



Predation Efficiency of different Life Stages of the Two Ladybirds *Coccinella Septempunctata* and *C. Undecimpunctata*

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Abstract

The predatory efficiency of first and fourth instar larvae, adults of the seven-spotted ladybird *Coccinella septempunctata* and the eleven-spotted ladybird *Coccinella undecimpunctata* in preying on nymphs and adults of black bean *Aphis fabae* Scopoli (Homoptera: Aphididae) was evaluated in the entomology laboratory at the College of Education for Girls/University of Kufa in 2021. The results showed that adults of *C. septempunctata* ladybirds and *C. undecimpunctata* ladybirds are the most efficient in consuming nymphs and adults of *A. fabae*. Adults of *C. septempunctata* ladybird were more competitively efficient at 26.5 individuals/day than adults of *C. undecimpunctata* which recorded 24.8 individuals/day. The predatory efficiency was 22.7 individuals/day for the fourth instar larvae of *C. septempunctata*, slightly less than the predatory efficacy of 23.4 individuals/day for the first instar larvae, and the predatory efficiency was 25.5 individuals/day for the fourth instar larvae of *C. undecimpunctata* than the fourth instar larvae of 22.7 individuals/day for the ladybird a *C. septempunctata*. The first instar in the two types of ladybirds was less predatory than the rest of the insect's stages.

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Introduction

Ladybirds are one of the effective biological control elements, as most of them feed on important agricultural insect pests such as aphids, white flies, mealybugs, scale insects and some types of mites (Michand et al. 2002). Predatory ladybirds belong to the family Coccinellidae, which includes about 6000 species, most of which feed on aphids, except subfamily Epilachninae, which feeds on plants (Linssen, 1958).

The extensive use of fertilizers and chemical pesticides to improve plant crops led to pollution and disturbances in ecosystems (Hogus et al. 2002). It can be considered as one of the important alternatives to harmful chemical pesticides, and thus ladybirds are considered one of the most

important predatory insects and spread in all countries of the world and are present in field crops and forests, where they feed on many groups of harmful agricultural pests (Omkar and Barvex, 2000). Kumare et al (2013) studied the food preference of the seven-spotted ladybird *C. septempunctata* and other ladybirds over two species of aphids and found that the ladybird prefers the consumption of aphids *Aphis curccivaa* over *Lipaphiserysimi* aphids, but in the fourth larval stage of the ladybird the results were opposite and preferred the larvae of *L.erysimi* aphids over the aphids *Aphid curccivaa*.

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Ali and Rizvi (2007) tested the ability of the seven-point ladybird to prey on five species of aphids: *Lipaphis erysimi*, *Aphis craccivora*, *Hyadaphis coriandri*, *Rhopalosiphum phumnyphae* and *Macrosiphum rosae* under laboratory conditions of temperature 25 + 1°C, humidity of 70 + 5%, 12 hours of light and 12 hours of darkness. It was found that there are differences in the growth period of the larval stage when feeding on aphids and that the period of growth in the larval stage increases when feeding on *H. corioclari* aphids and is shorter when feeding on *M. rosae* aphids.

MATERIAL AND METHODS

from the black bean 100 nymphs of seven-spotted ladybird were collected using a soft brush and placed with the leaves of the plant in it in plastic tubes with a diameter of 4 cm and a height of 6 cm, then a newly emerged adult of the seven-spotted ladybird was added to it and left in laboratory conditions at a temperature of 26 + 01 It has a relative humidity of 70+5 with a photoperiod of 12 light and 12 dark hours. The number of consumed insect nymphs was recorded daily for 7 days. Average number of aphids consumed during one day, and the predation efficiency was also calculated for the first and fourth instar larvae of the seven and eleven-spotted ladybird on black bean aphids (Ali & Rizvi, 2007).

Results and Discussion

The results indicated that the first larval instar of the seven-spotted ladybird *Coccinella septempunctata* was the least predatory efficient compared to the fourth larval instar and adults, and the adults were the most predatory efficient than the fourth instar larvae, and the first instar larvae and adults were the most efficient predatory daily during the seventh day of the experiment and recorded the highest Predatory efficiency of adults 32.7 after 7 days of experiment (Table1).

