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Preliminary study on composition and diversity of beetles (Order-Coleoptera) in Dharwad (Sadhankeri) of Dharwad Tauk, Karnataka, India

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Abstract
A preliminary study of the diversity of beetles was conducted in the sadhankeri area of Dharwad of Dharwad Tauk in Dharwad district of Karnataka. The study was carried out for six months from Jan-2023 to June 2023. In the present investigation 28 species were recorded in the study area. The Scarabaeidae family was recorded more dominent group during the study period. Curculionidae and Bostrychidae families have been considered less dominant. In the present investigation, The Scarabaeidae family recorded 12 species. Tenebrionidae recorded 5 species, Coccinellidae recorded 5 species, Cerambycidae, Elateridae, Hydrophylidae, Curculionidae, Chrysomelidae, Cicindelidae, ptinidae recorded one species each. Histeridae recorded 2 species. The observation of beetles was done in their natural habitat and got photographs with a Canon digital camera with 16.0MP (5X optical zoom was used) without disturbing beetles. After getting photographs of species, they were left in their natural habitat.

Keywords: Beetles, sadhankeri, coleoptera

Introduction
The order Coleoptera is the largest order contains diverse group of beetles. Beetles live in most of the habitats, they live on plants, wood and also stored products [1]. Beetles show diverse adaptations depending on environmental conditions and habits [2]. Beetles can cause damage to crops [3]. Coccinellidae beetles also called ladybird beetles. These are one of the important predaceous insects. The Coccinellidae beetles live in many habitats like rice fields, grass lands, garden areas, inside tree bark, even on cereals stored in human habitat [4]. Beetles have hard wings, it is the important distinguishing property of beetles. These wings are hard, thick and opaque without veins. In some beetles wings make noise during flight.Most of the beetles are detritus feeders, and some of them feed on fruits, flowers, pollen, fungi, dung, flesh [2]. Some beetles lead parasitic life and have specialized life cycles [5] & [6]. Beetles are not only harmful, some of them are very useful also, because they control pest [7]. They are very much sensitive and react very fast to environmental changes, so beetles are considered as indicators of terrestrial ecosystems [8]. Many beetles play very important role as nutrient recycle and it helps to study their diversity is less available for foothills of Western Ghats, such as Dharwad of karnataka. Dharwad district is situated in Western sector of northern half of Karnataka state and forms gate way of malnad. Therefore the present work was undertaken to determine the diversity of beetles in Sadhankeri area of Dharwad city, in Dharwad taluk of karnataka state.

Materials and methods
Study area
Dharwad is a place situated in Dharwad district in Karnataka state. The District is situated about 800 m above the sea level, and district having moderate and healthy climate. District is situated in Western sector of northern half of Karnataka (lies between the latitudinal parallels of 15° 02′ and 15° 51′ North and longitudes of 73° 43′ and 75° 35′ East.). For the present investigation, study area selected was Sadhankeri area of Dharwad city. Study area is covered with residential area, gardens and ponds.

