

## The Biology of *Coccinella septempunctata* Linn. on cowpea aphid, *Aphis craccivora* (Koch)

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**ABSTRACT:** The present research was carried out on in vitro mass multiplication, Larval feeding capacity on cowpea aphid, *Aphis craccivora* in laboratory condition ( $65 \pm 5$  per cent R.H. and  $25 \pm 2^\circ\text{C}$ ) at Rajasthan college of agriculture, Udaipur (Rajasthan). A study of the biology of the lady bird beetle indicated a significant variation in incubation period, grub, pupal period and adult longevity. Likewise, the fecundity, pre-oviposition, oviposition and post oviposition also varied considerably. However the mean incubation period was  $3.4 \pm 0.37$ , grub period,  $13.82 \pm 0.76$ , pupal period,  $6.9 \pm 0.54$  and the adult longevity was  $38.95 \pm 4.92$  for males and  $48.8 \pm 3.96$  for females. Fecundity, pre oviposition, oviposition and post oviposition period were observed  $259.8 \pm 19.67$  eggs/female,  $4.2 \pm 1.32$ ,  $37.7 \pm 6.88$  and  $4.1 \pm 1.29$  days, respectively.

**Keywords:** *Coccinella septempunctata*, cowpea aphid.

### INTRODUCTION

The lady bird beetle, *Coccinella septempunctata* Linn. (Coccinellidae: Coleoptera) are well known and diverse group of predator feeding on soft bodied insect pests. It is found in many habitats, including fields, sea, woodland, mountains and cities (Ali and Rizvi, 2009). Natural enemies play an important part for the prevention of arthropod pests in fields crops. Coccinellidae is a very diversified group with respect to feeding behaviour and the evolution of their food attentiveness includes move across trophic levels (herbivorous and primarily carnivorous) and kingdoms (Plantae, Animalia and Fungi) (Sutherland and Parrilla, 2009). Around 400 species of lady bird beetle are present in worldwide

As a consequence present study was conducted to explore the biological parameters and predatory potential of *C. septempunctata* on *A. craccivora* under laboratory situation.

*C. septempunctata* is ordinary species used for biological control in agriculture setting, as its main prey are aphid, a major agricultural pest. *C. septempunctata* is one of the most successful aphidophagous insects to suppress aphid populations.

Various chemicals are available for the control of aphids (Messelink *et al.*, 2013) but these chemicals have negative result on the environment (Khan *et al.*, 2015, 2016). Hence, there is necessity to explore alternate measures considering the management of aphids. Bio-control agent such as spiders, syrphids and coccinellid species are commonly present in the environment. These agents have been described as potential

candidates for the management of aphids (Singh *et al.*, 2001)

Preliminary study, *C. septempunctata* consumed more aphids (Soni *et al.*, 2004) than *brumoidessuturalis*, *Cheilomenes sexmaculata*, *Menochilus sexmaculatus* both grubs and adults. *C. septempunctata* consume about 40-173 aphid daily (Akram *et al.*, 1996; Suhail *et al.*, 1999).

Biological control agents (Coccinellids) a key constituent of many incorporated pest management programs but many synthetic pesticides influence them negatively (Moddud and Blackwell, 1993). Directed toward avoid such harmful effects, there is a need to utilize the natural enemies. The present review was therefore conducted to regulate the predatory potential of *C. septempunctata* opposed to cowpea aphids under the laboratory situation.

Biology of *C. septempunctata* on aphid that egg, larval and pupal period were  $9.27 \pm 0.30$ ,  $21.33 \pm 0.39$  and  $8.27 \pm 0.15$  days, respectively. Male and female beetle survived for  $21.13 \pm 1.02$  and  $22.17 \pm 1.27$  days, respectively. Female beetle laid  $253.85 \pm 38.76$  eggs on an average during life span and entire life of the predator was completed in  $63.50 \pm 1.15$  (female) and  $62.47 \pm 1.05$  (males) days. (Chakraborty and Korat (2014) Khasi *et al.* (2016) reported that feeding potential, oviposition, Larval and pupal stages of lady bird beetle (*C. septempunctata*) on crap myrtle aphid (*Tinocallis kahawaluokalani*). The average egg laid 88.6, average no. of grub emerged was 82.8, average egg incubation period was 3.6 days and total hatching percentage was 86.2%, the mean larval period completion was 13.5 days and pupal stages completion was 5.2 days respectively.

