



## Preliminary study on composition and diversity of beetles (Order- Coleoptera) in Nigadi Village of Dharwad Taluka, Karnataka, India

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### Abstract

Beetles are insects of class choleoptera. A preliminary study of the diversity of beetles was conducted in the Nigadi village area of Dharwad Taluka in Dharwad district of Karnataka. The study was carried out for six months from July-2023 to December 2024. In the present investigation 30 species were recorded in the study area. The Scarabaeidae family was recorded more dominant group during the study period. Curculionidae and Bostrychidae families have been considered less dominant. In the present investigation, The Scarabaeidae family recorded 11 species. Tenebrionidae recorded 4 species, Coccinellidae recorded 5 species, Cerambycidae, Elateridae, Hydrophilidae, Curculionidae, Chrysomelidae, Cicindelidae, Bostrychidae, Buprestidae 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:** Nigadi, choleoptera, beetle

### Introduction

Beetles are insects of the order Coleoptera and they come under super order Holometabola. Beetles have hard wings. It is an important distinguishing property of beetles. These wings are hard, thick and opaque, without veins. Beetles show diverse adaptations depending on environmental conditions and habits <sup>[1]</sup>. India is a diverse country due to varied climatic conditions and tremendous ecological diversity. India contributes about 5% of the beetle fauna of all known species in the world <sup>[2]</sup> Most of the beetles are detritus feeders, and some of them feed on fruits, flowers, pollen, fungi, dung, and flesh <sup>[1]</sup>. Some beetles lead parasitic lives and have specialised life cycles <sup>[3]</sup> and <sup>[4]</sup>. Beetles are not only harmful, some of them are also very useful because they control pests <sup>[5]</sup>. They are very sensitive and react very fast to environmental changes, so they are considered indicators of terrestrial ecosystems <sup>[6]</sup>. Beetles are found in almost every type of habitat, and many beetles are serious pests, where they can cause great damage to the trees and crops. While many beetles can play a very important role as nutrient recyclers and it helps improve soil fertility, they can also feed on injurious insects or act as scavengers <sup>[7]</sup>. However, some beetles are known to cause great damage to the trees and crops. While many beetles can play a very important role as nutrient recyclers and it helps improve soil fertility, they can also feed on injurious insects or act as scavengers <sup>[7]</sup>. However, some beetles are known to cause damage to crops, flowers, and the roots of plants, Beetles are found in almost all natural habitats, such as on plants, trees, and flowers, at the ground level of the plants, and even on decaying matter. Beetles are useful in agriculture, forestry, and it is also considered pests. Some beetles are not only pests but can also be beneficial. In agriculture, one of the best and known examples is the ladybird beetle (family Coccinellidae). Both the larvae and adults are found feeding on aphid colonies <sup>[8]</sup>. The beetle's diversity is very wide. They are found in different habitats. The family Scarabaeidae is the largest family <sup>[9]</sup>. However, information regarding their diversity is less available for the foothills of

the Western Ghats, such as Dharwad in Karnataka. Dharwad district is situated in the Western sector of the northern half of Karnataka state and forms the way of Malnad. This district is unique with three natural regions, Malnad, Semi Malnad, and Maidan. This area is rich in biodiversity. Therefore the present work was undertaken to determine the diversity of beetles in one of the villages of Dharwad taluka, the village was selected as study site because Nigadi is covered with agricultural fields with different crops and fresh water ponds. In order to cause damage to crops, flowers, and the roots of plants, Beetles are found in almost all natural habitats, such as on plants, trees, and flowers, at the ground level of the plants, and even on decaying matter. Beetles are useful in agriculture, forestry, and it is also considered pests. Some beetles are not only pests but can also be beneficial. In agriculture, one of the best and known examples is the ladybird beetle (family Coccinellidae). Both the larvae and adults are found feeding on aphid colonies <sup>[8]</sup>. The beetle's diversity is very wide. They are found in different habitats. The family Scarabaeidae is the largest family <sup>[9]</sup>. However, information regarding their diversity is less available for the foothills of the Western Ghats, such as Dharwad in Karnataka. Dharwad district is situated in the Western sector of the northern half of Karnataka state and forms the way of Malnad. This district is unique with three natural regions, Malnad, Semi Malnad, and Maidan. This area is rich in biodiversity. Therefore the present work was undertaken to determine the diversity of beetles in one of the villages of Dharwad taluka, the village was selected as study site because Nigadi is covered with agricultural fields with different crops and fresh water ponds.

