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ORIGINAL ARTICLE **OPEN ACCESS**

Feeding potential of lady beetle, *Chilomenes sexmaculata* (Fab.) on Cowpea aphid, *Aphis craccivora* (Koch.) under laboratory condition

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ABSTRACT
Aphids are important pests of various cultivated crops and their populations are kept in check under natural conditions by one of their predators, the coccinellids. Chilomenes sexmaculata (Fab.) is an effective predator to be used as a bio-control agent but the major challenge is it's mass rearing and augmentation. Hence, an experiment was conducted to determine the Feeding potential of lady beetle, Chilomenes sexmaculata (Fab.) on cowpea aphid, Aphis craccivora (Koch.) under laboratory condition, during 2010-12 at College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli.The laboratory study on feeding potential of predator on aphid-nymphs of Aphis craccivora (Koch.) revealed that, the grub consumed a total of 118.01 ± 3.2 aphid nymphs during its developmental period. The male beetle devoured on an average 53.5±1.25 aphid-nymphs while female beetle consumed on an average 58.3±1.32 aphid-nymphs.
Key words: *Chilomenes sexmaculata, Aphis craccivora, feeding potential.*

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INTRODUCTION

Aphidophagous lady beetles are one of the most important groups of predators that are very frequently observed where aphids are abundant. *Cheilomenes sexmaculata* Fabricius synonym *Menochilus sexmaculatus* Fabricius (Coleoptera: Coccinellidae) is important aphidophagous predator that control aphid population to a great extent in nature [10]. *Aphis craccivora* cause significant yield losses of 20-40 per cent in Asia and up to 35 per cent in Africa. Besides cowpea, this aphid has become a serious pest for legume crops such as faba bean, Indian bean and pea [4].

A large number of insecticides have been recommended for the management of this pest. These insecticides cause serious problems such as environmental pollution, insect resistance and pest resurgence besides adversely affecting beneficial organisms; the emphasized the use of predators for the management of aphids [13]. There is a need to evolve eco-friendly strategy using the bioagents for the management of cowpea aphid and *C. sexmaculata* may be the potential predator. Keeping these aspects under consideration, the feeding potential of *C. sexmaculata* on cowpea aphid was studied under laboratory condition to find out its potential for the management of cowpea aphid in leguminous crops.

MATERIAL AND METHODS

To study the aphidivorous capacity of *C. sexmaculata*, laboratory experiments were conducted. For this purpose, one newly hatched larva was confined in each glass vial (7 x 2 cm). Sufficient numbers of aphid-nymphs (30 and 100 for first and later instars, respectively) were provided. For adult beetles, separates glass vials were used and one hundred aphid-nymphs were provided in each glass vial. The aphid-nymphs provided in both cases were kept along with the leaves of host plant by maintaining its turgidity with the help of cotton soaked in water. Before actual feeding with aphid-nymphs, adults of coccinellids were kept under starvation for four hours. The glass vials were kept at laboratory temperature and relative humidity. Observations were taken on thirty individuals each of larva and adult. The observations were recorded on the rate of feeding as the number of aphids consumed per

individual per day and calculated the number of aphid-nymphs required for single larva and adult for their larval and adult period, respectively as suggested by [1].

RESULT AND DISCUSSION

The feeding potential of different instars of grubs and adults of the predator *C. sexmaculata* on aphid-nymphs of *A. craccivora* along with their longevity are studied and presented in Table 1.It is evident from the data that, the aphidivorous capacity was increased at each larval instar of *C. sexmaculata.* The consumption of aphid-nymphs during the first instar ranged from 11 to 15 with an average 11.26 ± 1.53. In the second instar, it ranged from 16 to 23 with an average 19.66 ± 1.15. The consumption of aphid-nymphs in third instar larva was in the range of 22 to 34 with an average of 27.83 ± 2.87.In the last instar, it ranged from 55 to 63 aphid-nymphs with an average of 56.20 ± 3.14.From the data, it could also be seen that for full larval development, the total number of aphid-nymphs required was in the range of 102 to 128 with an average 118.01 ± 8.68.

In case of adult of *C. sexmaculata*, it was observed that the female adult feeds on more number of aphid-nymphs than the male adults. At the time of mating period and after mating period, female feed on the aphid-nymphs more voraciously. The consumption of aphid-nymphs by male adult beetle ranged from 49 to 56 with an average 53.5 ± 1.25 while in case of female, it was 55 to 65 with an average 58.3 ± 1.32, respectively. Lot of variations in the aphid-nymph consumption by the larva and adult of *C. sexmaculata* are reported by various workers from India.[6] Reported that the number of aphids consumed by adult per day was 44 (*M. granarium*), while 60.84 aphid consumption was reported by [2] and 53.3 ± 1.1 aphids of *R. maidis* by [12, 9] reported that, under identical conditions, the total number of aphids of *A. nerii* and *A. craccivora* consumed by a single larva of *C. sexmaculata* during its developmental period varied from 143 to 189 and 355 to 394, respectively. Similar observations reported by [3]. [7] Observed that number of aphid-nymphs (*A. craccivora*) consumed during larval period varied from 87 to 120 (average 100.38).

Researcher [11] reported the wide differences in the number of aphid-nymphs consumed by *C. sexmaculata*. The maximum number (73.2) of aphids-nymphs consumed per day per beetle was that of *T. odinae*, followed by *A. craccivora* (53.0) and *L. erysimi* (52.8) [8]. presented the information on the consumption rate of coccinellid predator *C. sexmaculata* on *A. craccivora.* They reported that male and female of predator consumed 48±1.20, 33.2±1.25 nymphs of aphid and 41.3±0.72, 30±2.0 adults of aphids during 24 hours, respectively. [5] reported the average predation rate of coccinellid beetle ranged from10.6±0.71 to 33±5.43 aphids and 4.8±0.84 to 8.8±1.48 jassid per day. The average longevity of *C. sexmaculata* on *A. craccivora* was also studied in the laboratory. The data are presented in Table 2. From the data; it could be seen that larval period of *C. sexmaculata* was 5.5 days when fed on *A. craccivora*. The adult male and female longevity observed was 26.7 to 33.2 days on *A. craccivora*.

Table 1: Feeding potential of *C. sexmaculata* on aphid-nymphs of *A. craccivora*

Stages of predator	Range of aphid-nymphs consumed	Average no. of aphid-nymphs consumed	Average longevity (days)
Grub			
I instar	11-15	11.26±1.53	1.05±0.15
II instar	16-23	19.66±1.15	1.0±0.0
III instar	22-34	27.83±2.87	1.0±0.0
Iv instar	55-67	56.26 ± 3.14	2.05±0.15
Total	102-128	118.01±8.68	5.0±0.30
Adults			
Male	49-56	53.5±1.25	26.7
Female	55-65	58.3±1.32	33.2

Table 2: Developmental period of *C. sexmaculata* on *A. craccivora*

Stage	Developmental period (days)	
	Range	Average
Egg	2 -3	2.5
Grub		
I instar	1-1.5	1.05
II instar	1.0	1.0
III instar	1.0	1.0
IV instar	2.0	2.0
Total Grub period	5-6	5.5
Pre-pupa	1-1.5	1.1
Pupa	2-2.5	2.15
Total developmental period	9.5-12.5	10.8

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