Research Paper :

Comparative Biology of *Bracon hebetor* Say on *Corcyra cephalonica* Stainton and *Opisina arenosella* Walker

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SUMMARY

In *Bracon hebetor* Say mating frequently occurrs during day and night. Pre-oviposition period on *Corcyra cephalonica* and *Opisina arenosella* lasted for 15.5 and 17.8 hours, oviposition period 34.7 and 26.5 days and post-oviposion period 4.75 and 2.8 days. Eggs were deposited singly on ventral side of both the host larvae with an average of 423.3 and 33.7 eggs. Incubation period, larval period, pre-pupal period and pupal period lasted for 23.32 hours and 24.26 hours, 64.8 hours and 72.48 hours, 0.46 days and 0.93 day and 4.37 and 5.3 day on *C. cephalonica* and *O. arenosella*, respectively. Larvae passed through five instars, pupation took place in silken cocoon near vicinity of the host. Male and female adults from *C. cephalonica* and *O. arenosella* survived 14.2 and 37.9; 12.05 and 20.85 days, respectively. Life-cycle completed within 8.25 and 10.56 days on *C. cephalonica* and *O. arenosella*, respectively. Sex-ratio of male to female adult was 1.66:1 on *C. cephalonica* and 1.30 :1 on *O. arenosella.*

Key words : *Bracon hebetor*, biology, *Corcyra cephalonica*, Opisina arenosella

Bracon hebetor Say (Braconidae) is a most well known parasitoid of a number of Lepidopteran pests both in the field and in storage. It was first recorded on *Corcyca cephalonica* infesting stored grains (Krishna Ayyar, 1934). Biological control of insect pests of sesamum, lab-lab etc. was recorded by Appanna (1953). *B. hebetor* is a highly polyphagous parasitoid and distributed in many countries. Being gregarious and easy to rear in the laboratory on the factitious hosts, *C. cephalonica* stainton, it was reared in large numbers and released in the field for the suppression of *O. arenosella* population efficiently (Pillai and Nair, 1993). Since the biology of the parasitoid differs in different hosts so the sufficient knowledge about the biology of an insect parasitoid is necessary for adopting suitable biological control.

MATERIALS AND METHODS

The present investigations was carried out under laboratory conditions at the Biological Control Laboratory, Department of Agricultural Entomology, College of Agriculture, Dapoli, Dist. Ratnagiri (M.S.) during the year 2006-2007. Initial culture of *B. hebetor* was collected from Agriculture Research Station, Ambajipeta, east Godavari district, Andhra Pradesh. It was maintained and multiplied on the larva of *C. cephalonica* and then used for rearing the parasitoid. The culture of *C. cephalonica* was multiplied in the biocontrol laboratory. The culture of *O. arenosella* was collected from the fields of Agril. Research Station, Palghar, Dist. Thane and reared in the biological control laboratory. The 5th and 6th instar larvae of both natural as well as factitious hosts were used for study the biology of *B. hebetor*

Adults emerged from the culture were kept in the glass tube for two days and mated females were used for the mass multiplication on *C. cephalonica*

Healthy fifth and sixth instar *Corcyra* larvae were separated from *Corcyra* rearing boxes. The larvae were then transferred singly into glass vial by using a camel hair brush containing females of *B. hebetor* selected from original culture. A drop of honey was also provided as a source of nutrition. The parasitized *Corcyra* larvae were removed from the vial daily and fresh larvae were introduced into the same tube, taking care that the females of *B. hebetor* does not escape. In this way, the fresh *Corcyra* larvae were provided till the females of *B. hebetor* parasitized them by laying eggs.

The parasitized larvae with eggs of *Bracon* were placed on corrugated paper strips. These strips with parasitized larvae were placed in plastic boxes of approximate size and stored for three days until parasitic larvae reaches the pupal stage, once larvae attained

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pupal stages the strips were taken out of box and cleaned to remove the debris of dead larvae retaining only pupae of *B. hebetor*. The cleaned strips with healthy pupae were rolled and introduced into larger test tube for adult emergence. The newly emerged adults were separated and released for mating. Thus, the mass culture of *B. hebetor* was maintained in the laboratory. The same culture was used for study of pre-oviposition, oviposition, post oviposition, incubation, larval, pupal and adult period on *C. cephalonica* and *O. arenocella.*

