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Importation, colonization and establishment of the parasitoid, *Encarsia pergandiella* Howard (Hymenoptera: Aphelinidae) on *Bemisia argentifolii* Bellows & Perring (Homoptera: Aleyrodidae) in Egypt

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ABSTRACT: In Egypt for control of *Bemisia argentifolii* Bellows & Perring (Homoptera: Alyerodidae) biologically on different host plants about 250000 individuals of the imported parasitoid, *Encarsia pergandiella* Howard (Hymenoptera: Aphelinidae) were released during 2004- 2005 on different host plants. After releasing the parasitoid was evaluated. The average parasitism rates in Demmyate on cotton were 11.4 and 18.2 per cent during 2001 and 2002, respectively. While in Behira on common beans average parasitism was 6 and 10.3 per cent, and in Qalyubiya on cucumber it was 14.5 and 17 per cent during 2004 and 2005, respectively. Significant positive correlation was observed between the population of *E. pergandiella* and the build-up of the whitefly population all over the three governorates, which indicated the establishment of *E. pergandiella* parasitoid on these economic crops in Egypt.

KEY WORDS: Aphelinidae, biocontrol, Egypt, *Encarsia pergandiella*, whiteflies

INTRODUCTION

Bemisia argentifolii Bellows & Perring, the B strain of *Bemisia tabaci* (Gennadius) (Homoptera: Alyerodidae) is one of the most significant pests of agricultural production in the different parts of the world (McAuslane *et al.*, 2000).

Biological control is considered a promising approach toward ameliorating the whitefly problem, and considerable research is underway to examine the impact of native natural enemies and to introduce exotic parasitoids (Simmons and McCutcheon, 2001).

Encarsia pergandiella Howard (Hymenoptera: Aphelinidae) is a solitary, arrhenotokous autoparasitiod of whitefly species including *B. tabaci*, *Aleyrodes azalea* Baker, *A. spiraeoides* Quaintance, other *Aleyrodes* spp., *Aleuroplatus coronatus* Quaintance, *Trialeurodes vaporariorum* (Westwood) and *T. variablilis* (Schuster and Price, 1996). This species is one of the promising parasitoids that attack *B. argentifolii* (Liu and Stansly, 1996).

The present work is an attempt to control the dangerous pest *B. argentifolii* by importation, colonization and establishment of the parasitoid, *E. pergandiella* on different economic host plants in Egypt.

MATERIALS AND METHODS

During 2003, adults of *E. pergandiella*, parasitoid of *B. tabaci* infesting common beans, *Phaseolus vulgaris* in USA were collected and shipped to the Plant Protection Research Institute, Quarantine facility in Dokki, Egypt. The parasitoid individuals were re-identified for confirmation of the imported materials and then were reared for one generation prior to release from quarantine. This laboratory-bred colony was utilized for biocontrol releases in Demmyate, Behira and Qalubiya, governorates in Egypt during 2004-2005. *E. pergandiella* recovered from the field was reared under laboratory conditions on *B. argentifolii* to initiate a laboratory culture at Dokki on this host. Both parasitoids, emerging from field and from laboratory rearing, were utilized for field releases.

About 250000 parasitoids during 2004-2005 were released in Demmyate on cotton (*Gossypium barbadense*), Behira on common beans (*Phaseolus vulgaris*) and Qalyubiya on cucumber (*Cucumis sativus*) infested with *B. argentifolii*. Parasitoids were released as adults by fixing vials or cups containing these parasitoids and allowing the adults to walk out or fly simultaneously.

Establishment of released parasitoid individuals was assessed through either rearing or dissection. In 0.5-liter cardboard containers with ventilated tops were utilized for two weeks at 25-29°C. This was achieved by holding 30 leaves in each container from each site. All materials found at the bottom of the rearing containers were then examined for dead adults with parasitoids. Parasitoids were identified by comparison with voucher specimens.

Samples were collected every month during 2004-2005 from May to September for cotton and from July to October for cucumber and common beans. Dissection of third and fourth larval instars of whiteflies obtained from the released sites of the three governorates in Egypt was used to detect pre-pupae and of the pupae parasitoids.

In spite of the fact, that, it was difficult to separate strictly larval and egg stages of *E. pergandiella* from those of *Encarsia lutea* (Masi) and *Eretmocerus mundus* Mercet, pre-existing *B. argentifolii* parasitoids common in these three governorates in Egypt.

