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Feeding potentiality of *Menochilus sexmaculatus* Fab. on different aphid species

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Abstract :To evaluate predatory efficacy of *Menochilus sexmaculatus* Fab. on mustard aphid (*Lipaphis erysimi* Kalt.), lucerne aphid (*Therioaphis maculata* Buckton), indianbean aphid (*Aphis craccivora* Koch), fennel aphid (*Hydaphis coriandari* Das), cotton aphid (*Aphis gossypii* Glover), calotropis aphid (*Aphis nerri* Boyer), cabbage aphid (*Brevicoryne brassicae*), a laboratory experiment was escorted at 27.86 ± 3.85 ^{0}C temperature and 48.16 ± 6.41 per cent relative humidity (RH) during the investigation. During total larval period, the grubs of *M. sexmaculatus* consumed significantly maximum aphids of *A. craccivora* (132.53), whereas, it consumed minimum aphids of *B. brassicae* (110.60). In case of adults, it fed more number of *A. nerri* (423.12) as compared to other aphid species.

Keywords: *biological control, feeding potentiality, M. sexmaculatus, coccinellids, aphids, A. craccivora, A. gossypii, H. coriandari, L. erysimi, T. maculata, B. brassicae*

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I. INTRODUCTION :

Naturally, for this our attention reverts back to the use of cultural and biological methods of pest control. In view of above complexities, the maximum utilization of predators and parasites for managing the insect pests of major valuable crops is most desirable. In agricultural ecosystem there are number of arthropod pests that resulted a serious threat to production. Mostly growers used agro-chemicals on different field and horticultural crops to suppress the pest population (Solangi, 2004 and Khuhro, 2008). Their injudicious use on different crops has interrupted the natural balance in agro crops has interrupted the natural balance in agro-ecosystem by reducing the population of natural enemies (predator and parasitoid). It is reported that more than 550 insect species have developed resistance against insecticides worldwide (Eavy, *et al.* 1995; Chaudhry, 1997 and Jackson, 2009). However several predators and parasitoids play a significant role in the natural control of many arthropod pests in agro-ecosystem. These natural enemies suppress the insect population through their high reproductive rate and faster multiplication, if the their equilibrium is not disturbed by the other factors, especially with agro-chemicals. Approximately 4000 species of coccinellid are reported throughout the world (Michand, 2001) and many of these are playing major role in the predation of various pests. Among the insect predacious on aphids, coccinellids are considered to be efficient predators and keep aphid population under check (Gilkeson and Kelin, 2001). They are great economic importance because a majority of them are predaceous both in their grub as well as in adult stages on aphid.

It is found to be an efficient predator of aphid species (Hussien, 1991 and Maisni, *et al.* 1994). This is mainly fed on aphid species but it also devoured many soft bodied insects, widely distributed worldwide i.e. U.K. India, Pakistan, Indonesia, Philipines, France, Jawa, Sumatra, South Africa and Borneo (Agarwala and Bardhanroy, 1999; Debach and Rosen, 1991; Jagadish *et al.* 2010; Ross *et al.* 1982 and Solangi *et al.* 2005). Biological control agents are considered as the basic component of Integrated Pest Management strategy. Practically 90% of the major arthropod insects pests are controlled under naturally available natural enemies (Ulrichs *et al.* 2001). Primarily coccinellids predators effectively used against variety of insect pests and achieved a significant result in agr-oecosystem (William, 2002). Biological control is effectively suppressing the insect pest population and keeps them below the damage boundary. These measures are mostly preventive but not corrective mode (Ross *et al.* 1982). The present studies were planned to study the biological parameters by the M. sexmaculatus predation on seven aphid species under laboratory condition.

II. MATERIALS AND METHODS

Laboratory experiments were conducted at Dept. of Entomology, C. P. College of Agriculture, Sardar

Krushinagar Dantiwada Agricultural University, Sardar Krushinagar. Fifteen grubs of *M. sexmaculatus* were reared separately in plastic bowls right from the hatching to pupation. Known number of different aphid species *viz.*, *L. erysimi*, *T. maculata*, *A. craccivora*, *H. coriandari*, *A. gossypii*, *A. nerri* and *B. brassicae* were fed to each grub daily till pupation takes place. The number of aphids consumed was recorded daily and then fresh food was supplied. The feeding capacity was worked out for individual instar as well as for entire larval period.

The newly emerged adults i.e. 15 were kept individually in plastic bowls and counted number of different aphids species were given to each adult daily during entire adult period. The number of aphids consumed was recorded daily and then fresh aphids were given. The feeding potentiality of adult was worked out.

