

Development and Feeding Potential of *Scymnus* sp. on the Bean Aphid *Aphis craccivora*

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ABSTRACT

Scymnus spp. are well known predators of aphids in India. The biology and feeding potential of *Scymnus* sp. were studied in the laboratory at $28.2 \pm 1.2^{\circ}\text{C}$ and $60.4 \pm 8.5\%$ R.H. on *Aphis craccivora*, a pest of *Dolichos lablab*. The egg, larval, prepupal and pupal stages occupied 4.44 ± 0.26 , 11.96 ± 0.65 , 0.93 ± 0.23 and 6.18 ± 0.36 days respectively. The larvae fed by sucking fluids from the appendages of the aphid prey. Unlike the grubs, the adults chewed and swallowed the aphids. The consumption of first, second, third, fourth instar grub and adult was 4.62 ± 0.22 , 9.79 ± 1.06 , 12.06 ± 0.58 , 18.99 ± 2.29 and 31.13 ± 1.46 aphids per day respectively. The predatory grub consumed on an average 139.80 ± 11.25 aphids during its development.

KEY WORDS : *Scymnus* sp., biology, feeding potential, *Aphis craccivora*

Scymnus spp. are well known predators of pests of economic importance (Ghosh and Chakrabarti, 1984; Saraswati, 1990). Different workers have studied the biology of a number of *Scymnus* spp. (Kapur, 1942; Johnson, 1972; Tawfik *et al.*, 1974; Buntin and Tamaki, 1980; Ramamurthy, 1982; Mani and Thontadarya, 1987). In Orissa, Dash (1978) and Behera (1984) have studied the biology and feeding rates of *Scymnus castaneus* on *Rhopalosiphum maidis* (F.) and *Scymnus pyrocheilus* Mulsant on *Macrosiphoniella sanborni* (Gill.) respectively. The information available on the biology and feeding potential of *Scymnus* sp. in Orissa was found to be meagre. A detailed study on its biology and feeding potential was, therefore, carried out at College of Agriculture, Chiplima during 1990.

MATERIALS AND METHODS

The culture of the predatory beetle was maintained on mealybugs reared on ripe pumpkins as suggested by Mani and Thontadarya (1987) for *Scymnus coccivora* Ayyar.

The study was conducted in the laboratory at $28.2 \pm 1.2^{\circ}\text{C}$ and $60.4 \pm 8.5\%$ R.H. The life cycle and feeding potential of *Scymnus* sp. were determined on *Aphis craccivora* collected from *Dolichos lablab* L. Freshly laid eggs of *Scymnus* sp. (10) were kept individually in glass vials (10 x 2.5 cm) and plugged with cotton. The incubation period was recorded. After hatching, the predatory grubs were fed with known number of *A. craccivora*. The feeding rate of the grubs was determined at 24h. Similarly, the mean daily consumption of the adult beetles (10) on first three days of emergence was also recorded. Finally, the developmental period of each instar of the grub, and prepupal and pupal periods were recorded.

RESULTS AND DISCUSSION

Eggs were pale yellow and deposited singly under the moulted cuticle or dead aphids in the colony of *A. craccivora*. The eggs were oval, 0.4 to 0.5 mm long and 0.2 mm broad. The incubation period ranged from 4.10 to 5.04 days with a mean of 4.44 ± 0.26

Table 1. Duration of development and feeding potential of *Scymnus* sp. on *A. craccivora*

Stages of <i>Scymnus</i> sp.	Developmental period in days	Total number of aphids consumed	Number of aphids consumed per day
Egg	4.44 ± 0.26	-	-
Grub			
I instar	3.46 ± 0.23	16.00 ± 1.63	4.62 ± 0.22
II instar	1.95 ± 0.19	19.10 ± 3.14	9.79 ± 1.06
III instar	2.80 ± 0.23	33.80 ± 3.43	18.99 ± 2.29
IV instar	3.75 ± 0.29	70.90 ± 8.16	12.06 ± 0.58
Total	11.96 ± 0.65	139.80 ± 11.25	45.45 ± 3.03
Prepupa	0.93 ± 0.23	-	-
Pupa	6.18 ± 0.36	-	-
Total	23.51 ± 0.51	-	-
Adult	-	-	31.13 ± 1.46

days (Table 1). This is comparable with the incubation period of *Scymnus latemaculatus* (Motch) and *S. coccivora* (Kapur, 1942; Mani and Thontadarya, 1987).

The grubs had four instars. The first instar larva was yellowish brown without wax covering. White waxy warts developed on the dorsal surface within 24h of eclosion. Brues (1946) and Balduf (1935) proposed that some first instar larvae did not feed until after wax had formed; their wax covering could not have been derived from their food source. The second and third instar grubs were also yellowish brown but the fourth instar grubs were dark brown. All the grub stages were covered by waxy warts.

The newly hatched grub was 0.5 mm long and 0.2 mm broad. Duration of first instar grub was 3.21 to 3.87 days with a mean of 3.46 ± 0.23 days. Second instar grub measured 1.43 mm long and 0.49 mm broad. Its developmental period varied from 1.65 to 2.22 days with a mean of 1.95 ± 0.19 days. The third instar grub was 2.24 mm long and 0.55 mm broad. Third instar grub took 2.46 to 3.13 days with a mean of 2.80 ± 0.23 days for the development. Fourth instar grub was 3.20 mm long and 0.98 mm broad. Duration of fourth

instar grub varied from 3.30 to 4.17 days with a mean of 3.75 ± 0.29 days. The total larval duration varied from 10.93 to 13.32 days with a mean of 11.96 ± 0.65 days (Table 1). It is comparable to that of *Scymnus graciosus* wiese and *S. coccivora* (Ramamurthy, 1982; Mani and Thontadarya, 1987). The pupa was oval and pale reddish brown, fringed with short brown hairs. It was 2.20 mm long and 1.58 mm broad. The prepupal period varied from 0.65 to 1.27 days with a mean of 0.93 ± 0.23 days. The pupal period ranged from 5.60 to 6.62 days with a mean of 6.18 ± 0.36 days (Table 1). The pupal period of *Scymnus* sp. was comparable to the pupal period of other species of *Scymnus* (Kapur, 1942; Johnson, 1972; Ramamurthy, 1982; Mani and Thontadarya, 1987). Immediately on emergence, the beetles remained near the empty pupal skins. At first, the colour of the beetle was dull yellowish brown which soon changed to reddish brown with black markings. The females were slightly bigger than the males. Males were distinguished from the females by the presence of a tubercle on the first abdominal sclerite. The body of the beetle was oval, and measured 2.1 to 2.3 mm long and 1.3 to 1.6 mm broad. The beetles were active fliers

moving on plants swiftly. The size of the beetle was comparable to that of *S. latemaculatus* (Kapur, 1942) and smaller than that of *S. pyrocheilus* (Behera, 1984).

During the development of the first, second, third and fourth instars, a mean of 16.0, 19.1, 33.8 and 70.9 *A. craccivora* respectively, were consumed by a grub. The average number of aphids consumed by an individual grub during its development was 139.8. The per day consumption by first, second, third, fourth instar grubs and adults were 4.62, 9.79, 12.06, 18.99 and 31.13 aphids respectively (Table 1). Thus it is clear that the feeding rate of *Scymnus* sp. increased from the first instar larva to adult. This increased trend of feeding rate is in agreement with other *Scymnus* spp. (Kapur, 1942; Dash, 1978; Buntin and Tamaki, 1980; Behera, 1984). However, Johnson (1972) reported that the per day consumption by early fourth instar larva of *Scymnus nubilismus*. was higher than that by the adult.

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