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**Sonalika Kolhekar**  
Department of Entomology,  
College of Agriculture I.G.K.V.  
Raipur, Chhattisgarh, India

**Mamta Paikra**  
Department of Entomology,  
College of Agriculture I.G.K.V.  
Raipur, Chhattisgarh, India

**Krishna Gupta**  
Department of Entomology,  
College of Agriculture I.G.K.V.  
Raipur, Chhattisgarh, India

**Jayalaxmi Ganguli**  
Department of Entomology,  
College of Agriculture I.G.K.V.  
Raipur, Chhattisgarh, India

## Feeding potential of *Coccinellidae* predator, *Menochilus sexmaculatus* (Fabricius) (Coleoptera: Coccinellidae) on mustard aphid, *Lipaphis erysimi*

Sonalika Kolhekar, Mamta Paikra, Krishna Gupta and Jayalaxmi Ganguli

### Abstract

The laboratory studies conducted on the feeding potential of the *Coccinellidae* predator, *Menochilus sexmaculatus* (Fabr.) on mustard aphid, *Lipaphis erysimi* revealed that the neonate grub just after hatching start feeding on chorion of the eggs, and then feeds on the aphids. The feeding potential increased consequently from 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> instar by consuming an average number of 38.64±0.13, 55.57±0.78, 65.42±0.78 and 75.86±0.55 aphids/day respectively. Maximum number of aphids was consumed by adult of 92.20±1.02 aphids/day.

**Keywords:** *Menochilus sexmaculatus*, feeding potential, *Aphis Lipaphis erysimi*

### Introduction

Sucking pests like Aphids (Hemiptera: Aphididae), viz. cowpea aphid, *Aphis craccivora* Koch, mustard aphid, *Lipaphis erysimi* Kaltenbach, etc. are major pest problems in most of horticultural and field crops. Aphids are generally found on the underside of leaves and also attack soft growing tips. They are sap-sucking insects with piercing-sucking mouthparts, having a needle-like stylet that allows the aphid to access and feed on the contents of plant cells causing significant loss of plant's phloem sap, which is essential for plant growth (Dixon, 1998) [3]. Aphids are tiny, soft bodied, sucking pests and approximately 4000 species of aphids have been observed so far feeding over 250 agricultural and horticultural crops. These cause damage directly by sucking cell sap, secrete honey dew on leaves and shoots, and indirectly as vector of plant viruses (Raboudi *et al.*, 2002) [6].

On several occasions, insecticidal applications have accentuated the aphid populations and quite often resulted in outbreaks. However, predatory *Coccinellidsae* play a major role in keeping these under control (Kristopher *et al.*, 2002) [5]. Among the predatory *Coccinellidsae*, *Menochilus sexmaculatus* (Fabricius), is one of the potential predators of aphids and is widely distributed in India, Iran, Australia and other parts of the Oriental region (Agarwala and Bardhanroy, 1997) [1]. The important features of *M. Sexmaculatus* includes its wide geographic distribution and host range, broad habitats, tolerance to certain pesticides, enhanced searching ability, voracious larval feeding capacity and easy rearing in laboratory (Venkatesan *et al.*, 2006) [7].

### Material and methods

The present studies were conducted in the Instructional farm and Bio control laboratory, department of Entomology of IGKV, Raipur, during 2017-18. The green aphids were collected from experimental farm of IGKV and adults of *M. sexmaculatus* were collected from mustard (*Brassica juncea*) plant from IGKV campus. These were transferred to glass jar (22.5 x 15 cm) and they were used as a nucleus culture for mass multiplication. The bottom of the jar was covered with Whatman no. 1 filter paper. Cowpea twigs infested with *L. erysimi* were given as food for adult beetles. Oviposition took place inside the jar. Egg masses were also laid on cowpea twigs which were removed gently and kept for further development (Gautam, 2008). The cultures were maintained under laboratory conditions at 27±10 °C and 60±5% RH. Active and healthy grubs and adults were selected for further experimental purpose.

