Journal of Advanced Zoology
ISSN: 0253-7214
Volume 43 Issue 1 Year 2022 Page 1637-1642

To Study Dung Beetle Fauna's Diversity In The Bargi Region Of Jabalpur (M.P.)

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Abstract

Dung beetles are affected by a number of abiotic and biotic factors, including temperature, moisture content, soil pH, average rainfall, local flora and fauna, and most significantly, the type and availability of excretory materials for diet. They act as the environment's "Scavengers of Nature," assist in the cycling of nutrients, are essential to the maintenance of the grassland ecosystem, distribute seeds, and act as Bioindicators for tracking biodiversity loss and environmental deteriorations. The order Coleoptera includes the dung beetles (Scarabaeoid). One of the taxonomically diverse beetle families among the coelpteran families, the Scarabaeidae, has a large global representation. Faunistic surveys were undertaken during July 2017- October 2018, and a total of 1115 beetles representing 19 speices of 08 genera from various localities in and around the Bargi region, whereby the Scarabaeinae subfamily has a greater population than the others.

INTRODUCTION

Dung beetles are globally distributed insect group, with their high diversity in tropical forests and savannas (Hanski & Cambefort, 1991) and are member of family Scarabaeidae of insect's largest orderColeoptera representing about 7000 species throughout the world. The beetles mostly feed on the microorganism rich liquid component of mammalian dung and use the more fibrous material to brood their larvae (Halffter & Edmonds, 1982; Halffter & Matthews, 1966). Bases on their nesting strategies dung bettles are broadly classified into three functional groups viz. rollers (telocoprid), tunnelers (paracorpid) and dwellers (endocorpid). Rollers form balls from a dung pat, which are rolled away and buried in the ground for feeding and breeding while tunnelers make underground vertical chambers in close proximity to the dung pat and construct their nest using the dung from pat whereas dwellers breed in dung pats itself (Halffter& Edmonds, 1982). Geotrupidae and most the tribes of subfamily Scarabaeinae (Dichotomiini, Coprini, Onitini, Phanaeini, Onthophagini and Oniticellini) aretunnelers and the tribes Canthonini, Scarabaeini, Eucarniini, Sisyphini, Gymnpleurini and various Onthophagini and Dichotomiini are kleptoparasites. Through their dung consumption and relocation activities, dung beetles are involved in the ecological functions of parasite suppression, secondary seed dispersal, nutrient cyclingandbioturbation (Andresen 2002, 2003; Nichols et al., 2008; Stokstad, 2004; Waterhouse, 1974).

MATERIALS AND METHODS

Jabalpur is a district of Madhya Pradesh state which lies in central India and is surrounded by the Mandia, Seoni, Narsimhapur, Damoh, Katni, and Dindori districts of Madhya Pradesh. It is located between 23°10′ N latitude and 79°59' E longitude.

Bargi is a town in the Jabalpur district of Madhya Pradesh located at the coordinates 22.9901586, 79.8758780, near the side of Narmada river in Jabalpur district of Madhya Pradesh. It is 25 km. away from Jabalpur. Latitude is 23°00.23 N and Longitude is 79°88′,°W. It is situated 353m above the sea level. Soil type of this region is rocky. Identification of the beetles were made with the help of identification keys and descriptions of Indian fauna by Arrow (1931), Mittal (1975, 1981 a, 1993) and Gupta (1992).