## MATERIAL AND METHOD

Biology of *Coccinella septempunctata* Linn. on cowpea aphid,

The adult predator of ladybird beetle, *Coccinella septempunctata* Linn. Were collected through the cowpea area. The stock culture was maintained inside laboratory at ambient temperature ( $25\pm 2^{\circ}\text{C}$ ) and  $65\pm 5$  per cent relative humidity in ten replications. Single pair of newly come out virgin adults of the predator was put down glass jars and nurtured with nymphs of aphid (*A. craccivora*). The upper of the glass jars were covered with muslin cloth, 10 per cent honey suspension and water was also placed in jars for adult feeding. Wet cotton wool was lay down on top of the cover to ensure humidity. Eggs laid by female on the walls of glass jar were takeoff daily, counted and transferred in glass Petri dish (15cm). A total of fifty eggs were observed in 10 replications to study biology of predation after hatching the neonate grubs were kept overmulticelled plastic lure to keep away from canabolism and supplied cowpea aphid. At first 10 to 15 nymphs per grub/day were provided, but the numbers were increased with the increase in grub instar, till pupation take place. Pupae formed in the multi-celled plastic lure were kept separately and untroubled for adult emergence. Newly emerged adult *C. septempunctata* were transferred in acretic cage (60cm  $\times$  30cm  $\times$  30cm), in pairs and supplied with cowpea aphid as meals. Laboratory reared adults was isolate male and female on the basis of their structure of external genitalia longevity of males and females and body size were studied separately. Similarly, pre-oviposition, oviposition, post oviposition and fecundity period of females were also observed. the time after emergence of adult from pupae and starting of egg laying was considered as pre oviposition period. The period of egg laying was considered as oviposition period. Post oviposition period of female was recorded as period between the days of female ceased egg-laying to the day of dying. The eggs set down by each mated female weresum up daily in the morning and total

number of eggs laid during whole life period was recorded as fecundity.

## RESULT AND DISCUSSION

Examination of Table (1) disclosed that the mean incubation, larval and pupal period observed were  $3.4\pm 0.37$ ,  $13.82\pm 0.76$  and  $6.90 \pm 0.54$  days, respectively. The adult life span for male and female recorded was  $38.95\pm 4.92$  and  $48.8\pm 3.96$  days. Fecundity, pre oviposition, oviposition and post oviposition period were observed  $259.8\pm 19.67$  eggs/female,  $4.2\pm 1.32$ ,  $37.7\pm 6.88$  and  $4.1\pm 1.29$  days respectively.

It can be conclude from the results of biology such the incubation period, grub period, pupal period as well as fully grown longevity varied to a considerably extent within the replications/ pairs of lady bird beetle. The incubation period was minimum as compared to pupal duration whereas, larval period was maximum as compared to pupal stage. The adult longevity was comparably higher in case of female as compared to male. Higher sex ratio there was more females at the moment that compared to males were observed. The preoviposition, oviposition and postoviposition period was observed. The result was partially in line with Khasi *et al.* (2016) who observed that feeding potential, oviposition, larval and pupal stages of *C. septempunctata* on crap myrtle aphid (*Tinocallis kahawaluokalani*). The average fecundity was 88.60, mean number of grub emerged was 82.80, average incubation period was 3.6 days and total hatching percentage was 86.20 percent, the mean larval period was 13.5 days and pupal stages was 5.2 days, respectively. In another case Rana and Kakker (2000) reported that when the predation feed on cereal aphid, *Sitobion avenae* (F.) and found 4.2, 9.39 and 4.7 days incubation period, larval and pupal period, respectively and 81.89 percent were egg hatched. A mean male and female longevity were observed 36.91 and 39.90 days, respectively. The mean fecundity recorded was 476.40 eggs/female.

