



Research Article

DIVERSITY AND DISTRIBUTION OF SOME ECONOMICALLY IMPORTANT LEAF BEETLES (COLEOPTERA: CHRYSOMELIDAE) IN BIBHUTIBHUSHAN, BETHUADAHARI AND KULIK WILDLIFE SANCTUARIES OF WEST BENGAL, INDIA

*¹Priyanka Ghosh, ²Ashish Debnath, ³Irtiza Wani and ⁴Devanshu Gupta

Zoological Survey of India, M Block, New Alipore, Kolkata-700053, West Bengal, India

Article History: Received 22nd February 2025; Accepted 27th March 2025; Published 30th April 2025

ABSTRACT

This study investigates the biodiversity of economically important leaf beetles (Coleoptera: Chrysomelidae) within Bibhutibhushan, Bethuadahari, and Kulik Wildlife Sanctuaries in West Bengal, India. Specimens collected from these sanctuaries were examined, resulting in the identification of 21 species across 14 genera and 6 subfamilies. The study revealed the dominance of Galerucinae (11 species), followed by Cassidinae (4 species), Cryptocephalinae (2 species), Hispinae (2 species), Eumolpinae (1 species), and Criocerinae (1 species). Many of these identified Chrysomelid species are known pests of commercially valuable agricultural and forestry crops, highlighting their economic significance. This inventory provides baseline data for assessing the ecological roles of these beetles and developing integrated pest management strategies within the protected areas and surrounding agricultural landscapes of West Bengal.

Keywords: Chrysomelidae, Leaf Beetles, Biodiversity, Economic Importance, Wildlife Sanctuaries.

INTRODUCTION

The Chrysomelidae family, commonly known as leaf beetles, represents a remarkably diverse and ecologically significant group within the Chrysomeloidea superfamily. Primarily herbivorous, these beetles feed on a wide array of plant matter, including leaves, flowers, and roots. Their striking diversity in morphology, coloration, and global distribution underscores their ecological and economic importance. With over 32,500 species worldwide, classified into 2,114 genera (Bouchard *et al.*, 2017), Chrysomelidae are predominantly found in tropical regions, though they are also well-represented in temperate zones. They inhabit diverse habitats, showcasing a fascinating array of adaptations that facilitate survival in varied ecological niches. Often exhibiting vibrant metallic colors and intricate patterns, leaf beetles employ camouflage for defense and mate attraction. Their robust bodies and brightly colored elytra are distinctive characteristics.

The feeding habits of Chrysomelidae are equally diverse, with many species specializing on particular plant hosts. Some leaf beetles are recognized as significant agricultural

pests, capable of causing substantial damage to crops, while others play critical roles as pollinators or herbivores in natural ecosystems. The family is further divided into numerous subfamilies, each with unique characteristics. For example, the Alticinae, or flea beetles, are known for their jumping ability, facilitated by powerful hind legs (Maulik, 1926). The Galerucinae subfamily includes many economically significant pests, such as the pumpkin beetle, *Aulacophora foveicollis*, and the Colorado potato beetle, *Leptinotarsa decemlineata* (Sarker *et al.*, 2016). Other notable subfamilies include the Chrysomelinae, Eumolpinae, and Clytrinae, each possessing distinct morphological features and ecological roles.

Monographic studies on the Chrysomelidae fauna of India were conducted by Jacoby (1908) and Maulik (1919, 1926, 1936). Basu (1996) significantly contributed by documenting 320 Chrysomelidae species in West Bengal. More recent research, such as Patra and Bera's (2007) discovery of the polyphagous beetle, *Schenklingia bhaumiki*, feeding on ten fern species in the Lower Gangetic Plains, and Kharel *et al.*'s (2020) survey recording three leaf beetle species in Kalyani, West Bengal, have

*Corresponding Author: Priyanka Ghosh, Zoological Survey of India, M-Block, New Alipore, Kolkata-700053, West Bengal, India. Email: priyankaghosh8559@gmail.com.

further expanded our understanding. While protected areas in West Bengal have received comparatively less attention, studies by Mitra *et al.* (2015) and Basu *et al.* (2017) have documented 16 species in Bethuadahari Wildlife Sanctuary, and Saha and Raychaudhari (1997) and Raychaudhari and Saha (2017) have explored leaf beetle diversity in the Buxa Tiger Reserve.