In case of the eleven-spotted ladybird *Coccinella undecimpunctata*, the results (Table1) indicated that the fourth larval instar was the least predatory efficient compared to the first instar larvae and adults, and the adults were more predatory than the first-stage larvae, and the larvae and adults were more predatory efficient daily during the seventh day of the experiment, and the highest predatory efficiency was recorded for the adults 30.7 after 7 days of the experiment.

Deligeorgidis et al (2019) found in a field study on the predatory efficiency of adult seven-spotted ladybird *Coccinella septempunctata* daily consuming

between (18-16) prey from the insect *Prepano thripsreuteri*, and therefore there were no significant differences in the daily consumption of this ladybird.

Bhadauria et al (2001) indicated that the predatory efficiency of ladybirds depends directly on the size of the prey, as the predatory efficiency increases when feeding the predatory ladybird on small prey, and this theory was confirmed by Omkar and James (2001). A study Perumalsamy et al (2010) indicated that the predatory efficiency of *Stethorus gilvifrons* increases with the age of the larval stage, where the efficiency of the first larval stage was 10.6 nymphs / day, while the predatory efficiency of the fourth larvae was 52.2 nymphs / day and the predatory efficiency of adults was 76.8 nymphs/day.

It was found that the adults of the seven-spotted ladybirds recorded the highest daily predation of 38.7 prey/day, recorded on the seventh day of the experiment compared to predation rate less than 28.7 prey/day for each of the first and fourth larval instars, and from It is noticeable that the predatory efficiency of all predator stages increases with the passage of time, and the results of the above figure show that the larvae of the first instar were more predatory than the fourth instar larvae in most of the treatment days. In a study of the predatory efficiency of four species of ladybirds, Kumar et al (2013) confirmed that the efficiency of each of the fourth instar larvae and adults of the seven-pointed ladybird was close to consuming the nymphs and adults of the aphid *Aphis craccivora* either in the laboratory or in the field test.



Table 1. Predation efficiency of first and fourth instar larvae and adults of the two ladybirds *Coccinella septempunctata* and *Coccinella undecimpunctata* on nymphs and adults of the black bean aphids *Aphis fabae*

Treatments		No. of consumed black bean <i>Aphis fabae</i> after predation period (days)							L.S.D. (<i>P</i> ≤0.05)
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
The seven-spotted ladybird <i>Coccinella septempunctata</i>	1st instar larva	16	18.7	22.7	24.5	26	27.3	28.7*	7.7
	4th instar larva	17.3	19	20.7	22.7	22.9	27.3	28.7*	6.3
	Adult	17.3*	20.4*	23.7*	25.3*	26.7*	29.3*	32.7**	8.1
	L.S.D. (<i>P</i> ≤0.05)	0.9	1.2	2.1	1.9	2.8	1.3	3.1	
The eleven-spotted ladybird <i>Coccinella undecimpunctata</i>	1st instar larva	17.3	20.7	22.7	24	24.7	26.7	28.7*	5.9
	4th instar larva	21.3*	20.7	23.3	25.3	28	29.3	30.7*	6.2
	Adult	19.7	22.7*	25*	26.3*	28.3*	30.7*	32.7**	7.1
	L.S.D. (<i>P</i> ≤0.05)	2.6	1.7	1.5	1.9	3.1	2.6	2.6	

Findings also showed that the eleven-spotted ladybird adults were more predatory efficiency than the first and fourth instar larvae, and the highest predation rate was 32.7 prey/day after 7 days of the experiment, while the fourth instar larvae was more efficient than the first instar larvae. In general, the predatory efficiency increased over time and was highest on the seventh day of the experiment. The study of Imam (2015) showed that the predatory potential and biology of *Coccinella undecimpunctata* L. fed on cowpea aphid, *Aphis craccivora* Kock have been studied under laboratory conditions (25±2°C and 60±5% R.H.). The results revealed that mean consumption of aphids per *C. undecimpunctata* adult was 80.8, whereas, 21.76, 55.67, 107.86 and 231.03 aphids were consumed by a single larva during 1st, 2nd, 3rd and 4th instars, respectively.

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