RESULTS AND DISCUSSION

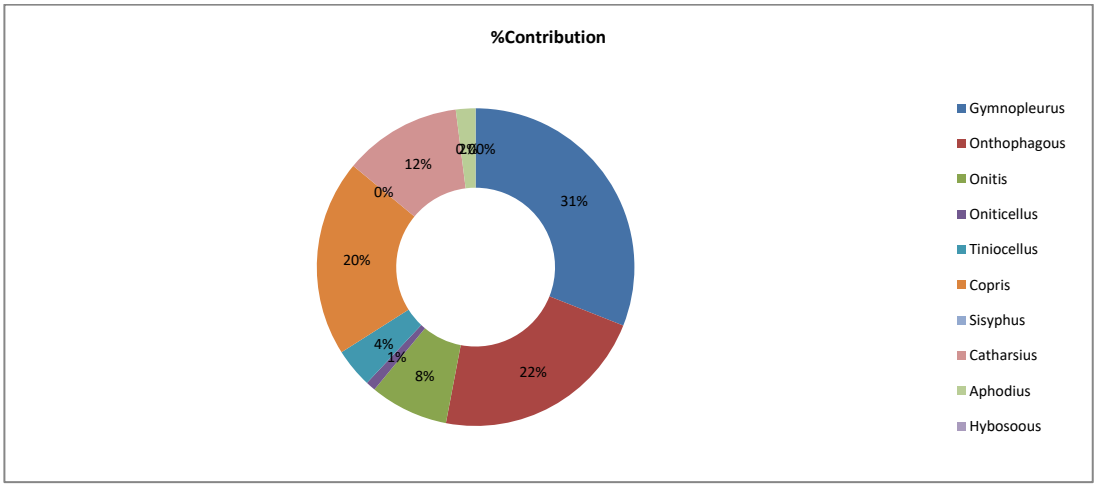
During the three year of collection, a large number of dung beetles were captured by manual and baited pitfall traps, manual collection by light traps methods. To keeping this in view that the main objectives of surveying and mapping a geographical area in Central India for dung beetles species concentrations, different places in Jabalpur and surroundings areas were explored and sample collections made. Initially there are several spots at different distances and different sites from Jabalpur were visited at random with a view to note down the presence and abundance of these dung beetles and the variety of habitats they live in this region. The areas visited present different types of habitats explored over a large part of Jabalpur (Covering more than 650 sq.km.). From this site a total of 1115 individuals of 19 species of 8 genera were recorded during the study period. *Gymnopleurus, Onthophagous, Onitis, Oniticellus, Tiniocellus, Copris, Catharsius, total 7 genera* from Scarabaeinae, and only genus *Aphodius* from Aphodiinae. Out of the total 19 species collected from this site, genera *Onthophagus*, *Gymnopleurus*, *Onitis, and Copris* presented 3 species each. Onitcellus, Catharsius and *Aphodius* each represented 2 species and *Tiniocellus* represented only 1 species. Species of dung beetle present on this site were*Gymnopleurus parvus, G. miliaris, G. gemmatus, Onthophagous falsus, O. catta, O. mopsus, Ontis virens, O. subopacus, O. philemon, Oniticellus cinctus, O. spinipes, Tiniocellus spinipus, Copris surdus, C. caninicus, C. signatus, Catharsius molossus, C.sagax,from Scarabaeinae and Aphodius campestris, A. moestus* from Aphodiinae were the 19 species present there.
Gymnopleurus parvus (289), *Onthophagus mopsus* (193) and *C. caninicus* (133) were the most abundant. *C. sagax* (88), and G. miliaris (50) were also present in large number. Rest of all the species were very less in number (Table 1). In the first year of collection, 367 individuals of three subfamilies, 5 genera and 12 species were recorded. In the next year of study, 19 species of 8 genera belonging to these three subfamilies with a total of 1115 individuals were collected. *Gymnopleurus parvus, G. miliaris, O. mopsus, C. caninicus, C. sagax* were the most dominant species during two years of survey (Table 1). Species diversity, calculated was higher during second year (H'=2.746) than first year (H'=1.659). Evenness was lower during second year (1.268) as compared to first year (1.858). However, the dominance index was also lower in Second year (0.065) as compared to first year (0.079). The overall (pooled) species diversity, evenness and dominance calculated was H'= 2.707, 1.182 and 0.074. The graphs also plotted for each collection year and pooled data for the Abundance, Species richness and species diversity. Higher peaks for Abundance and species richness were obtained in months June and July. Species richness was also varied from minimum 12 to maximum 19. Peaks in the no. of species were recorded in the month of June to August. (Table1).