### Materials and Methods

**Study area:** Dharwad district, belongs to the state of Karnataka. The district lies approximately 800 m above sea level, which is why it enjoys a moderate and healthy climate. Dharwad district is situated in the western sector of the northern half of Karnataka state, and 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, the study area was Nigadi. The Study area comprises a very small village area. Nigadi is located 11

kilometers west from the head quarters Dharwad. 10 km from Dharwad. 459 km from the State capital Bangalore.

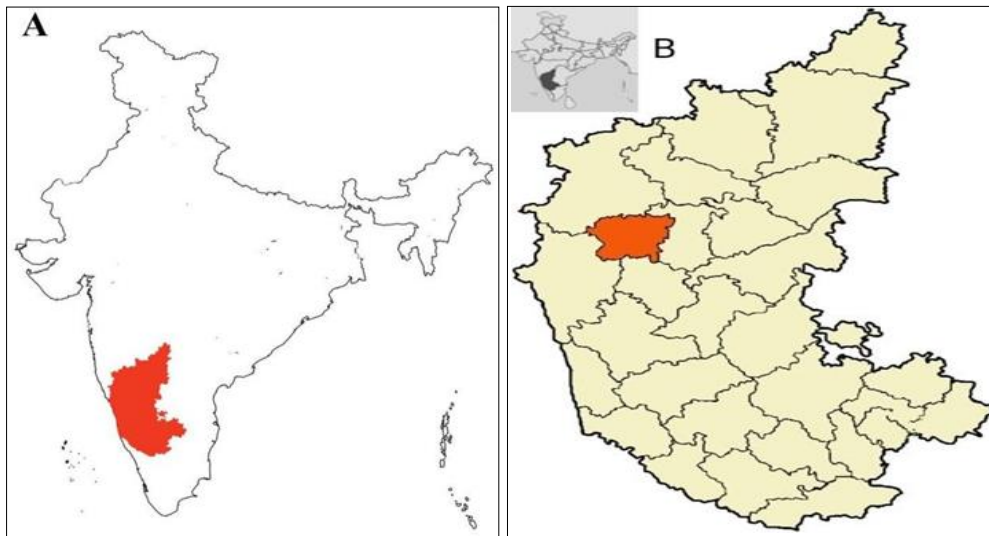


Fig A: Mapshowing karnatak in India

Fig B: Map showing Dharwad district in India



Fig C: Map showing study site -Nigadi

Fig 1

**Method of sampling and identification**

This study was conducted between July to December 2023, by observing beetles in their natural habitat. and got photographs with a canon digital camera at 16.0 MP (5X optical zoom was used) without disturbing beetles. Some of the materials, such as forceps, cotton, a sweep net and also picking methods, were used to collect beetles for photography. After getting photographs of species, they were left in their natural habitat without disturbing them. 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 [1]. Identification was done based on morphology with the help of taxonomic literature [10, 11, 7]. 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**

**Order: Coleoptera**

**Table 1:** Contribution of Beetle populatin in study site - Nigadi villege

Sl. No	Family and species name	Study site -Nigadi							Total species obtained	Percentage Contribution
		Jul	Aug	Sept	Oct	Nov	Dec			
A) Family: Scarabaeidea										
1	<i>Catharsius molossus</i>	2	3	-	4	3	3	15	6.0%	
2	<i>Oryctes rhinoceros</i>	2	-	3	-	2	2	9	3.6%	
3	<i>Cetonia aurata.</i>	-	-	-	2	-	-	2	0.8%	
4	<i>Cyclocephala longula</i>	3	-	2	-	3	4	12	4.8%	
5	<i>Protaetia aurichalcea</i>	-	-	-	2	1	-	3	1.2%	
6	<i>Heterorrhina elegans</i>	-	-	-	-	2	-	2	0.8%	

