

New Host Record for *Encarsia Sophia* (Hymenoptera: Aphelinidae) A Parasitoid Of Whitefly Species (Hemiptera: Aleyrodidae)

¹Shaaban Abd-Rabou and ²Gregory A. Evans

¹Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt

²USDA/APHIS/PPQ c/o Systematic Entomology Laboratory,
USDA/ARS/BARC-West, Beltsville, MD 20705, USA

Abstract: *Encarsia sophia* (Girault and Dodd) (Hymenoptera: Aphelinidae) was reared from *Pealius mori* (Takahashi) (Hemiptera: Aleyrodidae), an exotic whitefly species recently found infesting mulberry, *Morus alba* L. (Moraceae) in Giza, Egypt. This is the first record of *E. sophia* parasitizing this host species.

Key words: Biocontrol • Parasitic Hymenoptera • Aleyrodidae • Chalcidoidea

INTRODUCTION

Encarsia sophia (Girault and Dodd) (Hymenoptera: Aphelinidae) is a virtually cosmopolitan parasitoid known to parasitize 36 species of whiteflies [1]. It is an autoparasitoid, which oviposits female eggs in whitefly nymphs and male eggs externally on female larvae of primary parasitoids, either of their species or of other *Encarsia* and *Eretmocerus* species inside the whitefly nymphs. Recent research demonstrates that the efficiency of *E. sophia* in the biological control of whiteflies can be readily manipulated by controlling the duration of food deprivation and effects on mating status. This parasitoid suppresses more whiteflies through parasitism and host feeding than do other commonly used species [2-4].

The mulberry whitefly, *Pealius mori* (Takahashi) (Hemiptera: Aleyrodidae) has a serious pest of plantation and sucks the cell sap of the tender leaves of improved mulberry varieties. The leaves become pale, dechlorinated and curled or dwindled and are unsuitable for feeding silkworms (*Bombyx mori* L.) [5] as well as excretes honey dew that results in a black sooty mould on the mulberry leaves, which makes them unsuitable for silkworm feeding. Silkworms require leaves as a food source and attempts to use others plants or artificial diets without adding mulberry leaves have been unsuccessful. If their diet does not include mulberry leaves silkworm exhibit disrupted growth, high larval mortalities, small and thin-walled

cocoons and adult deformities [6]. This whitefly had been previously discovered infesting *Euphorbia* sp. in Giza, Egypt by Abd-Rabou and Evans [7].

During a field survey of whitefly parasitoids in July and August (2013) in Giza governorate, we collected 30 leaves of mulberry, *Morus alba* L. (Moraceae) infested with the mulberry whitefly, *P. mori*. The infested leaves were collected and placed separately in paper bags for further examination in the laboratory. The samples were maintained in a well-ventilated container and held for parasitoid emergence. The parasitoids that emerged were processed and mounted in Hoyers medium for examination and identification. The results indicated that 1533 individuals of whitefly, *P. mori* larval stages / 30 leaves was parasitized by 167 individuals of the parasitoid/ 30 leaves with percent parasitism about 10.2%. All of the parasitoids reared from *P. mori* were *Encarsia sophia* (Girault and Dodd).

Table (1) showed that the mulberry whitefly, *P. mori* recorded associated with 5 parasitoid species one of these recorded here for the first time (*E. sophia*) as well as the parasitoid, *E. lutea* is also known to occur in Egypt, but was not reared from the mulberry whitefly, *P. mori* in our collections.

During 1998, adult *E. sophia* wasps were collected from *B. tabaci* infested cotton, *Gossypium hirsutum* L., plants in a field in Ethiopia and shipped to the Plant Protection Research Institute quarantine facility in Dokki,

Table 1: Parasitoids associated with the mulberry whitefly, *Pealius mori*

Family	Parasitoid species	Reference
Aphelinidae	<i>Encarsia bothrocera</i> Huang and Polaszek	Huang and Polaszek [10]
	<i>Encarsia cibcensis</i> Lopez-Avila	Huang and Polaszek [10]
	<i>Encarsia lutea</i> (Masi)	Evans [11]
	<i>Encarsia perflava</i> Hayat.	Huang and Polaszek [10]
	<i>Encarsia sophia</i> (Girault and Dodd)	Present work

