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Host-Parasitoid Interaction Between *Chilo partellus* (Swinhoe) and *Allorhogas pyralophagus* Marsh*

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ABSTRACT

The effect of different parasitoid-host ratios on the mass multiplication of a gregarious ectoparasitoid, *Allorhogas pyralophagus* Marsh was investigated. One parasitoid : one host was found to be the optimum ratio for multiplying the parasitoid on *Chilo partellus* (Swinhoe) as it resulted in the production of maximum number of cocoons and healthy adults, besides providing a high per cent parasitism.

KEY WORDS: *Chilo partellus, Allorhogas pyralophagus,* host - parasitoid ratio

Allorhogas pyralophagus Marsh (Hymenoptera:Braconidae) is a Mexican parasitoid, imported into our country for trials against graminaceous borers. This parasite has proved its worth in India (Varma *et al.*, 1987) and also in the USA (Smith *et al.*, 1987).

For mass multiplication of any natural enemy, it is essential to standardise the optimum host-parasitoid ratio. Many hymenopterous parasites are known to increase progeny production in response to rising host densities (Legner, 1967). There are studies on the response of egg parasites, egg-larval parasites and gregarious larval endoparasites to different host densities (Reznik and Umarova, 1991; Ballal and Kumar, 1991; Hu *et al.*, 1986). But studies on the response of gregarious larval ectoparasites to different host densities are scarce. The present investigation was designed to study the host-parasitoid interaction and to arrive at the optimum host-parasitoid ratio between *Chilo partellus* (Swinhoe) (Lepidoptera:Pyralidae) and *A. pyralophagus*.

MATERIALS AND METHODS

C. partellus was continuously maintained on an artificial diet formulated by Nagaraja (ICAR., 1988). *A. pyralophagus* was reared on *C. partellus* following the technique of Jayanth and Nagarkatti (1985).

In the first experiment, the parasitising ability of large, medium and small sized adults of *A. pyralophagus* was compared. The male parasitoids are generally small and do not have much size variations. But the female parasitoids were of varying sizes. In our study, length x breadth in mm was taken as size index. Female parasitoids whose size index was more than 2.5 was considered as large, those between 1.5 and 2.5 as medium and those below 1.5 as small.

In the second experiment, only large female parasitoids were used based on the results of the first experiment. In this experiment, optimum parasitoid-host ratio for multiplying *A. pyralophagus* was worked out. The seven parasitoid - host ratios tried were 4:1, 3:1, 2:1, 1:1, 1:2, 1:3 and 1:4. The per cent

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parasitism and the number of cocoons and adults obtained per larva at the different ratios were checked.

RESULTS AND DISCUSSION

In the first experiment, where the parasitising ability of adult parasitoids of different sizes were worked out, it was found that large parasitoids caused 68.8% parasitism while medium sized adults produced 43.8% (Fig.1), both being statistically on par. However, the per cent parasitism caused by the small sized adults was 12.5 which was significantly less.

Lasota and Kok (1986) had opined that host-parasitoid ratio adjustments might be necessary for mass rearing gregarious endoparasites if the host resources were reduced because of laboratory rearing conditions. The results of the second experiment with seven parasitoid-host ratios showed that the first four ratios appeared to be superior to the rest with respect to per cent parasitism (Table 1). However, it also showed that there was no significant difference in the number of cocoons obtained per larva among the different treatments.

Table 1. Per cent parasitism and number of cocoons per larva at different parasitoid - host ratios

Parasitoid-host ratio	Per cent parasitism*	Mean no. of cocoons/larva
4:1	100.00(90.00)	11.00
3:1	100.00(90.00)	12.67
2:1	100.00(90.00)	10.17
1:1	100.00(90.00)	9.33
1:2	50.00(39.60)	10.50
1:3	36.10(21.30)	8.83
1:4	37.50(22.30)	8.73
SEM	9.27	0.93
CD@ 5%	28.55	NS

* Figures in parentheses are transformed values

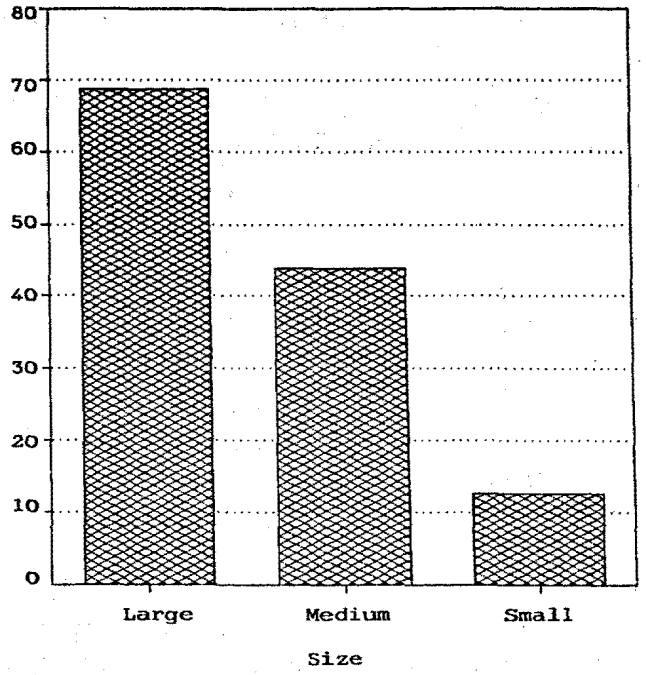

Fig.1. Per cent parasitism by *A. pyralophagus* of different sizes

In the case of *Glyptapanteles flavicoxis* Marsh (Hym., Braconidae) a gregarious endoparasite of *Ocneria (Lymantria) dispar* (L.) (Lep., Lymantriidae), the reproductive output per host larva declined as the number of host larvae increased (Hu *et al.*, 1986). In our study also, the number of adults obtained per larva (irrespective of the size index) was significantly more in the first four ratios and reduced significantly when the number of host larvae increased (Table 2). Irrespective of the different ratios tried, among the progeny produced, large and medium sized adults were more in number than small sized adults. Maximum number of large adults per larva was obtained from the ratios 3:1, 2:1 and 1:1. The latter two ratios were superior in that they could also produce maximum number of medium sized adults and negligible number of small sized adults (Table 2).

Considering the good parasitism, good number of cocoons and large and medium sized adults obtained per larva, the parasitoid-host ratios of 2:1 and 1:1 seemed to be better than the other ratios. However,

Table 2. Number of large, medium and small sized adult parasitoids obtained per larva at different ratios

Parasitoid host ratio	Mean number of adults of different sizes per larva			Mean
	Large	Medium	Small	
4:1	0.0	2.0	3.0	1.78
3:1	3.3	1.0	1.0	1.78
2:1	3.17	3.5	0.50	2.39
1:1	3.17	4.0	0.67	2.61
1:2	1.17	0.63	0.0	0.60
1:3	1.17	1.11	0.0	0.76
1:4	1.52	0.49	0.0	0.67
Mean	1.93	1.82	0.79	
	Size	Ratio	Size x Ratio	
SEM	0.22	0.34	0.58	
CD @ 5%	0.63	0.96	1.66	

utilising 2 parasitoids on one larva did not prove to be more productive when compared to the utilisation of one parasitoid for one larva. Hence, for good production, 1:1 could be the suggested ratio.

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