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Feeding Capacity of Adults and Grubs of Different Morphotypes of *Cheilomenes sexmaculata* Fab.

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ABSTRACT

Grubs and adults of *Cheilomenes sexmaculata* Fab. were important predators of aphids attacking the cowpea crop. Feeding potential of both adults and grubs were studied on cowpea aphid, *Aphis craccivora* Koch. The first, second, third and fourth instars of the grub of all the morphotypes of *C. sexmaculata* were found to consume 7.0 ± 1.07, 18.85 ± 1.20, 70.0 ± 1.74 and 173.0 ± 3.53; 6.42 ± 0.57, 15.28 ± 0.91, 71.42 ± 1.32 and 178.0 ± 3.66; 5.85 ± 0.59, 12.14 ± 0.67, 70.28 ± 2.77 and 177.7 ± 2.37; 6.14 ± 0.26, 11.8 ± 0.73, 77.7 ± 1.86 and 191.71 ±2.76 and 5.57 ± 0.48, 13.0 ± 0.61, 75.57 ± 0.89 and 193.57 ± 3.82 aphids respectively. Adults also consumed the aphids to a greater extent when compared to the immature stages of the *C. sexmaculata*. The average predatory potential of adults of all morphotypes was 579.71 ± 27.3, 599.3 ± 33.3, 563.71 ± 30.9, 598.14 ± 23.06 and 588.4 ± 23.10 aphids respectively.

Key words : *Aphis craccivora, Cheilomenes sexmaculata*, Coccinellid, Feeding potential.

Cowpea (Vigna unguiculata L.) is an annual herbaceous legume grown throughout the year both as a grain legume and vegetable purpose and extensively damaged by number of insect pests and among those, aphids, soft bodied insects, that feed by sucking the sap from the plant tissues. Aphids excrete large quantities of sugary substance called honey dew which supports the growth of sooty mould fungus. Mild damp weather favours development of aphid populations (Davis et al., 1991). Coccinellids were popularly called as the ladybird beetles and were of great economic importance because majority of them are predaceous both in their grub as well as adult stages on small bodied insects like aphids (Rawat and Modi, 1969). *Cheilomenes sexmaculata* was an efficient predator for the management of both prey species such as *Aphis craccivora* and *Myzus persicae* (Pervez and Omkar, 2000). The knowledge of predatory potential plays an important role in mass rearing and utilization in pest management programme. To insight the information on description, feeding potential of grubs and adults of *C.sexmaculata* on cowpea aphid, *Aphis craccivora* and aphid quantity required for the mass production of beetles, with this objective present study of feeding capacity were undertaken.

MATERIAL AND METHODS

The grubs of different morphotypes of *Cheilomenes sexmaculata* were reared separately in glass vials on *Aphis craccivora* right from the stage of egg hatching. The grubs were provided with counted number of aphids (say 25 to 100) daily according to the development in grub instars viz., from first instar to final instar. The number of aphids consumed was recorded daily and after the removal of the preyed aphids, fresh food of counted aphids was provided for further study. Thus the predatory capacity during different grub instars as well as during its entire larval period was recorded. The newly emerged adults were kept separately in petriplates and provided with 100 aphids of *Aphis craccivora*. The left over aphids were counted and fresh food of aphids was provided. Thus, the feeding capacity of the adults was worked out. The obtained data were subjected to statistical analysis.

RESULTS AND DISCUSSION

From the Table 1, it was observed that the average number of aphids consumed by the predatory grub of the morphotype 1 during its first, second, third and fourth instars were 5.71±0.52, 16.0±0.79, 42.4±2.38 and 68.14±1.24 aphids per day respectively, whereas the average number of

Table 1. Feeding potential of grub (different instars) and adults of *C. sexmaculata* of five morphotypes