Freshly collected aphid hosts, *L. erysimi*, which were placed over the filter paper. Single grub was released to each petri plate (6x 1 cm) with the help of camel hair brush. Aphids were supplied every morning at the rate of 40, 60, 80 and 100 in number for 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> instars, respectively. The number of aphids consumed within 24 hr. and duration of each instar were recorded. To determine predation efficiency of adult, newly emerged adults were transferred individually in petri plates and aphids were supplied

**Correspondence**  
**Sonalika Kolhekar**  
Department of Entomology,  
College of Agriculture I.G.K.V.  
Raipur, Chhattisgarh, India

every day at the rate of 100 numbers for an adult on respective leaf and twigs. The number of aphids consumed by an adult beetle was recorded at 24 hr. intervals.

Eggs laid on the cowpea twigs, and tissue papers placed in the rearing jars were gently separated and kept in small petri plate (6 x 1cm) hatching. The period between egg laying and hatching was considered as incubation period. Newly hatched grubs were kept individually in small plastic petri plates (5 x 1.5 cm) and provided with sufficient food throughout their developmental period. Observations were taken at 12 hr. intervals to record the duration of each instar, the summation of each of which gave the total larval period. Experiment was replicated four times. (Chandrababu *et al.* 1999) [2]. The data were subjected to square root transformation and statistically analysed with CRD using OPSTAT.

### Results and discussion

The predatory efficiency of the grub was determined by counting total number of aphids consumed by each larval instar. The data presented in the Table 1 show that the rate increased gradually from the first to fourth instar. Consumption of first instar 38.64±0.13 aphids/day, while

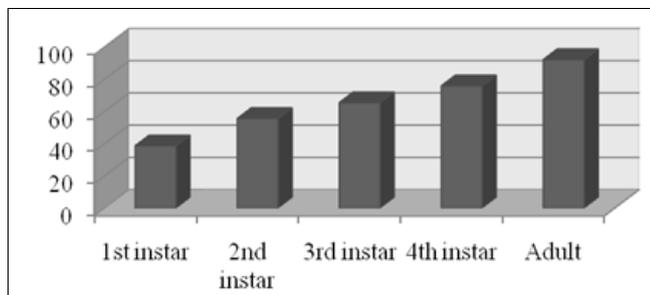
predation of 2<sup>nd</sup> instar grub of 55.00±0.78 aphids was recorded. Third instar grub showed better predatory activity than first two instars and the fourth and final instar grubs were very active until pupal transformation. They required more food than the previous instar due to bigger size, longer duration and to accumulate nutrient for pupal period. In the 3<sup>rd</sup> instar, the mean consumption was estimated to be 65.42±0.78 aphids/day. During 4<sup>th</sup> instar, they devoured a maximum number of 75.86±0.55 aphids/day. Duration of all the four instars were found to be of one day in the present studies, however, the adult stage prolonged for about 25-35 days. It was found that the female consumed more prey than the male and the longevity of adult beetle ranged from 25-35 days.

Thus the studies conducted on the feeding potential of *Coccinellidae* predator, *M. sexmaculatus* on mustard aphid, *L. erysimi* revealed that the mean maximum number of aphids consumed increased from 1<sup>st</sup> to 4<sup>th</sup> instar with maximum number of aphids were consumed by adult *i.e.*, 92.20±1.02/day. Feeding potential of *M. Sexmaculatus* grubs increased consequently from 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> instar by consuming an average number of 38.64±0.13, 55.57±0.78, 65.42±0.86 and 75.86±0.55 aphids/day respectively.

**Table 1:** Feeding efficiency of *M. sexmaculatus* on Mustard aphid (*Lipaphis erysimi*)

	R1	R2	R3	R4	R5	R6	R7	Mean
1st instar	38.00	38.00	40.5	37.00	38.00	40.00	39.00	38.64±0.13 (6.29)
2nd instar	52.00	58.00	59.00	54.00	58.00	56.00	52.00	55.57±0.78(7.52)
3rd instar	62.00	68.00	68.00	64.00	68.00	66.00	62.00	65.42±0.86 (8.15)
4th instar	74.00	75.00	76.00	76.00	78.00	77.00	75.00	75.86±0.55(8.77)
Adult	91.28	92.06	91.53	91.71	92.26	93.21	93.33	92.20±1.02 (9.65)
C.D.								0.143

\*Figures in parentheses are square root transformation values



**Fig 1:** Graph showing feeding efficiency of *M. sexmaculatus* on *L. erysimi*

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