RESULTS AND DISCUSSION

Pre-oviposition period, oviposition period and post-oviposition period ranged from 11 to 19 hrs, 10 to 57 days and 1 to 9 days, respectively on *C. cephalonica*. Similarly, on *O. arenosella* pre-oviposition period ranged from 15 to 20 hrs, oviposition period ranged from 18 to 37 and post-oviposition period ranged from 1 to 6 days (Table 1). Sathiamma *et al.* (1986) reported that 2 to 5 hrs pre-oviposition period, 22 to 25 days oviposition period and 1 to 8 days post-oviposition period on *O. arenosella* and 2.5 to 15 days pre-oviposition and oviposition periods on *E. kuhniella*, respectively. Eggs laying capacity of the female was found 141 to 577 and 13 to 59 on *C. cephalonica* and *O. arenosella,* respectively.

Jackson and Butler (1984) observed that *B. greeni* female laid 159.1 eggs on *P. gossypiella* and Sathiamma *et al.* (1986) reported 142 to 345 eggs on *E. kuhniella* larvae.

Incubation period on *C. cephalonica* and *O. arenosella* varied from 22 to 25 and 23.30 to 26.00 hrs, respectively. Sathiamma *et al.* (1986) agreed with this result and Azab *et al.*(1968) noticed 12.9 hrs incubation periods on *B. kirkpatricki.*

Total larval period on *C. cephalonica* and on *O. arenosella* ranged from 60 to 69.6 hrs and 60 to 79.2 hrs, respectively. Gul and Gulel (1995) reported that larval period completed in 2-3 days. *Bracon* larval instars I, II, III, IV and V ranged from 9.6 to 12 and 9.6 to 13.2, 9.6 to 14.4 and 12 to 14.4, 12 to 44.4 and 9.6 to 15.6, 9.6 to 16.8 and 12 to 18, 12 to 19.2 and 16.8 to 18 hrs, respectively. Chiu and Chien (1974) reported that *Bracan* completed its five larval instars of means at 8, 9, 8, 10 and 8.4 hrs, respectively. Pre-pupa and pupal stages completed within 0.40 to 0.50 and 4 to 5 days on *C. cephalonica* and 0.85 to 1.00 and 5 to 6 days on *O. arenosella,* respectively. Abbas (1980) observed 22.2 hrs and 3.60 days of prepupal and pupal stages of *B. brevicornis*, respectively.

Female and male adults that emerged from *C. cephalonica* and *O. arenosella* survived for 14 to 59, 6 to 22 and 10 to 32, 6 to 20 days, respectively. Sathiamma *et al.* (1986) reported that longevity of adult female and male ranged from 20 to 63 days and 6 to 13 days, respectively. Sex ratio for male adults to female adults on host *C. cephalonica* was 1.66:1 whereas, on host *O. arenosella* was 1.30:1. Azab *et al.* (1969) and Sathiamma

Table 1: Developmental parameters of *B. hebetor* on different hosts

Sr. No.	Stage	*B. hebetor* on host larvae			
		C. cephalonica		*O. arenosella*	
		Range	Mean	Range	Mean
1.	Preoviposition period (hrs)	11 - 19	15.55	15-20	17.8
2.	Oviposition period (days)	10 – 57	34.70	18-37	26.50
3.	Post oviposition period (days)	01 – 09	04.75	01-06	02.80
4.	Fecundity (egg number)	141-577	423.3	13-59	33.70
1.	Incubation period (hrs)	22-25	23.32	23.30-26	24.46
2.	Larval period (days)	02-2.80	2.45	3-4	3.32
	1 instars	9.6-12	11.4	9.6-13.2	11.28
	II instars	9.6-14.4	11.76	12-14.4	13.44
	III instars	12-44.4	12.72	9.6-15.6	14.16
	IV instars	9.6-16.8	13.44	12-18	16.08
	V instars	12-19.2	15.12	16.8-18	17.52
3.	Prepupal period (days)	0.40-0.50	0.40	0.85-01	0.93
4.	Pupal period (days)	04-05	04.37	5-6	5.30
5.	Adult longevity (days)				
	Male	6-22	14.2	6-20	12.05
	Female	14-59	37.9	10-32	20.85
6.	Sex ratio	1.66:1		1.30:1	
7.	Life cycle (days)	07-09.34	0.8.25	09.82-12.08	10.56

et al.(1986) agreed with these results.

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