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Research Note

Biology and predatory potential of the ladybird beetle, *Cheilomenes sexmaculata* (Fabricius) (Coleoptera: Coccinellidae) on sugarcane aphids

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ABSTRACT: The mean duration of development of *Cheilomenes sexmaculata* (Fabricius) reared on *Melanaphis indosacchari* David was 11.3 ± 2.4 days. The adults survived for 22.7 ± 9.1 days when fed with aphids. The feeding potential of grubs was 220.2 ± 17.4 aphids in the case of *M. indosacchari* and 179.6 ± 40.5 aphids in *Melanaphis sacchari* Zehnt. The adult beetles preyed a mean of 992.8 ± 256.8 *M. indosacchari* and 1403.3 ± 99.9 *M. sacchari*, respectively. The feeding potential of grubs increased with age while that of adults decreased with age.

KEY WORDS: Biology, *Cheilomenes sexmaculata,* predatory potential, sugarcane aphids

Nine species of aphids are reported to occur on sugarcane (Seth and Chona, 1961; Bhargava *et al.*, 1971; Rizvi and Bhargava, 1973) among which *Melanaphis sacchari* Zehnt. and *Melanaphis indosacchari* David are more common. They cause damage directly by desaping and indirectly by acting as a vector of the sugarcane mosaic virus (Alexander and David, 1986). However, the aphids are only minor pests and seldom build up heavy populations, probably due to the activity of predators. Among the different predators (Easwaramoorthy *et al.*, 1994), the coccinellid beetle, *Cheilomenes sexmaculata* (Fabricius) is widely distributed and feeds on the nymphs and adults of the aphids. But no quantitative data are available on the feeding potential of aphids commonly infesting sugarcane. In the present study the biology was studied on *M. indosacchari* and feeding potential was studied on both the species.

Sugarcane plants (variety Co 6304) were raised in pots and were infested separately with *M. indosacchari* and *M. sacchari* by tying aphid infested leaves to the leaves of healthy plants at Sugarcane

Breeding Institute, Coimbatore during 1992-1995. The infested plants were covered with wire mesh cages to prevent the entry of parasitoids and predators. The nucleus culture of *C. sexmaculata* was collected from sugarcane fields infested with aphids. Adults collected from the field were released for oviposition in plastic boxes (13.0 cm diam x 15.0 cm ht) containing cut sugarcane leaves with aphid colonies. The leaves were examined and changed every day. The leaves having egg masses of *C. sexmaculata* were maintained separately in glass vials (15 x 2.5 cm) for hatching of the grubs. On hatching the grubs were separated with a fine brush and reared individually on aphids.

The biology of the coccinellid was studied in the laboratory at 27 ± 2°C and 70 ± 5% RH. Freshly laid eggs (n=100) were placed in glass vials and the incubation period was recorded. After hatching, the grubs were reared individually on *M. indosacchari* provided *ad libitum*. Moultings and successive developmental period of each instar of the grub, prepual and pupal periods were noted. The adults were fed with *M. indosacchari* and the longevity was determined. For studying the feeding potential, the newly hatched grubs were fed with known number of aphids of either species. Observations were made at 24 h interval and the remaining aphids were removed. Fresh batches of aphids were offered to the grub everyday until pupation and upon emergence the adults were fed with known number of aphids until death.

