

STUDIES ON FEEDING POTENTIAL OF THREE COCCINELLIDS, *COCCINELLA SEPTEMPUNCTATA*, *CHEILOMENS SEXMACULATA* & *HIPPODAMIA CONVERGENS* ON WHITEFLIES FROM NASHIK DISTRICT (M.S.) INDIA.

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ABSTRACT

The predatory potential of ladybird beetles was carried out in entomology research laboratory, KTHM College, Nashik. *Whiteflies* are most common agricultural pest, damaging the some agricultural crops, vegetables, tomato, potato, cotton, guava, and garden plants. The feeding potential was carried for the period September 2014 to November 2014 at laboratory conditions. 25 *whiteflies* *Trialeurodes vaporariorum* were provided to three different species of adult ladybird beetles each namely, *Coccinella septempunctata*, *Cheilomens sexmaculata* and *Hippodamia convergens* daily for three months. The feeding potential of *Coccinella septempunctata* on the whiteflies were found dominant. The average *whiteflies* consumption of *Hippodamia convergens* and *Cheilomens sexmaculata* was 15.34 ± 1.37 and 12.69 ± 0.09 respectively; the *Coccinella septempunctata* consumed 17.58 ± 1.72 whiteflies significantly. It is summarized that the Coccinellids have predation potential against controlling the whiteflies in the farmlands of agricultural crops, vegetables and garden plants and therefore, their numbers in the fields should be augmented for better production of crops yield which will increase the national production of agriculture.

KEYWORDS: Feeding potential, Coccinellidae, *Coccinella septempunctata*, *Cheilomens sexmaculata*, *Hippodamia convergens*; *Whiteflies*- *Trialeurodes vaporariorum*.

INTRODUCTION

The synthetic pesticides create pollution to soil, air and water in the environment. This pollution disturbs the ecology and ecosystem and therefore there is need to develop biological method to control the agricultural insect pest. In order to achieve this goal the insects particularly from family Coccinellidae (Coleoptera) are useful. The Coccinellid ladybugs also called as ladybird beetles because they are natural predators of many insect pests such as aphids, mealy bugs, whiteflies, corn borer, brown plant hopper and scale insects. These coccinellids are act as biological control agent both in their larval and adult stages, Gautam (1989), Omkar and Pervez (2000), Rao *et al.* (1989), Mani M. (1995), Hippa *et al.* (1978), Kring *et al.* (1985). The cultivated crops like maize, wheat, grapes, cotton and vegetables are infected by both sucking and chewing type of insects, such as white flies, aphids, mealybugs, mites and the chewing type of insects like grasshopper, termites respectively. The mealy bugs are serious pests of cotton and have resulted in severe damage during the last few years, Solangi *et al.* (2008), Lohar *et al.* (2005). In many studies it is known that *Coccinella septempunctata* has been used for the biological control of *T. tabaci* and *T. vaporariorum* in a green house, Solomon M.E. (1949).

Coccinella septempunctata is an important bio control agent of soft bodied insects such as aphids, aleroid flies and small lepidopterous larvae. The ladybird beetle (Coccinellidae) is being exploited as a potent insect for the control of aphids, whiteflies beside other animal pests that cause economic losses throughout Pakistan, Fayyaz (1998). Many species of aphids attack and damage the various vegetations leading to economic losses. Whiteflies attack on the tomato field, *Calotropis* plant and guava garden on the cumulative in the different countries. The three-stripped beetle, *Brumus suturalis* belongs to the subfamily of coccinellinae, is important and most voracious predator of mature and immature stages of mealy bug on different field and vegetable crops in Sindh, Pakistan, Lohar (2001). The whiteflies are feed by tapping into the phloem of plant, introducing toxic saliva and decreasing the plants turgid pressure overall. Whitefly control is difficult and complex as whiteflies rapid gain resistance to chemical pesticides. Hence, biological methods have been proposed to control whitefly infestation. The biological control agents, from Coccinellids has contributed greatly and suppressed the agricultural pest bellow the economic damage level. Keeping in view the above facts and importance of ladybird beetles as biological control over whiteflies, the present studies were conducted to determine the feeding potential of three species of ladybird beetles namely, *Coccinella septempunctata*, *Cheilomens sexmaculata* and *Hippodamia convergens*.