7	<i>Gymnopleurus mopsus</i>	-	2	-	4	-	3	9	3.6%
8	<i>Garreta nitens</i>	4	3	2	-	1	-	10	4.0%
9	<i>Oniticellus cinctus</i>	-	2	-	4	2	-	8	3.2%
10	<i>Anomala varicolor</i>	3	-	5	-	1	1	10	4.0%
11	<i>Holotrichia serrata</i>	-	5	3	4	3	1	16	6.4%
	Total	14	15	15	20	18	14	96	38.70%
B) Family: Tenebrionidae									
1	<i>Scotobius pilularis</i>	-	2	-	-	-	-	2	0.8%
2	<i>Gonocephalum granulatum</i>	-	4	3	1	-	4	12	4.8%
3	<i>Eleodes armata</i>	2	-	-	4	3	-	9	3.6%
4	<i>Luprops orientalis</i>	5	4	-	2	-	-	11	4.4%
	Total	7	10	3	7	3	4	34	13.70%
C) Family: Coccinellidae									
1	<i>Hormonia axyridis</i>	-	2	-	1	-	3	6	2.4%
2	<i>Cheilomenes sexmaculata</i>	-	4	-	2	2	-	8	3.2%
3	<i>Coccinella septempunctata</i>	3	-	-	-	2	-	5	2.0%
4	<i>Coccinella transversalis</i>	-	4	-	-	3	-	7	2.8%
5	<i>Illeis cincta</i>	1	-	-	2	1	-	4	1.6%
	Total	4	10	-	5	8	3	30	12.0%
D) Family: Cerambycidae									
1	<i>Xystrocera globosa</i>	-	5	-	2	3	-	10	4.0%
	Total	-	5	-	2	3	-	10	4.0%
E) Family: Elateridae									
1	<i>Lanelater fuscipes</i>	5	-	-	2	-	2	9	3.6%
	Total	5	-	-	2	-	2	9	3.6%
F) Family: Hydrophilidae									
1	<i>Hydrophilus picus</i>	1	1	-	3	-	5	10	4.0%
	Total	1	1	-	3	-	5	10	4.0%
G) Family: Histeridae									
1	<i>Hister coenosus</i>	1	-	-	-	2	3	6	2.4%
2	<i>Atholus bimaculatus</i>	4	-	2	-	2	-	8	3.2%
	Total	5	-	2	-	4	3	14	5.6%
H) Family: Curculionidae									
1	<i>Myllocerus discolor</i>	4	-	-	1	1	-	6	2.4%
	Total	4	-	-	1	1	-	6	2.4%
I) Family: Chrysomelidae									
1	<i>Aulacophora foveicollis</i>	3	-	-	2	1	3	9	3.6%
	Total	3	-	-	2	1	3	9	3.6%
J) Family: Cicindelidae									
1	<i>Cicindela gloriosa</i>	5	4	-	-	2	1	12	4.8%
	Total	5	4	-	-	2	1	12	4.8%
K) Family: Bostrychidae									
1	<i>Rhyzopertha dominica</i>	2	-	1	-	2	1	6	2.4%
	Total	2	-	1	-	2	1	6	2.4%
L) Family: Buprestidae									
1	<i>Sphenoptera perotetti</i>	-	-	6	6	-	-	12	4.8%
	Total	-	-	6	6	-	-	12	4.8%
	Total no of species obtained in study site	50	45	27	48	42	36	248	