Stage	Morphotype 1		Morphotype 2		Morphotype 3		Morphotype 4		Morphotype 5	
Larva (Instars)	No. of aphids consumed per day Mean ±SD	Total no. of aphids consumed by respective stage Mean ±SD	No. of aphids consumed per day Mean ±SD	Total no. of aphids consumed by respective stage Mean ±SD	No. of aphids consumed per day Mean ±SD	Total no. of aphids consumed by respective stage Mean ±SD	No. of aphids consumed per day Mean ±SD	Total no. of aphids consumed by respective stage Mean ±SD	No. of aphids consumed per day Mean ±SD	Total no. of aphids consumed by respective stage Mean ±SD
1st	5.71±0.52	7.0±1.07	5.71±0.56	6.42±0.57	5.28±0.42	5.85±0.6	5.57±0.37	6.14±0.26	5.14±0.26	5.57±0.48
2nd	16.0±0.79	18.85±1.20	13.6±0.99	15.3±0.91	10.85±0.50	12.14±0.67	10.4±0.48	11.8±0.73	12.0±0.308	13.0±0.61
3rd	42.4±2.38	70.0±1.74	42.14±2.0	71.42±1.32	40.14±1.65	70.3±2.77	44.8±1.31	77.7±1.86	43.1±1.05	75.57±0.89
4th	68.14±1.24	173.0±3.53	74.0±1.34	178.0±3.66	78.42±1.26	177.7±2.37	80.4±2.03	191.71±2.76	86.14±1.01	193.57±3.82
Total	132.5±19.5	273.0±25.0	134.5±17.5	275.0±24.0	135.0±15.0	268.0±29.0	141.0±16.0	290.0±22.2	145.0±9.0	290.0±22.0
Adults	87.14±2.25	579.71±27.3	89.57±2.23	599.3±33.3	85.6±2.09	563.71±30.9	85.57±1.06	598.14±23.06	83.3±1.6	588.4±23.10

aphids consumed by the predatory grub during their individual instar were 7.0±1.07, 18.85±1.20, 70.0±1.74 and 173.0±3.53 aphids, respectively. The predatory capacity of this morphotype during the total grub duration varied with an average of 273.0±25.0 aphids. The predatory grub of the morphotype 2 consumed the aphids on an average of 5.71±0.56, 13.57±0.99, 42.14±2.08 and 74.0±1.34 aphids per day during its first, second, third and fourth instars, respectively, whereas the average number of aphids consumed during their individual instar were 6.42±0.57, 15.28±0.91, 71.42±1.32 and 178.0±3.66 aphids, respectively. The grubs of this morphotype consumed on an average of 275.0±24.0 aphids during the entire grub period, whereas, the first, second, third and fourth instars of the third morphotype grub consumed 5.28±0.42, 10.85±0.50, 40.14±1.65 and 78.42± 1.26 aphids per day respectively, and the total number of aphids consumed by each instar was 5.85±0.59, 12.14±0.67, 70.28±2.77 and 177.7±2.37 aphids, respectively and consumed 268.0±29.0 aphids during the entire grub period. Similarly, the predatory grub of the fourth mophotype consumed 5.57±0.37, 10.4±0.48, 44.8±1.31 and 80.4± 2.03 aphids per day during its first, second, third and fourth instars, respectively, whereas, the average number of aphids consumed by the predatory grub during each instar were 6.14±0.26, 11.8± 0.73, 77.7±1.86 nd 191.71±2.76 aphids, respectively. The predatory capacity of this morphotype during the total grub duration varied with an average of 290.0±22.2 aphids.

The results from the Table 1 reported that the average number of aphids consumed by the predatory grub of the morphotype five during its first, second, third and fourth instars were 5.14±0.26, 12±0.31, 43.1±1.05 and 86.14± 1.01 aphids per day respectively, whereas, the average number of aphids consumed by the predatory grub during their individual instar were 5.57±0.48, 13.0± 0.61, 75.57±0.89 and 193.57±3.82 aphids, respectively. The predatory capacity of this morphotype during the total grub duration varied with an average of 290.0± 22.0 aphids.

The total number of aphids consumed by the morphotype 1 per day was 87.14±2.25 per day and 579.71±27.3 during the adult life

span. Similarly, the adult beetles of the respective four morphotypes consumed on an average of 89.57±2.23, 85.6±2.09, 85.57±1.06 and 83.3±1.60 aphids per day and 599.3±33.3, 563.71±30.9, 598.14±23.06 and 588.4±23.10 aphids during the entire life cycle (morphotype 2,3, 4 and 5) (Table 1).

From these findings, of all the larval instars, fourth instar consumed a large number of aphids than the previous early instars. The present findings were in accordance with the previous reports made by Modawal (1941) where he reported that a single grub of *C. sexmaculata* can feed on 310 aphids (*A. craccivora*) per week under laboratory conditions and also by the Gupta (1966). Patel (1985) reported predatory capacity of first, second, third and fourth instars to be 7.60, 16.28, 23.39 and 26.5 aphids per day, respectively, whereas the predatory capacity of *M. sexmaculatus* during its total grub period varied from 47.0 to 121.0 aphids (*A. craccivora*) with an average of 107.5 aphids. Adults also consume aphids to a greater extent when compared to the grub stages of the *C. sexmaculata*. The present findings were in agreement with the previous reports made by Patel (1985) reported that aphid consumption varied from 378.0 to 684.0 with an average of 546.64 during the adult life span and Zala (1995) who reported that the feeding capacity of *M.sexmaculatus* during larval and adult period was on average 193.0 and 507.3 mustard aphids (*Lipaphis erysimi*).

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