Table 1 : Collection –Bargi, Pooled (2017+2018)

Species	**Weeks**								
	A_1	**A_2**	**A_3**	**M_1**	**M_2**	**M_3**	**J_1**	**J_2**	**J_3**
Gymnopleurus parvus	**2**	**4**	**6**	**18**	**23**	**16**	**61**	**25**	**24**
G. miliaris	**0**	**0**	**3**	**6**	**2**	**4**	**8**	**5**	**6**
G. gemmatus	**2**	**2**	**5**	**0**	**1**	**0**	**0**	**0**	**0**
Onthophagous falsus	**0**	**3**	**2**	**3**	**0**	**3**	**2**	**1**	**0**
O. catta	**0**	**1**	**0**	**5**	**4**	**4**	**4**	**7**	**4**
O. mopsus	**0**	**24**	**20**	**18**	**9**	**13**	**11**	**10**	**4**
O. bonasus	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
O. cervus	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
O. spinifex	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Onitis virens	**0**	**0**	**0**	**3**	**4**	**3**	**7**	**4**	**0**
O. subopacus	**0**	**0**	**1**	**1**	**5**	**0**	**2**	**1**	**2**
O. philemon	**0**	**0**	**0**	**0**	**3**	**0**	**1**	**1**	**2**
Oniticellus cinctus	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
O. spinipes	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**2**
Tiniocellus spinipus	**3**	**0**	**6**	**4**	**1**	**3**	**2**	**1**	**6**
Copris surdus	**0**	**0**	**2**	**1**	**4**	**0**	**2**	**0**	**0**
C. caninicus	**21**	**16**	**15**	**8**	**10**	**13**	**6**	**3**	**8**

C. signatus	0	2	0	9	7	5	10	13	9
Sisyphus neglectus	0	0	0	0	0	0	0	0	0
Catharsius molossus	1	0	6	3	0	1	1	3	7
C. pithecius	0	0	0	0	0	0	0	0	0
C. sagax	0	0	0	13	0	15	11	0	8
Aphodius campestris	0	0	0	0	0	0	2	3	1
A. testaceus	0	0	0	0	0	0	0	0	0
A. moestus	0	0	0	0	0	1	3	5	0
Hybosorous illigeri	0	0	0	0	0	0	0	0	0
H. orientalis	0	0	0	0	0	0	0	0	0
Total	29	52	66	93	74	81	133	82	83

Species	Weeks												
	J_1	J_2	J_3	A_1	A_2	A_3	S_1	S_2	S_3	O_1	O_2	O_3	Total
Gymnopleurus parvus	28	38	41	0	0	2	0	1	0	0	0	0	289
G. miliaris	0	6	5	1	0	3	1	0	0	0	0	0	50
G. gemmatus	0	0	0	0	0	0	0	0	0	0	0	0	10
Onthophagous falsus	0	0	0	0	0	0	0	0	0	0	0	0	14
O. catta	2	1	2	1	0	1	0	0	2	0	0	0	38
O. mopsus	26	14	11	3	11	10	0	0	9	0	0	0	193
O. bonasus	0	0	0	0	0	0	0	0	0	0	0	0	0
O. cervus	0	0	0	0	0	0	0	0	0	0	0	0	0
O. spinifex	0	0	0	0	0	0	0	0	0	0	0	0	0
Onitis virens	3	3	5	4	2	6	0	2	0	0	0	0	46
O. subopacus	2	0	0	3	3	1	1	1	1	0	0	0	24
O. philemon	3	1	6	0	0	0	0	1	0	0	0	0	18
Oniticellus cinctus	0	0	2	0	3	0	0	0	0	0	0	0	5
O. spinipes	0	0	0	0	0	0	0	0	0	0	0	0	3
Tiniocellus spinipus	3	3	5	0	1	0	7	0	0	0	0	0	45
Copris surdus	1	2	0	0	0	0	0	0	0	0	0	0	12
C. caninicus	7	8	10	1	3	0	0	0	2	0	2	0	133
C. signatus	5	8	4	2	0	0	0	0	0	3	0	0	77
Sisyphus neglectus	0	0	0	0	0	0	0	0	0	0	0	0	0
Catharsius molossus	0	0	0	2	13	4	0	1	2	0	0	0	44
C. pithecius	0	0	0	0	0	0	0	0	0	0	0	0	0
C. sagax	4	12	8	4	3	0	0	3	0	4	0	3	88
Aphodius campestris	0	0	1	0	4	0	0	0	0	0	0	0	11
A. testaceus	0	0	0	0	0	0	0	0	0	0	0	0	0
A. moestus	2	1	2	1	0	0	0	0	0	0	0	0	15
Hybosorous illigeri	0	0	0	0	0	0	0	0	0	0	0	0	0
H. orientalis	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	86	97	102	22	43	27	9	9	16	7	2	3	1115



