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On the Parasitoids Species of the Cabbage Worm, *Artogeia (Pieris) rapae* L. (Lepidoptera: Pieridae) at El-Minoufia Governorate, Egypt

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ABSTRACT

Parasitoid species of *Artogeia (Pieris) rapae* L. in El-Minoufia Governorate, at the three localities, *i.e.* (Quessna, Berket El-Saba and Shibin El-Kom) were surveyed during the two successive years of 2006 and 2007. The recorded parasitoids were the gregarious larval parasitoid, *Apantelus glomeratus* L., (Hymenoptera: Braconidae), the solitary pupal parasitoid, *Brachymeria femorata* Panz. (Hym.: Chalicididae) and the gregarious pupal parasitoid, *Pteromalus puparum* L. (Hym.: Pteromalidae). Total parasitism percentages ranged between 5.7-16.2, 7.8-20.0 and 10-23% for *A.glomeratus*, *B. femorata* and *P. puparum*, respectively. However, the total monthly parasitism percentages recorded 26, 28 and 39% at Quessna, Shibin El-Kom and Berket El-Saba localities, respectively.

Key words: Parasitoids, *Apanteles glomeratus*, *Pteromalus puparum*, *Brachymeria femorata*, *Artogeia (Pieris) rapae*, Egypt.

INTRODUCTION

The cabbage white butterfly *Artogeia (Pieris) rapae* L. is known to be the main insect pest infesting cabbage and other cruciferous plants. It causes severe economic damage to those plants in various parts of the world (Chadrie, 1956 and Jaques, 1972). It is important to control this pest biologically using their parasitoids, to reduce cabbage contamination with insecticides and to keep the environment clean. Many authors have studied the parasitoids of *A. rapae* (Chadrie 1956; El-Sufty *et al.*, 1983; Abbas and El-Dakroury 1985, and Ragab, 1992 in Egypt ; Blunck 1957 in Canada ; Radzievskii 1980 in USSR ; Lasota and Kok 1986; Lee and Heimpel 2005 and Shelton *et al.*, 2002 and recently Wold-Burkness *et al.*, 2005 in USA; Musthtaque and Mohyuddin 1986 in Pakistan; Mustata and Costea 2000 in Romania; Cai *et al.*, 2004 in China and Walker *et al.*, 2004 in New Zealand). Despite the economic importance of this pest, no work has been conducted on its parasitoids at El-Minoufia Governorate, Egypt.

Therefore, this work throws the light on *A. rapae* parasitoids and their role at El-Minoufia, Egypt during the two years of 2006 and 2007.

MATERIALS AND METHODS

Associated parasitoid species of the *A. rapae* under field conditions in the three localities *i.e.* (Shibin El-Kom, Quessna and Berket El-Saba) of Minoufia Governorate were investigated by collecting immature stages of *A. rapae* and classified them into two stages *i.e.* larvae and pupae. Allowed numbers collected from each stage were confined individually in test glass tubes covered with muslin cloth tighten with rubber bands. Larvae were provided by pieces of cabbage leaves for feeding. Emerged parasitoid species were identified by Prof. Dr. M. O. Kolaib, Faculty of Agriculture, Minoufia University, Shibin El-Kom, Egypt.

Parasitism rates were calculated using the formula:

$$\% \text{ parasitism} = \frac{\text{No. of emerged parasitoids}}{\text{Total no. of collected host insects}} \text{X } 100$$

The survey of the parasitoids extended through the months of the two years 2006 and 2007 from January till December. Sampling was done weekly at the three localities during the two years of study. The inspected plants were 150 cabbage plant, from 4 Kirates, (Kirate =175 m^2/locality/weekly).

RESULTS AND DISCUSSION

Different parasitoid species found associated with *A. rapae* were surveyed in the three localities at El- Minoufia Governorate during the years of 2006 and 2007:

The survey of parasitoid species of *A. rapae* revealed the presence of three parasitoid species; the gregarious larval parasitoid species, *Apanteles glomeratus* L. (= *Cotesia glomeratus* L.) (Hymenoptera: Braconidae), the solitary pupal parasitoid species, *Brachymeria femorata* Panz. (Hym.: Chalicididae) and the gregarious parasitoid species *Pteromalus puparum* L. (Hym.: Pteromalidae) in the three localities in both years.