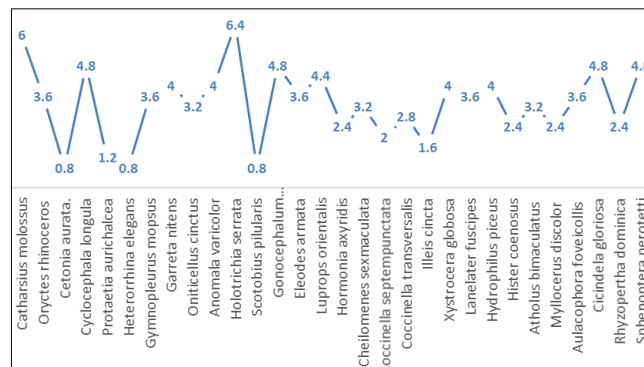
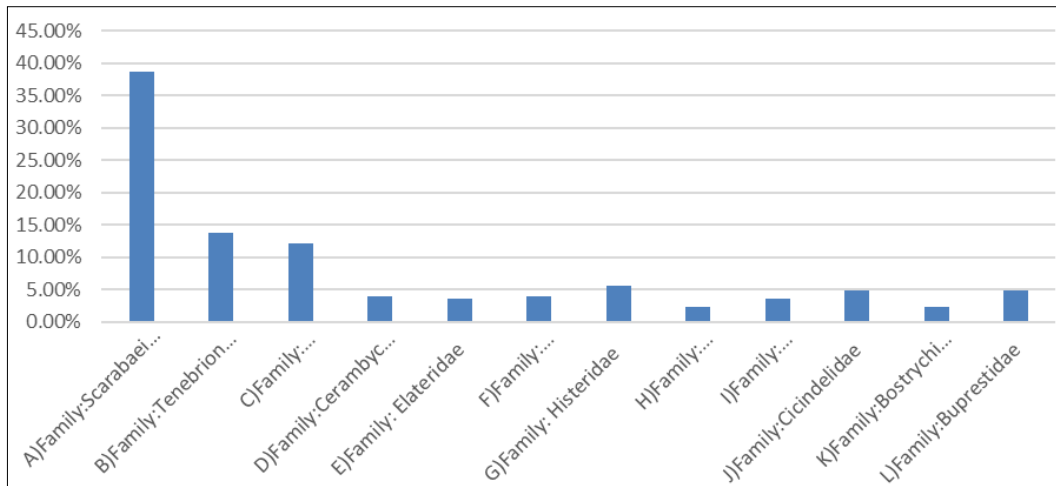


Fig 2: Contribution of Beetle popalutin in study site - Nigadi villege

**Table 2:** Percentage Contribution of Beetles in different families of order Coleoptera from study site - Nigadi village

Name of the family	Species found in the family in study site	Percentage contribution of beetles in the family
A)Family:Scarabaeidea	96	38.70%
B)Family:Tenebrionidae	34	13.70%
C)Family: Coccinellidae	30	12.09%
D)Family:Cerambycidae	10	4.0%
E)Family: Elateridae	09	3.6%
G)Family: Histeridae	14	5.6%
H)Family: Curculionidae	06	2.4%
I)Family: Chrysomelidae	09	3.6%
J)Family:Cicindelidae	12	4.8%
K)Family:Bostrychidae	06	2.4%
L)Family:Buprestidae	12	4.8%



