

**Biology and life table studies of *Apanteles cypris* Nixon
(Hymenoptera: Braconidae), a larval parasitoid of
Cnaphalocrocis medinalis (Guenée)**

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ABSTRACT: The egg-larval and pupal periods of *Apanteles cypris* Nixon (Hymenoptera: Braconidae), a larval parasitoid of *Cnaphalocrocis medinalis* (Guenée) were 0.90 ± 0.72 and 3.70 ± 0.73 days, respectively. Longevity of male and female were 4.1 ± 0.71 and 3.95 ± 0.82 days, respectively. Male : female ratio was 1:1.8. Life table data of the parasitoid indicated that the ovipositing females lived for maximum six days and they increased their population at the rate of 30.97 per generation (R_0) with mean generation time (T_0) of 14.01 days. The intrinsic rate of natural increase (r_m) was 0.249 and the finite rate of increase (λ) was 1.282 females/female/day.

KEY WORDS: *Apanteles cypris*, biology, life table, intrinsic rate of increase, *Cnaphalocrocis medinalis*

Apanteles cypris Nixon has been described as a major population limiting agent of the rice leaf folders, viz., *Cnaphalocrocis medinalis* (Guenée) and *Marasmia exigua* (Butler) in larval stage, in the coastal belt of Orissa (Anon., 1988). The parasitoid was also recorded on rice leaf folder in other rice growing tracts of the world (Tian, 1987). The paper deals with the studies on the biology, life table and intrinsic rate of increase of the parasitoid to assess its biocontrol efficiency against the rice leaf folders.

MATERIALS AND METHODS

Twenty mated females of *A. cypris*, freshly collected from the stock culture, were released in glass tubes (10 x 2.5 cm) and provided with honey solution (20%) in cotton swabs as food. Third instar larvae of *C. medinalis* were introduced individually into the tube at 2 h interval for parasitization until the females died. Parasitized larvae were reared separately, day-wise, till the emergence of parasitoid cocoons or pupation of the host larvae. Life

history parameters were studied as per Verma and Bindra (1973) and fecundity life table was constructed using the methods suggested by Andrewartha and Birch (1954) and Southwood (1978).

RESULTS AND DISCUSSION

The adults of *A. cypris* mated immediately after emergence and the mating period was 21.0-27.0 (23.85 ± 1.81) seconds. Mated females immediately oviposited on the host larvae. Some females even oviposited on the host without mating. Oviposition period lasted 1-3 (1.90 ± 0.78) seconds (Table 1).

cadaver. The pupal period was 3-5 (3.70 ± 0.73) days. The duration of adult males (4.10 ± 0.71 days) was longer than that of females (3.95 ± 0.82 days). Total life span of the males ranged from 14-20 (17.25 ± 1.77) days and those of the females from 14-20 (15.90 ± 1.44) days. However, Chen *et al.* (1983) reported its life cycle to be 12.64-15.95 days in China. The differences might be due to differential temperature conditions.

The data on age specific fecundity and life table of *A. cypris* is presented in Table 2. The ovipositing females lived for a period of 2-6 days and laid maximum number of

Table 1. Biological parameters of *A. cypris* reared on *Cnaphalocrocis medinalis*

| Parameter | Range | Mean \pm SD |
|-----------------------------------|-------------|------------------|
| Mating period (seconds) | 21.0 - 27.0 | 23.85 ± 1.81 |
| Duration of oviposition (seconds) | 1.0 - 3.0 | 1.90 ± 0.78 |
| Egg + larval period (days) | 8.0 - 10.0 | 8.90 ± 0.72 |
| Pupal period (days) | 3.0 - 5.0 | 3.70 ± 0.73 |
| Adult longevity (days) | | |
| Male | 3.0 - 5.0 | 4.10 ± 0.71 |
| Female | 3.0 - 5.0 | 4.95 ± 0.82 |
| Total life span (days) | | |
| Male | 14.0 - 20.0 | 17.25 ± 1.77 |
| Female | 14.0 - 20.0 | 15.90 ± 1.44 |

Life history parameters (Table 1) indicated that the females laid 9-13 (10.85 ± 1.26) eggs inside a single host. The egg-larval period ranged from 8 -10 (8.90 ± 0.72) days. Fully fed parasitoid larvae emerged from the dead host larvae and formed yellowish white, smooth and oval cocoons immediately by the side of the

eggs ($x = 14.8$) on the second day of oviposition. About 90 per cent of eggs were laid on the first three days. The parasitoids gross reproductive rate was 34.5 females/female which indicated that it can multiply rapidly and can effectively bring about the pest under control. The parasitoid increased at the rate of 30.97 (R_0) per

generation, the mean duration (T_c) being 14.01 days. The intrinsic rate of natural increase (r_m) was 0.249 with the finite rate

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Table 2. Age specific fecundity and life table statistics of *A. cypris*

| Pivotal age in days (x) | Age specific longevity (l_x) | Age specific fecundity (m_x) | $l_x m_x$ | $\sum l_x m_x$ |
|-------------------------|----------------------------------|----------------------------------|-----------|----------------|
| 1-12 | Immature stages | - | - | - |
| 13 | 1.0 | 10.20 | 10.20 | 132.60 |
| 14 | 1.0 | 14.80 | 14.80 | 207.20 |
| 15 | 0.7 | 6.30 | 4.41 | 66.15 |
| 16 | 0.5 | 2.80 | 1.40 | 22.40 |
| 17 | 0.4 | 0.40 | 0.16 | 2.72 |
| 18 | 0.2 | 0.00 | 0.00 | 0.00 |
| Total | | 34.50 | 30.97 | 431.07 |

$R_0 = 30.97$ $T = 13.78$
 $T_c = 14.01$ $\lambda = 1.282$
 $r_c = 0.245$ $M:F = 1:1.8$
 $r_m = 0.249$

of increase (λ) being 1.282 females per female per day. This parasitoid had quicker rate of multiplication in comparison to *Agathis unicolorata* (Shenefelt), a larval parasitoid of *Phthorimaea operculella* (Zeller) (Chundurwar, 1977) and *Cotesia flavipes* (Cameron), a parasitoid of *Chilo partellus* (Swinhoe) (Nikam and Sathe, 1983). This indicates that *A. cypris* is capable of rapid multiplication.

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