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Biological Control of Two Species of Whiteflies by *Eretmocerus siphonini* (Hymenoptera: Aphelinidae) in Egypt

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Eretmocerus siphonini Viggiani and Battaglia is one of parasitoids that showed a promising trend towards control of some whitefly species. The classical biological control of *Siphoninus phillyreae* (Haliday) (Homoptera: Aleyrodidae) and *Aleurolobus niloticus* Priesner and Hosny (Homoptera: Aleyrodidae) was achieved through mass rearing and releasing of *E. siphonini* in three governorates in Egypt during 1998–1999. A total of 237,020 parasitoids were reared and released in Assiut, Giza and Sharqiya governorates. The rate of parasitism increased from 5 to 60% and from 21 to 65% during 1999–2000, respectively, in Assiut. In Giza governorate, the increase amounted 2 to 46 and 10 to 67% on *S. phillyreae* on pomegranate plant. Accordingly, *E. siphonini* showed that, it is an effective parasitoid legible for control of this whitefly. Similarly, the parasitism rates of *E. siphonini* increased (from 8 to 67% and 12 to 73 in Assiut and from 14 to 76 and 27 to 70% in Sharqiya) after releasing of the parasitoids on *A. niloticus* on ziziphus plants which showed the important role of this parasitoid in Egypt.

Keywords: *Eretmocerus siphonini,* biological control, *Siphoninus phillyreae, Aleurolobus niloticus.*

Eretmocerus siphonini Viggiani and Battaglia, 1983 (Hymenoptera: Aphelinidae) is one of the most important parasitoids that attack *Siphoninus phillyreae* (Haliday) and *Aleurolobus niloticus* Priesner and Hosny of whiteflies (Viggiani and Battaglia, 1983; Rose et al., 1995; Abd-Rabou, 1998). It has been associated with two species of whiteflies in Egypt. These are *Aleurolobus niloticus* Priesner and Hosny, 1934 and *Siphoninus phillyreae* (Haliday, 1835); (Abd-Rabou, 1999). Recently, biological control of whiteflies by *Eretmocerus* species became valuable during the last years (Rose and Zolnerowich, 1997). The present work is an attempt to evaluate the efficacy of the indigenous parasitoid *E. siphonini* in controlling *S. phillyreae* and *A. niloticus* on zizyphus and pomegranate trees. Mass-rearing, manipulation and releasing of this parasitoid in three different localities of Egypt abundant with these trees were achieved during the period preceding the evaluation program in this study.

Materials and Methods

In the laboratory, the parasitoid *E. siphonini* was successfully mass reared on infestations *S. phillyreae* that were feeding on pomegranate plant *(Punica granatum).* During March, large cuttings (120–130 cm) and 10–15 cm in diameter were taken from pomegranate plants about 8–10 year-old and these cutting were pots into puts filled with

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soil consisting of loam, sand and peatmoss (1:1:1). The pots were placed in a steel and wire insectary (5 x 3 x 3 meters). One to two years later, the leaves were exposed to infestation with the host insect *(S. phillyreae).* Whiteflies adult were allowed to oviposit on 1–2 year-old pomegranate plants. Oviposition was repeated twice at one week interval to ensure the presence of the different developmental stages of the host species. To prevent the accumulation of honey dew and the growth of black sooty mould. The plant leaves were washed throughly with water. The plant pots with whiteflies were transferred to the laboratory at 25–27 °C and 60–65% R. H. The pots containing pomegranate plants infested with whiteflies *(S. phillyreae)* were introduced enclosed into wooden cages (70 x 80 x 110 cm). The cages were covered with nylon wire gauze to prevent escape of whitefly parasitoids.

Adults of *E. siphonini* were introduced into these cages to obtain newly emerged adults of parasitoids. About 237,020 parasitoids were released *(Table 1)* in pomegranate orchards at Assiut and Giza and on zizyphus trees at Assiut and Sharqiya during 1998–1999.

Table 1

Number of releases of the parasitoid *Eretmocerus siphonini* into pomegranate and nabk trees in different localities in Egypt

Siphoninus phillyreae					*Aleurolobus niloticus*				
Period	No. of released adults/year				Period	No. of released adults/year			
	Assiut		Giza			Assiut		Shargiya	
	1998	1999	1998	1999		1998	1999	1998	1999
July	10150	12340	5600	10970	May	3990	1560	750	1210
Aug.	15100	28170	7840	13180	June	2570	1060	900	1500
Sept.	29090	21290	11480	6610	July	4180	840	1100	1300
Oct.	15250	8310	3100	5600	Aug.	1250	1370	1350	1260
					Sept.	800	970	680	1000

Releasing of *E. siphonini* adults were achieved four times on *S. phillyreae* in Assiut and Giza (from June to Oct. *S. phillyreae* activity) and in Assiut and Shargiya (from June to Nov. *A. niloticus* activity).