**Fig 3:** Percentage contribution of beetles in different families of order Coleoptera from study site - Nigadi village

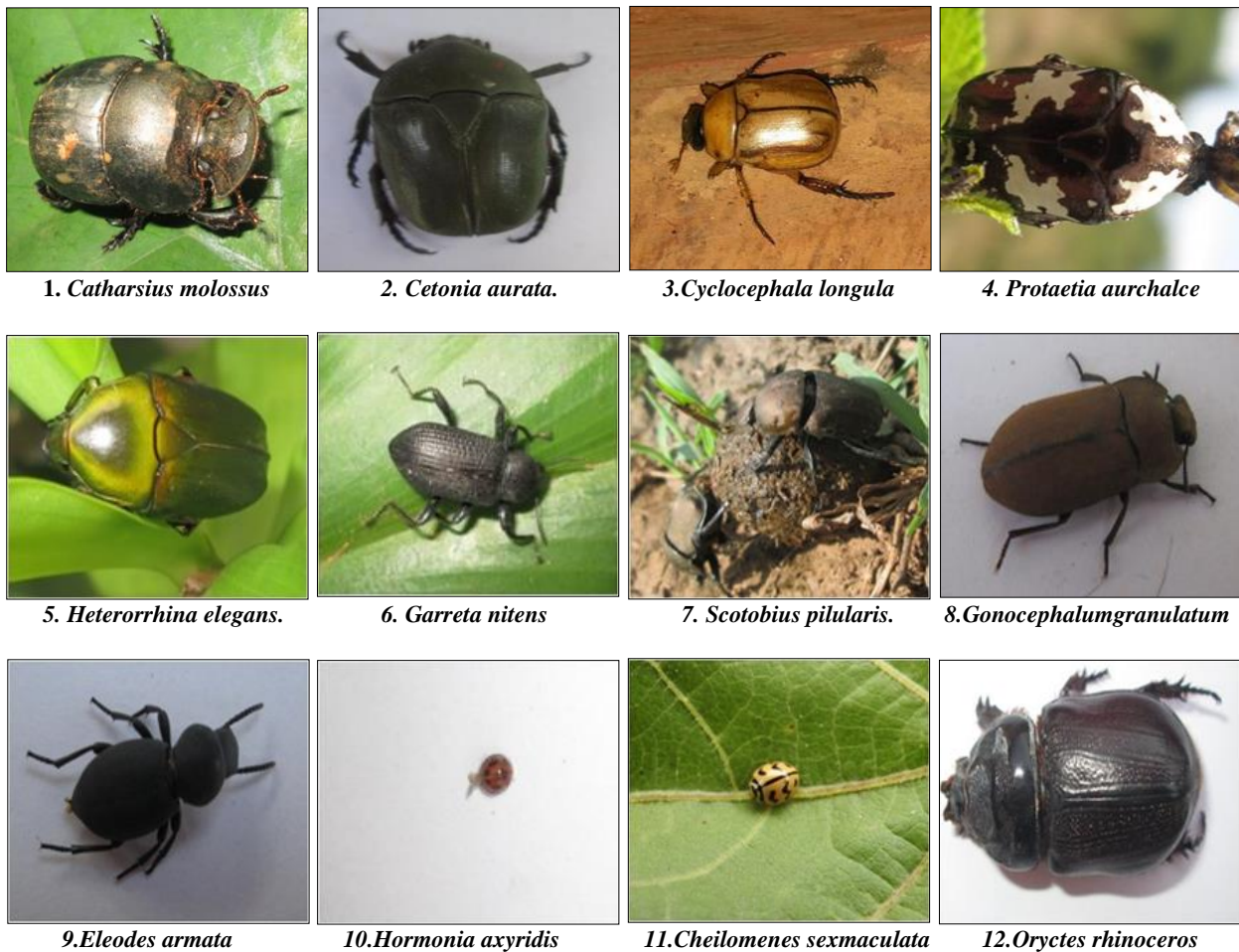




Fig 4: Some beetles of study site

Table 3: Diversity indices of study Site

Studysite-Nigadi	Jul	Aug	Sep	Oct	Nov	Dec
Families	12	12	12	12	12	12
Shannon diversity index	2.72	2.56	2.08	2.77	2.97	2.52
Evenness	0.961	0.971	0.946	0.958	0.975	0.954
Rrichness	17	14	9	18	21	14
Total no of species	50	45	27	48	42	36
Ave.population size	2.94	3.21	3	2.67	2	2.57

**Results and Discussion**

Beetle diversity has been reported in other regions of the country. About 54 species belonging to scarabaeidae at Jablapur, M.P. [12], 12 species of coccinellidae beetles at Gulbarga district [13], and 4382 species of coccinellid beetles, in Dehradun district, Uttarakhand, were reported. [16]. Likewise, Bhavane *et al*, (2012) documented 29 species of white grub beetles, Kolhapur district, Maharashtra [15], whereas 123 species of beetles were recorded in Kodagu district, Karnataka [14]. The present study documented 30 species of beetles belonging to 12 families. The scarabaeidae family was dominant with 11 species, followed by coccinellidae with 5 species, tenebrionidae with 4 species, cerambycidae and elateridae, hydrophilidae, curculionidae, chrysomelidae, cicindelidae, bostrychidae, and buprestidae with 1 species each. Histeridae with 02 species (Table:1). The present study showed that the percentage contribution of the scarabaeidae family was 38.70%, tenebrionidae- 13.70%, coccinellidae-12.09%, cerambycidae-4.0%, elateridae-3.6%, hydrophilidae 4.0%, histeridae 5.6%, curculionidae 2.4%, chrysomelidae 3.6%, cicindelidae 4.8%, bostrychidae-2.4%, buprestidae-4.8% (Table:2). The present study reveals occurrence of both harmful and useful beetles. Asiatic rhinoceros beetle noted in the present study kills the newly planted plants, whereas flower beetles (*Oxycetioia versicolor*) and chafer beetles (*Heterorrhina* sp.) feed on flowers and pollens. Some useful beetles such as *Scotobius* species (Darkling beetle) are known to feed on decaying leaves and dead insects and help to increase the nutrients in the soil

**Conclusions**

This study reveals the diversity of beetles in Nigadi village of Dharwad aluka within this limited time, 30 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 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 Bostrychidae families have been

considered less dominant. present investigation is the base line for future studies on beetle diversity in the Nigadi area of Dharwad Taluka in the Dharwad district of Karnataka state.

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