Documenting the leaf beetle fauna within wildlife sanctuaries is crucial for establishing baseline biodiversity data, monitoring ecological changes, and informing conservation strategies. These protected areas can serve as reservoirs for both beneficial and pest species, influencing the surrounding agricultural landscapes. In this study, we aimed to identify and catalog the leaf beetle species present in Bethuadahari, Bibhutibhushan, and Kulik Wildlife Sanctuaries in West Bengal. This research documents 21 species of leaf beetles, representing 14 genera and 6 subfamilies, from these sanctuaries. These species have significant economic implications, potentially impacting regional agricultural productivity through crop damage, particularly affecting crops such as rice, vegetables and fruit trees, and influencing natural ecosystem dynamics. This inventory provides essential data for developing integrated pest management strategies and furthering our understanding of the ecological roles of Chrysomelidae within West Bengal's protected areas.

MATERIAL AND METHODS

Study Areas

i. Bethuadahari Wildlife Sanctuary, a relatively small, tropical moist deciduous forest, is located in the Nadia district of West Bengal, India. Geographically positioned at 23.5975516°N 88.3920227°E, it covers approximately 66.77 hectares. Established in 1998, the sanctuary serves to protect the region's biodiversity.

ii. Bibhutibhushan Wildlife Sanctuary is a protected area situated in the North 24 Parganas district of West Bengal, India. This sanctuary is located on the banks of the Ichamati River, covering an area of approximately 0.68 square kilometers. Its geographical coordinates are 23°11'10"N 88°45'44"E.

iii. Kulik Wildlife Sanctuary is located in Raiganj, West Bengal, India, at 25°38'13"N 88°07'16"E. The sanctuary's specific geographical characteristics, including its proximity to the Mahananda River and its location within a tropical climate, contribute to its diverse ecosystem, supporting a wide variety of flora and fauna.

Specimen collection and Identification

Specimens for this study were collected from three wildlife sanctuaries in West Bengal, India: Bibhutibhushan, Bethuadahari, and Kulik, during surveys conducted in 2021. Collection methods primarily involved sweep netting and hand picking. Locality details were meticulously recorded for each specimen. Subsequently, specimens were dry-pinned and identified using taxonomic literature from the Fauna of British India (including Ceylon and Burma) (Jacoby, 1908; Maulik, 1919, 1926, 1936) and by

comparison with reference collections housed at the Zoological Survey of India (ZSI), Kolkata. The identified specimens were then deposited in the National Zoological Collections of the Zoological Survey of India, Kolkata.

RESULTS AND DISCUSSION

A total of 123 leaf beetle specimens were collected from Bibhutibhushan, Bethuadahari, and Kulik Wildlife Sanctuaries in West Bengal during surveys conducted in 2021. Identification of these specimens revealed 21 species, representing 14 genera and 6 subfamilies within the Chrysomelidae family: Cryptocephalinae, Criocerinae, Cassidinae, Hispinae, Galerucinae, and Eumolpinae (Table 1). The distribution of species across subfamilies was as follows: Galerucinae (11 species), Cassidinae (4 species), Cryptocephalinae (2 species), Hispinae (2 species), Eumolpinae (1 species), and Criocerinae (1 species).

Aspidimorpha miliaris (Fabricius, 1775) and *Monolepta signata* (Olivier, 1808) were recorded from all three wildlife sanctuaries. Conversely, *Cryptocephalus analis* Olivier, 1808, *Hoplasoma unicolor* (Illiger, 1800), *Monolepta limbata* (Olivier, 1808), *Oides flava* (Olivier, 1807), and *Oncocephala tuberculata* (Olivier, 1792) were exclusively recorded from Kulik Wildlife Sanctuary. *Lilioceris cheni* Gressit & Kimoto, 1961, *Aspidimorpha sanctaerucis* (Fabricius, 1792), *Aulacophora indica* (Gmelin, 1790), *Phygasia unicolor* (Olivier, 1808), and *Sphenoraia bicolor* (Hope, 1831) were exclusively recorded from Bethuadahari Wildlife Sanctuary. *Platycorynus peregrinus* (Herbst, 1783) was exclusively recorded from Bibhutibhushan Wildlife Sanctuary. In this study, the collected 123 leaf beetle specimens, representing 21 species across 14 genera and 6 subfamilies, exhibited the following subfamily distribution: Galerucinae (52.38%), Cassidinae (19.04%), Cryptocephalinae (9.52%), Criocerinae (4.76%), and Eumolpinae (4.76%).

