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Feeding potential different species of syrphid larva on *Aphis fabae* Scopoli infesting *Solanum nigrum* in mid-hills of Himachal Pradesh

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ABSTRACT: ***Solanum nigrum*** **L., which is an important medicinal plant, is attacked by *Aphis fabae* Scopoli in mid hills of Himachal Pradesh. Syrphid larvae of different species feed on this aphid and considerably reduce its population. Consumption of different instars of the aphid by the larvae of *Eupeodes frequens* Matsumura, *Eupeodes confrater* (Wiedemann) and *Scaeva pyrastri* (Linnaeus) was studied under laboratory conditions which revealed that the maximum number of I instar nymphs of *A. fabae* were consumed by the larva of *E. confrater* (64.33 nymphs) followed by *S. pyrastri* (41.78 nymphs) and *E. frequens* (34.44 nymphs). However, the consumption rate of the larvae of these syrphid species was comparatively less for the subsequent nymphal instars. The consumption rate for the IV instar nymph was 13.11, 6.44 and 10.67 nymphs, respectively, for the larvae of *E. frequens, E. confrater* and *S. pyrastri* revealing thereby that syrphid larvae are able to manage the population of this aphid species in the early stage (I instar nymph) of settling of aphids on the host.**

KEY WORDS: *Aphis fabae*, consumption rate, syrphids

INTRODUCTION

Solanum nigrum L. is an important medicinal plant grown throughout India. The plant is attacked by a number of insect pests at one or other stages of the plant growth (Das and Ram, 1988, Semeada *et al.*, 2004) of which *Aphis fabae* Scopoli has been found to cause considerable damage (Muller and Borner, 1988). Syrphids are important predators of many aphid species. They are predacious in the larval stage while adults are pollinators of several cultivated crops. The larvae remain hidden among aphids or quietly loop about over the surface of the plant and grasp the aphids, raise it in the air, suck the body content and finally discard the exoskeleton. Two of the basic characteristics of a predator, which affect its success in acquiring food are foraging efficiency and prey handling time (Leir and Barlow, 1982). The present studies have, therefore, been undertaken to record observations on the consumption rate of three syrphid species on *A. fabae* infesting *S. nigrum*.

MATERIALS AND METHODS

Fecund females of three syrphid species, *viz. Eupeodes frequens* Matsumura, *Eupeodes confrater* (Wiedemann) and *Scaeva pyrastri* (Linnaeus) were collected from aphid infested plants in field.

Each female was enclosed separately in rearing cages (38 cm x 30 cm x 25 cm) and provided with aphids supported on the host leaves. Ten per cent honey solution in cotton swab was given as food for adult flies. The eggs, thus laid, were picked up with the help of camel hairbrush and placed individually on fresh host plant leaf and transferred to homeopathic vials (5 x 1 cm).

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The vials were plugged with plugs made up of cotton wrapped in muslin cloth and kept at room temperature varying from 17.5°C to 21.6°C with 57% RH. To record observations on the predation rate of different syrphid species, freshly hatched larva was kept singly in vial having aphids of particular instar supported on the host plant. The number of aphids given to each larva always exceeded the number consumed for the subsequent instars. On the following day, i.e., after 24 hours, live aphids in each vial were counted and aphids of particular instars eaten by each syrphid larva in different instars were recorded till pupation. The vials were cleaned daily and soaked in 70 per cent alcohol so as to provide hygienic conditions for the developing larvae. The data were statistically analyzed using CRD.

RESULTS AND DISCUSSION

The consumption rate of the larvae of *E. frequens*, *E. confrater* and *S. pyrastri* species was studied under laboratory conditions in different instars during 24 hours. The larva of *E. frequens* on an average consumed 21.0 first instar, 7.3 second instar, 4.0 third instar and 3.3 fourth instar aphids, while the second instar syrphid larva consumed 22.3, 15.0, 10.0 and 6.7 individuals of the I, II, III and IV instar *A. fabae* (Table 1). In the third instar the syrphid larva consumed 60.0, 68.7, 36.0 and 29.3 individuals of the I, II, III and IV instar nymphs of *A. fabae*, respectively. The I, II and III instar larva of *E. confrater* consumed 15.0, 43.3 and 134.7 nymphs of the I instar nymphs; 8.0, 8.7 and 59.6 II instar nymphs; 6.7, 13.0 and 29.3 nymphs of III instar and 1.7, 7.0 and 10.7 nymphs of the IV instar nymphs of *A. fabae* in 24 hours, respectively. The larva of *S. pyrastri*, on the other hand consumed 10.7, 38.0 and 76.7 nymphs of the I instar; 7.0, 19.0 and 100.3 nymphs of II instar; 3.0, 14.7 and 26.0 nymphs of the III instar and 1.3, 12.3 and 18.3 nymphs of IV instar *A. fabae* in the first, second and third larval instars, respectively. The mean number of the I, II, III and IV instar nymphs of aphids eaten by different instar syrphid larva was found to be significantly different from one another in all the three syrphid species but in the case of *E. frequens*, the average number of aphids consumed by the I and II instar larva was statistically on par with each other and significantly different from those consumed by the III instar syrphid larva. In the case of *E. confrater* and *S. pyrastri*, the mean number of aphids consumed by I, II and III instar larvae during 24 hours were significantly different from one another (Table 1).

The studies thus revealed that syrphid larvae consumed maximum number of the I instar nymphs followed by II, III and IV instar nymphs during 24 hours. Since the consumption rate by the larvae of all the three

Table 1. Mean aphid (*A. fabae*) consumption in 24 hours by the larva of different syrphid species

Syrphid species	Syrphid (larval) instar	Mean consumption in the indicated aphid instar				Mean
		I	II	III	IV	
Eupeodes frequens	I	21.00	7.33	4.00	3.33	8.92
	II	22.33	15.00	10.00	6.67	13.50
	III	60.00	68.67	36.00	29.33	48.50
Mean		34.44	30.33	16.67	13.11	
CD (P = 0.05) Syrphid instar (T) = 10.39, Aphid instar (I) = 12.00, T x I = 20.74						
Metasyrphus confrater	I	15.00	8.00	6.67	1.67	7.83
	II	43.33	8.67	13.00	7.00	18.00
	III	134.70	59.60	29.33	10.67	58.42
Mean	64.33		25.22	16.33	6.44	
CD (P = 0.05) Syrphid instar (T) = 9.13, Aphid instar (I) = 10.55, T x I = 18.24						
Scaeva pyrastri	I	10.67	7.00	3.00	1.33	5.50
	II	38.00	19.00	14.67	12.33	21.00
	III	76.67	100.3	26.00	18.33	55.33
Mean		41.78	42.11	14.56	10.67	

syrphid species on the I instar nymphs of *A. fabae* was higher as compared to the subsequent nymphal instars, the larvae could reduce the aphid population in the early stages of its settlement on the plant. As reported by Klingauf (1967), the success or failure of a predator is dependent on the relative sizes of the prey and predator, thus corroborating the present studies. While comparing the prey consumption and searching efficiency of *Coccinella transversalis* on different aphid hosts, Omkar and Srivastava (2003) reported that the consumption of small sized aphids is more as compared to the larger aphids. Sood *et al.* (2000) reported that the larva of *E. frequens* consumed 289.4 individuals of this aphid during its life span.

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