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Feeding preference of *Cheilomenes sexmaculata* (Fab.) on different species of aphid

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Abstract

An experiment on feeding preference of *Cheilomenes sexmaculata* (Fabricius) on five different species of aphid viz., mustard aphid, *Lipaphis pseudobrassicae*, cotton aphid, *Aphis gossypii*, maize aphid, *Rhopalosiphum maidis*, cowpea aphid, *Aphis craccivora* and gaillardia aphid, *Uroleucon compositae* was conducted under laboratory condition at Department of Agricultural Entomology, B. A. College of Agriculture, AAU, Anand during 2020-21. The most preferred aphid species by *C. sexmaculata* grub was *A. craccivora* (10.66 aphids). Among the five species of aphids, the least preferred species were *U. compositae* (6.26 aphid) and *L. pseudobrassicae* (7.17 aphids). The feeding preference of *C. sexmaculata* adult towards different species of aphids, it placed in descending order of feeding preference, *A. craccivora* (13.41 aphids) > *R. maidis* (12.53 aphids) > *A. gossypii* (11.40 aphids) > *L. pseudobrassicae* (7.97 aphids) > *U. compositae* (7.06 aphid). The maximum feeding preference was opined to aphid species, *A. craccivora* while, the minimum preferred species was *U. compositae* by both the grub and adult stages of *C. sexmaculata*.

Keywords: *Cheilomenes sexmaculata*, aphids, feeding preference

1. Introduction

The coccinellid is one of the most important predator in reducing sucking pest population. Coccinellids are known to have the strongest impact among all aphidophagous insects in aphid population regulation (Hodek, 1970; DeBach and Huffaker, 1971) [4, 3]. Coccinellids, known as ladybugs, ladybeetles or ladybird beetles are one of the most common and easily recognizable invertebrate components of almost every terrestrial ecosystem. Species in the family are so ubiquitous and yet so sensitive to environmental conditions that they have been proposed as indicator species (Omkar and Mishra, 2002) [6]. The ladybird beetle, family coccinellidae comprises approximately 6000 described species in about 360 genera and 42 tribes (Hodek *et al.*, 2012) [5]. India has an enriched biodiversity of economical insects including the coccinellids. Out of these species, *Coccinella transversalis* (Fabricius), *Brumoides suturalis* (Fabricius) and *Cheilomenes sexmaculata* (Fabricius), (*Menochilus sexmaculatus* Feb.) are the most widely spread and are important bio suppression agents of aphids and occupy a unique place among the aphidophagous predators by virtue of their wide distribution and good predating ability both in the larval and adult stages. A good number of species of this group have been very effective in bringing down the field population of aphids (Chowdhuri and Pal, 1975) [2]. Common ladybird beetle, *C. sexmaculata* as the predominant species in middle Gujarat (Tank, 2006) [11].

Ladybird beetles are one of the beautiful insects found in all parts of the world. immature of ladybird beetles and adult stages play important role in biological ecosystems and have been used in different regions of the world to manage pests such as aphids, mealybugs, thrips and mites (Tank *et al.*, 2010) [12]. Among all the natural enemies, aphidophagous coccinellids especially *Coccinella septempunctata* is well known potential aphid predator and manage the pest under field condition (Bilashini and Singh, 2009; Sethi and Atwal, 1964) [1, 8] in mustard ecosystem. Both grubs and adults feed voraciously on mustard aphid but their feeding efficiency varies from stage to stage and at different temperatures. The indiscriminate use of pesticides causes phytotoxicity and death of beneficial organism such as parasites, parasitoids, micro-organisms and pollinators (Southwood and Henderson, 2000) [10]. Therefore, it is felt needed to find out suitable and safer insecticides against coccinellid beetle.

The amount of prey consumed effects on the development, survival and reproduction of predators. Therefore, one must study predator responses to these factors to understand the ecology of predators including the searching behaviour, foraging efficiency and prey consumption.

Moreover, predatory beetles can be used for suppressing the preferred host of pest under field conditions. Hence, this study on feeding preference of *C. sexmaculata* on different species of aphid was carried out under laboratory conditions.