Fig 1: Map showing Dharwad district in karnataka

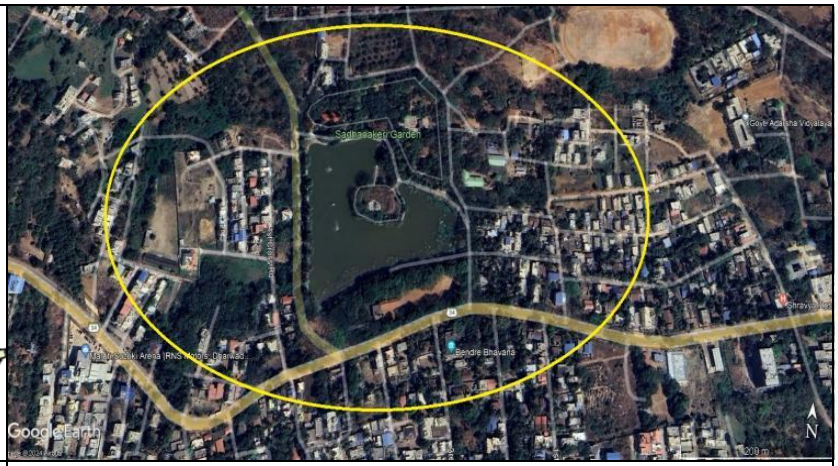

Fig 2: Map showing study site -Sadhankeri area of Dharwad city

Method of sampling and identification

This study was conducted between January to June 2023, photographs of beetles were taken in their natural habitat with a canon digital camera at 16.0 MP (5X optical zoom was used) without disturbing them. Some of the materials, such as forceps, cotton, a sweep net and also picking methods were used to get photography. After getting photographs of species, they were left in their natural habitat. Photographs of species were used for species identification. The data obtained was used to analyse the diversity indices. The beetle diversity was evaluated using the Shannon- wiener diversity index, which was used for the identification of species richness. The evenness index was also calculated [2]. Identification was done based on morphology with the help of taxonomic literature [10, 11], for calculation of the percentage contribution of species, the following formula was used.

$$\text{Percentage contribution of species} = \frac{\text{Total number of species in each family}}{\text{Total number of species in whole population}} \times 100$$

Observations

Table 1: Contribution of Beetle populatin in study area Order: Coleopter (January to June- 2023)

Sl. No	Family and species name	Jan	Feb	Mar	Apr	May	June	Total No of species obtained	Percentage contribution
A. Family: Scarabaeidea									
1	*Catharsius molossus*	2	1	3	-	1	1	08	3.6%
2	*Oryctes rhinoceros*	1	-	1	1	-	-	03	1.3%
3	*Cetonia aurata.*	-	-	-	-	+	-	00	00%
4	*Cyclocephala longula*	3	-	2	-	2	1	08	3.6%
5	*Protaetia aurchalcea*	-	1	-	1	1	-	03	1.3%
6	*Heterorrhina elegans.*	2	-	1	-	1	-	04	1.8%
7	*Garreta nitens*	-	2	3	1	-	-	06	2.7%
8	*Oniticellus cinctus*	-	-	2	2	-	-	04	1.8%
9	*Anomala varicolor*	-	1	4	3	4	2	14	6.3%
10	*Holotrichia serrata*	3	4	2	3	2	2	16	7.2%
11	*Anamola rugosa*	2	1	1	3	2	2	11	4.9%
12	*Pentodon bidense*	3	2	1	1	3	2	12	5.4%
	Total	16	12	20	15	16	10	89	40.2%
B. Family: Tenebrionidae									
1	*Scotobius pilularis.*	-	1	-	1	-	-	02	0.9%
2	*Gonocephalum granulatum*	-	2	1	2	1	-	06	.2.7%
3	*Eleodes armata*	1	2	-	2	-	+	05	2.2%
4	*Luprops orientalis*	-	1	2	3	1	-	07	3.1%
5	*Isopteron triviiale*	1	1	-	-	2	1	05	2.2
	Total	2	7	3	8	4	1	25	11.3%
C. Family: Coccinellidae									
1	*Hormonia axyridis*	2	-	2	1	1	-	06	2.7%
2	*Cheilomenes sexmaculata*	1	-	4	-	-	-	05	2.2%
3	*Coccinella septempunctata*	-	2	-	2	-	2	06	2.7%
4	*Coccinella transversalis*	2	-	-	3	1	1	07	3.1%
5	*Illeis cincta*	-	2	-	3	1	-	06	2.7%
	Total	5	4	6	9	3	3	30	13.5%
D. Family:Cerambycidae									
1	*Xystrocera globosa*	2	1	2	2	2	-	09	4.0%
	Total	2	1	2	2	2	-	09	4.0%
E. Family: Elateridae									
1	*Lanelater fuscipes.*	1	2	6	4	5	3	21	9.5%
	Total	1	2	6	4	5	3	21	9.5%
F. Family: Hydrophylidae									
1	*Hydrophilus piceus*	-	2	3	-	-	2	07	3.1%
	Total	-	2	3	-	-	2	07	3.1%
G. Family: Histeridae									
1	Hister coenosus	1	-	1	-	+	+	02	0.9%
2	*Atholus bimaculatus*	-	2	-	2	3	1	08	3.6%
	Total	1	2	1	2	3	1	10	4.5%
H. Family: Curculionidae									
1	*Myllocerus discolor*	-	-	2	-	2	-	04	2.1%
	Total	-	-	2	-	2	-	04	2.1%
I. Family: Chrysomelidae									
1	*Aulacophora foveicollis*	2	-	4	-	3	1	10	4.5%
	Total	2	-	4	-	3	1	10	4.5%
J. Family: Cicindelidae									
1	*Cicindela gloriosa*	-	2	3	-	3	-	08	3.6%
	Total	-	2	3		3	-	08	3.6%