Egypt. After the identity of the parasitoids was confirmed, they were reared on *B. tabaci* infested *Lantana camara* L. in the laboratory [8]. Parasitoids from this colony were used for experimental releases in Qalyubiya governorate in Egypt. Approximately 200,000 adults of *E. sophia* were released in field plots of “Balady” cabbage (*Brassica oleracea* var. *capitata* L.), “Madina” cucumber (*Cucumis sativus* L.) and “Aswad” eggplant (*Solanum melongena* L.) that were naturally infested with *B. tabaci* B-biotype during 2001. Weekly releases of 10 to 15 parasitoids per plant were made from July to October for a total of 15 releases. Increase in rates of parasitism by *E. sophia* tended to be additive for overall parasitism in the release plots and was mostly affected in cabbage followed by the cucumber crop. In the release plots, parasitism peaked at ~70% during the last 5 wk in cabbage, whereas parasitism peaked at ~50% in cucumber and eggplant. Among the crops, cabbage appears to have benefited the most from parasitoid augmentation [9]. Our results agree with aforementioned results about the incidence of this parasitoid and its efficiency in Egypt. It is concluded, this represents the first record of the association of *E. sophia* with *P. mori*.

REFERENCES

- Noyes, J.S., 2012. Universal Chalcidoidea Database. World Wide Web electronic publication. <http://www.nhm.ac.uk/chalcidoids>.
- Hunter, M.S. and S.E. Kelly, 1998. Hyperparasitism by an exotic autoparasitoid: secondary host selection and the window of vulnerability of conspecific and native heterospecific hosts. *Entomol. Exp. Appl.*, 89: 249-259.
- Zang, L.S. and T.X. Liu, 2008. Host feeding of three whitefly parasitoid species on *Bemisia tabaci* B biotype, with implication for whitefly biological control. *Entomol. Exp. Appl.*, 127: 55-63.
- Zang, L.S. and T.X. Liu, 2009. Food-deprived host-feeding parasitoids kill more pest insects. *Biocontrol. Sci. Tech.*, 19: 573-583.
- Singh, N.I. and Th. B. Singh, 1991. *Pealius mori* (Homoptera: Aleyrodidae), a new record of an insect pest of *Morus* species in Manipur. *Sericologia*, 31(2): 355-359.
- Maketon, M., P. Orosz-Coghlan and D. Hotaga, 2009. Laboratory and field evaluation of *Beauveria bassiana* for controlling Mulberry whitefly *Pealius mori* Takahashi (Homoptera: Aleyrodidae) in mulberry (*Morus alba* Linn). *Journal of Pest Science*, 82(3): 251-259.
- Abd-Rabou, S. and G. Evans, 2013. *Pealius mori*-a new invasive whitefly to Egypt (Hemiptera: Aleyrodidae). *Acta Phytopathologica et Entomologica, Hungarica* (In Press).
- Abd-Rabou, S., 1998. A revision of the parasitoids of whiteflies from Egypt. *Acta Phytopathologica et Entomologica, Hungarica*, 33: 193-215.
- Simmons, A.M. and S. Abd-Rabou, 2005. Parasitism of *Bemisia tabaci* (Homoptera: Aleyrodidae) after multiple releases of *Encarsia sophia* (Hymenoptera: Aphelinidae) in three vegetable crops. *J. Agric. Urban Entomol.*, 22(2): 73-77.
- Huang, J. and A. Polaszek, 1998. A revision of the Chinese species of *Encarsia* Foerster (Hymenoptera: Aphelinidae): parasitoids of whiteflies, scale insects and aphids (Hemiptera). *Journal of Natural History*, 32: 1825-1966.
- Evans, G.A., 2007. The whiteflies (Hemiptera: Aleyrodidae) of the world and their host plants and natural enemies. http://www.sel.barc.usda.gov:8080/1WF/whitefly_catalog.htm.