SUCCESSFUL INTRODUCTION OF ENCARSIA LAHORENSIS (HOWARD) (HYMENOPTERA: APHELINIDAE) FOR THE CONTROL OF DIALEURODES CITRI (ASHMEAD) (HOMOPTERA: ALEYRODIDAE) IN EGYPT

Shaaban ABD-RABOU

Scale Insect Research Division, Plant Protection Research Institute, Agricultural Research Centre, Dokki, Giza, Cairo, Egypt

Abstract – Against the citrus whitefly Diaeurodes citri, the aphelinid parasitoid Encarsia lahorensis was introduced, released and recovered in citrus orchards of Qalyubiya governorate. To assess dynamics and efficiency of the new parasitoid, random samples were collected every month from October 1996 to September 1997 on citrus trees. The percentage of parasitization reached a maximum of 57% in September 1997. These data indicated that E. lahorensis is established in Egypt and may be considered an effective antagonist of D. citri.

Key words – Citrus whitefly, Diaeurodes citri, Encarsia lahorensis, parasitoid introduction, citrus, Egypt.

INTRODUCTION

The citrus whitefly Diaeurodes citri (Ashmead) was first detected on citrus in Egypt in 1988 (ABD-RABOU 1990). It is a polyphagous insect attacking plants belonging to 28 botanical families (MOUND & HALSEY 1978). Host damages result from the large quantity of sap consumed and by the sooty mold growing on whitefly excreta (honeydew). The parasite wasp Encarsia lahorensis (Howard) was introduced into different parts of the world to control the citrus whitefly. This parasitoid reduced satisfactorily the populations to low levels in areas where they have caused previously serious problems (KATSOYANNOS 1993). Excellent results were reported within the literature for biological control of D. citri by E. lahorensis such as in Italy (VIGGIANI & MAZZONE 1978), in Florida, USA (RU & SAILER 1979; SAILER et al. 1984), in Israel (ARGOV & ROSSLER 1986), in Turkey (YOLDES 1990) and in North Carolina, USA (NALEPA 1996). In Egypt, ABD-RABOU (in press) recorded Encarsia sp., the only indigenous wasp parasitizing the citrus whitefly; however this parasitoid was not effective enough to control it.

MATERIALS AND METHODS

Three small glasshouses were used for mass rearing the parasitoids: for host plants, host whiteflies and imported parasites after a regular transit by the quarantine unit. The host plants were sweet orange seedlings, chosen as they grow rapidly and can be forced to produce many
terminal shoots through adequate pruning and feeding. Young shoots and leaves are needed to harbour large numbers of whiteflies. Citrus seedlings were planted in 18 x 15 cm clay pots, filled with mixture of equal quantity of loam, sand and peat moss. They were defoliated and pruned several times. Specimens of *D. citri* were individually scattered on young leaves of the orange trees in the second greenhouse conditioned at 25 ± 2 °C, 65 % of relative humidity and 14 hours of light per day. *Encarsia lahorensis* multiplication unit began with a shipment of 62 adults. 14 males and 48 females, imported from Florida, USA.

*Figure 1.* – Population of *Dialeurodes citri* on citrus (A) and parasitism (%) by the imported endoparasitoid *Encarsia lahorensis* (B) in Qalyubiya governorate, Egypt.
Introduction of Encarsia lahorensis

Herein, previous laboratory studies showed that E. lahorensis females produced only females when allowed to parasitize as ectoparasites the citrus whiteflies. In order to obtain males, the females should be used as hyperparasitoids on immature females of their own species that parasitized the whiteflies, namely as endoparasitoids. The development from egg deposition to adult under the above-mentioned thermic conditions required 16 ± 1 and 24 ± 1 days for the adelphoparasitic males and the females, respectively.

For release, a mass culture was developed on third-instar larvae of D. citri, under the above-mentioned climatic conditions. Citrus plants with many expanded young leaves were placed 24 hours within the mother culture for oviposition. Contaminated plants were then transferred into another climatic greenhouse and were held 17 days, until the time when most of the whiteflies reached the third instar. They were then moved into another third climatic chamber and females of E. lahorensis were released, 15 days after the previously released females. Twenty five days later, new plants bearing abundantly third-instar larvae of D. citri were offered E. lahorensis females for oviposition.

Release and recovery of E. lahorensis were carried out on 330 15 to 25-year old citrus trees in Qalyubiya governorate. For release, 270 potted citrus seedlings bearing about 25 000 parasitized larvae of D. citri were transferred and deposited to the centre of the trees at the activity period of D. citri in September and October 1996. The rate of release was adjusted to one pot per three trees every month, viz. 135 pots per month for the whole area. To monitor recovery, 100 leaves were randomly collected from trees every month from October 1996 up to December 1997. Leaves were inspected under a stereomicroscope and all parasitized and unparasitized whitefly larval instars were counted. Besides, some leaves representing the time and date of inspection were kept in well ventilated emergence glass tubes for parasitoid emergence and identification.

RESULTS AND DISCUSSION

The dynamics of the whitefly population appears in Fig. 1A and the percentage of parasitism, in Fig. 1B. These results clearly showed that within one year, the population of whiteflies decreased drastically, correlative to a conspicuous increase of parasitization reaching 57% in September 1997. The establishment of E. lahorensis was effective in Egypt where environment host relationship and climate were favourable to this exotic parasitoid. It was successfully introduced in various countries, such as in Israel and in Florida, where the recorded parasitizations were 80% (Argov & Rossler 1986) and 30 to 40% (Ru & Sailer 1979), respectively.

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