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PRELIMINARY STUDY OF SPECIES COMPOSITION AND DISTRIBUTION OF BEETLES (INSECTA: COLEOPTERA) IN DU GIA COMMUNE, DU GIA NATIONAL PARK - DONG VAN KARST PLATEAU, TUYEN QUANG PROVINCE

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Abstract. This study investigated the species composition and distribution of beetles across three habitats in Du Gia commune, located within Du Gia National Park - Dong Van Karst Plateau, Tuyen Quang Province. The study employed a direct survey of beetles across three habitats, conducted over three sampling periods. A total of 39 beetle species, belonging to 10 families and 33 genera, were recorded. The family Coccinellidae contained the highest number of taxa, with 13 species (33.33%) and 10 genera (30.30%). Three families, Phalacridae, Ptinidae, and Scarabaeidae, had the lowest number, each with one species (2.56%) and one genus (3.03%). The distribution of beetle species varied among habitats. The natural forest habitat supported the highest diversity, with 38 species (97.45%) recorded; followed by the grassland and shrub habitat on the mountainside with 34 species (87.18%); and the agricultural land and fruit tree habitat with 24 species (61.52%). The composition of beetle species also varied across survey phases. Phase 1 (October 2024) yielded the highest species richness, with 39 species recorded (100%); Phase 2 (January 2025) with 21 species (53.85%); and Phase 3 (March 2025) with 35 species (89.74%).

Keywords: species composition, distribution, beetles, Du Gia commune, Du Gia National Park - Dong Van Karst Plateau, Tuyen Quang.

1. Introduction

Du Gia National Park – Dong Van Karst Plateau has a total natural area of 15,006.3 hectares across three communes of Tuyen Quang province: Tung Ba, Minh Son, and Du Gia. The flora and fauna here include 1,061 plant species and 318 terrestrial vertebrate species, comprising 72 mammal species, 162 bird species, and 84 reptile and amphibian species. The National Park encompasses diverse forest types, including lowland tropical humid evergreen closed forests below 700 m, subtropical humid evergreen closed forests above 700 m, tropical humid evergreen closed forests on limestone mountains, and secondary forests regenerating after logging and slash-and-burn cultivation. Additional vegetation includes bamboo stands, planted forests (pine, acacia), and shrublands. [1]

Du Gia commune, one of the three communes in Du Gia National Park - Dong Van Karst Plateau, is home to a rich flora and fauna, notably the rare Tonkin snub-nosed monkey (*Rhinopithecus avunculus*), also known as the Khau Ca snub-nosed monkey [2]. However, studies on invertebrate fauna, especially insects, have been limited. Therefore, we conducted an initial study on the species composition of beetles in Du Gia commune, Tuyen Quang province. This article reports on the species composition and distribution of beetles across local habitats, providing a reference for future research on other insect groups.

2. Content

2.1. Research methods

A survey and collection of beetle species in three habitats, including natural forests, grasslands, and shrubs growing on mountain slopes, agricultural land, and fruit trees, was conducted in Du Gia commune, located in Du Gia National Park - Dong Van Karst Plateau, Tuyen Quang province, in three phases (October 2024, January 2025, and March 2025).

Natural forest habitat: This habitat is located along high mountain ranges, on slopes and in valleys, at elevation from approximately 400 m to over 2,200 m, extending from the southern area to the Pu Tha Ca peak (nearly 2,275 m). The forest comprises lowland tropical evergreen, mid-mountain, and limestone forests, with *Fokienia hodginsii* stands occurring at higher peaks. It exhibits a multi-layered structure, with a canopy reaching nearly 30 m in height and dominated by woody species such as *Fagraea fragrans*, *Flueggea virosa*, *Chukrasia tabularis*, *Vatica odorata*, *Michelia mediocris, Cupressus torulosa*, and *Burretiodendron hsienmu*; the middle and lower canopy comprises various tree species. The area harbors over 289 plant species, 57 mammal species, 82 bird species, 18 reptile species, and 14 amphibian species, including several rare species listed in the Red Data Book, such as the Tonkin snub-nosed monkey, serow, and Pallas's squirrel.

