

## Record of natural enemies of whitefly, *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae) in some cultivated crops in Haryana

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### ABSTRACT

The whitefly, *Bemisia tabaci* (Gennadius) is a worldwide pest in diverse agroecosystems. There are numerous species of predators and parasitoids that are associated with this pest. A field survey was conducted to determine the natural enemies of *B. tabaci* in 14 cultivated crops in Hisar, Haryana. Six species of natural enemies of *B. tabaci* were observed, including 5 species of predators and one species of parasitoid. *Serangium parcesetosum* Sicard, *Cheilomenes sexmaculata* (Fabricius) and *Brumoides suturalis* (Fabricius) were the most commonly found predators. *Encarsia lutea* was the only nymphal parasitoid reported on seven crops. *S. parcesetosum* was reported for the first time from Haryana on *B. tabaci* on cotton.

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**Key words:** *Bemisia tabaci*, natural enemies, predator, parasitoid.

### INTRODUCTION

The whitefly, *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae) is a devastating pest of vegetables, ornamental plants and agronomic crops throughout the tropical and subtropical regions of the world (Oliveira *et al.* 2001). Numerous species of parasitoids and predators are associated with *B. tabaci* (Gerling *et al.*, 2001; Li *et al.*, 2011; Torres *et al.*, 2014). These natural enemies of *B. tabaci* are found in diverse agroecosystems around the world. A wide diversity of generalists predators feed on *B. tabaci* (Nordlund and Legaspi, 1996; Gerling *et al.* 2001; Palaniswami *et al.*, 2001). Several studies have been conducted on the importance of the beneficial fauna attacking *B. tabaci* in agricultural systems (Asiimwe *et al.*, 2007; Atuncha *et al.*, 2013). In India studies conducted in Andhra Pradesh, Tamil Nadu and Maharashtra states have also added important information on natural enemies of *B. tabaci* (Natarajan, 1990; Kapadia and Puri, 1991 and Rao *et al.*, 1989). However, there is no information available on natural enemies of *B. tabaci* from Haryana. Therefore, the present investigations were undertaken to document various natural enemies of *B. tabaci* on some cultivated host plants.

### MATERIALS AND METHODS

Fourteen diverse crops were sown during different dates, namely, okra (*Abelmoschus esculentus*), soybean and sesamum during first fortnight of June;

eggplant, mungbean, urdbean, chilli (*Capsicum annuum*), pumpkin (*Cucurbita moschata*), Indian bean (*Lablab purpureus*), cowpea (*Vigna unguiculata*) and ricebean (*Vigna umbellata*) during first fortnight of July; cotton (*Gossypium hirsutum*) during second fortnight of May; sunflower (*Helianthus annuus*) during first fortnight of March; tomato (*Solanum lycopersicum*) during second fortnight of February in experimental field plots without insecticidal sprays during 2011, 2012 and 2013. Each experimental plot was 500 m<sup>2</sup> in size. At ten days interval after 30 days of sowing the leaf samples were collected from each field. The samples consisted of 25 leaves that were randomly selected from separate plants in a zigzag pattern in each field, and the leaves were taken from the middle canopy of the selected plants. The adult predators of *B. tabaci* were determined based on direct observation of each selected leaf while the leaf was still attached to the plant and the immature stages of predators feeding on the whitefly nymphs were collected and reared in the laboratory culture of *B. tabaci* until the emergence of adult. The leaves with parasitized nymphs were kept in glass jars covered with muslin cloth and the parasitoids were allowed to emerge. All adult specimens of parasitoids found at the bottom of the rearing containers were then collected and preserved. All the natural enemies were got identified from experts upto species level.

**Table 1.** List of natural enemies of *Bemisia tabaci* in some cultivated crops during 2011- 2013.

Crop	Period of activity of natural enemies*					
	<i>B. suturalis</i>	<i>S. parcesetosum</i>	<i>C. zastrowi sillemi</i>	<i>C. sexmaculata</i>	<i>C. septempunctata</i>	<i>E. lutea</i>
Okra	July-September	-	-	July-September	July	July-September
Eggplant	-	August-September	August- September	August –November	-	August –Nove.
Urdbean	July-September	July-September	-	July-September	-	July-September
Mungbean	July-September	July-September	-	July-September	-	July-September
Cotton	July-October	July-October	July-October	July-October	July-October	July-October
Sunflower	March-April	-	March-April	March-April	March-April	-
Soybean	July-September	July-September	-	July-September	-	July-September
Chilli	July-September	--	-	July-September	-	-
Pumpkin	July-September	--	-	July-September	-	-
Tomato	March-April	-	-	March-April	March-April	-
Indian bean	August-October	August-October	August-October	August-October	August-October	-
Cowpea	-	-	-	July-September	July-September	-
Ricebean	August-October	August- October	August- October	August- October	August- October	August- October
Sesamum	-	-	-	-	-	-

## RESULTS AND DISCUSSION

Five species of predators and one species of parasitoid were observed among the 14 cultivated crops (Table 1). The five predators were identified as: *Serangium parcesetosum* Sicard, *Brumoides suturalis* (Fab.), *Cheilomenes sexmaculata* (Fab.), *Coccinella septempunctata* L., *Chrysoperla zastrowi sillemi* (Esben-Petersen) and a parasitoid, *Encarsia lutea* (Masi). The *C. sexmaculata* coccinellid predator was commonly found in all cultivated crops except sesamum. *S. parcesetosum* was observed in ten cultivated crops (eggplant, mungbean, urdbean, cotton, soybean, Indian bean and ricebean). It has been recorded feeding on *B. tabaci* on cotton (Kapadia and Puri, 1992) and on *Aleurocanthus woglumi* Ash by Kalidas, (1995). In cotton and ricebean crops all the recorded six natural enemies were observed during the period of July to October. Rao *et al.* (1989) in Andhra Pradesh reported that *B. tabaci* was predated by coccinellids, *Verania vincta*, *Menochilus sexmaculata*, *Chrysoperla carnea* and the phytoseiid, *Amblyseius* sp. Three coccinellid predators namely, *B. suturalis*, *S. parcesetosum* and *C. sexmaculata* were observed in mungbean and urdbean during July to September.

Several workers from different locations have also reported the peak activity of coccinellids and hrysopids in different cropping systems (Purohit *et al.*, 2006; Aggarwal *et al.*, 2007; Kutuk *et al.*, 2008; Simmons and Rabou, 2007). The parasitization by

nymphal parasitoid, *E. lutea* was observed during July to November on five crops like okra, cotton, soybean, ricebean and eggplant. Earlier, Sharma *et al.* (2003) also reported *B. tabaci* parasitization by *E. lutea* on three different crops such as soybean, urdbean and cotton during July to October. Abdel-Fattah (1986) recorded 22 to 60% parasitization of whitefly by *E. lutea* in cotton crop. On sesamum crop no natural enemies were recorded. Among the recorded natural enemies the coccinellid predator, *S. parcesetosum* was reported for the first time from Haryana. The present investigations provides an opportunity to further extend the studies to understand the association of natural enemies with *B. tabaci* and to explore the possibility of utilizing the newly recorded natural enemies for biological control in cultivated crops.

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