

## Some Observations on the Biology of an Exotic Parasite *Allorhogas pyralophagus* Marsh in India

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*Allorhogas pyralophagus* Marsh, an ectoparasite of graminaceous borer was recorded for the first time from *Eoreuma loftini* (Dyar) feeding on Johnson grass (*Sorghum halepense* L.) Pers. in Mexico by F. D. Bennett in 1981 who advocated its evaluation against sugarcane borers both in old and new worlds (Bennett *et al.*, 1983). Culture of this parasite was supplied by Project Coordinator, Biological Control, Bangalore for trials against sugarcane borers in the subtropical India in October 1984. The parasite has been evaluated against sugarcane stalk borer, *Chilo auricilius* Dug- under laboratory and field conditions (Varma *et al.*, 1987). Further investigations for its suitability as potential biocontrol agent against other sugarcane borers were conducted at Lucknow and Sardarnagar and the results are presented in this paper.

The host suitability of the parasite was studied on field-collected sugarcane stalk borer, *C. auricilius*, shoot borer, *C. infuscatellus* Snellen, green borer, *Raphimetopus ablutellus* Zeller, internode borer, *C. sacchariphagus indicus* Kapur, top borer, *Scirpophaga excerptalis* Walker and pink borer *Sesamia inferens* Walker. Female parasites after mating were allowed to oviposit on individual borer larvae. Eggs were separated and implanted on individual paralysed host for recording duration of incubation, larval and pupal periods. An average of 30 observations were taken during the natural availability of host in the area.

Effect of continuous laboratory rearing on the vigour and vitality of the parasite was studied by recording observations on egg + larval period, pupal period and the sex ratio of the parasite on *C. auricilius*, a host for which semi-synthetic diet is perfected. Observations were recorded in November of each year from 1983 to 1986. Compatibility with *Apanteles flavipes* Cam., was studied by exposing stalk borer larvae parasitised by *A. flavipes* and Gurdaspur borer larvae parasitised by *Sturmiopsis inferens* Tns. to mated females of *A. pyralophagus*. After paralysis, the larvae were reared as per techniques already perfected. The emergence of the parasites was observed to see the compatibility of both the parasites. Longevity of adults at different temperatures was studied by rearing freshly mated females in incubators set at fixed temperature. Five adults in three replications were placed in plastic jars (15x10 cm) provided with cotton dipped in 5% honey.

Of the five sugarcane borer hosts tried, the parasite successfully completed its life cycle in all. On *S. inferens* larva, though the parasite oviposited, first instar grub hatching out of the eggs failed to establish and died on the host body. Average egg + larval period and pupal period of the parasite ranged from 5.44 to 11.4 days and 8.99 to 18.64 days, respectively. The total life cycle of the male and female parasite ranged between 14.03 to 33.98 and 14.58 and 34.83 days, respectively, on different hosts (Table 1).

The reasons for the non-acceptability of the pink borer larva as a host could not be understood. Perhaps the thick cuticle of the larva deterred the young parasitic grub to establish on it. It was also evident from Table 1 that the parasite could be reared at temperature ranging between 22.8°C and 32.9°C on available natural host. Occurrence of borer larvae in succession, round the year, and their acceptability as suitable host may provide better chance for the survival of the parasite and establishment in the new environment.

The study on the effect of continuous laboratory rearing on the vigour and vitality of the parasite revealed that there was no marked change in the development period and sex ratio observed in 72 generations (Table 2). On an average egg + larval period and pupal period ranged from 8.8 to 10.2 days and 11.8 to 13.0 days, respectively while the sex ratio of the emerging adults remained almost same. The phenomenon of loss of vigour and vitality was earlier noticed in exotic parasites *Lixophaga diatraeae* Tns., *Paratheresia claripalpis* Wulp. and indigenous *Sturmiopsis inferens* so far evaluated against sugarcane borers (King et al., 1977; Saraceni and Mourao, 1977; Chandra and Avasthy, 1982).

Stalk borer larvae already parasitised by *A. flavipes* when exposed to *A. pyralophagus* yielded on an average 28.5 and 4.4 cocoons of *A. flavipes* and *A. pyralophagus*, respectively, while Gurdaspur borer larvae earlier parasitised by *S. inferens* yielded on an average 1.7 puparia and 5.7 cocoons of *S. inferens* and *A. pyralophagus* respectively. In both the cases, *A. pyralophagus* could develop on the parasitised host larvae. Thus the parasite coexisted with the indigenous endoparasites, *A. flavipes* and *S. inferens*. Occurrence of *A. pyralophagus* with *A. flavipes* and *Lixophaga diatraeae* on *Diatraea* spp. and *Elasmus zehntneri* on *Scirpophaga* (= *Tryporyza*) *nivella* W. was reported earlier by Des Vignes (1983) and Ubandi et al. (1983), respectively.

Table 1. Duration (in days) of different stages of *A. pyralophagus* and sex - ratio of the progeny on different sugarcane borers.

Host species	Egg + larval period	Pupal period	Total development period		Sex ratio (F : M)	Range of ambient laboratory temperature
			Female	Male		
<i>C. infuscatellus</i>	5.44 ± 0.53	8.99 ± 0.81	14.58 ± 0.75	14.05 ± 0.74	1 : 0.33	28.8 - 32.1°C
<i>R. ablutellus</i>	5.58 ± 0.66	9.48 ± 1.85	14.91 ± 1.85	14.83 ± 1.94	1 : 1.38	29.3 - 32.9°C
<i>S. excerptalis</i>	16.44 ± 1.24	18.28 ± 1.01	34.83 ± 2.12	33.98 ± 1.15	1 : 0.25	22.8 - 24.4°C
<i>C. sacchariphagus indicus</i>	6.92 ± 1.54	10.50 ± 1.20	17.37 ± 2.19	17.07 ± 1.88	1 : 0.29	24.9 - 27.3°C
<i>C. auricilius</i>	14.88 ± 0.93	18.64 ± 1.01	33.59 ± 1.80	33.32 ± 1.86	1 : 0.26	22.8 - 24.8°C

Table 2. Rearing the exotic parasite, *A. pyralophagus* through successive generations

Period	Average egg + larval period (in days)	Average pupal period (in days)	Sex - ratio Male : Female
November 1983	8.8 (5-11)*	11.88 (11-13)	1 : 2.5
November 1984	9.92 (7-11)	13.00 (12-14)	1 : 2.5
November 1985	10.28 (8-12)	12.32 (11-15)	1 : 2.7
November 1986	9.68 (7-13)	12.80 (12-14)	1 : 3.0
C. D. at 5%	NS	NS	NS

\* Figures in parentheses indicate the range.

Females of the parasite could withstand 6, 15, 20 and 35°C of constant temperatures for 30 min, and 22.7, 18.2 and 10.5 days, respectively. A low temperature tolerance is a matter of significance in post-monsoon period in subtropical India, the time of heavy build up of the stalk borer (Varma and Mitra, 1981). Messenger *et al.* (1976) opined that the natural enemy must be able to tolerate the range of temperatures, humidities and other physical conditions that occur in different seasons including those that occur during extremes of weather and the exotic parasite *A. pyralophagus* fulfilled these attributes besides possessing a wider range of host acceptability.

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Key words : *Allorhogas pyralophagus*, biology, host suitability

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