Percentage sharing of different genus in total pitfall bait trap collection from Bargi.

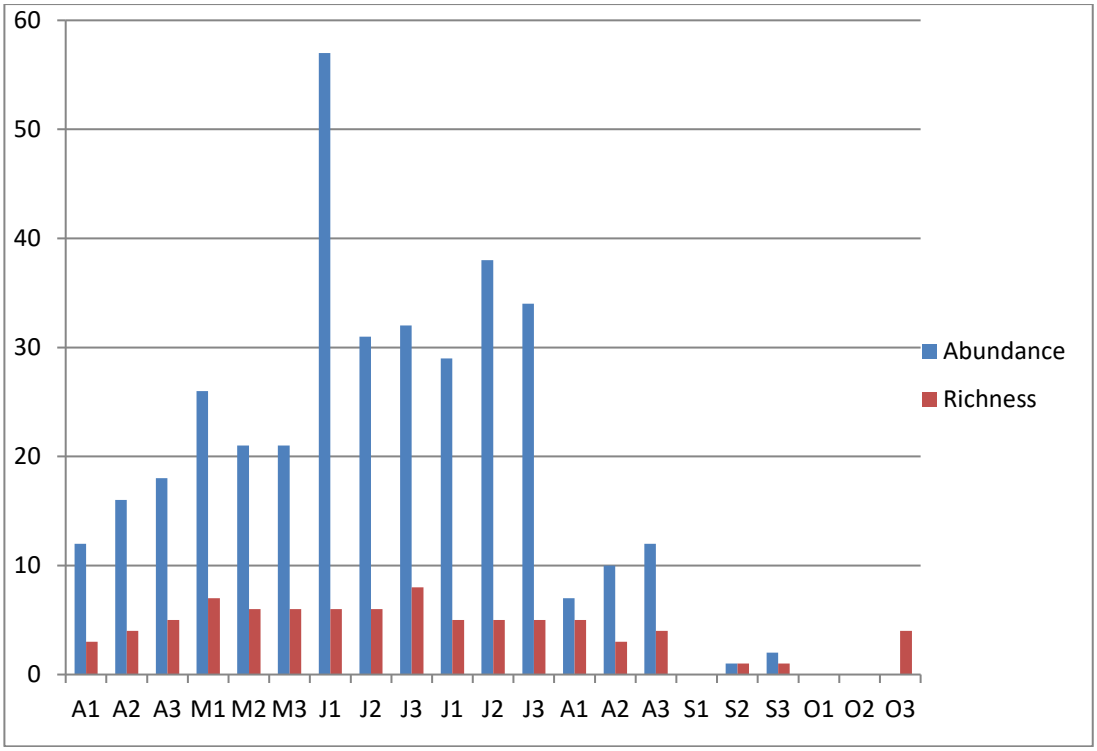


Fig.1.0 : Dung beetles abundance and species richness of Bargi (2017)