2. Materials and Method

In order to determine the feeding preference of grub and adults of *C. sexmaculata* to different species of aphids viz., mustard aphid, *Lipaphis pseudobrassicae*; cotton aphid, *Aphis gossypii*; maize aphid, *Rhopalosiphum maidis*; cowpea aphid, *Aphis craccivora* and gaillardia aphid, *Uroleucon compositae* were collected from their respective host crops. A laboratory trial was carried out at the Department of Agril. Entomology, B. A. College of Agriculture, AAU, Anand during February 2020-21 to check the feeding preference of *C. sexmaculata* on different aphid species.

The grubs of *C. sexmaculata* obtained from laboratory culture were utilized for the study on feeding preference. A fourth instar grub was released in the middle compartment of galvanized tray (diameter: 35 cm and length: 9 cm). The tray was partitioned into five compartments in which five aphid species viz., mustard aphid, *L. pseudobrassicae*; cotton aphid, *A. gossypii*; maize aphid, *R. maidis*; cowpea aphid, *A. craccivora* and gaillardia aphid, *U. compositae* (twenty aphids per leaf) were released. The tray was covered with plastic net with help of rubber band to prevent the escape of grub. The observations were recorded at an interval of 2 hours during whole day and after 24 hours regarding preference of *C. sexmaculata* to prey. The number of individuals of different species of aphids consumed by grub was recorded. Same methodology was also followed to understand feeding preference of adult. The experiment was repeated ten times and data were statistically analyzed following square root

transformation.

3. Result and Discussion

3.1 Feeding Preference of Grubs on Different Species of Aphid: After 2 hours of release of grub, the most preferred aphid species were cowpea aphid, *A. craccivora* (1.16 aphids) and maize aphid, *R. maidis* (1.16 aphids) followed by cotton aphid, *A. gossypii* (0.99 aphid). Among the five species of aphids, the least preferred species were gaillardia aphid, *U. compositae* (0.52 aphid) and mustard aphid, *L. pseudobrassicae* (0.62 aphid) which remained statistically at par with each other. The maximum preference in case of grub was observed toward *A. craccivora* (2.42 aphids) after 4 hours of release. It was at par with *R. maidis* (2.16 aphids) and *A. gossypii* (2.00 aphid). Out of five species of aphids, the minimum preference was noticed towards *U. compositae* (1.35 aphids) which remained at par with *L. pseudobrassicae* (1.54 aphids). Same trend was observed at 6th, 8th and 10th hours after grub released. After 12 hours of grub release, the lowest preferred aphid species was *U. compositae* (5.60 aphids) and the preference remained at par with *L. pseudobrassicae* (5.85 aphids) by the grub of *C. sexmaculata*. Out of five species of aphids, the maximum preferred aphid species was *A. craccivora* (8.62 aphids) by grub of *C. sexmaculata* and it remained at par with *R. maidis* (7.97 aphids) and *A. gossypii* (7.34 aphids). Feeding rate was increased after 24 hours of release of grub. The most aphid species preferred by grub was *A. craccivora* (10.66 aphids) and the preference remained statistically at par with *R. maidis* (9.87 aphids) and *A. gossypii* (9.11 aphids). Among the five species of aphids, the least preferred species were *U. compositae* (6.26 aphids) and *L. pseudobrassicae* (7.17 aphids).

Table 1: Feeding preference of *C. sexmaculata* grub on different species of aphid

