

Influence of male parasitoid on the fecundity, longevity and sex-ratio of *Trichomalopsis apanteloctena* Crawford parasitising puparia of *Blepharipa zebina* (Walker)

R. N. SINGH

Central Tasar Research and Training Institute, Ranchi 835 303, Bihar, India

ABSTRACT: Studies conducted on the bionomics of the pteromalid parasitoid, *Trichomalopsis apanteloctena* Crawford indicate that the reproductive ability of the parasitoid is hindered by the male during oviposition period. The hindrance was caused by the male either by chasing for mating or by antennal encounters during oviposition. The mean fecundity of the female in the presence of male was lower and in the absence it is higher. The mean sex ratio was higher in isolated females than those females that were mixed with male.

KEY WORDS: *Blepharipa zebina*, fecundity, *Trichomalopsis apanteloctena*

Earlier findings of the authors (Singh *et al.*, 1994; Singh and Thangavelu, 1995 & 1996; Singh and Sinha, 1996) have shown that female *Trichomalopsis apanteloctena* Crawford (Hymenoptera: Pteromalidae) is an important biocontrol agent against fly pest *Blepharipa zebina* (Diptera: Tachinidae). In the present study an attempt has been made to find out the influence of the male on the fecundity, reproductive pattern and longevity of the female and sex-ratio of F1 generation. The experiment was conducted in the Entomology Division of Central Tasar

Research and Training Institute, Ranchi during 1994-95. The parasitoid culture was maintained in the laboratory on the puparia of *B. Zebina* as described earlier by Singh *et al.* (1995). Ten pairs of freshly emerged and fully fed females and males were obtained from the culture and allowed to mate in test tubes, one pair in each. Ten small beakers (250 ml) containing 25 host puparia of uniform size were arranged serially. A small honey streak (30% honey solution) was drawn inside each beaker as food for the parasitoids. Mouth of each beaker was covered with muslin cloth and

tightened with rubber band. One pair of parasitoid was gently introduced into each of five beakers. In the remaining five, the males were withdrawn and only females were released (one in each). The parasitoids were allowed to parasitise for twenty hours and hosts were replaced by fresh ones regularly till the survivability of the parasitoid. The exposed puparia were serially arranged, reared and observed regularly. The total number of egressed parasitoids from each puparia were recorded and sexed.

As the potential fecundity (number of eggs in the ovaries) and the released fecundity (number of eggs laid) do not furnish the actual number of eggs that successfully develop an attempt has been made to record the realistic fecundity (in terms of emergents) among pteromalid parasitoids. Therefore, we considered the number of emergents as a measure of fecundity. The fecundity (in terms of emergents) of the parasitoid was recorded in the presence and in the absence of male by recording the number of emergents egressed from the puparia. The results presented in Table 1 indicate that the presence of male parasitoid reduced the total number of eggs laid and daily output of the female parasitoid. The mean fecundity of female in presence of male was 35.0 and in its absence 43.8. The daily observation sequence indicated that the male parasitoid interfered with ability to reproduce and the hindrance caused by him was either by chasing for mating or by antennal encounters by chance during oviposition (Singh *et al.*, 1995). The decrease in the fecundity of the parasitoid

is in agreement with Legner (1967) and King and Richard (1969). Singh and Thangavelu (1996) reported that the longevity (in days) of the female in presence of male was (6.5 ± 0.18) more than that of its absence (6.1 ± 0.18).

The reproductive period corresponded in *T. apanteloctena* with her life span and ranged 7-11 days like other pteromalids. The oviposition pattern was regular and decreased linearly which was in agreement with Ables and Shipard (1974) and Singh and Thangavelu (1996). During the first five days about 65-75 per cent eggs were laid. The daily oviposition pattern of a parasitoid is also not an absolute value and depends upon her species specific characteristics and other biotic and abiotic factors. It has been observed that the male present in the oviposition chamber of the female used to die on the 4th day, the presence only decreased the amount of parasitisation during first three days. Longevity of the female is an important factor for determination of the reproductive period and the rate of oviposition and it also correlates with the life cycle pattern of the host. The co-presence of male with the female appeared to have some influence on the survivorship of the female parasitoid since the longevity of the female in the presence of male was significantly more than that in his absence. How the presence of male affects the physiology of ageing of female parasitoid is not explainable at present.