Bethuadahari Wildlife Sanctuary demonstrated the highest species richness, 14 species from 10 genera and 43 individuals. Kulik Wildlife Sanctuary recorded 11 species from 8 genera and 46 individuals. Bibhutibhushan Wildlife Sanctuary exhibited the lowest species richness and abundance, with 7 species from 6 genera and 34 individuals. The percent composition of the Chrysomelidae subfamilies recorded is presented in Figure 1. Table 3 presents the diversity indices calculated for leaf beetles in Kulik, Bethuadahari, and Bibhutibhushan Wildlife Sanctuaries, with the following observations:

Bethuadahari Wildlife Sanctuary: Exhibited the highest species diversity with 14 species and 43 individuals. Simpson's Diversity Index: 0.318, indicating moderate species diversity. Shannon-Wiener Diversity Index: 0.779, indicating a less even species distribution compared to Kulik.

Recorded 14 species and 43 individuals. Simpson's Diversity Index: 0.318, suggesting moderate species diversity. Shannon-Wiener Diversity Index.

Bihutibhushan Wildlife Sanctuary: Displayed the lowest species diversity with 7 species and 34 individuals.

Simpson's Diversity Index: 0.104, suggesting low species diversity. Shannon-Wiener Diversity Index: 0.644, demonstrating the least even distribution of species among the three sanctuaries. Based on these indices, Bethuadahari

Wildlife Sanctuary exhibited the highest biodiversity of leaf beetles, followed by Kulik. Bibhutibhushan Wildlife Sanctuary demonstrated the lowest diversity.

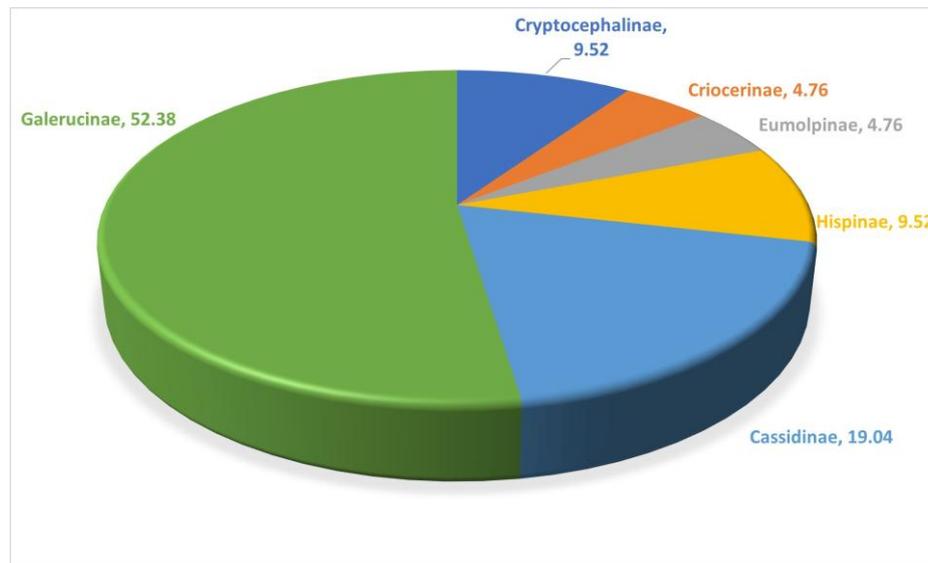


Figure 1. Species Distribution of Leaf Beetles by Subfamily in Kulik Wildlife Sanctuary (KWLS), Bethuadahari Wildlife Sanctuary (BDWLS), and Bibhutibhushan Wildlife Sanctuary (BBWLS).

Table 1. Checklist of Economically Important Leaf Beetles (Coleoptera: Chrysomelidae) from Kulik Wildlife Sanctuary (KWLS), Bibhutibhushan Wildlife Sanctuary (BBWLS), and Bethuadahari Wildlife Sanctuary (BDWLS), West Bengal (21 species, 14 genera, 6 subfamilies).