It was essential to dissect pre-pupae and pupae of *E. pergandiella* as *Encarsia* exuviae are black, these of *E. lutea* pupae are transparent and these of *E. mundus* are yellow and all easily distinguished. Rates of parasitism of the pre-existing parasitoids of *E. lutea* and *E. mundus* in these samples were recorded and reported to provide comparisons to future parasitoid samples after being introduced. Some time will lapse before maximal levels of impact of these parasitoids on the target pests.

Data were analyzed by simple correlation and regression from the Statistical Analysis System (SAS Institute, 1989).

RESULTS AND DISSCUSION

In Demmyate, 65000 adults of *E. pergandiella* were released on cotton during the period of 2004 and 2005. Maximum parasitism reached 19 and 27 per cent during September 2004 and 2005 (Fig.1). *E. pergandiella* population build-up over Demmyate governorate was correlated to whitefly population build-up ($r = 0.776$). Applying simple regression to this result revealed values of $\beta = 0.254$, $R^2 = 0.734$ at $P < 0.01$. In control experiment the average parasitism rates were 7.4 and 11.4 per cent during 2004 and 2005, respectively (Fig.1).

In Behira governorate, parasitoids released during 2004 and 2005 on the pest on common beans, amounted approximately 65000 adult individuals of *E. pergandiella* and these were released on common beans. The maximum parasitism reached 20 and 23 per cent in October 2004 and 2005, respectively (Fig.2). *E. pergandiella* population build-up over locations was correlated to whitefly population build-up ($r = 0.599$). Applying simple regression to this result revealed values of $\beta = 0.211$, $R^2 = 0.684$ at $P < 0.05$. In control experiment the average parasitism rate of 6 and 10.3 per cent during 2004 and 2005, respectively (Fig.2).

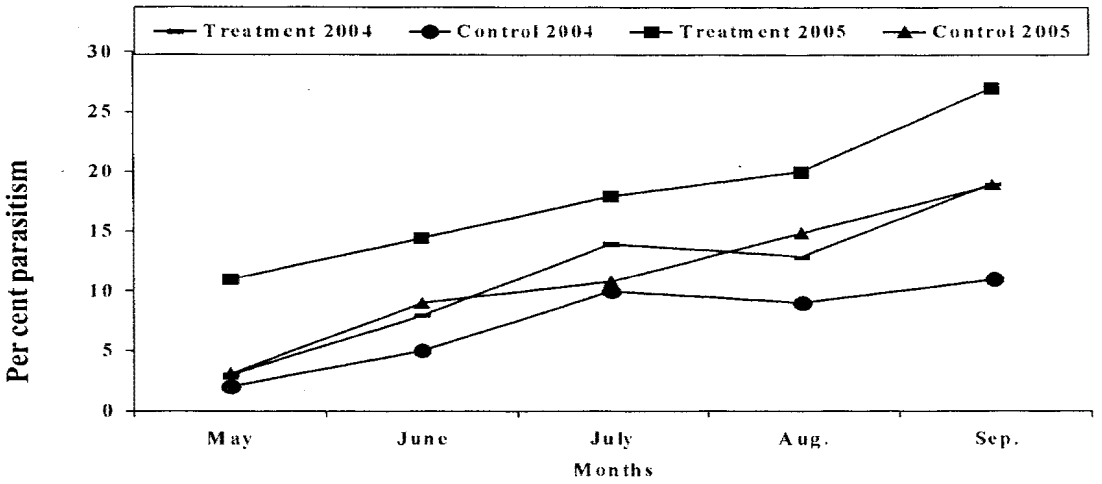

Fig 1 : Per cent parasitism of *B. argentifolii* by *E. pergandeilla* cotton in Demmyate

