STUDIES ON DUNG INSECT COMMUNITY IN AND AROUND KOLHAPUR CITY

A.B. Mamlayya*, S.M. Gaikwad*, G.P. Bhawane* and O.V. Kalame

**Department of Zoology, Shivaji University, Kolhapur – 416004*
Department of Journalism & Communication Science, Shivaji University, Kolhapur- 416004

ABSTRACT

- Bovine excrement attracts and shelters a highly diverse group of organisms during the different stages of decomposition. The investigation on the dung insect community was carried out in and around Kolhapur city.

- The study yielded 37 insect species belonging to three orders *viz.* Coleoptera, Diptera and Dermaptera. Study revealed that the dung insect community was dominated by dung beetles i.e. tuneller, roller, dweller and dung flies. Histerid beetles and ear wigs found scarce during the study period.

Keywords: Dung insect community, Soil, Nutrient recycling, Coprophagy.

INTRODUCTION

- Animals related with excrements have been object of research since many years**.** Insects associated with animal excrements form a highly diverse community including general feeders, predatory and coprophagus insects which consume and inhabit feces during different stages of decomposition (Koskela & Hanski, 1977).

- Among these dung beetles plays a key role in dung decomposition (Anderson and Coe, 1974; Holter, 1977) and improve nutrient recycling, soil structure (Bornemissza and Williams, 1970; Fincher et al., 1981).

- Dung insect fauna are potentially an important part of the ecosystem and several studies have described the dung insect community assemblages (Pinero, 2004; Nealis, 1977; Dajoz, 1994).

- On the other hand animal feces also attract and shelters several flies which transmit various diseases to livestock and humans caused by several pathogens (Greenberg, 1971).

- These flies have been a limiting factor to the yield of livestock industries. Several biological control agents have been used to control disease spreading flies (Bornemissza 1968; Achiano, 2007).

- The coleopterans of the family Histeridae are predators in the young and adult phase. They prey on insects present in any substratum in decomposition (Arnett, 1968).

- The present study was carried out to determine the diversity of dung insect community and also to determine the potential of histerid beetles in the control of dung breeding dipterous flies.

MATERIAL AND METHOD

- The insects associated with cattle excrement were collected from the grazing lands in and around Kolhapur city, Maharashtra, India. For collection of insects dung baited pitfall traps were used (Southwood, 1978; Lobo *et al.*, 1988).

- Trap consisted of a plastic cylinder (10 cm diameter X 20 cm high) buried in the ground and containing a cup (6 cm diameter X 9 cm high). Three sites were selected for the sampling (Grazing lands). The sampling was carried out June 2008 to May 2009. Pit fall traps were baited at 15 days interval and contents of the pit fall traps were collected after 4 days.

- The identification with the help of available literature Arrow (1931), Malcolm (1910) ; from the Commonwealth Institute of Entomology, London and Dr. V.V. Ramamurthy, Insect Identification Service, IARI, New Delhi.

- Laboratory studies were carried out to determine the potential of predatory beetles in the control of blow fly, *Calliphora erythrocepahala*. Hister beetles were found key predators on the developing stages of blow fly. They were hand sorted; collected from the field and brought to the laboratory.
- Experiment was designed to determine the effect of predation on developing stages of flies at different beetle densities (2, 3 and 5). Beetles were released in the glass jars (20 x 20 x 16 ½ cm) and maintained in laboratory at 250 C to 300 C and a 12 hour day length with a relative humidity varying from 65 to 75 % with varying beetle densities.
- Glass jars contained a mixture of sand (250 gm), soil (250 gm) and manure (500 gm). Developing stages of flies were added as food to the beetles. Glass jars of treatment were arranged with a control.

RESULTS AND DISCUSSION

- Cattle are the most common type of large domesticated ungulates which produces considerable volume of fibrous and nitrogen rich dung. Several organisms use this resourse such as coprophagus scarabaeidae (Coleoptera), Muscidae and Calliphoridae (Diptera), bacteria, protists and many insect predators and parasites.
- The studies on the dung insect community in the Kolhapur yielded a total of 37 species belonging to 3 orders of insecta in the dung pads at three sites and over one year of the study (Table 1).
- The most abundant order was Coleoptera followed by Diptera and Dermaptera. No termites and ants were found during this study. The beetle assemblage was diverse including 32 species from the three families.
- The beetle family with the highest number of species was scarabaeidae. The study sites showed low number of Dermaptera and high number of dung breeding flies (Diptera).