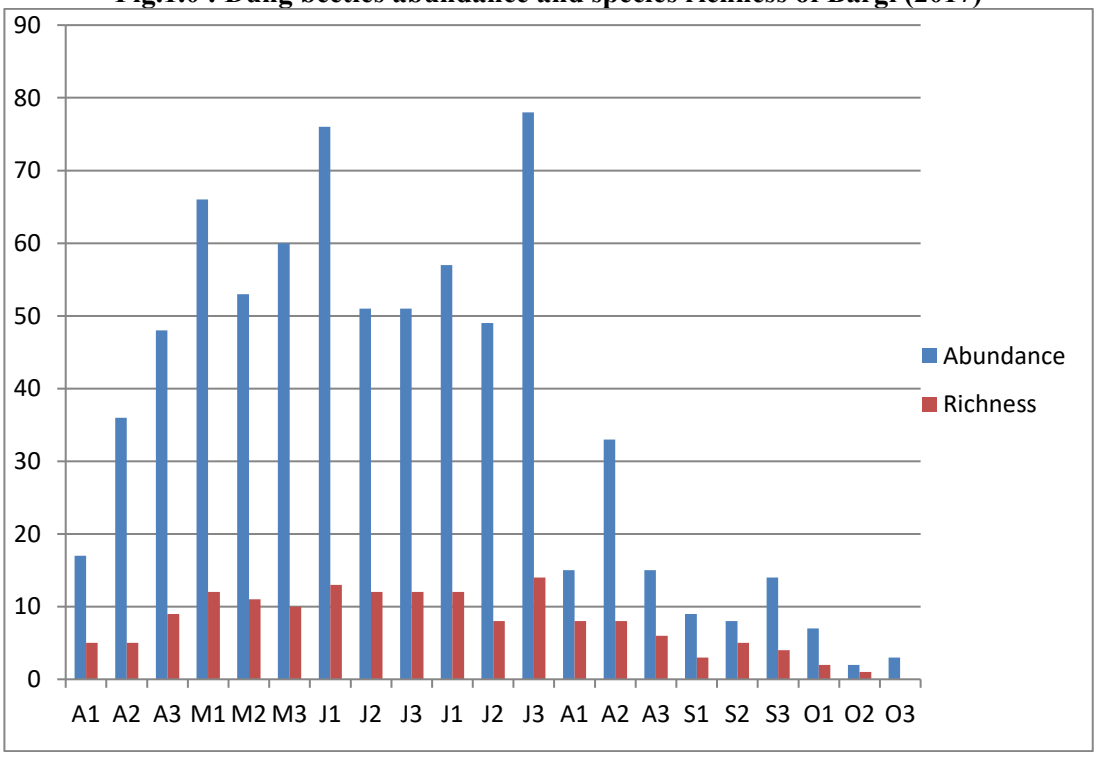


Fig.1.1 : Dung beetles abundance and species richness of Bargi (2018)

