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Life-table and Intrinsic Rate of Increase of *Eupeodes frequens* Matsmura: a Predator of *Brevicoryne brassicae* (Aphididae, Homoptera) Infesting Cauliflower

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Syrphids have been recognised as important predators of aphids (Ghorpade, 1981; Agarwala *et al.*, 1984). In the mid-hill regions of Himachal Pradesh *Eupeodes frequens* Matsmura has been found to predate upon *Brevicoryne brassicae* (L.) (Aphididae, Homoptera) infesting cauliflower. The present study was undertaken to study the life-table and intrinsic rate of increase of *E. frequens* under laboratory conditions to understand the dynamics of this predator as biological agent of the aphid.

Studies were initiated by taking 15 pairs of syrphids which were kept in glass chimneys (20 x 15 cm), the tops of which were covered with muslin cloth. Honey solution (10%) soaked in cotton swab and flowering shoots of mustard were provided as food for adults along with some cauliflower leaves infested with the aphid to stimulate egg laying. Observations were initiated as soon as females started ovipositing and continued till the death of the females. The life- table was prepared using methods of Andrewartha and Birch (1954) and Southwood (1976). The whole experiment was conducted at temperature ranging from 11 to 18°C and 50 to 72 per cent R.H.

The results revealed that the average survival in the generation was 70 per cent. The species had a preoviposition period of 8 days. Female mortality was observed on the 16th day of emergence and increased thereafter. A single female on an average produced 6.28 female progeny on the first day of oviposition, reaching a maximum of 38.12 female progeny on 12th day (Fig. 1). The maximum oviposition period was 36 days.