K. Family: Ptinidae									
1	*Stegobium paniceum*	2	1	2	2	-	1	08	3.6%
	Total	2	1	2	2	-	2	08	3.6%
	Total no of species	31	33	52	42	41	22	221	

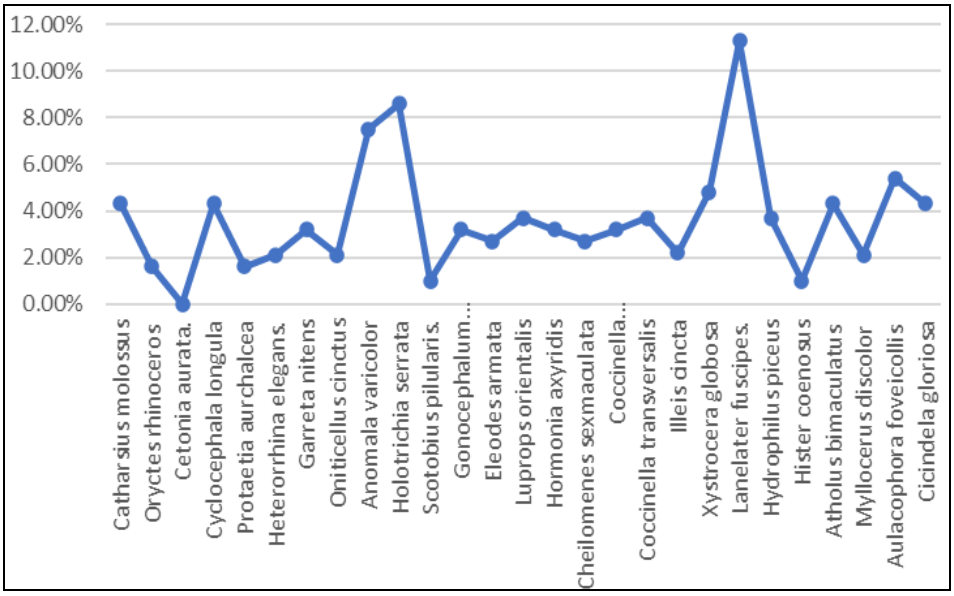

Fig 3: Percentage contribution of Beetles in different families of order Coleoptera from study site

Table 2: Percentage contribution of Beetles in the family in study site

Name of the family	Species found in the family in study site	percentage contribution of beetles in the family
A)Family:Scarabaeidea	89	40.2%
B)Family:Tenebrionidae	25	11.3%
C)Family: Coccinellidae	30	13.5%
D)Family:Cerambycidae	09	4.0%
E)Family: Elateridae	21	9.5%
F)Family: Hydrophylidae	07	3.1%
G)Family: Histeridae	10	4.5%
H)Family: Curculionidae	04	2.1%
I)Family: Chrysomelidae	10	4.5%
J)Family:Cicindelidae	08	3.6%
K)Family:Ptinidae	08	3.6
Total no of species in all families	221	

Table 3: Diversity indices of species in study area (Sadhankeri)

Study site-sadhankeri	Jan	Feb	Mar	Apr	May	Jun
Families	11	11	11	11	11	11
Shannon diversity index	2.76	2.91	2.96	2.9	2.86	2.56
Evenness	0.973	0.971	0.957	0.969	0.954	0.971
Rrichness	17	20	22	20	20	14
Total no of species	31	33	52	42	41	22
Ave.population size	1.82	1.65	2.36	2.1	2.05	1.57

Results and discussion

Beetle diversity has been reported in other regions of the country. The present study documented 28 species of beetles belonging to 11 families (Table-1). Scarabaeidae family was dominant with 12 species (40.5%), followed by Tenebrionidae with 5 speceis (11.5%), Coccinellidae with 05 species (13.5%), Cerambycidae and Elateridae, Hydrophylidae,Chrysomelidae Curculionidae, Cicindelidae ptinidae with one species each (4.0% and 9.5%,3.1%,4.5%2.1%,3.6%,3.6% respectively; Family Histeridae has two species (4.5%).