1. At Shibin El-Kom:

The larval parasitoid *A. glomeratus* occurred only in April and May of both years of the study and not

in the rest of the year months. Percentages of monthly parasitism with *A. glomeratus* on *A. rapae* larvae were (11.76, 12.19%) and (11.92, 16.66%) in April and May of 2006 and 2007, respectively.

Results illustrated in Figs. (1&2) indicated that there was almost identity between results of the two years under study that there were no parasitoids found on *A. rapae* stages in January, February & March 2006 and 2007, while three parasitoid species of larval and pupal stages were recorded along the rest months of the years. The highest total parasitism rate of different parasitoids (27 & 29.48%) was recorded in May of both years, respectively.

The gregarious parasitoid species, *P. puparum* was found to be an endoparasitoid of *A. rapae* pupae at Shibin El-Kom during 2006 and 2007 years. The parasitoid was active through the period lasted from May to December. The monthly parasitism percentages ranged between 12.5 and 18.18%. Highest parasitism percentages were recorded in August (18.9 and 23.1%) during 2006 and 2007, respectively.

The solitary parasitoid, *B. femorata* was recorded on *A. rapae* pupae at Shibin El- Kom in both years. Data presented in Figs. (1&2) showed that the parasitism rates ranged between 11.76 and 14.81% in 2006 and 2007 years, respectively.

2. At Quessna:

A. glomeratus was found in April and May. The parasitoid was not recorded along the rest of the year months. Percentage of monthly parasitism with *A. glomertus* was (7.5, 8.8%) and (5.71, 7.50%) in April and May of 2006 and 2007 seasons, respectively.

Results illustrated in Figs. (3 & 4) show that there was similarity between results of the two years under study that there was no parasitism in *A. rapae* immature stages in January, February and March of 2006 and 2007, while the three parasitoid species were recorded along the rest of the year months.

P. puparum was recorded also on *A. rapae* pupae at Quessna during 2006 and 2007 years. Monthly parasitism percentages ranged between 13.04 and 15.59%. Highest parasitism percentage was recorded in October by 15.62 and 15.55% at 2006 and 2007 years, respectively.

B. femorata was recorded in *A. rapae* pupae at Quessna in both seasons. Data present in Figs. (3& 4) show that the parasitoid was not recorded along the months from January to September. The monthly parasitism rates ranged between 11.53 and 14.81%. Highest total parasitism of the three parasitoids (27.00 and 30.43%) was recorded in October and November of the two years of study, respectively.

3. At Berket El-Saba:

A. glomeratus was found only in April and May and disappeared along the rest year months. Percentage of parasitism with *A. glomeratus* was (10.0 and 10.9%) and (8.57 and 8.0%) in April and May of 2006 and 2007, respectively.

Results illustrated in Figs.(5&6) show that there was almost identity between results of the two years under study that there was no parasitism with *A. glomeratus* on *A. rapae* immature stages in January, February and March 2006 and 2007, while the three parasitoid species of *A. rapae* larval and pupal stages were recorded along the rest months of the years. Highest monthly total parasitism of the three parasitoids on *A. rapae* was recorded in October of the two years (39.24 and 35.35%) in 2006 and 2007, respectively.

P. puparum was also recorded on *A. rapae* at Berket El- Saba during 2006 and 2007 years. Data indicated that the parasitoid was active during the period lasted from May to December. The parasitism percentages ranged between 15.78 and 22.58%. Highest parasitism percentages (22.58 and 22.22%) were recorded in October during both years, respectively.

B. femorata was recorded in *A. rapae* pupae at Berket el- Saba. Data presented in Figs.(5 & 6) show that the parasitoid did not occur along the months from January to September, while it was found in October, November and December. Total parasitism averaged 11.76 and 14.81% in 2006 and 2007 seasons, respectively.