Grassland and shrub habitat: This habitat occurs mainly on steep mountain slopes at elevations of 800 – 1,200 m, where limestone soil is mixed with red soil or humus. These harsh edaphic conditions limit the development of closed forests, creating a transitional zone between forest and bare land. It often arises from human impacts such as deforestation, slash-and-burn cultivation, and livestock grazing. The vegetation includes *Imperata cylindrica*, *Phragmites australis, Rhodomyrtus tomentosa*, *Melastoma*

candidum, *Baeckea frutescens*, and *Ochna integerrima*. Fauna comprises wild birds, civets, the crab-eating mongooses, reptiles, and insects.

Agricultural and fruit-growing habitat: This habitat is mainly distributed in valleys, along streams, and on low hillsides, where the terrain is relatively flat and the soil friable, making it suitable for cultivation. Local communities mainly grow upland rice, corn, vegetables, and fruit trees such as plums, peaches, persimmons, bananas, and oranges. This habitat is vital for sustaining food security and supporting local livelihoods.

Specimen Collection and Processing: All specimens were adult beetles collected during surveys across three habitats. They were placed into a killing jar with ethyl acetate (99%), transported to the laboratory, and dried for 72 hours. All dried specimens were labelled and preserved at the Department of Zoology, Faculty of Biology, Hanoi National University of Education. Insect taxonomy was determined according to the documents of Triplehorn et al. (2005) [3], Chujo M (1968) [4], Greessit JL et al. (1970) [5], Kimoto S and Gressitt JL (1982) [6], Bouchard et al., (2011) [7], and Wikipedia [8].

2.2. Research results

Species composition of beetles was investigated in three habitats: natural forests, grasslands, and shrubs growing on mountain slopes, and agricultural and fruit-growing areas in Du Gia Commune, located in Du Gia National Park - Dong Van Karst Plateau, Tuyen Quang province. The results are presented in Table 1.

Table 1. Species composition of Coleoptera in Du Gia Commune, Du Gia National Park - Dong Van Karst Plateau, Tuyen Quang province

No.	Scientific name	Family
1	*Adalia decempunctata* (Linneaus,1758)	Coccinellidae
2	*Adalia bipunctata* (Linnaeus, 1758)	
3	*Lemnia biplagiata* (Swartz, 1808)	
4	*Coccinella transversalis* Fabricius, 1781	
5	*Coccinella septempunctata* Linnaeus 1758	
6	*Coelophora inaequalis* (Fabricius, 1775)	
7	*Cheilomenes sexmaculata* Fabricius, 1781	
8	*Calvia quatuordecimguttata* (Linnaeus, 1758)	
9	*Diomus amabilis* (LeConte,1852)	
10	*Harmonia axyridis* (Pallas, 1773)	
11	*Harmonia octomaculata* Fabricius, 1781	
12	*Micraspis* sp.	
13	*Oenopia lyncea* (Olivier, 1808)	

14	*Anoplophora chinensis* (Forster, 1782)	Cerambycidae
15	*Eutrichillus biguttatus* (Leconte,1852)	
16	*Spondylis buprestoides* (Linnaeus, 1758)	
17	*Cicindela chinensis* Degeer,1774	Cicindelidae
18	*Tricondyla aptera* (Olivier, 1790)	
19	*Aulacophora foveicollis* (Lucas, 1849)	Chrysomelidae
20	*Cerotoma trifurcata* (Forster, 1771)	
21	*Diphaulaca aulica* (Olivier, 1808)	
22	*Mantura chrysanthemi* Koch,1903	
23	*Monolepta signata* Olivier, 1808	
24	*Parheminodes mouhoti* (Baly, 1864)	
25	*Podagrica fuscicornis* (Linneaus,1766)	
26	*Podagrica fuscipes*(Fabricius,1775)	
27	*Pyrrhalta viburni* (Paykull,1799)	
28	*Oulema* sp.	
29	*Cyrtotrachelus dux* (Both, 1916)	Curculionidae
30	*Phyllobius* sp.	
31	*Rhynchophorus ferrugineus* (Hope, 1782)	
32	*Agriotes acuminatus* (Stephens, 1830)	Elateridae
33	*Pyrophorus noctilucus* (Linnaeus, 1758)	
34	*Olibrus millefolii* (Paykull, 1800)	Phalacridae
35	*Calymmaderus nitidus* (LeConte, 1865)	Ptinidae
36	*Maladera* sp.	Scarabaeidae
37	*Lagria* sp.	Tenebrionidae
38	*Lagria hirta* (Linneaus,1758)	
39	*Lagria villosa* (Fabricius,1781)	