Tr. No.	Aphid species	No. of aphids consumed by <i>C. sexmaculata</i> grub at indicated hours						
		2	4	6	8	10	12	24
T ₁	Mustard aphid, <i>L. pseudobrassicae</i>	1.06 (0.62)	1.43 (1.54)	1.75 (2.56)	2.02 (3.58)	2.27 (4.65)	2.52 (5.85)	2.77 (7.17)
T ₂	Cotton aphid, <i>A. gossypii</i>	1.22 (0.99)	1.58 (2.00)	1.92 (3.19)	2.25 (4.56)	2.52 (5.85)	2.80 (7.34)	3.10 (9.11)
T ₃	Maize aphid, <i>R. maidis</i>	1.29 (1.16)	1.63 (2.16)	1.99 (3.46)	2.33 (4.93)	2.61 (6.31)	2.91 (7.97)	3.22 (9.87)
T ₄	Cowpea aphid, <i>A. craccivora</i>	1.29 (1.16)	1.71 (2.42)	2.09 (3.87)	2.44 (5.45)	2.73 (6.95)	3.02 (8.62)	3.34 (10.66)
T ₅	Gaillardia aphid, <i>U. compositae</i>	1.01 (0.52)	1.36 (1.35)	1.66 (2.26)	1.94 (3.26)	2.15 (4.12)	2.47 (5.60)	2.60 (6.26)
S.Em±	Treatment (T)	0.06	0.05	0.05	0.05	0.07	0.06	0.05
	Period (P)	-	-	-	-	-	-	-
	T x P	-	-	-	-	-	-	-
	CD at 5%	0.17	0.14	0.15	0.16	0.18	0.17	0.16
	CV (%)	16.03	10.64	8.81	8.14	8.46	7.19	6.14

Note: Figures in parentheses are retransformed values and those outside are $\sqrt{x+0.5}$ transformed values

3.2 Feeding Preference of Adults on Different Species of Aphid

The data on feeding preference of *C. sexmaculata* adult to different species of aphid is presented in Table 2. Significantly higher number of *A. craccivora* (1.46 aphids) were preferred by the adult of *C. sexmaculata* and it remained at par with *R. maidis* (1.35 aphids) and *A. gossypii* (1.09 aphids) 2 hours after release. On the other hand, *U. compositae* (0.75 aphid) and *L. pseudobrassicae* (0.87 aphid) were found significantly the least preferred by the adults of coccinellid, *C. sexmaculata*. After 4 hours of adult release, the

most preferred aphid species was *A. craccivora* (3.15 aphids) and it remained statistically at par with *R. maidis* (2.96 aphids) and *A. gossypii* (2.56 aphids). Among the five species of aphids, the least preferred species were *U. compositae* (1.78 aphids) and *L. pseudobrassicae* (1.87 aphids). More or less similar trend was observed at 6th, 8th, 10th and 12th hours after adult released. Significantly more (13.41 aphids) number of *A. craccivora* were preferred by the adults of *C. sexmaculata* than *R. maidis* (12.53 aphids) after 24 hours of release and it found statistically at par with each other. The aphid, *A. gossypii* (11.40 aphids) was intermediated in

preference by adult *C. sexmaculata*. The lowest preferred species was *U. compositae* (7.06 aphids) and remained at par with *L. pseudobrassicae* (7.97 aphids). The data revealed that the similar tendency in host preference was observed in case of both grub and adult stages. The maximal preference was opined to aphid species, *A. craccivora*. The aphids, *R. maidis* and *A. gossypii* were found subsequent in their preference. While, the minimal preferred species were *U. compositae* and *L. pseudobrassicae*.

The result of present investigation tally with the reports of

Joshi *et al.* (1999) [6] who found that *A. craccivora* was the most preferred while; *U. compositae* was the least preferred host by *C. sexmaculata*. By the same token, Shinde and Radadia (2017) [9] stated that the maximum preference of grubs and adults of *C. sexmaculata* was noticed towards *A. craccivora* followed by *A. gossypii*, *R. maidis* and *U. compositae* while, the minimum preference was found towards *L. erysimi*. Tank (2006) [11] who observed that *A. craccivora* was the intermediately preferred host.