MATERIALS AND METHODS

a. The study area, Collection of Ladybird Beetle and Mass Culture of Whiteflies

The present study was carried out at Zoological Research Laboratory, Department of Zoology, K.T.H.M. College, Nashik-2 having Latitude 19.9942° N, Longitude 73.7972° E. The adult ladybird beetles of *Coccinella septempunctata*, *Cheilomens sexmaculata* and *Hippodamia convergens* were collected from different localities like the green grass, maize field and guava garden of Nashik district. The whiteflies were collected from the host plant guava *Psidium guajava* from botanical garden of K.T.H.M. College, Nashik (M.S.). The culture of whiteflies *Trialeurodes vaporariorum* (Aleroididae) was carried out on the same guava plant *Psidium guajava*. Such culture were maintained and used for further experimental work.

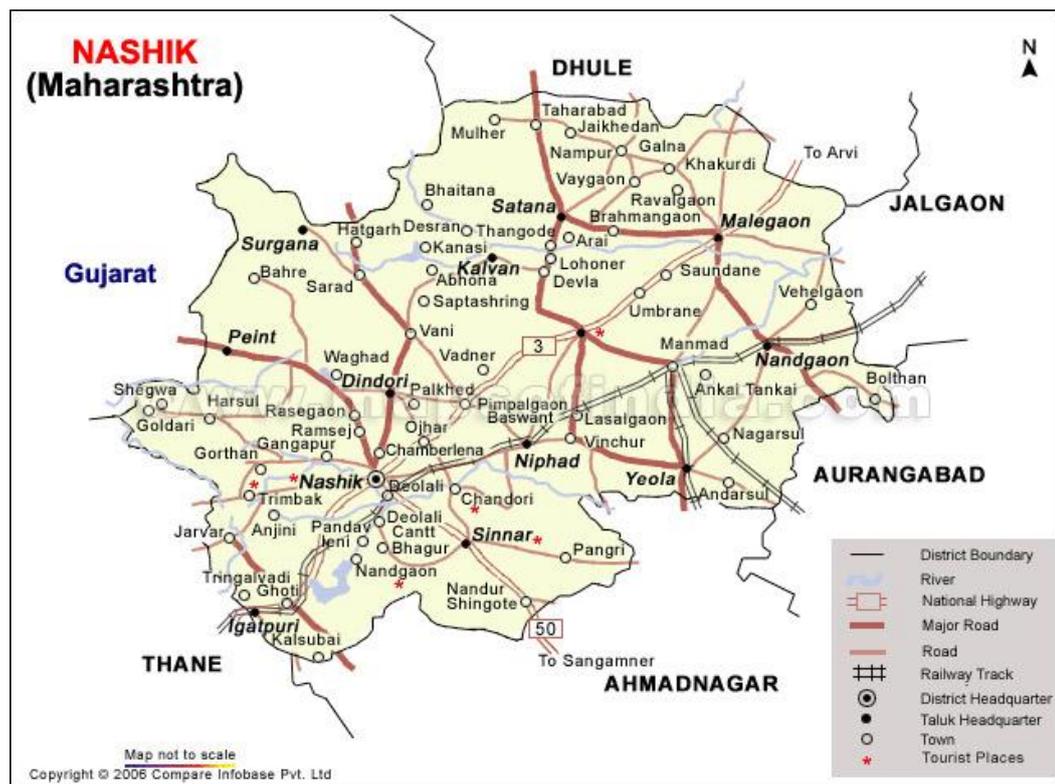


Figure 1: Location map of Nashik District in Maharashtra State (India)
(Source by Google: <http://nashik.nic.in/htmldocs/distmaps.htm>)