This study the reveals the diversity of beetles in Dharwad area. Within the limited time, 28 species of beetles have been recorded. Although not exhaustive, this study provides baseline information for future research on diversity with respect to beetles. The results of the present investigation reveal the presence most of harmful beetles, along with some beneficial species for the agricultural crops.

Conclusions

The present investigation reveal the presence of the most harmful beetles, along with some beneficial species for agricultural crops. In the present investigation, the scarabaeidae family was recorded as more dominant during the study period. Curculionidae and Hydrophylidae families have been considered less dominant. Present investigation is the base line for future studies on beetle diversity in sadhankeri area of Dharwad.

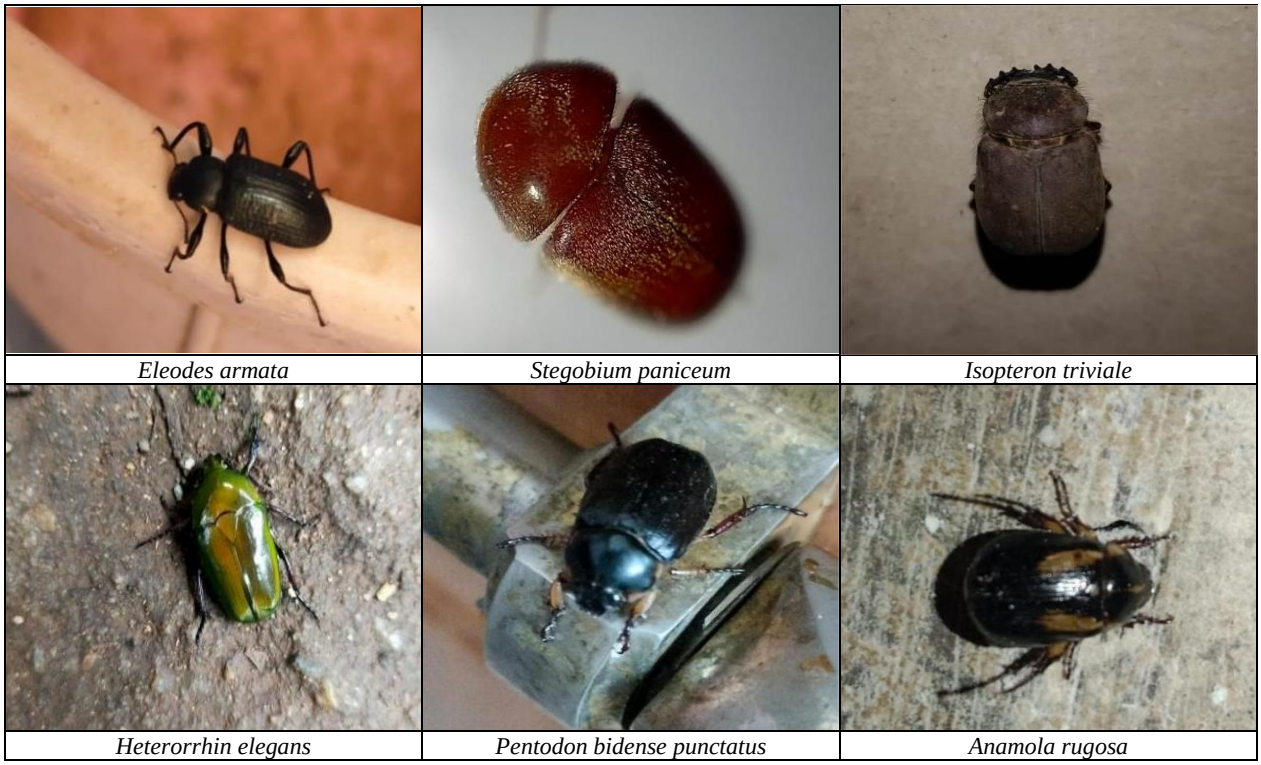

Fig 4: some Beetles found in sadhanakeri area of Dharwad in their natural habitat

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