

Evaluating the Role of *Diaeretiella rapae* (M' Intosh) (Hymenoptera: Aphidiidae) Parasitizing the Cabbage Aphid, *Brevicoryne brassicae* L. (Homoptera: Aphididae) at Sharkia Governorate, Egypt

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ABSTRACT

Rate of parasitism by *Diaeretiella rapae* (M' Intosh) on the cabbage aphid, *Brevicoryne brassicae* L., as well the hyperparasitism at Kafer Sakr district, Sharkia Governorate, Egypt for the four seasons 2005-06 - 2008-09 was recorded. Total means of parasitism rates with *D. rapae* were 29.87, 36.44, 25.74 and 37.64 % during the four seasons, respectively. Respective total means of percentage adult emergence were 82.74, 80.09, 81.71 and 81.81 %. Two hyperparasitoid species; *Pachyneuron* sp. and *Alloxysta* sp. were recorded on *D. rapae*. Seasonal means of hyperparasitism percentage were 4.84, 3.53, 5.68 and 3.40 % in the four seasons, respectively. *D. rapae* abundance was negatively correlated with temperature in the four seasons. Also, *D. rapae* had significant negative correlations with the host. Parasitoid density in relation to host density had influenced percentage of parasitism. Highest percentage reached 91.40 % at 16 *D. rapae* female parasitoids per cage while the minimum was 55.6 % at one female per cage. Sex ratio (females: males) was 1.7:1. By rearing the parasitoid for five successive generations, sex ratio was almost 1:1 in the first three generations, but males dominated in the 4th and 5th generations.

Key words: *Diaeretiella rapae*, *Brevicoryne brassicae*, evaluation, parasitism, hyperparasitism, Egypt.

INTRODUCTION

The aphid *Brevicoryne brassicae* L. is a major pest, on cruciferous plants, in several parts of the world, especially cabbage in Egypt (Herakly and Abou El-Ezz, 1970 and Saleh, 2000). The parasitoid *Diaeretiella rapae* was found to parasitize *B. brassicae* and some other aphid species all over the world (Hafez, 1965, Abou Fakar and Kawar, 1998 and Saleh, 2008). *D. rapae* is attacked by hyperparasitoids that reduce its efficient role. Recorded hyperparasitoids on *D. rapae* in Egypt were; *Pachyneuron* sp. and *Alloxysta minuta* (Hafez, 1965, Herakly and Abou El Ezz, 1970, El-Maghraby, 1993 and Saleh, 2008).

The present study aims to highlight the role of primary and hyperparasitoid species associated with *B. brassicae* infesting cabbage.

MATERIALS AND METHODS

1- Estimation of parasitism rates in the field:

This work was carried out on cabbage plants cultivated in about two feddan area, located at Kafr-Sakr district, Sharkia Governorate, Egypt, for four cabbage seasons; 2005-06 - 2008-09. Random samples of five infested cabbage leaves/ sample were picked weekly, placed into plastic bags and transferred to the laboratory. All aphid individuals in an area of 20 square inches/ leaf were counted. Aphids were fed on their host plant and kept in Petri dishes (50 aphid individuals /Petri-dish) until formation of mummies. The mummies were isolated and kept in small glass tubes until emergence of

adult parasitoids. At the same time, hyperparasitoid adults emerged from mummies, were classified, counted and their percentages were also calculated. Emerged parasitoids were mounted and identified at the Biological Control Department, ARC, Giza, Egypt. Percentage of parasitism was calculated as monthly means according to Ferrell and Stufkens (1990) also, percentage of adult's emergence and sex-ratio were calculated. Daily records of both minimum and maximum temperatures along with relative humidity throughout the four seasons were obtained from the Agrometeorological Station at Zagazig region. Correlation between weekly average numbers of *B. brassicae*, *D. rapae* and corresponding weekly means of temperature and relative humidity were estimated.

2- Effect of parasitoid densities on parasitization rate:

D. rapae and *B. brassicae* were reared in the laboratory. Young potted cabbage seedlings bearing about 200 hosts (mixed ages) were used. The experiments were carried out in iron cages (200 x 50 x 50 cm) using different densities of the parasitoid; 4, 8, 12 and 16 per cage, fresh emerged mated females were fed on honey solution. Mated female parasitoids were gently introduced into each cage and kept for 24h., then the parasitoids were removed and the hosts were left until they mummified. After mummification, the mummies were gently placed with parts of cabbage leaves, on a moisten filter paper in marked Petri dishes. The mummies were observed until the adults emerged, then sexed and recorded. Five replicates were performed for each parasitoid density.