



Studies on Some Aspects of *Diaeretiella Rapae* (M, Intosh), A Parasitoid of Mustard Aphid, *Lipaphis Erysimi* Kalt

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 14 Oct 2023	Two aspects in relation to host <i>Lipaphis erysimi</i> and parasitoid <i>Diaeretiella rapae</i> are studied. It is found that parasitization percentage depends on the host as well as the parasitoid density. Even single copulated female <i>Diaeretiella rapae</i> is capable of parasitizing 94 aphids within the three days. If number of host decreases super parasitism may also occur. Parasitization also affects the development rate of the parasitoid and it depends upon the stage of the host aphid. In I and II instar nymphs of aphid development of <i>Diaeretiella rapae</i> is delayed and in other stages of aphid nymphs, normal development occurs.
CC License CC-BY-NC-SA 4.0	Keywords: <i>Lipaphis Erysimi</i> , <i>Diaeretiella Rapae</i> , Host Parasitization, Development

1. Introduction

Lipaphis erysimi Kalt (Homoptera – Aphididae) is a serious pest of mustard crop, *Brassica campestris* (Cruciferae). It is a greenish tiny, globular pest infesting tender parts (leaves, twigs, inflorescence) of the crop. Cloudy and humid weather is very favourable for its multiplication and establish colony very soon. Although, each individual is about 2 mm in size but its sucking propensities are very high. Both nymphs and adults seek the sap from the stem, leaves, inflorescence, and developing pods. In severe infestation, the entire plant is densely covered by a crowd of aphids resulting in stunting growth and poor pod formation. Moreover, the aphids also transmit virus. The affected leaves, tender inflorescence and pod assume curly appearance and the plant wilt up soon. Thus yield of the crop is greatly reduced. (Atwal 1976).

Due to pollution and health hazards of insecticide research on biological control of aphids is being carried out in India since last three decades. Main attention has been paid to the indigenous fauna of aphid parasitoids. *Diaeretiella rapae* (Hymenoptera-Ichneumonidae, Braconidae-Aphidinae) is an important effective parasitoid of mustard aphids, *Lipaphis erysimi*, which occurs in good number in India, specially north western parts (Dhiman and Ghayyur, 1994). Various studies are carried out on this parasitoid time to time by Deshraj and Lakhanpal (1998), Dhiman (2005 and 2006), Dogra et al (2003) and Dhiman and Singh, (2002). The parasitoid has been established as a potential bio control agent of *L.erysimi* (Dhiman -2006). In present paper few aspects of *Diaeretiella rapae* are being described here which add further information on this bio- control agent.

2. Material and Methods

Adults of *Diaeretiella rapae* were collected with the aid of specially designed aspirator during the peak season Feb to April from the mustard as well radish crops and brought and alive in lab in polythene bags and maintained in lab in hurricane glass lamp chimneys covered at top by fine muslin cloth. Thirty percent honey solution was supplied as food. A piece of cotton soaked with water was also placed in the chimney in a water glass to maintain necessary. R. H. Healthy aphid population of *Lipaphis erysimi* was maintain on a caged mustard potted plants. Thus, ready culture of both the parasitoid and host aphids was maintained for experimental purposes for present studies experiments.

3. Results and Discussion

Two Aspects Were Studies for Present Studies

Effect of host and parasitoid density on percentage of parasitization

The incidence and occurrence of *Lipaphis erysimi* on mustard crop usually commences in saharanpur and adjacent districts in January coinciding with the abundance of young leaves on crop. The population of aphid gradually increased in February and maintained the same trend in March and first week of April after which the crop matured and harvested in late April. In this month, the aphid migrates to the other host plants at distant places while the *Diaeretiella rapae* remain in the same habitat and parasitizes other species of aphids such as *Brevicornis brassica* on cabbage and diapause only during winter months November to January. The parasitoid appears in the field on mustered crops parasitizing *Lipaphis erysimi* in first week of Feb. As the new generation of parasitoid emerges, their population increases and rate of parasitization also increases. Thus, percentage of parasitization is directly propositional to the number of host aphids and parasitoid both. To confirm this aspect following experiment was conducted during march when the host and parasitoid population remain on peck in field.

Experiment. A specific number of aphid. *L.erysium* and parasitoid, *D. rapae* (Plate 1 and 2) were maintained in the wire gauze cage. The aphids were maintained on mustard leaf whose mid rib was dipped in water in a vial. Only copulated female. *Diaeretiella rapae* were released in the cage and after five days these were taken out. parasitization was noticed by doing dissections after 3 days of oviposition. The data are pooled in the table -1.

Table 1: Effect of host plant and parasitoid density on percent of parasitization.

No of <i>Diaeretiella rapae</i>	No of Aphids	No of aphids parasitized	Percent of parasitization
1	100	94	94
2	125	124	99.2
5	120	120	120.0
2	25	25	25.0
10	220	220	220.0
25	426	422	99.06
1	10	10	10.0
15	510	509	99.0
12	1450	1220	84.3
2	560	240	42.85
50	1516	1498	78.81
5	62	62	62
20	120	119	99.16

The data of table 1. depicts that parasitization percentage depends on host plant density both. Even one female *Diaeretiella rapae* is capable of infesting 94 aphids within three days and all 10 aphids within the same period. In this case superparasitism was observed.

If the number of host decreases and parasitoids are few, then parasitization percent decreases and if parasitoid population also increases along with the increases in the host population, then parasitization also increases many time. Thus the parasitization is directly dependent on both host and parasitoid population.

Effect of host stage on the development of parasitoid

It has been observed during these studies that parasitization significantly affects the developmental rate of the parasitoid but, its effects depends on the stage of aphids which has been parasitized. In the earlier instars (I and II) development is delayed where as in the later instars and adults there is hardly any differences in the normal growth of the parasitoid larvae. These observation are mainly based on the biological data as well as on the following experimental data. Different instar nymphs from (first to fifth) and adults (alate and apterus both) of the aphids *Lipaphis erysimi* were exposed to oviposition by the parasitoid, *Diaeretiella rapae*. After oviposition parasitoid were removed and the parasitized aphids were reared till mummification (Plate 3) and emergence of *Diaeretiella rapae*. Time taken for the development of parasitoids larva in each nymphal instars and adults was noted and the data are presented in table -2.

Table 2: Developmental periods of parasitoid in different nymphal instars and adults of *Lipaphis erysimi*

Stage of host	No. of observations	Time taken from oviposition to mummification (in days)
Ist instar nymph	10	10
IInd instar nymph	12	9.5
IIIrd instar nymph	15	9.0
IVth instar nymph	12	8.5
V th instar nymph	16	8.5
Adult after us	18	8.0
Adult a late	18	8.0



Plate 1: Female, *Diaeretiella rapae*



Plate 2: Male, *Diaeretiella rapae*



Plate 3: Mummified *Lipaphis erysimi*, parasitized by *Diaeretiella rapae*

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