The eggs are laid mostly in clusters of 6 to 12 adhered to each other by a mucilage and the unfertilized eggs are laid singly. The adult females oviposit their eggs almost close to the aphid colonies. The egg period lasted for 2.4 ± 0.52 days. The duration of first, second, third and fourth instars lasted for 1.3 ± 0.48; 1.4 ± 0.52, 2 ± 0.0, 1.1 ± 0.32 days, respectively. The mean adult longevity was found to be 22.2 ± 9.07 days. Rajamohan and Jayaraj (1973) conducted studies on the biology of *C. sexmaculata* on four species of aphids and noted that the average duration of development from egg to adult varied from 8.60 to 13.75 days. Campbell *et al.* (1980) imported *C. sexmaculata* to America from South West Asia, reared on *Schizaphis graminum* (Rondani) and reported the mean number of days for development from egg to adult was 12.2 ± 0.5 days and the mean adult longevity was 63.68 ± 5.19 days at 27 ± 5°C and 45 to 65% RH. Our present study has shown that the duration of development of *C. sexmaculata* was 11.3 ± 2 days. However, there was slight variation in the duration of each instar and this may be due to the influence of the host insect provided, temperature and RH maintained. Gautam (1989) studied longevity of *C. sexmaculata* on different hosts *viz.*, *Ferrisia virgata* (Cockerell) , *Planococcus pacificus* Cox, *F. virgata* + *P. pacificus*, *Corcyra cephalonica* (Stainton), *Spodoptera litura* (Fabricius) and aphids. Longevity when fed on mealybugs ranged from 22.71 to 40.14 days in males and from 26.14 to 42.71 days in females, but when fed on *S. litura* and *C. cephalonica* the period ranged from 2.57 to 3.86 days in both sexes. Our studies indicated that the longevity of *C. sexmaculata* adults fed on sugarcane aphid *M. indosacchari* was 22.7 ± 9.07 days.

The longevity of the adults increased on being fed with sugarcane aphids and hence this host can be considered more suitable for *C. sexmaculata.*

The number of aphids preyed by *C. sexmaculata* grubs increased steadily with increase in age and subsequent moultings. The average feeding potential of first, second, third and fourth instar grubs was 19 ± 1.5; 47.1 ± 3.3, 77.7 ± 7.6 and 76.4 ± 12.9 individuals in the case of *M. indosacchari* and 18.5 ± 2.2; 25.8 ± 12.7, 57.5 ± 16.8 and 77.8 ± 18.5 individuals in the case of *M. sacchari* , respectively. During the entire period of development from first instar to fourth instar, a single grub preyed upon 220.2 ± 17.4 (range 190-240) *M. indosacchari* or 179.6 ± 40.5 (range 122-265) *M. sacchari.*

The predatory potential of adults was observed over a period of 35 days. The feeding potential was at its peak during the first week following its emergence and subsequently it decreased with increase in age (Fig.1). Freshly emerged adults preyed on an average 89.6 *M. indosacchari* or 85.2 *M. sacchari* per day, while a 35 day old (the day prior to its senescence) adult could feed only 25 *M. indosacchari* or 28 *M. sacchari* per day. A single *C. sexmaculata* adult preyed a mean of 992.8 (465-1295) *M. indosacchari* and 1403.3 (1260-1568) *M. sacchari.* The present study showed that *C. sexmaculata* has high feeding potential on sugarcane aphids and hence it may provide effective suppression of the pest under field conditions which require further study.

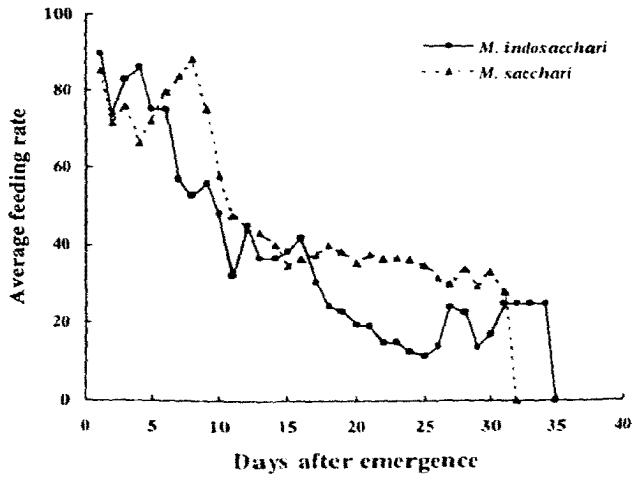

Fig. 1. Predatory potential of *C. sexmaculata* adult on sugarcane aphids

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