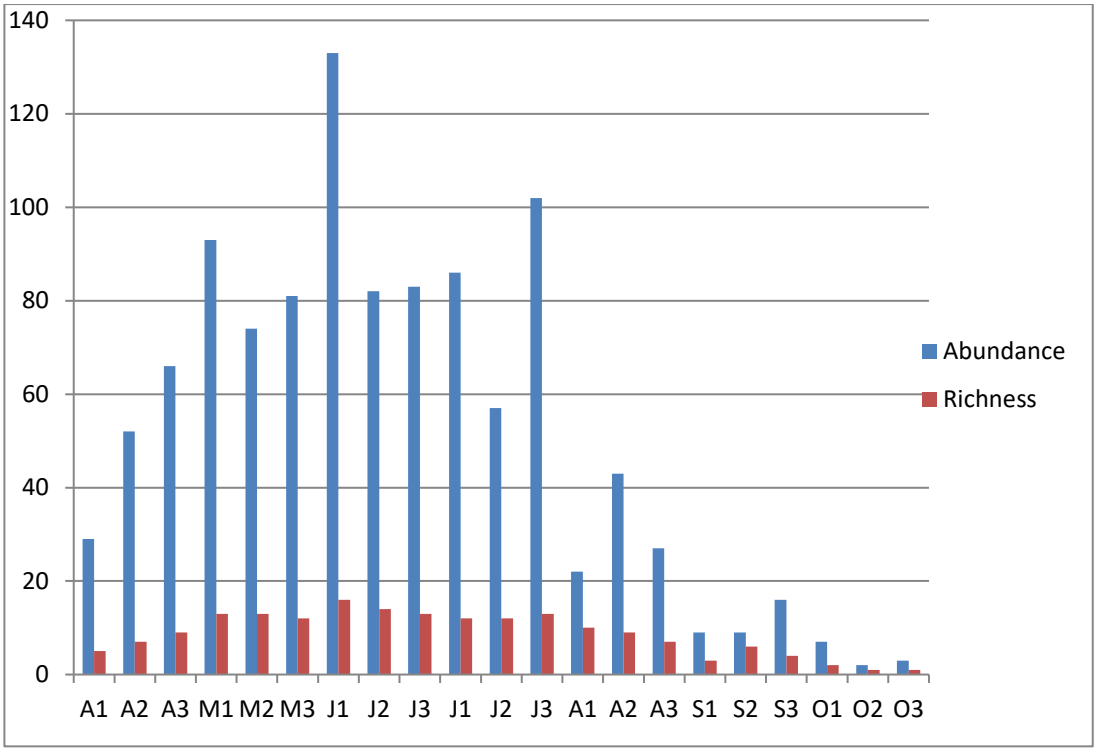


Fig.1.2 : Dung beetles abundance and species richness of Bargi (pooled)

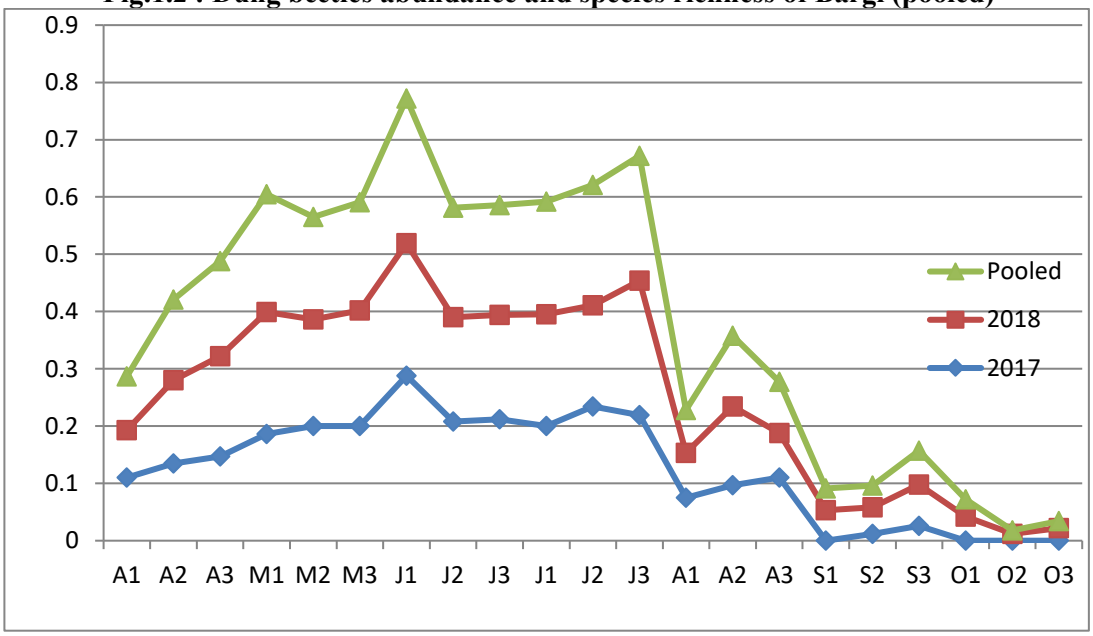


Fig.1.3 : Seasonal pattern (10 days interval) of Species diversity of dung beetles in Bargi.

CONCLUSION

The variety, composition, seasonal change, and abundance of the dung beetle faunas were examined and discussed in the current paper, diversity of dung beetles towards the declining rate due to habitat destructions. One of the mason is that some steroids given to the cattle's for a particular disease also affect the diversity of dung beetles directly or indirectly. This is a matter of concem and we conserve the diversity of dung beetles for safety of environment.

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