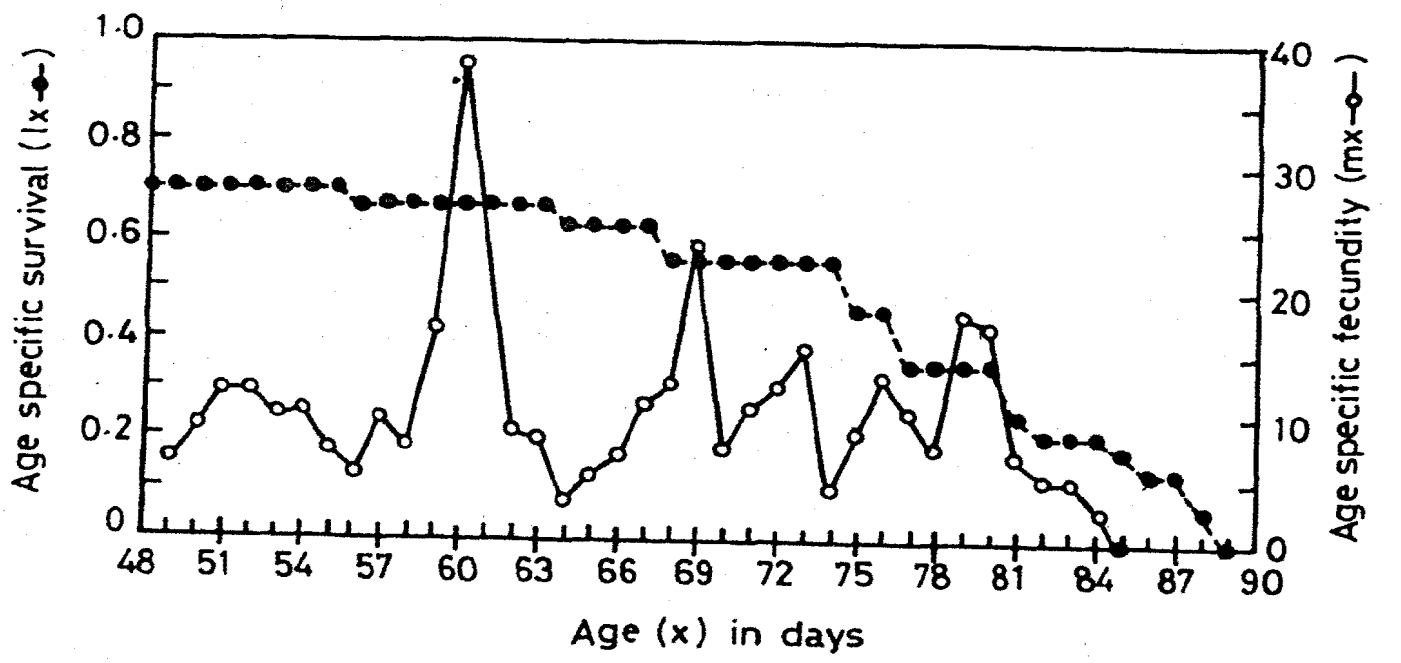

Fig.1. Age-specific survival and fecundity of *E.frequens*

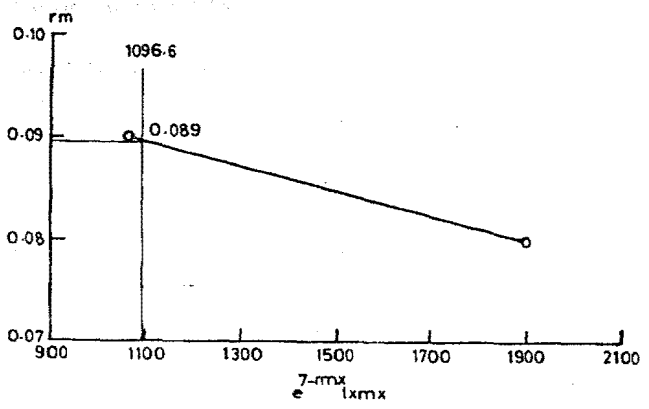

Fig.2. Determination of the true intrinsic rate of increase of *E.frequens*

Population growth statistics of the species revealed that the gross reproductive rate (GRR) was 395.25 eggs/female while the net reproductive rate (Ro) representing the total female birth was 226.002 (Table 1). The net reproductive rate was lower than the gross reproductive rate which could be explained on the basis of sharp decline in the survivorship value (lx) of the parent females most of which died earlier than the maximum reproductive period. Mean length of generation (Tc) of the species was 63.69 days which approximated the corrected generation time (T) of 61.90 days, thus the species had the capacity to multiply 226.002 times in a generation time of 61.9 days. The innate capacity for increase in number of the species was 0.085 while the true intrinsic rate of increase in number (rm) which was determined graphically (Fig.2.) found to be 0.089. The value of the true intrinsic rate of increase was slightly higher than the capacity for increase in number, which is evident as pointed out by Southwood (1976) for insects having overlapping generations. The value of true intrinsic rate of increase in the present study was lower than those reported by Makhmoor and Verma (1989) for *Metasyrphus confrater* (Wied.) as 0.102 which might have been due to difference in the rate of fecundity and the proportion of survival of female insects. The finite rate of increase (λ) of the species was

Table 1. Population growth statistic of the *Eupeodes frequens*

Gross reproductive rate (GRR) $\sum$ mx	= 395.25 female eggs/female
Net reproductive rate (Ro) $\sum$lxmx	= 226.002 female eggs/female
Mean length of generation (Tc) $\frac{\sum lxmx}{R_o}$	= 63.69 days
Innate capacity for increase in number (rc) $\frac{\log Ro}{Tc}$	= 0.085 female/day
The intrinsic rate of increase (rm) e^{7-rmx}lxmx	= 0.089 females/day
Corrected generation time (T) $\frac{\log_e Ro}{rm}$	= 61.90 days
Finite rate of increase in number (λ) antilog $_e$ rm	= 1.09 females/day
Weekly multiplication of population $(e^{rm})^7$	= 1.86
Doubling time (DT) $\frac{\log_e 2}{\log \sigma rm}$	= 8.05 days

1.09. Under the prevailing environmental conditions, the populations doubled every 8.05 days and would be able to multiply 1.86 times every week. The life table study of the *E. frequens* revealed that within favourable environmental conditions, the species could produce a large population and thus holds promise as a biological control agent.

KEY WORDS : *Eupeodes frequens*, life table, *Brevicoryne brassicae*, net reproductive rate, intrinsic rate of increase

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