

Age - Specific Fecundity and Life Table Studies of *Trichogramma embryophagum* (Htg.) and *Trichogramma dendrolimi* Matsumara

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ABSTRACT

Life table data of *Trichogramma embryophagum* (Htg.) and *Trichogramma dendrolimi* Matsumara were collected on eggs of *Corcyra cephalonica* Stainton. The net reproductive rate (Ro) of *T.embryophagum* was 60.23 and that of *T.dendrolimi* 33.98, the intrinsic rate of natural increase (rm) was 0.292 and 0.305 and net generation time (T) was 14.03 and 13.25 days, respectively. For mass production, adult females of *T.embryophagum* should be utilised for 5 days and *T.dendrolimi* for 2 days.

KEY WORDS : Age - specific fecundity, *Trichogramma embryophagum*, *T.dendrolimi*

Trichogramma spp. are now widely used as one of the key components of Integrated Pest Management for suppression of lepidopterous pests of many crops. Recently, *Trichogramma embryophagum* (Htg.) and *T.dendrolimi* Matsumara were imported for trials against *Cydia pomonella* L., *Chilo* spp., *Helicoverpa armigera* (Hb.) and *Achaea janata* L. in India. *T.embryophagum* is an important parasitoid particularly of codling moth of apple, *C.pomonella* in many parts of the world (Voegelé *et al.*, 1977; Zlatanov and Tarabaev, 1985). Similarly, *T.dendrolimi* is an important parasitoid of the pine defoliator *Dendrolimus punctatus* (Wlk.), *Ostrinia nubilalis* (Hb.) and *Achaea melicerata* (Drury) in China (Hua, 1981; Yu *et al.*, 1982; Gao *et al.*, 1982). It was therefore considered desirable to study the age-specific fecundity and collect life table statistics of these parasitoids before field evaluation.

MATERIALS AND METHODS

The male and female parasitoids of *T.embryophagum* and *T.dendrolimi* upon emergence were allowed for mating in separate glass vials (15 x 2.5cms). After mating, 40 females of each species were confined in separate glass vial (15 x 2.5cms) with

streaks of honey as food. Daily, 1000 freshly laid *C.cephalonica* eggs were offered to both species till all female parasitoids died. Observations on the number of eggs parasitised, number of female progeny produced per day, number of female parasitoids died per day were recorded. Data thus obtained were utilised for construction of age-specific fecundity and life table statistics. The experiment was carried out at 25 ± 1.5°C and 76 ± 3.5% R.H. The life table was constructed using methods and terminology suggested by Andrewartha and Birch (1954) and Soughwood (1966).

RESULTS AND DISCUSSION

The data on age-specific fecundity of *T.embryophagum* and *T.dendrolimi* are presented in tables 1 & 2. The study indicated that *T.embryophagum* lived for 18 days and *T.dendrolimi* for 13 days. *T.embryophagum* laid significantly more number of eggs in the first five days though it continued to lay eggs upto 15 days. Thus, for mass production programme, the ratio of host eggs and parasitoid should be 25:1 for first five days. *T.dendrolimi* laid most of the eggs on the first day itself. Egg laying capacity was reduced by 75% on the following two days. Thus, for mass production programme, the ratio of host and

Table 1. Age - specific fecundity of *T. embryophagum*

Pivotal age in days (x)	Age specific longevity (lx)	Age-specific fecundity (mx)	lxmx	xlxmx
1-10	developmental period			
11	1.0	11.41	11.41	125.51
12	1.0	8.89	8.89	106.68
13	0.91	8.66	7.88	102.44
14	0.83	8.87	7.36	103.04
15	0.71	9.48	6.43	100.95
16	0.67	6.94	4.64	74.24
17	0.61	5.60	3.41	57.97
18	0.57	5.57	3.17	57.06
19	0.53	6.50	3.44	65.36
20	0.51	4.44	2.26	45.20
21	0.46	2.00	0.92	19.32
22	0.42	0.24	0.10	2.20
23	0.36	0.05	0.01	0.003
24	0.26	0.00	0.00	0.00
25	0.22	0.08	0.01	0.002
26	0.20	0.00	0.00	0.00
27	0.10	0.00	0.00	0.00
28	0.06	0.00	0.00	0.00
$lxmx (Ro) = 60.23$ $xlxmx = 859.975$				

parasitoid should be 35:1 on the first day and 15:1 on the subsequent two days.

The data on life table statistics of *T.embryophagum* and *T.dendrolimi* are presented in table 3. It is clear that the increase per generation (Ro) in *T.embryophagum* and *T.dendrolimi* was 14.27 and 10.83

respectively. The mean duration of generation (Tc) was 14.27 and 10.83 days and calculated finite rate of natural increase was 1.34 and 1.30 times per female per day for *T.embryophagum* and *T.dendrolimi*, respectively. Varma *et al.* (1980) reported the rate of increase of *Trichogrammatoidea* sp. near *guamensis* Nagaraja as 1.31 and Brar and

Table 2. Age Specific fecundity of *T. dendrolimi*

Pivotal age in days (x)	Age-specific longevity (lx)	Age-specific fecundity (mx)	lxmx	xlxmx
1-9	developmental period			
10	1.0	20.46	20.46	204.60
11	0.80	6.80	5.44	59.84
12	0.80	6.00	4.80	57.60
13	0.73	2.27	1.65	11.06
14	0.66	1.20	0.79	11.06
15	0.53	0.75	0.39	5.85
16	0.13	2.00	0.26	4.16
17	0.13	0.50	0.06	1.02
18	0.13	0.00	0.00	0.00
19	0.13	1.00	0.13	2.47
20	0.13	0.00	0.00	0.00
21	0.06	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00
$lxmx (Ro) = 33.98$ $xlxmx = 368.05$				

Table 3. Life table statistics of *T.embryophagum* and *T. dendrolimi*

Particulars	Values	
	<i>T. embryophagum</i>	<i>T. dendrolimi</i>
Ro	60.23	33.98
Tc	14.27	10.83
rc	0.287	0.325
rm	0.292	0.305
T	14.03	13.25
	1.34	3.91
Average longevity (days)	5.83	1.305
Min. longevity (days)	4.0	2.0
Max. longevity (")	18.0	12.0
Sex-ratio (M : F)	0:1.0	1:1.30

Varma (1989) reported 1.416 for *T.eldanae* Viggiani. The intrinsic rate of natural increase (rm) was 0.292 and 0.305 and the average longevity was 5.83 and 3.91 days, respectively for *T.embryophagum* and *T.dendrolimi*. The rm value calculated for *T.exiguum* Pinto and Plantner was 0.382 (Maninder and Varma, 1982) and *T.eldanae* 0.348 (Brar and Varma, 1989) are higher than those of *T.embryophagum* and *T.dendrolimi*. However, values obtained in the present study were higher than that of *T.Chilonis* Ishii (0.282) reported by Nagarkatti and Nagaraja (1978). *T.embryophagum* and *T.dendrolimi* are therefore, capable of increasing population size under favourable climatic condition.

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