Analysis of the survey data from Du Gia Commune revealed 39 species of beetles, belonging to 33 genera and 10 families. Among these, the family Coccinellidae contained the largest number of species (13), whereas the families Phalacridae, Ptinidae, and Scarabaeidae each comprised only one species.

The beetle species composition by family and genus recorded in Du Gia Commune is presented in Table 2.

Table 2. Number and percentage of genera and species of Coleoptera insects in Du Gia commune, Du Gia National Park - Dong Van Karst Plateau, Tuyen Quang province

No.	Family	Species		Genus	
		Number	***Percentage (%)***	***Number***	***Percentage (%)***
1	Coccinellidae	13	33.33	10	30.30
2	Curculionidae	3	7.69	3	9.09
3	Cerambycidae	3	7.69	3	9.09
4	Chrysomelidae	10	25.64	9	27.27
5	Cicindelidae	2	5.12	2	6.06
6	Elateridae	2	5.12	2	6.06
7	Phalacridae	1	2.56	1	3.03
8	Ptinidae	1	2.56	1	3.03
9	Scarabaeidae	1	2.56	1	3.03
10	Tenebrionidae	3	7.69	1	3.03
Total		**39**	**100**	**33**	**100**

The results indicate that Coccinellidae had the highest number of species and genera, with 13 species accounting for 33.33 of % total recorded species and 10 genera (30.30%). Chrysomelidae ranked second, with 10 species (25.64%) and 9 genera (27.27%).

Curculionidae, Cerambycidae, and Tenebrionidae each contained three species (7.69%). Both Curculionidae and Cerambycidae comprised three genera (9.09%), whereas Tenebrionidae was represented by only one genus (3.03%).

Cicindelidae and Elateridae each had two species (5.12%) and two genera (6.06%). Phalacridae, Ptinidae, and Scarabaeidae contained the lowest numbers, each with one species (2.56%) and one genus (3.03%).

The number of beetle species recorded in Du Gia Commune is significantly lower when compared with the study of Bui Minh Hong and Doan Manh Tung (2021) [9] in Dong Son - Ky Thuong Nature Reserve, Quang Ninh province which reported 59 species belonging to 49 genera and 18 families, and the study of Bui Minh Hong and Bui Nhu Quynh (2021) [10] in Van Long, Ninh Binh province with 54 species belonging to 42 genera and 12 families. This difference may be attributed to several factors, including local flora, survey timing, and the characteristics of the insect fauna. Our

survey of beetle species composition in Du Gia Commune was conducted in three phases (October 2024, January 2025, and March 2025), corresponding to autumn, winter, and spring. Although the flora in the study area was quite diverse, the species composition of beetles was found to be less diverse.

The distribution of beetle species in the three habitats, including natural forests, grasslands, and shrubs growing on mountain slopes, and agricultural and fruit-growing areas in Du Gia Commune, is presented in Table 3.

Table 3. Distribution of Coleoptera species in three habitats in Du Gia Commune, Du Gia National Park - Dong Van Karst Plateau, Tuyen Quang province