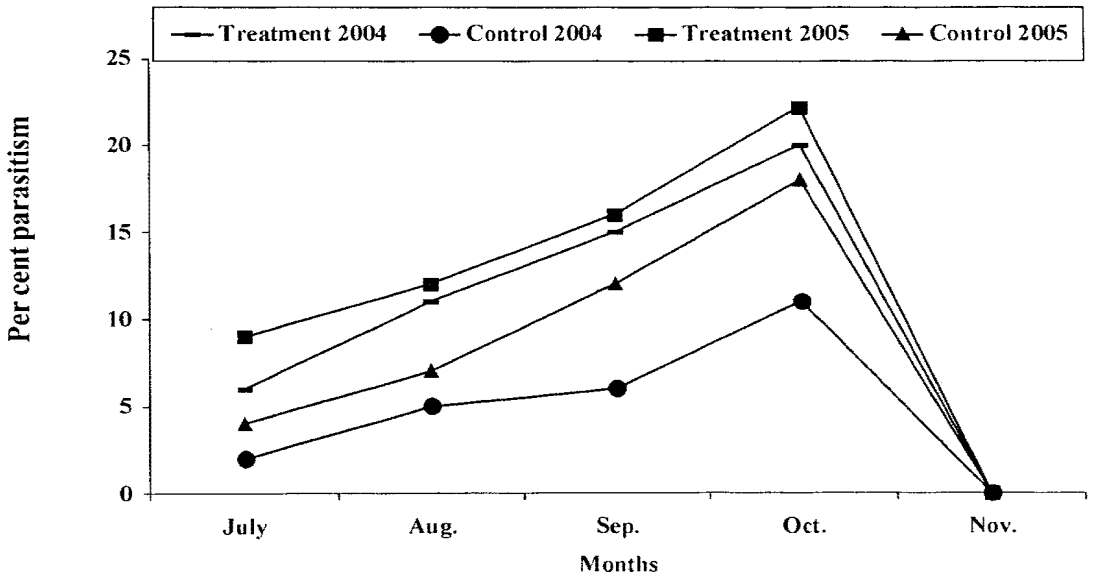

Fig 2 : Per cent parasitism of *B. argentifolii* by *E. pergandeilla* common beand in Behira

In Qalubiya governorate, 75000 adults were released on cucumber during 2004 and 2005. The Maximum parasitism reached 25 and 29 per cent during October 2004 and 2005, respectively (Fig. 3). *E. pergandiella* population build-up over locations was correlated to whitefly population build-up ($r = 0.843$). Applying simple regression to this result revealed values of $\beta = 0.465$, $R^2 = 0.811$ at $P < 0.01$. In control experiment the average parasitism rates were 9.5 and 10 per cent during 2004 and 2005, respectively (Fig.3).

The present result indicates that the parasitoid *E. pergandiella* has become established in all governorates under consideration. The occurrence of this parasitoid reflects its importance as potential biological control agent of *B. argentifolii* in Egypt. The similar results were recorded in Latin America and the southern USA of (Bogran *et al.*, 1998; Simmons, 1998). While, Heniz (1995) stated that the percentage of parasitism by this parasitoid was 15.6 per cent in California, USA.

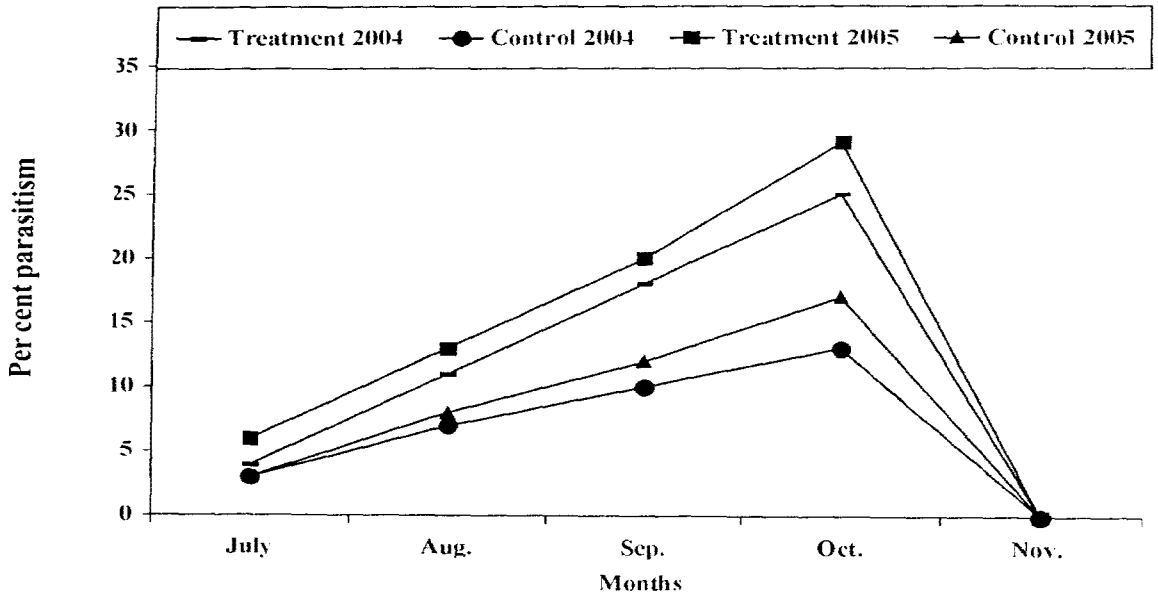

Fig 3 : Per cent parasitism of *B. argentifolii* by *E. pergandeilla* on cucumer in Qalyubiya

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