III. RESULT AND DISCUSSION :

Observations were taken to determine the comparative consumption ability of grubs as well as adults of *M. sexmaculatus* on different aphid species. The results obtained are presented in Table 1 as well as graphically depicted in Fig. 1 and 2. The grub of *M. sexmaculatus* was found voracious feeder and active during predation. They catch the prey with their legs and suck the body fluid leaving behind empty skin, which can be often seen, on host plant. The data on predatory potentiality of grubs are presented in Table 1 and graphically depicted in Fig 1 revealed that among all the aphid species, significantly maximum aphids of *A. craccivora* were consumed (20.07) by first instar grub followed by *H. coriandari* (15.93), *L. erysimi* (15.27) and *T. maculata* (15.27), while aphids of *A. gossypii* (10.47) were least consumed by grub and was at par with *B. brassicae* (12.60) and *A. nerri* (11.40). Feeding potentiality of second instar grubs was significantly varied among different aphid species. The significantly maximum aphids of *A. craccivora* was consumed by second instar grub (32.60) and was at par with *H. coriandari* (29.13), while *A. gossypii* was least consumed (19.20) and was at par with *B. brassicae* (19.60), *T. maculata* (19.80), *A. nerri* (21.13) and *L. erysimi* (21.93). Similar findings also reported for first and second instar larvae by Solangi *et al.* (2007). During third instar, the grub consumed significantly maximum aphids of *A. craccivora* (39.60) and was at par with *T. maculata* (37.47), *L. erysimi* (35.53) and *H. coriandari* (34.00), whereas, the minimum consumption was *A. nerri* (25.47) and was at par with *A. gossypii* (29.53) and *B. brassicae* (30.73). In case of fourth instar grubs, the consumption of different aphid species was not significantly differed. It was varied from 17 to 56 aphids with an average of 38.40, 40.33, 39.60, 38.87, 40.80, 38.67 and 44.73 aphids when they were reared on *L. erysimi*, *T. maculata*, *A. craccivora*, *H. coriandari*, *A. gossypii*, *A. nerri* and *B. brassicae*, respectively. During entire larval period (Table 1 and Fig. 2), the grubs of *M. sexmaculatus* consumed significantly maximum aphids of *A. craccivora* (132.53) and was at par with *A. nerri* (130.07) and *A. gossypii* (123.33), whereas, the minimum consumption was *B. brassicae* (110.60) and was at par with *T. maculata* (110.80), *H. coriandari* (116.27) and *L. erysimi* (118.33). Muhammad *et al.*(2014) recorded that rose aphids consumed varied from 93 to 133 by the *M. sexmaculatus* during entire grub period. Gupta (1966) recorded that each grub instar had a capacity of feed upon 21.6, 26.1, 29.9 and 32.1 adults of maize aphid (*R. maidis*), respectively. Anand (1983) reported that *L. erysimi* was consumed in the largest number while *A. gossypii* was the least preferred by the predator. Patel (1985) reported predatory capacity of first, second, third, fourth instars and total larval period was 10.87, 24.28, 35.39, 36.51 and 107.05 aphids of *A. craccivora*. However, slight differences in feeding capacity of grubs may be attributed due to the different prey material used for rearing and laboratory conditions.

Observations were recorded to determine the consumption ability of adult of *M. sexmaculatus* and results are summarised in Table 1 and graphically depicted in Fig. 2. The data revealed that there was no significant difference for the consumption of aphid by the adults of *M. sexmaculatus* when they fed on different aphid species. The adults consumed different aphids varied from 185 to 597 with an average of 348.27, 364.40, 423.07, 406.53, 370.53, 423.12 and 387.73 aphids of *L. erysimi*, *T. maculata*, *A. craccivora*, *H. coriandari*, *A. gossypii*, *A. nerri* and *B. brassicae*, respectively. The predatory capacity of adult stages was 546.34 on *A. craccivora* (Patel, 1985) and 507.3 on *L. erysimi* (Zala, 1995). The differences on consumption of aphid by the adults of *M. sexmaculatus* may be due to the change in host species or prey materials on which adults were reared and laboratory condition.

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Table 1: Feeding potentiality of *M. sexmaculatus* on different aphid species

Aphid species	No. of aphids consumed					
	I instar	II instar	III instar	IV instar	during grub period	Adults
L. erysimi	15.27	21.93	35.53	38.40	118.33	348.27
T. maculata	15.27	19.80	37.47	40.33	110.80	364.40
A. craccivora	20.07	32.60	39.60	39.60	132.53	423.07
H. coriandari	15.93	29.13	34.00	38.87	116.27	406.53
A. gossypii	10.47	19.20	29.53	40.80	123.33	370.53
A. nerri	11.40	21.13	25.47	38.67	130.07	423.12
B. brassicae	12.60	19.60	30.73	44.73	110.60	387.73
S. Em. ±	1.28	2.47	2.68	2.95	4.21	30.82
C. D. at 5 %	3.59	3.50	7.53	NS	11.85	NS

