered for the first time parasitizing *B. tabaci*. This species was described from Brazil parasitizing the whiteflies *Aleurothrixus aepim* (Göeldi) and *A. floccosus* (Maskell) (Evans & Polaszek 1998). *E. inaron* (Walker) is used in biological control programs of *T. vaporariorum* in Russian greenhouses (Slobodyanyuk *et al.* 1993), and of ash whitefly, *Siphoninus phillyreae* (Haliday), in theUSA (Gould *et al.* 1992).

The hyperparasitoid *Signiphora aleyrodis* Ashmead was collected from both *B. tabaci* and *T. vaporariorum*, whereas the *S. flavopalliata* group was obtained only from *T. vaporariorum*. These hyperparasitoids were seldom observed and they act frequently as primary parasitoid of *E. formosa* and *E. hispida*. However, *S. aleyrodis* was on a few occasions observed apparently acting as primary parasitoid in *T. vaporariorum* nymphs.

In relation to predators, the lady beetle *Nephaspis gemini* Gordon was observed in 14.8% of the samples. At first, larvae and adults were seen feeding on *T. vaporariorum* eggs and nymphs, and later on *B. tabaci* eggs and nymphs. The remaining species were found in smaller number and frequency. The lady beetles *Nephaspis hydra* Gordon and *Delphastus davidsoni* Gordon are recorded preying on *B. tabaci* for the first time.

The neuropteran and dipteran predators were observed preying only on *B. tabaci*. Unlike the beetles, the green lacewings and flower flies were found preying on whitefly immature stages, while adults fed on pollen and nectar.

In Brasília, there are a great number of whitefly natural enemies not yet recorded, opening new perspectives for the development of integrated management programs.

Acknowledgments

We are grateful to Dr. G.A. Evans, University of Florida, USA, and Dr. A. Polaszek, International Institute of Entomology, London, UK, for the identification of the parasitoids and hyperparasitoids; Dr. R.D. Gordon, National Museum of Natural History, Washington, USA, for the identification of the coleopterans; Dr. F.C. Thompson, Smithsonian Institution, Washington, USA, for the identification of the flower flies; and Dr. Sérgio de Freitas, UNESP, Jaboticabal, SP, for the identification of the green lacewings.

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Received 24/12/01. Accepted 30/08/02.