



Biology of *Eumicrosoma* sp. (Hymenoptera: Scelionidae) reared on the eggs of black bug, *Dimorphopterus gibbus* (Fabricius) (Hemiptera: Lygaeidae) of sugarcane

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ABSTRACT: Biology and mass multiplication technique of *Eumicrosoma* sp. on eggs of sugarcane black bug, *Dimorphopterus gibbus* (Fabricius) were developed. The mean per cent parasitisation of host eggs, developmental period, and adult emergence of the parasitoid were 41.33 to 61.05 percent, 8.65 to 10.26 days, and 75.0 to 90.0 per cent, respectively. The parasitoid preferred to parasitise freshly laid to two day old eggs. Longevity of adult wasps was 2.15 to 2.99 days. One mated female parasitised on an average 15.67 eggs. Sex ratio (male to female) was 1:1 to 1:1.1. Only one wasp emerged from one parasitised egg thus it indicates no super parasitism in this parasitoid.

KEY WORDS: Black bug, *Dimorphopterus gibbus*, *Eumicrosoma* sp., sugarcane

Black bug, *Dimorphopterus gibbus* (Fabricius) is a sporadic sucking pest of sugarcane causing economic losses (1-5 t/ha) to the crop by sucking the sap from inner surface of leaf sheath, leaves and tender of the cane during pre-monsoon period (Pandey, 1975). Its infestation has been recorded in sugarcane growing tracts of Uttar Pradesh, Madhya Pradesh and Rajasthan (Chaudhary and Khanna, 1964). Emphasis is given to the judicious use of insecticides along with other methods of pest control, especially biological control. Among bioagents of black bug, a scelionid egg parasitoid, *Eumicrosoma* sp. is promising. But no information is available on biology and laboratory rearing of this parasitoid. Therefore, present studies were conducted to develop biology, laboratory-rearing technique for mass multiplication

and parasitising potential of this parasitoid on eggs of *D. gibbus*.

For the collection of initial culture, 250 freshly laid eggs (0-24 hour old) of *D. gibbus* were glued on paper card (1.5x5.0cm) and stapled on ventral surface of lower leaves (2nd to 3rd leaf from soil surface) of sugarcane in heavily infested ratoon crops at Indian Institute of Sugarcane Research (IISR) Research Farm at Lucknow in first week of February, 2001. Paper cards with eggs were collected 24 hours after field exposure in glass tubes and kept in the laboratory for emergence of the parasitoid. Only 25 per cent of glued host eggs were parasitised in the field conditions. Parasitised eggs started blackening from one end and in five days whole egg became shiny black before hatching.

Adult shiny black parasitic wasps were obtained and nucleus culture was maintained on host eggs for the present studies conducted during 2001. Adult wasps mated just after emergence.

For the multiplication of the parasitoid, 50 fresh loose eggs of *D. gibbus* were offered to five pairs of parasitic wasp (five each of male and female formed an unit of observation) in small glass tubes. Twenty such tubes were kept per month from April to August constituted twenty replications.

Developmental period and adult longevity were studied by keeping twenty parasitised eggs individually in small glass tubes (each tube constituted one replication) per month from April to August. Superparasitism was studied by taking the count of adult parasitoid emerged from each egg in each tube. For per cent emergence and sex ratio 120 black eggs were kept in the batch of 30 eggs in four individual small glass tubes/ month.

For studying parasitising potential of *Eumicrosoma* sp. twenty-five fresh host eggs (*D. gibbus*) were offered to one pair of parasitoid (one each of male and female) in glass tubes and allowed to parasitise the eggs till the death of female. One tube with twenty-five eggs and a pair of parasitoid constituted one replication and twenty replications were maintained. Female parasitises the eggs by

taking the egg in the grip of hind leg through backward movement.