No.	Scientific name	Family	Number of individuals recorded in the habitat		
			SC1	*SC2*	*SC3*
1	*Adalia decempunctata*	Coccinellidae	5	3	5
2	*Adalia bipunctata*		4	5	4
3	*Lemnia biplagiata*		5	3	5
4	*Coccinella transversalis*		8	7	8
5	*Coccinella septempunctata*		7	7	5
6	*Coelophora inaequalis*		3	4	3
7	*Cheilomenes sexmaculata*		8	5	8
8	*Calvia quatuordecimguttata*		2	2	0
9	*Diomus amabilis*		2	2	0
10	*Harmonia axyridis*		8	5	8
11	*Harmonia octomaculata*		8	8	8
12	*Micraspis* sp.		1	1	1
13	*Oenopia lyncea*		2	2	0
14	*Anoplophora chinensis*	Cerambycidae	4	2	0
15	*Eutrichillus biguttatus*		2	4	0
16	*Spondylis buprestoides*		4	0	0
17	*Cicindela chinensis*	Cicindelidae	5	0	5
18	*Tricondyla aptera*		2	0	2
19	*Aulacophora foveicollis*	Chrysomelidae	2	8	8
20	*Cerotoma trifurcata*		2	6	8
21	*Diphaulaca aulica*		3	4	0
22	*Mantura chrysanthemi*		2	0	0
23	*Monolepta signata*		3	5	8
24	*Parheminodes mouhoti*		1	2	1

25	*Podagrica fuscicornis*		2	2	0
26	*Podagrica fuscipes*		2	6	4
27	*Pyrrhalta viburni*		2	5	8
28	*Oulema* sp.		2	5	6
29	*Cyrtotrachelus dux*	Curculionidae	2	5	0
30	*Phyllobius* sp.		3	3	8
31	*Rhynchophorus ferrugineus*		3	6	0
32	*Agriotes acuminatus*	Elateridae	6	5	0
33	*Pyrophorus noctilucus*		3	3	0
34	*Olibrus millefolii*	Phalacridae	3	4	1
35	*Calymmaderus nitidus*	Ptinidae	5	0	0
36	*Maladera* sp.	Scarabaeidae	2	2	0
37	*Lagria* sp.	Tenebrionidae	0	1	5
38	*Lagria hirta*		3	5	8
39	*Lagria villosa*		3	3	5
Number (species)			***38***	***34***	***24***
Percentage (%)			***97.45***	***87.18***	***61.52***

Notes: *Natural forest (SC1); Grassland and shrubs growing on mountain slopes (SC2); Agricultural and fruit-growing areas (SC3)*

The results revealed that species occurrence varied across habitats. The habitats were ranked by the number of beetle species from highest to lowest as follows:

The natural forest habitat supported the species richness with 38 species representing all 10 families. Within the family Coccinellidae, seven species (*A. decempunctata, L. biplagiata, C. transversalis, C. septempunctata, C. sexmaculata, H. axyridis, and H. octomaculata*) were particularly abundant. *A. acuminatus* of Elateridae and *C. nitidus* of Ptinidae, were also abundant. The remaining families (Chrysomelidae, Phalacridae, Cerambycidae, Tenebrionidae, Cicindelidae, Scarabaeidae, and Curculionidae) had low to moderate numbers of species abundance.

The grassland and shrub habitat on the mountain slopes harbored 34 species belonging to 9 families. In Coccinellidae, six species (*A. bipunctata, C. transversalis, C. septempunctata, C. sexmaculata, H. axyridis, and H. octomaculata*) were abundant. Chrysomelidae contained six abundant species: *A. foveicollis, C. trifurcata, M. signata, P. fuscipes, P. viburni, and Oulema* sp.. Curculionidae had two abundant species, *C. dux* and *R. ferrugineus*. , *A. acuminatus* of Elateridae and *L. hirta* of Tenebrionidae were also abundant. The other families (Phalacridae, Cerambycidae, Scarabaeidae, and Ptinidae) had low to moderate numbers of species abundance. No species from the family Cicindelidae was observed in this habitat.

The agricultural and fruit-growing habitat supported 24 species from six of the ten surveyed families. Among these families, Coccinellidae was well-represented with seven abundant species, including *A. decempunctata, L. biplagiata, C. transversalis, C. septempunctata, C. sexmaculata, H. axyridis,* and *H. octomaculata.* Chrysomelidae had five abundant species: *A. foveicollis, C. trifurcata, M. signata, P. viburni, and Oulema* sp.. Tenebrionidae had three abundant species*: L. hirta, Lagria villosa, and Lagria* sp. One species of Cicindelidae, *Cicindela chinensis, and* one of Curculionidae, *Phyllobius calcaratus,* were also common. Phalacridae were rarely observed. The other four families, Cerambycidae, Elateridae, Scarabaeidae, and Ptinidae, had no observed species in this habitat.

