

Biology of *Cotesia ruficrus* (Haliday) (Hymenoptera: Braconidae), a parasitoid of sorghum armyworm, *Mythimna separata* (Walker)

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ABSTRACT: *Cotesia ruficrus* (Hal.) took a period of 16.1 days from oviposition to adult emergence. Oviposition to larval egression took 11.9 days and pupal period for 4.1 days. Adults survived for 12.26 (females) and 8.1 (males) days with food. Without food they did not thrive beyond 2.2 days. Sex-ratio with male dominance was 1.0:1.4 (F: M).

KEY WORDS: *Cotesia ruficrus*, *Mythimna separata*, parasitoid

The gregarious endoparasitoid, *Cotesia ruficrus* (Haliday) is widely distributed in Asia, Europe, Australia, New Zealand, Africa and India. The extent of parasitism varies from place to place and season to season (Hill, 1977; Butter, 1978; Dilwari *et al.*, 1981). The biology of the parasitoid was studied with a view to generate detailed information as the same is not available.

The biology of the endogregarious parasitoid was studied in the laboratory twice each year during 1992 and 1993. Since the parasitoid survived well during

August and September in the laboratory, the biology was carried out during the same months for both the years in the laboratory of the Department of Entomology, Agricultural College, Dharward.

From the laboratory maintained culture, immediately after emergence of the adults, males and females were separated, pairing was done (15 x 2.5 cm vials) and the adults were allowed to mate for two-three days. The adults were fed using cotton swabs soaked in honey solution (50%). After the mating and pre oviposition period (2.0 days), the females were transferred to

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separate vials. Females were exposed to 4-5 day old larvae of *M. separata* for parasitization. After oviposition, the host larvae were reared in Petri-dishes individually, with sorghum leaves, recording developmental periods of the parasitoid. Further, the pre-mating, pre-oviposition and oviposition periods, number of larvae parasitized by each female, fecundity, adult longevity with and without food, and sex-ratio were recorded. The data pertaining to morphological characteristics of egg, larva, pupa and adult were recorded.

The data presented in Table 1 revealed that the mean developmental period from oviposition to larval emergence was 11.9 days (range 9.67-15.15 days). The pupal period was 4.1 days (range 3.55 - 4.55 days). The total period from oviposition to adult emergence was 16.1 days (range 13.17-19.65 days).

Each female could parasitize 4.9 ± 0.75 larvae. The mean pre-mating, pre-oviposition and oviposition periods were 1.2, 1.4 and 6.6 days, respectively. Mean fecundity was 179.3 ± 10.95 per female.

With food adult females survived longer than males. While females lived for 12.26 days, males survived only for 8.1 days. Without food females survived for 2.2 days, while males for 1.8 days. The sex ratio indicated the predominance of males with an average sex ratio of 1: 1.4 (female : male).

The present investigation in reference of the period from oviposition to larval emergence (11.9 days) are in close

conformity with the studies of Mallasure (1993) who reported 12.1 days.

Table 1. Biology of *Cotesia* on *Mythimna separata*

Stage	Mean \pm S D
Oviposition to larval emergence (days)	11.90 ± 0.56
Pupal period (days)	4.10 ± 0.41
Total period (days) (ovi-adult emergence)	16.10 ± 0.75
Larvae parasitized by each female (No.)	4.90 ± 0.75
Pre-mating period (days)	1.90 ± 0.24
Pre-oviposition period (days)	1.40 ± 0.24
Oviposition period (days)	6.00 ± 0.88
Fecundity	
a) with food	179.30 ± 10.95
b) without food	0.00 ± 0.00
Longevity	
a) with food	
1) Female	12.26 ± 0.90
2) Male	8.10 ± 0.74
b) without food	
1) Female	2.20 ± 0.32
2) Male	1.80 ± 0.29
Sex ratio (F : M)	$1.0:1.40 \pm 0.23$

The mean developmental period from oviposition to larval emergence recorded by Cumber *et al.* (1977) was one week when reared on *Agrotis epsilon* (Hufn.), which shows the change in developmental period caused due to difference in host.

The egg is with a small stalk at the anterior end and devoid of sculptures. It is smooth, glistening white, transparent and slightly broader at the terminal portion with curved nature in the middle. The length of

the egg measured from 0.13 ± 0.004 mm. Eggs were laid in groups inside the host body.

Larva is tiny, transparent, whitish with 13 segments which were not clear. The larval body is broad in the middle and tapering towards the anterior and posterior ends. the length of larvae varied from 3.23 to 3.96 mm with an average length of 3.6 ± 0.21 mm. The broadest portion (width) of the larva measured 0.97 ± 0.42 mm with a range of 0.93 to 1.06 mm. The larvae constructed the cocoons, retaining little posterior portion in the host body. The construction of cocoons was completed in 60-90 minutes and formed a compact mass or clump.

The pupation occurred in group in a silken cocoon. The cocoons were yellowish white in colour gradually turned darker on third or fourth day. The cocoons were, cylindrical and rounded at both ends. Inside the silken cocoons the pupae were of the exarate type. On fourth or fifth day after cocoon formation, the adults emerged out cutting the silken cocoon at the apical region in a neat circular manner. The cocoon measured 3.16 ± 0.13 mm in length and 1.12 ± 0.05 mm in width.

The adults of *C. ruficrus* are with transparent wings and veination. The fore wing is larger than hind wing. The appendages viz., legs, antennae and oviposition in females are well sclerotized and dark pinkish in colour. The male is smaller than the female in body size except the antennae where it is longer than the female.

The length of adult female from tip to tip was 3.09 ± 0.09 mm with a range of

2.89 to 3.2 mm. The width at broadest portion of body was 0.97 ± 0.05 mm with a range of 0.89 to 1.05 mm. The antenna length of female was 2.99 ± 0.16 mm with a range of 2.89 to 3.37 mm. Fore wing measured 3.08 ± 0.16 mm length and 1.7 ± 0.04 mm width with a range of 2.84 to 3.16 mm and 1.1 to 1.21 mm, respectively. Hind wing length was 2.4 ± 0.075 mm which varied from 2.31 to 2.57 mm. The adult male parasitoid of *C. ruficrus* measured 2.51 ± 0.08 mm length from tip to tip with a width of 0.82 ± 0.03 mm. The antennal length of male was 3.16 ± 0.08 mm (3.02 - 3.68 mm). Fore wing of male measured 2.58 ± 0.09 mm with variation from 2.42 to 2.72 mm in length and hind wing measured 2.12 ± 0.07 mm in length.

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