These studies were carried out at ambient room temperature and relative humidity from April to August 2001. In the month of April, May, June, July and August minimum mean temperature was 26, 28, 30, 28 and 27°C while maximum mean temperature was 30, 31, 34, 31 and 28°C, respectively. Relative humidity in the months of April, May, June, July and August was 68, 52, 72, 76 and 80 percent, respectively. Each tube was provided with 50 per cent honey solution in cotton swabs as food for the parasitoids.

About 25.0 per cent of the eggs exposed to the field population of *Eumicrosoma* sp. were parasitised. Adult parasitoids emerged out from the eggs in 9-10 days. Female parasitic wasps were generally larger than males. The antennae of females are clavate while straight pointed in case of males. Adult wasps mated just after emergence.

Parasitised eggs became blackish in colour from one end and in few days and turned completely black to shiny black just before emergence of adult parasitoid. Adult wasps emerged out from the eggs in 8-10 days in April, May, June and August whereas it took 8-12 days in July with an average of 8.65±1.34, 8.65±1.34, 9.10±1.41, 8.67±0.94 and 10.26

Table1. Per cent parasitisation of eggs of *D. gibbus* by *Eumicrosoma* sp., developmental period and sex ratio

Month	Parasitisation (%)	Developmental period (days)	Longevity of adult parasitoid (days)	Per cent adult emergence	Sex ratio*
April	52.05±3.07	8.65±1.34	2.55±0.40	75.00	1:1.1
May	41.33±2.99	8.65±1.34	2.40±0.59	90.00	1:1.1
June	50.06±3.10	9.10±1.41	2.15±0.22	62.50	1:1.0
July	61.05±1.43	10.26±0.24	2.68±0.14	69.33	1:1.1
August	47.36±3.68	8.67±0.94	2.99±0.19	84.17	1:1.1
SEM±	3.137	0.264	0.144	6.337	
CD (P=0.05)	6.211	0.523	0.258	13.264	—

*Sex Ratio: Male: Female

±0.24 days, respectively (Table 1). It was observed that only one wasp emerged from one egg, it indicates that there is no super parasitism in the case of *Eumicrosoma* sp. when reared on eggs of *D. gibbus*. Sex ratio (male to female) varied from 1:1 to 1:1.1 (Table 1). It was observed that eggs, which were parasitised once, were not parasitised again.

Per cent parasitisation ranged 21.48–72.50, 33.89–53.85, 25.00–70.00, 50.75–71.32 and 40.83–54.17 in April, May, June, July and August, respectively. Parasitisation was significantly higher in July (61.05 per cent), followed by April (52.05%) June (50.06%), August (47.36%) and May (41.33%) (Table 1). It is indicated that 76 per cent relative humidity is favourable for parasitisation. Khan and Nath (1939) observed up to 83.6 per cent egg parasitisation by *Eumicrosoma phaex* of a black bug, *Macropes excavatus* Distant in Punjab and Uttar Pradesh during monsoon period in ratoon crops of sugarcane where as Wright and Danielson (1992) recorded 47.2 per cent parasitisation of field collected eggs of *Blissus gibbus* (Say) by *Eumicrosoma beneficum* Gahan collected from wheat (*Triticum aestivum* L.) near Odell, Nebraska during the month of June.

Adult emergence from parasitised eggs was 75.0, 90.0, 62.5, 70.8 and 84.12 per cent in April, May, June, July and August, respectively (Table 1). It was significantly higher in May. Single mated female could parasitise on an average of 15.67 eggs with a range of 5–22 eggs. Thus *Eumicrosoma* sp. could be multiplied on the eggs of laboratory bred *D. gibbus* successfully for field trials against black bug of sugarcane. Coracini and Samuels (2002) also observed that *Eumicrosoma* spp. could be a possible candidate for biological control of a

lygaeid bug *Blissus antillus* Leonard. More intensive work on field releases of this parasitoid against black bug in plant and ratoon sugarcane crop is needed.

ACKNOWLEDGEMENTS

Author is thankful to the Director of the Institute and Head Crop Protection Division for providing facilities to carry out these studies. Thanks are also due to Mr. M. P. Sharma for rendering technical assistance throughout the studies.

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