Table 2: Feeding preference of *C. sexmaculata* adult on different species of aphid

Tr. No.	Aphid species	No. of aphids consumed by <i>C. sexmaculata</i> adult at indicated hours						
		2	4	6	8	10	12	24
T ₁	Mustard aphid, <i>L. pseudobrassicae</i>	1.17 (0.87)	1.54 (1.87)	1.89 (3.07)	2.16 (4.17)	2.42 (5.36)	2.67 (6.63)	2.91 (7.97)
T ₂	Cotton aphid, <i>A. gossypii</i>	1.26 (1.09)	1.75 (2.56)	2.18 (4.25)	2.56 (6.05)	2.85 (7.62)	3.15 (9.42)	3.45 (11.4)
T ₃	Maize aphid, <i>R. maidis</i>	1.36 (1.35)	1.86 (2.96)	2.29 (4.74)	2.67 (6.63)	2.99 (8.44)	3.31 (10.46)	3.61 (12.53)
T ₄	Cowpea aphid, <i>A. craccivora</i>	1.40 (1.46)	1.91 (3.15)	2.38 (5.16)	2.78 (7.23)	3.11 (9.17)	3.43 (11.26)	3.73 (13.41)
T ₅	Gaillardia aphid, <i>U. compositae</i>	1.12 (0.75)	1.51 (1.78)	1.84 (2.89)	2.07 (3.78)	2.30 (4.79)	2.52 (5.85)	2.75 (7.06)
S.Em±	Treatment (T)	0.05	0.05	0.04	0.05	0.05	0.06	0.06
	Period (P)	-	-	-	-	-	-	-
	T x P	-	-	-	-	-	-	-
	CD at 5%	0.15	0.14	0.13	0.14	0.16	0.17	0.18
	CV (%)	13.97	9.55	7.08	6.76	6.49	6.42	6.28

Note: Figures in parentheses are retransformed values and those outside are $\sqrt{x+0.5}$ transformed values

4. Conclusion

The present investigation revealed that the *A. craccivora* was the most preferred while, *U. compositae* was the least preferred host by *C. sexmaculata*.

5. References

- Bilashini Y, Singh TK. Studies on population dynamics and feeding potential of *Coccinella septempunctata* Linnaeus in relation to *Lipaphis erysimi* (Kaltenbach) on cabbage. *Indian Journal of Applied Entomology*. 2009;23:99-103.
- Chowdhuri AN, Pal SK. Beneficial coccinellids of Simla Hills. *Science and Culture*. 1975;41(12):600-601.
- DeBach, P, Huffaker CB. Experimental techniques for evaluation of the effectiveness of natural enemies. *Biological Control* (2nd Ed.), Springer, Boston, MA; c1971, pp. 113-140.
- Hodek I. Coccinellids and the modern pest management. *Bio-science*. 1970;20(9):543-552.
- Hodek I, Van Emden H, Honek A. Ecology and behaviour of the ladybird beetles (Coccinellidae). John Wiley & Sons; c2012.
- Joshi S, Ballal CR, Rao NS. Biotic potential of three coccinellid predators on six different aphid hosts. *Journal of Entomological Research*. 1999;23(1):1-7.
- Omkar, Mishra G. Ladybirds: The ecofriendly option. *Everyman's Science*. 2002;37(3):162-167.
- Sethi SL, Atwal AS. Influence of temperature and humidity on the development of different stages of ladybird beetle, *Coccinella septempunctata* L. (Coleoptera: Coccinellidae). *Indian Journal Agricultural Sciences*. 1964;34:166-171.
- Shinde CU, Radadia GG. Feeding preference of potent predator, *Cheilomenes sexmaculata* (F.) on various aphid species. *Trends in Biosciences*. 2017;10(46):9434-9436.
- Southwood TRE, Henderson PA. *Ecological methods*. Blackwell Sciences, Oxford, London; c2000, p. 370.
- Tank BD. Carry-over and biology of ladybird beetle, *Cheilomenes sexmaculata* (Fab.) under middle Gujarat conditions. (Master's thesis, Anand Agricultural University, Anand); c2006. Retrieved from: <http://krishikosh.egranth.ac.in/handle/1/5810032020>
- Tank BD, Korat DM, Borad PK. Determination of dominant species of predatory coccinellid in Anand region of Gujarat. *Karnataka Journal of Agricultural Sciences*. 2010;20(3):637-638.