Therefore, the natural forest habitat supported the highest number of species (38 species, 97.45%), followed by the grassland and shrub habitat (34 species, 87.18%), and the agricultural and fruit-growing habitat (24 species, 61.52%).

The distribution of beetle species by survey periods is shown in Table 4.

Table 4. Distribution of Coleoptera species across the survey period in Du Gia Commune, Du Gia National Park - Dong Van Karst Plateau, Tuyen Quang province

No.	Family	Phase 1 (October 2024)		Phase 2 (January 2025)		Phase 3 (March 2025)	
		Number of species	*Percentage (%)*	*Number of species*	*Percentage (%)*	*Number of species*	*Percent age (%)*
1	Coccinellidae	13	33.33	8	20.51	12	30.77
2	Curculionidae	3	7.69	1	2.56	2	5.13
3	Cerambycidae	3	7.69	1	2.56	2	5.13
4	Chrysomelidae	10	25.64	7	17.95	10	25.64
5	Cicindelidae	2	5.12	1	2.56	2	5.13
6	Elateridae	2	5.12	0	0	2	5.13
7	Phalacridae	1	2.56	1	2.56	1	2.86
8	Ptinidae	1	2.56	0	0	1	2.86
9	Scarabaeidae	1	2.56	1	2.56	1	2.86
10	Tenebrionidae	3	7.69	1	2.56	2	5.13
Total		**39**	**100**	**21**	**53.85**	**35**	**89.74**

Phase 1 (October 2024): The survey recorded a total of 39 species of *Coleoptera*. Among these, Coccinellidae comprised 13 species (33.33%), and Chrysomelidae had 10 species (25.64%). Three families, Curculionidae, Cerambycidae, and Tenebrionidae, were represented by 3 species each (7.69%). Two families, Cicindelidae and Elateridae, each contained 2 species (5.12%). The remaining families, Phalacridae, Ptinidae, and Scarabaeidae, each had 1 species (2.56%).

Phase 2 (January 2025): A total of 21 species were recorded in the survey. Among these, Coccinellidae was represented by 8 species (20.51%), and Chrysomelidae by 7 species (17.95%). Six families, including Curculionidae, Cerambycidae, Tenebrionidae, Cicindelidae, Phalacridae, and Scarabaeidae, each comprised 1 species (2.56%). No species were recorded for Elateridae or Ptinidae across surveyed habitats during this period.

Phase 3 (March 2025): The survey recorded a total of 35 species. As the other phase, Coccinellidae contained the highest number of species (12 species, 30.77%), followed by Chrysomelidae (10 species, 25.64%). Five families, Curculionidae, Cerambycidae, Tenebrionidae, Cicindelidae, and Elateridae, each had 2 species (5.13%). Three families, including Phalacridae, Ptinidae, and Scarabaeidae, each had 1 species (2.86%).

Therefore, the species composition of beetles across three habitats in Du Gia Commune shows variation between surveyed phases. Variation in beetle species richness likely reflects differences in temperature, survey timing, food availability, and biological characteristics of the insects.

3. Conclusions

The study in Du Gia commune, a part of Du Gia National Park - Dong Van Karst Plateau in Tuyen Quang province, recorded, for the first time, 39 species of beetles, representing 33 genera and 10 families. Coccinellidae was the most species-rich family, comprising 13 species and 10 genera. Three families, Phalacridae, Ptinidae, and Scarabaeidae, each had only one species and one genus.

The distribution of beetles varied across the habitats in Du Gia Commune. The natural forest habitat supported the largest number of species (38 species, 97.45%), followed by the grassland and shrub habitat on mountain slopes (34 species, 87.18%), and the agricultural and fruit tree habitat with 24 species (61.52%).

Beetle species distribution also differed among survey phases. Phase 1 (October 2024) was recorded with the highest number of species (39 species, 100%), Phase 2 (January 2025) with 21 species (53.85%), and Phase 3 (March 2025) with 35 species (89.74%).

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