



## BIOLOGY AND FEEDING POTENTIAL OF *METASYRPHUS CONFRATER* (WIEDEMANN)- A SYRPHID PREDATOR OF GREEN APPLE APHID

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### ABSTRACT

Field observations were made on the predators of green apple aphid *Aphis pomi* De Geer in apple nursery fields at Mashobra, Shimla district and Ner Chowk, Mandi district of Himachal Pradesh. These revealed three species of Syrphidae (Diptera) viz., *Betasyrphus serarius* (Wiedemann), *Episyrphus balteatus* De Geer, and *Metasyrphus confrater* (Wiedemann). The life history and feeding potential of the larvae of the latter were studied under laboratory conditions.

**Key words:** Apple, Mashobra, Ner Chowk, nursery, *Aphis pomi*, predators, Syrphidae, *Metasyrphus confrater*, larvae, predations, feeding potential, life stages

Green apple aphid, *Aphis pomi* De Geer is a pest damaging nursery plants severely in Himachal Pradesh and Kashmir. This aphid pest was reported by De Geer (1773), it has world-wide distribution and been reported from all the apple growing regions (Blackman and Eastop, 1984). On fruit bearing trees, it affects the quality and yield (Madsen et al., 1961; Oatman and Legner, 1961); and in nurseries and orchards, large aphid colonies result in reduced yield as well as retardation in shoot growth (Hamilton et al., 1986). Carroll and Hoyt (1984) reported that there are 39 predators and two parasitoids on this in North Central Washington in USA. Many workers (Niemczyk, 1978; Carroll and Hoyt, 1984; Niemczyk and Pruska, 1986; Bouchard et al., 1988, 1982) reported that many predators consume nymphs and adults. Control of aphids usually requires a more complex approach for which the basic knowledge of biology of predator species is prerequisite. Of different predators, the larvae of aphidophagous species of syrphids such as *Episyrphus balteatus* (De Geer) are considered important (Ankersmit et al., 1986; Chambers and Adams, 1986). In the present study, feeding potential of larval stages of *Metasyrphus confrater* (Wiedemann) is observed during summer and autumn season.

### MATERIALS AND METHODS

Regular field surveys of apple nurseries were conducted in two localities i.e. Mashobra locality (31°1'N latitude, 77°1'E, 2286 masl) of Shimla district and Ner chowk locality (31°32'N, 76°54'E, 878 masl) of Mandi district of Himachal Pradesh. The syrphid predators of green apple aphid *Aphis pomi* De Geer

were observed for three years from 2003 to 2005, and reconfirmed in 2016 to 2018. Apple nurseries of Mashobra and Ner Chowk were surveyed, and in the subsequent years, the life history and feeding potential of larvae were studied under laboratory conditions in the Department of Biosciences, Himachal Pradesh University, Shimla. The developmental stages and their feeding potential were observed from May to November covering mainly two seasons i.e. summer (May-August) and autumn (September-November).

Eggs of syrphid flies were collected from the field and after hatching the development of the larvae were observed. The feeding potential of 10 larvae of each species was recorded. Fixed numbers of aphids were given to larvae and they were examined after regular intervals to record the feeding potential. The duration of life stages were observed and adult flies were maintained on 10% honey soaked in cotton along with some commonly available flowering shoots under laboratory conditions to record the adult life span.

### RESULTS AND DISCUSSION

Observations were made on young nursery plants and apple orchards to record the syrphid predators of *Aphis pomi* De Geer. During May to November when the infestation rate of green apple aphid was high, larvae of *M. confrater* were found preying on green apple aphid. The observations on the biology are as follows:

The eggs are greyish white, and oval, and hatch from 2 to 2.5 days during summer (mean 2.20 days  $\pm$  0.08 SE) and 2 to 3.5 days during autumn (mean 2.80 days  $\pm$

0.15 SE) (Table 1). The larva grows rapidly, brownish grey with pale orange patches on abdominal segments (Fig. 1). It has three larval instars, lasts for  $9.10 \pm 0.27$  days (summer) and  $16.30 \pm 0.47$  (autumn). The pupal stage is dark to reddish brown, with pupal period of  $9 \pm 0.25$  (summer) and  $16.90 \pm 0.31$  days (autumn). Adult very active on emergence and lasts for  $14.90 \pm 0.93$  (summer) and  $22.90 \pm 0.94$  days (autumn). Total life span is 35.20 to 65.5 day. The number of aphids consumed by the larvae is  $452.30 \pm 18.42$  (summer) and  $612 \pm 25.04$  aphids (autumn).



Fig. 1. *M. confrater*: Larva;



Fig. 2. *M. confrater*: Adult

Syrphids have been recognised as important predators of aphids (Campbell and Davidson, 1924; Ghosh, 1974; Ghorpade, 1981). Newly hatched larvae prefer the lower side of the leaf where green apple aphid colonies are abundant. A close relationship was observed between the life cycle of syrphid larvae and that of the green apple aphid. Initial larval instars were poor feeders and their capacity of feeding increased during subsequent instar stages. The larvae become voracious feeder in last instar stage consuming about hundred aphids in a day. Roy and Basu (1977) reported the feeding potential of larvae of *Syrphus balteatus* and *S. confrater* which consume on an average of 510 and 708 aphids of *Lipaphis erysimi*, respectively. Bhatia and Shaffi (1932) reported that *S. balteatus* is one of the commonest species in India. These earlier observations reveal that flies are seen from January to March and available during most of the part of the year. They are seen hovering over flowers in search of food which they find in honey stored in the nectaries of the flowers.

The larvae of *M. confrater* consumed more aphids during autumn as compared to summer because the life cycle of this species is longer during autumn as compared to summer. In the present investigations, it was observed that the larvae of this species start feeding on green apple aphids just after hatching from egg. Present studies indicate that larvae of *M. confrater* are very effective predators of green apple aphid *A. pomi* in Himachal Pradesh.

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Table 1. Developmental stages of *M. confrater* on *A. pomi* on apple

Developmental stage	Egg	Larva	Pupa	Adult	Total life	Aphids
Consumed						
Summer	2.20 $\pm 0.08$	9.10 $\pm 0.27$	9.00 $\pm 0.25$	14.90 $\pm 0.93$	35.20 $\pm 1.00$	452.30 $\pm 18.42$
Autumn	2.80 $\pm 0.15$	16.30 $\pm 0.47$	16.90 $\pm 0.31$	22.90 $\pm 0.94$	58.90 $\pm 1.35$	612 $\pm 25.04$

\*n=10

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