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**Research Note**

# Feeding potential of *Coccinella transversalis* F. on different morphs of mustard aphid, *Lipaphis erysimi* (Kaltenbach)

**ROSHMI BORAH* and S. K. DUTTA**

*Department of Entomology, Assam Agricultural University, Jorhat 785013, Assam, India.*

**Corresponding author E-mail*: roshmidutta@gmail.com

**ABSTRACT**: Feeding potential of the aphidophagous coccinellid beetle, *Coccinella transversalis* F., was studied under laboratory conditions at Assam Agricultural University, Jorhat. The first instar larvae of *C. transversalis* were less voracious than older instars. The voracity (no. of aphids consumed / 24h) of *C. transversalis* increased in succeeding instars. The fourth instar larva of *C. transversalis* consumed 65.67 apterous adults of *L. erysimi* in 24h and the overall consumption during the entire fourth instar was 252.90 apterous adults. The theoretical effectiveness was worked out as 107.50, which was a product of multiplication of its seasonal average numbers in the field by its average daily consumption.

**KEY WORDS**: *Coccinella transversalis,* feeding potential, *Lipaphis erysimi*

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## INTRODUCTION

Coccinellid beetles (Coleoptera: Coccinellidae) are well known predators of aphids and some of them appear capable of regulating field populations of some species of aphids (Hagen and Van den Bosch, 1968; Saharia, 1985; Ghosh *et al*., 1981; Agarwala *et al*., 1987; Gautam 1989; Takizawa *et al*., 2000; Chitra Devi *et al*., 2002). *Coccinella transversalis* F. has been reported as a predator of mustard aphid, *Lipaphis erysimi* (Kalt.) (Saharia, 1982; Ghosh *et al*., 1981; Singh and Rai, 2000). No information is available on the predatory potential of *C. transversalis* on *L. erysimi* from Assam. The potential of this predator is evident from its role in regulating *L. erysimi* in *toria* fields during 2006-07 and 2007-08 *rabi* seasons as it constituted 25-27% of the total natural enemy population. The efficiency of a predator in the control of aphids depends upon a number of factors including predatory potential, fecundity and its relative abundance (Yakhontov, 1966). The feeding potential of several coccinellids like *Coccinella septempunctata* L. and *Menochilus sexmaculatus* (Fab.) have been studied on *L. erysimi* (Singha *et al*., 1982; Anand, 1983; Shenmar and Brar, 1995). Keeping in view its abundance and future prospect of utilization in biocontrol programmes, attempts were made to study its feeding potential under Assam conditions.

*Toria* variety TS-36 was grown in a plot of 160sqm at ICR Farm, Assam Agricultural University, Jorhat, during the *rabi* seasons of 2006-07 and 2007-08. The crop was allowed to be naturally infested by *L. erysimi* and regular monitoring was done for appearance of *C. transversalis.* The initial culture of *C. transversalis* was raised by collecting large number of adults from this heavily infested *toria* plot. The field collected adults were released in pairs (one male and one female) into plastic containers (9 x 9 cm) covered with muslin cloth fastened by elastic bands. These plastic containers were provided with fresh aphid infested *toria* branches. As soon as the females started laying eggs, the males were removed. These eggs were used for initiating the culture of the predator. The eggs were transferred to cotton plugged vials (5cm x 1cm) with a fine moist paint brush and incubation period was recorded. Newly hatched grubs were transferred individually into petri plates of 15 cm diameter and provided *toria* twigs infested with prey aphids offered as groups of young nymphs (instars I and II), old nymphs (instars III, IV and V), apterous adults and alate adults. Hundred individuals of each group were offered to the predator as food. Fresh prey individuals were introduced as and when necessary. The number of aphids consumed by the larva in 24 h was recorded. The feeding potential of the remaining instars and the adults was recorded by transferring the individuals into petri dishes containing prey aphids as described earlier.

**Table 1. Feeding potential (no. of aphids consumed / day) of *C. transversalis* on different stages of *L. erysimi***

| Stage of *C. transversalis* | Prey stage | | | | Mean |
|---|---|---|---|---|---|
| | YN | ON | Ap. A | Al. A | |
| I instar | 28.20±6.81 | 25.20±4.65 | 20.20±3.45 | 6.20±2.81 | 19.95±3.23 |
| II instar | 52.00±7.89 | 43.00±5.88 | 32.00±3.303 | 10.20±2.30 | 34.25±4.36 |
| III instar | 65.40±2.30 | 73.40±8.40 | 77.80±6.81 | 16.60±5.32 | 58.30±7.54 |
| IV instar | 76.60±11.31 | 80.60±10.98 | 84.20±13.46 | 21.20±9.68 | 65.67±8.23 |
| Male | 60.20±8.38 | 68.60±5.45 | 72.80±4.68 | 31.60±11.23 | 58.32±5.23 |
| Female | 53.20±5.60 | 72.20±4.76 | 76.40±9.19 | 36.80±3.56 | 62.17±5.76 |
| Mean | 55.39±7.67 | 60.50±6.84 | 60.56±5.76 | 20.45±5.86 | 49.77±5.24 |

Data based on 5 replications; YN=Young nymph; ON=Old nymph; Ap.A=Apterous adult; Al.A=Alate adult

The theoretical effectiveness of the predator was calculated by multiplying the seasonal average numbers of the predator in the field (Bora and Dutta, unpublished) by the average daily consumption in the feeding potential study (Simpson and Burkhardt, 1960).

The feeding potential (no. of aphids consumed / day) of the first instar larvae was less than the later instars. The voracity (no. of aphids consumed / day) increased in succeeding instars. The first and second instar larvae of *C. transversalis* preferred young nymphs to older nymphs and adults of *L. erysimi*. Preference for young nymphs may be due to their smaller size and lower numbers of encounters would be necessary to capture the smaller aphids (Dixon and Russel, 1972). The fourth instar larvae of *C. transversalis* consumed more numbers of aphids than did the adult female (average 65.67 and 62.17, respectively). Pandey and Khan (2002) reported that the fourth instar larvae of *C. septempunctata* consumed more aphids (*M. persicae*) than did the adults. Wagle *et al*. (2006) reported that *C. transversalis* on average devoured 38.8 *Brevicoryne brassicae* per day with the feeding range of 25-50 aphids per day. Their findings were similar to the present findings. In the present study it was seen that *C. transversalis* consumed an average of 47.77 *L. erysimi* with the feeding range of 19.95-62.17 aphids.

The adult females of *C. transversalis* were more voracious than the adult males (62.17 and 58.32 aphids / day, respectively). Veeravel and Baskaran (1996) and Malik *et al*. (1998) reported that an adult of *C. transversalis* consumed on average 67.66 aphids / day. The theoretical effectiveness of *C. transversalis* worked out by multiplying its seasonal average number of 2.16 (adults+larvae) / plant in the field (Borah and Dutta, unpublished) by the average daily consumption (49.77 aphids / predator) was 107.50, which showed its potential for use as an effective biocontrol agent against mustard aphid.

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