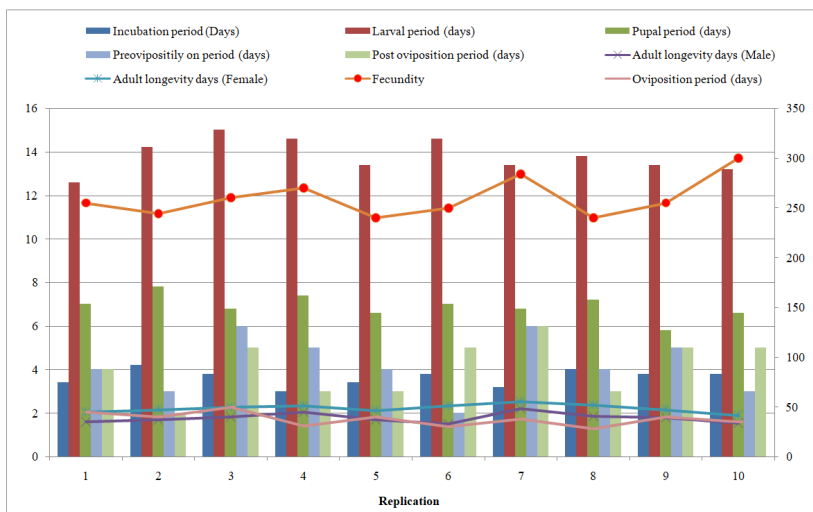


Fig. 1. Biology of *Coccinella septempunctata* on cowpea aphid (*Aphis craccivora*).

**Table 1: Biology of *Coccinella septempunctata* on cowpea aphid (*Aphis craccivora*).**

Replication	No. of eggs	Incubation duration (Days)	Larval duration (Days)	Pupal duration (Days)	Adult life span (Days)		Fecundity	Pre oviposition duration (Days)	Oviposition duration (Days)	Post oviposition duration (Days)
					Male	Female				
1	5	3.40	12.60	7	35.00	45.00	255	4	45	4
2	5	4.20	14.20	7.8	37.50	47.33	244	3	40	2
3	5	3.80	15.00	6.8	40.00	50.00	260	6	50	5
4	5	3.00	14.60	7.4	45.00	51.33	270	5	31	3
5	5	3.40	13.40	6.6	37.00	46.67	240	4	40	3
6	5	3.80	14.60	7	33.00	51.33	250	2	30	5
7	5	3.20	13.40	6.8	48.50	55.33	284	6	38	6
8	5	4.00	13.80	7.2	40.50	52.00	240	4	28	3
9	5	3.80	13.40	5.8	39.50	47.33	255	5	40	5
10	5	3.80	13.20	6.6	33.50	41.67	300	3	35	5
<b>Mean±S.D.</b>		3.4±0.37	13.82±0.76	6.9±0.54	38.95±4.92	48.8±3.96	259.8±19.67	4.2±1.32	37.7±6.88	4.1±1.29

## CONCLUSION

The mean incubation period was 3.4±0.37, grub period, 13.82±0.76, pupal period, 6.9±0.54 and the adult longevity was 38.95±4.92 for males and 48.8±3.96 for females. Fecundity, pre oviposition, oviposition and post oviposition period was observed 259.8±19.67 eggs/female, 4.2±1.32, 37.7±6.88 and 4.1±1.29 days, respectively.

## FUTURE SCOPE

There is lot of scope to intensify the research which can improve and synergize the biological control. Basic research areas in the field of biology, ecology, biosystematics, behavior, biochemistry, population dynamics etc. have a great contributing value to biological suppression which needs to be studied. This research would help greatly in the application of IPM strategies of the pest.

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**Conflict of Interest.** None.

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