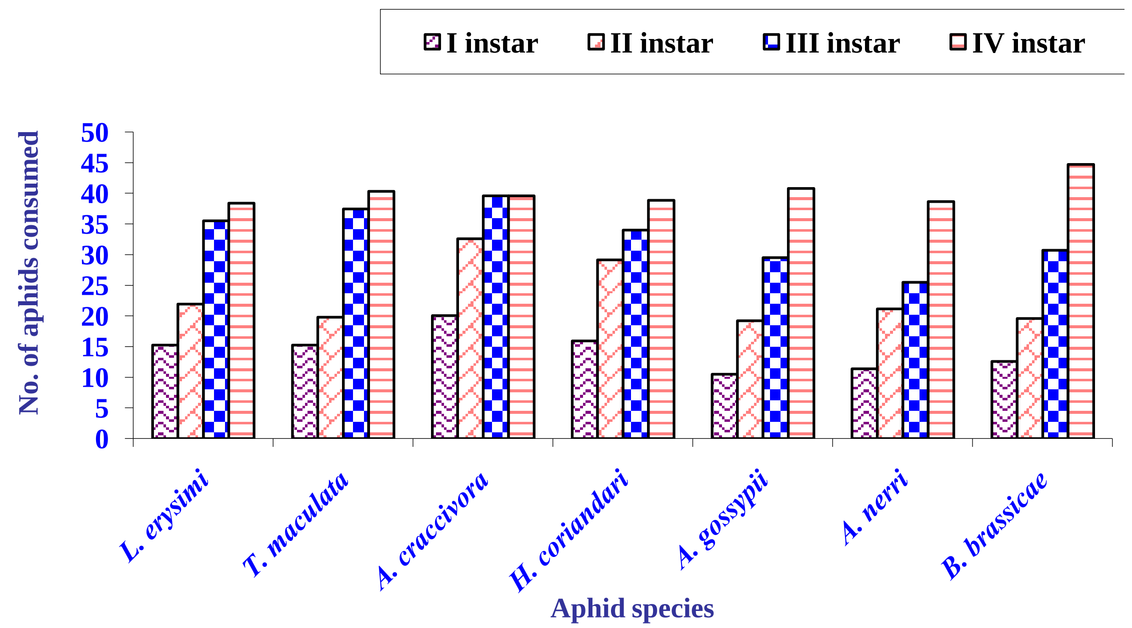

Fig. 1 : Feeding potentiality of different grub instars of *M. sexmacultus* on different aphid species

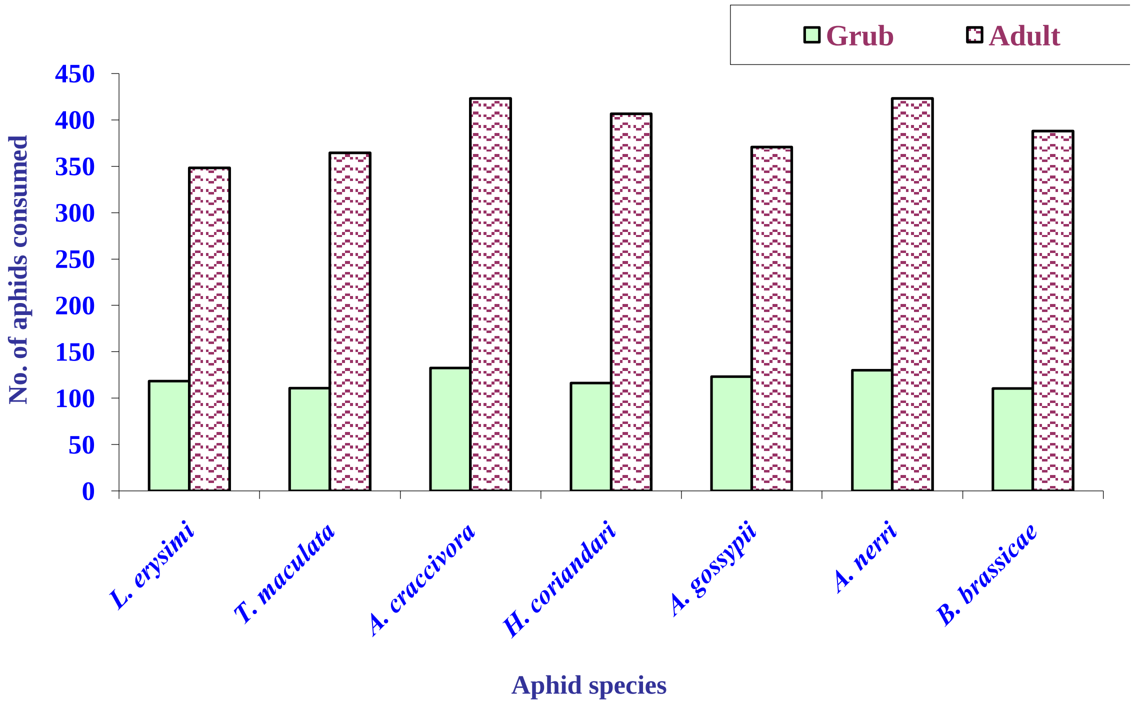

Fig. 2: Feeding potentiality of grub and adult of *M. sexmaculatus*on different aphid species

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