The mean sex-ratio of the parasitoid in F1 generation of isolated females was significantly higher than of those females

Table 1. The mean fecundity, sex - ratio and reproductive pattern of *T. apantelectena*

Oviposition period (days)	Number of eggs laid by female mixed with male (Mean \pm SD)	Number of eggs laid by isolated female (Mean \pm SD)	Sex-ratio of the female mixed with male (Mean \pm SD)	Sex-ratio of the isolated female (Mean \pm SD)
1	10.0 \pm 0.63	12.6 \pm 1.01	8.2 \pm 0.74	11.2 \pm 0.74
2	8.2 \pm 0.74	10.8 \pm 1.16	7.2 \pm 0.97	9.6 \pm 1.30
3	7.8 \pm 1.16	9.2 \pm 0.74	6.2 \pm 0.74	8.2 \pm 0.74
4	6.2 \pm 0.74	7.4 \pm 1.10	4.8 \pm 1.89	3.5 \pm 1.32
5	3.8 \pm 0.40	2.9 \pm 1.16	3.6 \pm 0.63	2.8 \pm 0.74

which were mixed with males (Table 1). During the first three days of the oviposition, till the male survived, the proportion of the females yielded by the eggs laid by the females mixed with male was lower than that of isolated females but after that the proportion of female in isolated female was less in comparison to female mixed with male. It needs further confirmation. The sex-ratio of *T. apantelectena* gradually decreased on subsequent day of reproductive period in both the conditions and varied with the variations in host size and some other behavioural response. Similar observation has been made by Stevenson *et al.* (1977) during the study of sex- ratio in *T. apantelectena* and some other parasitoids. The main observation is that male parasitoid affects the female reproductive ability, her longevity and sex -ratio of the F1 generation.

REFEREINCES

- Ables , J. P. and Shipard, M. 1974. Response and competition of the parasitoids *Spalangia endius* and *Muscidifurax raptor* (Hymenoptera: Pteromalidae) at different host densities of house fly pupae. *Canadian Entomology*, **106**: 825-830.
- King, P. E. and Richard, J. G. 1969. Oogenesis in *Nasonia vitripennis* (Walker) (Hymenoptera: Pteromalidae). *Proceeding of Royal Entomological Society of London*, **44**: 143-157.
- Legner, E. F. 1967. Behaviour reproduction of *Spalangia cameroni*, *S. endius*, *Muscidifurax raptor* and *Nasonia vitripennis* (Hymenoptera: Pteromalidae) at different increasing host fly densities. *Annals of Entomological Society of America*, **60**: 819-826.
- Singh, R. N., Babu, T. K and Sinha, S. S. 1995. Reproductive strategies of an ectophagous parasitoid, *Trichomalopsis apantelectena* (Hymenoptera: Pteromalidae) on the pupae of *Blepharipa zebina* (Diptera: Tachinidae). *Indian Journal of Ecology*, **22** (1): 17-20.

- Singh, R. N., Bakshi, B. R., Sinha, R. P. and Sinha, S. S. 1994. Host discrimination between parasitised and unparasitised uzi fly pupae by females of *Trichomalopsis apanteloctena* Crawford (Hymenoptera: Pteromalidae). *Trends Science*, **9** (1): 27-32.
- Singh, R. N. and Sinha S. S. 1996. Demonstration of the kairomonal activity in the pupae of uzi fly to its parasitoid *Indian Journal of Sericulture*, **35** (1): 73-75.
- Singh, R. N. and Thangavelu, K. 1995. First record of *Trichomalopsis apanteloctena* on the uzi fly to its parasitoid. *Indian Journal of Sericulture*, **34** (2): 164-165.
- Singh, R. N. and Thangavelu, K. 1996. Biological characteristics of *Trichomalopsis apanteloctena* Crawford (Hymenoptera: Pteromalidae), a parasitoid of *Blepharipa zebina*. *Indian Journal of Sericulture*, **35** (1): 62-63.
- Stevens, L. N., Mc. Gauire, J. V., Steinbauer, A. T. and Zungoli, R. A. 1977. The observed sex ratio of *Pediobius foveolatus* (Hymenoptera: Eulophidae) in field populations of *Epilachna varivestis* (Coleoptera: Coccinellidae). *Entomophaga*, **22**: 175-177