Obtained results are in agreement with those of Abbas and EI- Dakroury (1985) who recorded *P. puparum* as a parasitoid on *A. rapae* pupae, and Ragab (1992) who recorded three parasitoids (*P. puparum, B. femorata* and *Exorista larvarum* on the pupae of *A. rapae* in Egypt. Lee and Heimpel (2005) recorded *P. puparum* attacking *A. rapae* pupae in USA. Also, Mustata and Costea (2000) in Romania reported that parasitism on *A. rapae* was 66%. Recently, Wold-Burkness *et al.*, (2005) recorded *Cotesia glomeratus* (L.) and *P. puparum* as parasitoids of *A. rapae* in USA.

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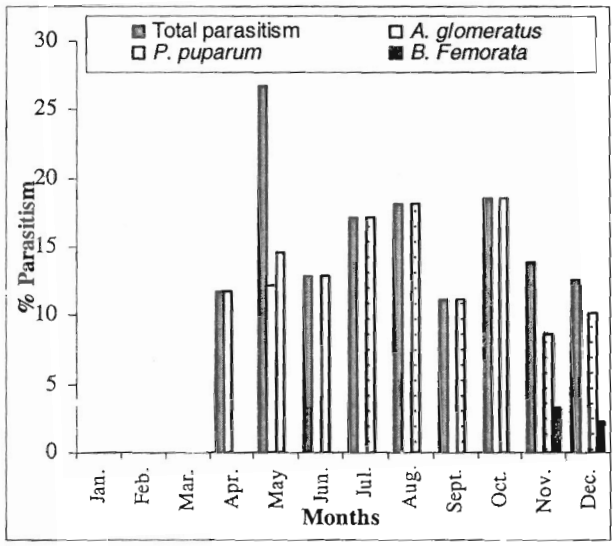

Fig. (1): Total monthly % parasitism on *A. rapae* different immature stages at Shibin El-Kom during 2006.

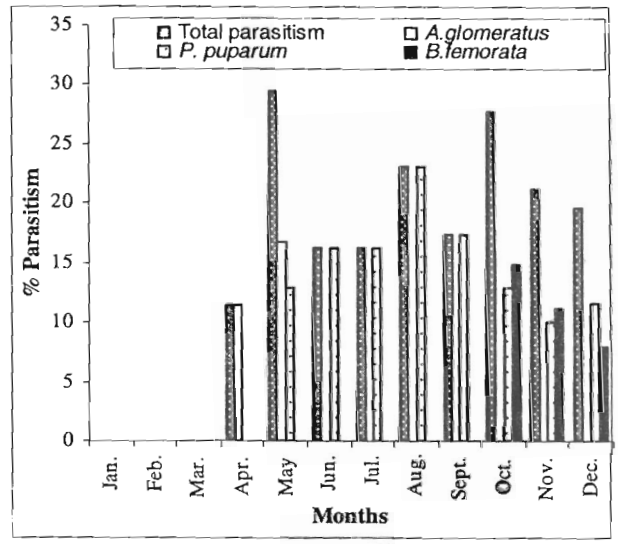

Fig. (2): Total monthly % parasitism on *A. rapae* different immature stages at Shibin El- Kom during 2007.

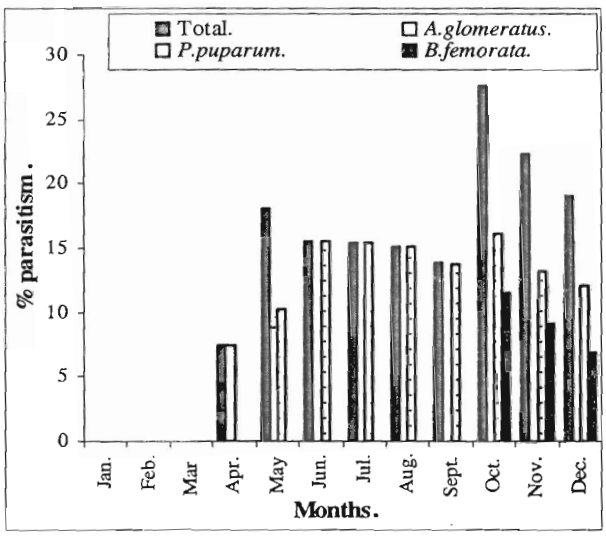

Fig. (3): Total monthly % parasitism on *A. rapae* different immature stages at Quessna during 2006.