The follow-up of the parasitoid activity after releases was made by inspection of randomly picked samples each consisting of 30 leaves during the period Aug. to Dec. 1998–1999 *(S. phillyreae)* and during June to Dec. 1998–1999 *(A. niloticus).* The collected *S. phillyreae* and *A. niloticus* immatures were inspected using a binocular stereomicroscope to determine the parasitized individuals and consequently the percentages of parasitism.

Results and Discussion

Biological control of Siphoninus phillyreae *by* Eretmocerus siphonini

A total of 207,380 adults were released in Assiut and Giza at different times between July and October in both 1998 and 1999 *(Table 1).*

S. phillyreae parasitized by *E. siphonini* before releasing with parasitism rates 6, 21% in Assiut and 2, 10% in Giza during the two seasons 1999 and 2000, respectively.

Parasitism rate was elevated to 60 and 65% in Assiut during Sept. 1999 and Oct. 2000, respectively, and to 46 and 67% in Giza during Oct. 1999 and 2000, respectively. These results reflect on an increased parasitoid activity. Abd-Rabou (1998) studied the biological control of *S. phillyreae* by releasing more than 82019 parasitoids of different aphelinid species and observed that *E. inaron* is the most active parasitoid effective in control of *S. phillyreae* in Egypt. The present work adds to effectiveness of this parasitoid species in controlling one of the serious pest on pomegranate in Egypt.

Biological control of Aleurolobus niloticus *Priesner and Hosny by* Eretmocerus siphonini

Approximately 29,640 adults were released in Assiut and Sharqiya at different times between May and September during 1998 and 1999 on *A. niloticus (Table 1). A. niloticus* was also parasitized by *E. siphonini.* Before releasing, the parasitism rates were 8 and 12% in Assiut and 14 and 27% in Sharqiya during the two seasons 1999 and 2000, respectively. These parasitism rates increased to 67 and 73% in Assiut during Aug. 1999 and 2000 and to 76 and 70% in Sharqiya during Aug. 1999 and 2000, respectively. The statistical analysis observed no significant difference between the obtained data ($P > 0.05$) for the two years of study *(Table 2).* These results indicate that the parasitoid activity increased as shown in *Table 2. A. niloticus* one of the most serious pest on zizyphus plant in Egypt

Table 2

The parasitism rates in population of pomegranate and nabk whiteflies following the releases of *Eretmocerus siphonini* adults on pomegranate and nabk trees in different localities in Egypt

Siphoninus phillyreae					*Aleurolobus niloticus*				
Period	Percent parasitism/year				Period	Percent parasitism/year			
	Assiut		Giza			Assiut		Shargiya	
	1999	2000	1999	2000		1999	2000	1999	2000
June	6	21	2	10	April	8	12	14	27
Aug.	28	36	15	23	June	30	41	45	53
Sept.	60	58	34	45	July	45	56	51	66
Oct.	45	65	46	67	Aug.	67	73	76	70
Nov.	38	50	21	50	Sept.	62	71	68	84
Dec.	19	34	13	28	Oct.	53	59	52	76
					Nov.	36	46	44	61
					Dec.	17	35	39	49
Mean	32.5	44.0	21.833	37.167	Mean	39.75	49.125	48.628	66.75
± SD	±19.50	±16.53	±15.817	±20.68	± SD	±20.96	±20.167	±18.776	±17.80

(Abd-Rabou, 1997). It is attacked by different parasitoid species in the worlds; *Encarsia lutea* (Masi), 1910 in Sudan (Gameel, 1969), *Eretmocerus haldemani* Howard, 1898 and *Encarsia bifasciafacies* Hayat 1989 in India (Hayat, 1972, 1989), *E. lutea* (Polaszek et al., 1999) and *Encarsia elegans* Masi, 1911, *E. lutea, Euderomphale* sp. in Egypt (Abd-Rabou, 1997). Abd-Rabou (1999) recorded *E. siphonini* associated with *A. niloticus* in Egypt and noted that the parasitoid *E. siphonini* is an effective parasitoid attacking this whitefly species.

Thus, in conclusion the parasitoid *E. siphonini* is a promising parasitoid in controlling these two forementioned species of whiteflies by releasing this species periodically on pomegranate and zizyphus plants.

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