b. Rearing and Observation of Ladybird Beetle

The collected adult ladybird beetles were released in plastic jars, acclimatized and reared on whiteflies *Trialeurodes vaporariorum* (Aleroididae) in the laboratory condition at temperature 24 ± 1 ; RH: 60-65% and L D – 10-14., and the ladybird beetles were fed with different stages of nymphs and adult of whiteflies *Trialeurodes vaporariorum* daily. The plastic jars covered with muslin cloth

c. Experimental Bioassay

The experiment was carried out to identify variation in feeding potential among adult beetles namely: *Coccinella septempunctata*, *Cheilomens sexmaculata* and *Hippodamia convergens* against whiteflies *Trialeurodes vaporariorum*. In each petriplate one healthy adult ladybird beetle of each species was released separately and 25 whiteflies *Trialeurodes vaporariorum* were provided to each beetle on guava leaf at a time. The behavior and feeding potential was observed for 24 hours and continued for three months. The observed data was analyzed statistically by ANNOVA test.

RESULTS AND DISCUSSION

The present studies was carried from September 2014 to November 2014 at laboratory conditions. Three species of ladybird beetle namely *Coccinella septempunctata*, *Hippodamia convergens* and *Cheilomens sexmaculata* were fed with 25 whiteflies daily for three months each. The average feeding potential of *Coccinella septempunctata*; *Hippodamia convergens* and *Cheilomens sexmaculata* to whiteflies (*Trialeurodes vaporariorum*) are 17.58 ± 1.72 ; 15.34 ± 1.37 and 12.69 ± 0.09 respectively. The *Coccinella septempunctata* consumed more whiteflies (*Trialeurodes vaporariorum*) (17.58 ± 1.72) than the *Hippodamia convergens* and *Cheilomens sexmaculata*. Table- 1 depicts the significance difference in the mean consumption of whiteflies *Trialeurodes vaporariorum*

Table- 1 Depict the feeding potential for three species of ladybird beetles

Sr. No.	Biological name of ladybird beetle	Number Of beetle released	Number of Whiteflies provided	Days	Average of whiteflies consumed \pm S.E.	Calculated f- value
1.	<i>Hippodamia convergens</i>	1	25	90	15.34 ± 1.37	1.89
2.	<i>Coccinella septempunctata</i>	1	25	90	17.58 ± 1.72	2.955
3.	<i>Cheilomens sexmaculata</i>	1	25	90	12.69 ± 0.09	0.009

Data is average of three months.

Kaur et al. (2010) reported that the ladybird beetles were reproduced by feeding on Aleyroid flies. The increase in feeding potential with age of beetle is in line with earlier findings of Ali and Razvi (2007) and Babu (1999). In the present studies the *Coccinella septempunctata* consumed more whiteflies than the other coccinellids significantly. These findings resembles with fourth instar larvae of *C. montrozieri* consumed *Maconellicoccus hirsutus* nymphs and adult female than other larval stages of the predator by (Mani and Thontadarya, 1987). The forth instar larvae of *Cryptolaemus montrouzieri* found to be voracious feeders of whiteflies as compared to other larval stages, (Fandi et al. 2010, Lucas et al., 2004). Similarly, Rosas Garcia et al. (2009) shown that the adult beetle of *Coccinella septempunctata* was most efficient adult predator as compared to other stages of beetle. This is may be due to the fact that adult beetle *Coccinella septempunctata* are continues feeder and have a greater longevity. This predatory beetle has potential to exploit for the control of mealy bugs, scale insects and whiteflies on different crops, vegetables and agricultural field from Nashik district. Thus, our findings are noticed that *Coccinella septempunctata* is more efficient predator of Aleroididae than *Hippodamia convergens* and *Cheilomens sexmaculata*.

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