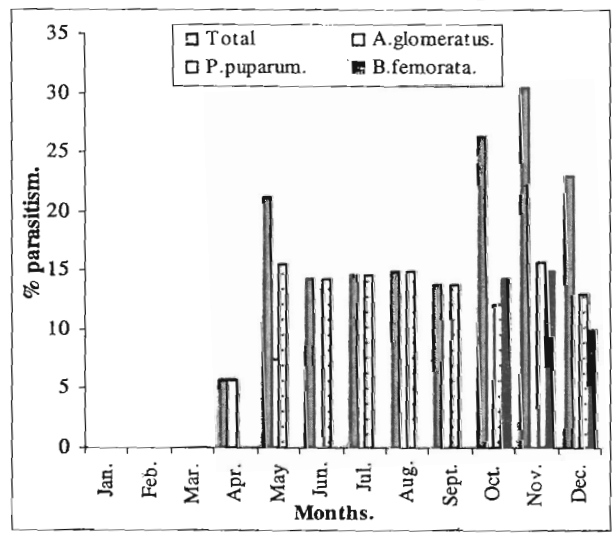

Fig. (4): Total monthly% parasitism on *A. rapae* different immature stages at Quessna during 2007.

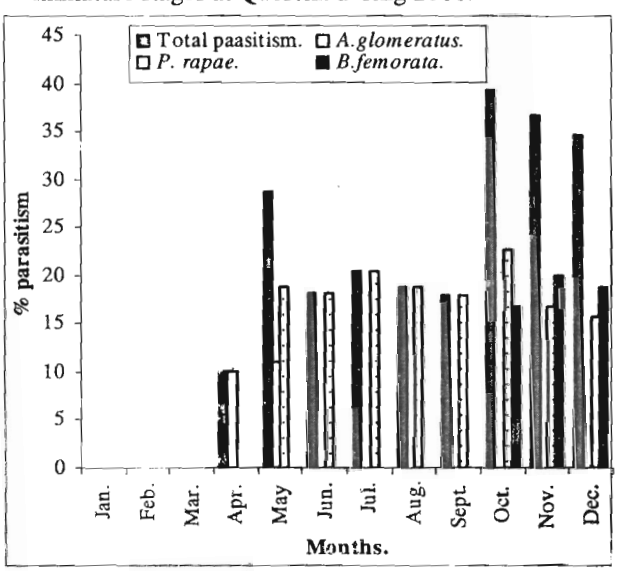

Fig. (5): Total monthly % parasitism on *A. rapae* different immature stages at Berket El-Saba during 2006.

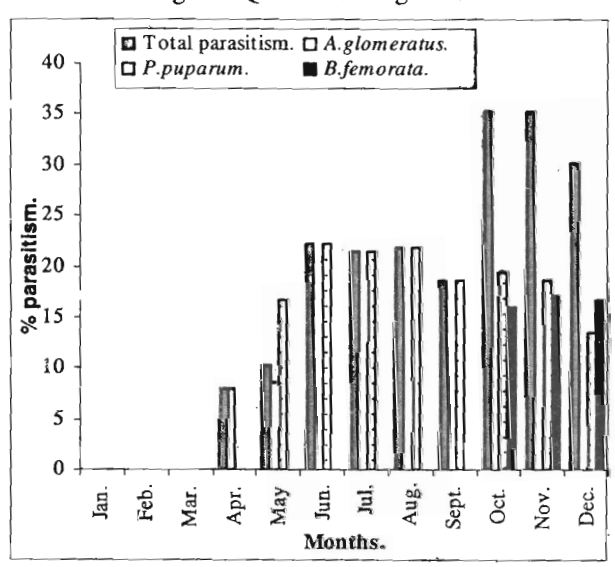

Fig. (6): Total monthly % parasitism on *A. rapae* different immature stages at Berket El-Saba during 2007.

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