Life table of *Cotesia glomeratus* (Linnaeus), a larval parasitoid of *Pieris canidia* (Sparrman)

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ABSTRACT: Life table data were calculated for *Cotesia glomeratus* (Linnaeus) on *Pieris canidia* (Sparrman). The ovipositing female survived for a mean period of 13± 0.29 days and produced a mean progeny of 163.8 females. The mean duration of immature stage of parasitoid was 35.71±0.45 days. The average total progeny was 245±8.05 with a sex ratio of 1:2.03 (M:F). The intrinsic rate of increase (r_m) was 0.126 per female per day. The net reproductive rate (R_o) was 150.46 and net generation time (T) was 39.80 days.

Cotesia glomeratus (Linnaeus) (Hymenoptera: Braconidae) is a potent larval parasitoid of *Pieris* spp. In Manipur this species was observed to parasitize upto 17 percent of *P. brassicae*. Another oligophagous species, *P. canidia* having a limited host range of cruciferous crops but with an extended infestation upto 87.50 percent in the field was found to be attacked by *C. glomeratus* (Devjani, 1999). Life table studies have been carried out on different hymenopteran parasitoids including *Apanteles* sp. by several workers to understand the population ecology (Peter & David, 1989; Singh & Jalali, 1992; Sathee & Ingawale, 1993; Edward George *et al.*, 1998; Mishra & Senapati, 1998). A perusal of literature reveals paucity of information on life table of *C. glomeratus* on *Pieris canidia*. Therefore, life table studies were worked out in laboratory to make a critical assessment of the biocontrol of this parasitoid.

MATERIALS AND METHODS

The parasitized larvae of *P. canidia* were collected from Lilong under Thoubal district of Manipur and were observed for parasitoid emergence. After emergence, identity was determined and culture was maintained in the Entomology Research Laboratory at Department of Life Sciences, Manipur University, Canchipur. The present study was carried out with 20 newly mated female of *C. glomeratus* at 20±1°C; 46±0.6 per cent relative humidity during February to March, 1999. Each parasitoid was placed individually in a glass tube (16X2.5cm) provided with cotton swabs soaked in honey solution (20%). A single second instar larva of *P. canidia* was introduced into the tube daily for 24 h for parasitization until the death of female parasitoid. The parasitized host larvae were transferred day-wise and reared separately in the glass Petri-dish (9X2cm) till the emergence of

parasitoids. Sex ratio and daily emergence of parasitoids from the cocoons of each of the parasitized as larva were also recorded. Numbers of adults that emerged from the cocoons was considered as its fecundity. The life table was constructed with the help of fecundity data and later the intrinsic rate of natural increase of the population of parasitoids was calculated as per Andrewartha & Birch (1954) and Southwood (1978).

RESULTS AND DISCUSSION

The data on age specific fecundity and longevity of *Cotesia glomeratus* (Table 1) revealed that females survived on average for 13±0.29 (range, 6.1-19.1 days) and raised maximum female progeny (27.15) on the third day of oviposition and about 75 percent female eggs were laid in the first five days of oviposition. *Aparteles cypris* Nixon a larval parasitoid of *Cnaphalocrosis medanalis* (Guenee) was reported to lay a maximum number of eggs (14.8) on the second day of oviposition (Mishra & Senapati, 1998). The rate of oviposition decreased with the age of the female. The number of female progeny produced ranged from 90-206 individuals with mean value of 163.8. The sex ratio of male: female varied from 1:1 to 1:3.25 with a mean value of 1:2.03. The average length of endoparasitic periods was 20.99± 0.60 whereas, the total average length of immature periods was 35.71 days.

Table 1. Life table statistics of *C. glomeratus*

Pivotal age in (x days)	Proportional live at age (l_x)	No. of female progeny/female (m_x)	($l_x m_x$)	($x.l_x m_x$)
35 Days Immature stages				
36	1 pre-oviposition Period			
37	1	21.33	21.33	789.21
38	1	22.65	22.65	860.70
39	1	27.15	27.15	1058.85
40	1	21.05	21.05	842.00
41	0.96	20.94	20.10	824.10
42	0.87	17.28	15.03	631.26
43	0.79	12.87	10.16	436.88
44	0.75	09.66	07.27	319.88
45	0.60	05.60	03.36	151.20
46	0.45	05.25	02.36	108.56
47	0.33	0.00	0.00	0.00
48	0.00	0.00	0.00	0.00

Σm_x=163.8 $\Sigma l_x m_x$ =150.46 $\Sigma x l_x m_x$ = 6022.64

R_o = net reproductive ($\sum l_x m_x$) = 150.46

T_c = approximate duration of generation ($\dfrac{\sum x.l_x m_x}{R_o}$) = 40.03

r_c = approximate value of r_m ($\dfrac{\text{Log}_e R_o}{T_c}$) = 0.125

r_m = intrinsic rate of natural increase ($\text{å} e^{-r}{}_m{}^x.l_x m_x = 1$) = 0.126

T = net generation time ($\dfrac{\text{Log}_e R_o}{r_m}$) = 39.80

λ = finite rate of increase (antilog$_e$ r_m) = 1.136

The first adult mortality was recorded on the 6th day after emergence of adults. In a single generation, the intrinsic rate of natural increase per female per day(r_m) was 0.126. The net reproductive rate (R_o) was 150.46 times in generation time (T) of 39.8 days. Similar rate of multiplication was observed by Sathee and Ingawale (1993) in *A. jayanagarensis*, a larval parasitoid of *Spilosoma obliqua*. The calculated finite rate of increase showed that the population of *C. glomeratus* would increase by 1.134 times per female per day. This parasitoid has quicker rate of multiplication in comparison to *A. cypris* (Mishra & Senapati, 1998) where the value of (λ) was 1.282 females per female per day.

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