Sr. No.	Name of the species	Family	Order
1.	*Labidura reparia* Pallas	Labiduridae	Dermaptera
2.	Unidentified species	Labiduridae	Dermaptera
3.	*Aphodius sp*	Scarabaeidae	Coleoptera
4.	*Aphodius sp*		
5.	*Hybosorus orientalis* Westwood		
6.	*Scarabaeus sp.*		
7.	*Sisyphus neglectus Gory*		
8.	*Synapsis gilleti* Arrow		
9.	*Heliocopris bucephalus* F.		
10.	*Heliocopris tyranus* Thoms.		
11.	*Catharsius molossus* L.		
12.	*Catharsius pithecius*F.		
13.	*Copris sp.*		
14.	*Copris repertus* Walk.		
15.	*Phalops divisus* Weid.		
16.	*Onthophagus sp.*		
17.	*Onthophagus unifasciatus* Schall.		
18.	*Onthophagus catta* F.		
19.	*Onthophagus nasalis* Arrow		
20.	*Onthophagus acuticollis* Arrow		

21.	*Onthophagus agnus* Gill		
22.	*Onthophagus cervus* F.		
23.	*Onthophagus amplexus* Sharp.		
24.	*Onthophagus dama* F.		
25.	*Onthophagus sp.*		
26.	*Onthophagus pectolus* F.		
27.	*Liatongus rhadamistus* F.		
28.	*Drepanocerus setosus* Weid.		
29.	*Onitis philemon* F.		
30.	*Chironitis arrowi* Arrow		
31.	*Hister lutarius* Erichson	Histeridae	
32.	*Hister melanarius* Erichson		
33.	*Hister javanicus* Payk.		
34.	*Aleochara sp.*	Staphylinidae	Coleoptera
35.	*Musca domestica* L.	Muscidae	Diptera
36.	*Musca sp.*		
37.	*Calliphora erythrocephala* Meigen	Calliphoridae	Diptera

- Among the Coprophagus beetles, *Onthophagus* was found to be a dominant genera and very common in all the sites. Similarly *Onitis philemon*, *Chironitis arrowi*, *Catharsius molossus*, *Heliocopris bucephalus*, *Sisyphus neglectus*, *Drepanocerus setosus* were also well distributed throughout the study region.

- Pinero and Avila (2004) studied dung insect community composition in arid zones of south eastern Spain. Several studies have been carried out on the dung insect community assemblages, their distribution, and seasonal abundance in different climatic regions (Tyndale-Bisque *et al*., 1981; Doube, 1987; Kingston, 1977).

- Predatory species *viz*. *Hister lutarius*, *H*. *melanarius* and *H*. *javanicus* were also found actively feeding on the dung breeding dipterous flies. Among these Hister *lutarius* was common in all the sites. Laboratory studies were conducted to find out the potential of *Hister lutarius* in the control of dung breeding dipterous flies.

Table: 2

Effect of Predation by *Hiter lutarius* Er. during larval period of blow fly, *Calliphora erythrocephala* Meigen at three beetles densities.

Sr. No.	Density of *Hister lutarius*	% Blow fly reduction (Larva)
1	2	70
2	3	80
3	5	90

Insects associated with bovine excrement in and around Kolhapur City.


Aphodius sp.


Aphodius sp.


Scarabeus sp.


Sisyphus neglectus


Synapsis gilletti


Helicopris bucephalus


Catharcius molossus


Phalops divisus

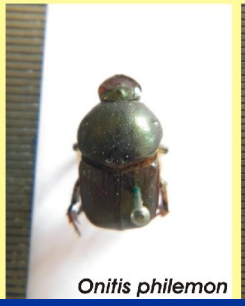

Onthophagus catta


Onthophagus agnus


Onthophagus cervus


Onthophagus pectolus


Liatongusrhabadamistus


Onitis philemon


Chironitis arrowi


Hister lutarius


Hister javanicus


Chrysoma megacephala

- The effect of predation by *Hister lutarius* resulted in to 70%, 80% and 90% reduction in the blow fly, *Calliphora erythrocephala* population (Table 2). There is increased % of predation with increased densities of predators. Similar results were obtained with *Xerosaprina orbiculatus* and S. *pennsylvanicus* (Summerlin *et al*., 1982).

- The study indicates that *H. lutarius* may be an effective predator of the dung breeding dipterous flies when present in the dung.

CONCLISION

- **The present study will be helpful to study role of dung beetles in recycling of dung and utilization of Hister beetles as a biocontrol agent against disease spreading dipterous flies.**

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Thank you