Sl. No.	Species Name	Specimens Studied		
		Kulik	Bethuadahari	Bihutibhushan
	Subfamily Criocerinae Latereille, 1804			
1	<i>Lilioceris cheni</i> Gressit & Kimoto, 1961	-	2 (07.xii.2021)	-
	Subfamily Cryptocephalinae Gyllenhal, 1813			
2	<i>Cryptocephalus analis</i> Olivier, 1808	2 (25.ix.2021)	-	-
3	<i>Cryptocephalus sehestedti</i> Fabricius, 1798	-	3 (05.xii.2021)	2 (14.xii.2021)
	Subfamily Eumolpinae Hope, 1840			
4	<i>Platycorynus peregrinus</i> (Herbst, 1783)	-	-	3 (14.xii.2021)
	Subfamily Galerucinae Latreille, 1802			
5	<i>Aulacophora foveicollis</i> (Lucas, 1849)	9 (25.ix.2021)	3 (07.xii.2021)	-
6	<i>Aulacophora indica</i> (Gmelin, 1790)	-	1 (07.xii.2021)	-
7	<i>Hoplasoma unicolor</i> (Illiger, 1800)	7 (25.ix.2023)	-	-
8	<i>Monolepta bifasciata</i> (Hornstedt, 1788)	1 (25.ix.2021)	1 (04.xii.2021)	-
9	<i>Monolepta limbata</i> (Olivier, 1808)	2 (24.ix.2021)	-	-
10	<i>Monolepta signata</i> (Olivier, 1808)	9 (24.ix.2021)	11 (06.xii.2021)	7 (13.xii.2021)
11	<i>Oides flava</i> (Olivier, 1807)	3 (25.ix.2021)	-	-
12	<i>Oides maculata</i> (Olivier, 1807)	-	4 (04.xii.2021)	8 (13.xii.2021)
13	<i>Oides palleata</i> , (Fabricius, 1781)	2 (24.ix.2021)	-	-
14	<i>Phygasia unicolor</i> (Olivier, 1808)	-	1 (25.ix.2021)	-
15	<i>Sphenoraia bicolor</i> (Hope, 1831)	-	2 (26.ix.2021)	-
	Subfamily Cassidinae Gyllenhal, 1813			
16	<i>Oncocephala tuberculata</i> (Olivier, 1792)	3 (26.ix.2021)	-	-
17	<i>Rhadinosa reticulata</i> (Baly, 1888)	-	4 (09.xii.2021)	5 (13.xii.2021)
18	<i>Aspidomorpha dorsata</i> (Fabricius, 1787)	-	1 (04.xii.2021)	1 (15.xii.2021)
19	<i>Aspidomorpha miliaris</i> (Fabricius, 1775)	6 (25.ix.2023)	5 (07.xii.2021)	8 (14.xii.2021)

20	<i>Aspidomorpha sanctaerucis</i> (Fabricius, 1792)	-	3 (06.xii.2021)	-
21	<i>Cassida circumdata</i> Herbst, 1799	2 (25.ix.2023)	2 (07.xii.2021)	-

Table 2. Species Richness of Leaf Beetles by Subfamily in Kulik Wildlife Sanctuary (KWLS), Bethuadahari Wildlife Sanctuary (BDWLS), and Bibhutibhushan Wildlife Sanctuary (BBWLS).

Sl. No.	Subfamily	Genera	No. of Species	Species %
1	Cryptocephalinae	1	2	9.52
2	Criocerinae	1	1	4.76
3	Eumolpinae	1	1	4.76
4	Galerucinae	7	11	52.38
5	Hispiinae	2	2	9.52
6	Cassidinae	2	4	19.04
	Total	14	21	100

Table 3. Diversity Indices for Leaf Beetles in Kulik Wildlife Sanctuary (KWLS), Bethuadahari Wildlife Sanctuary (BDWLS), and Bibhutibhushan Wildlife Sanctuary (BBWLS).

Diversity Indices	Kulik	Bethuadahari	Bibhutibhushan
Number of Species	11	14	7
Number of Individuals	46	43	34
Simpson's Diversity Index	0.408	0.318	0.104
Shannon-Weiner Diversity Index	1.033	0.779	0.644
Evenness	0.431	0.295	0.331
Dominance	0.454	0.036	0.009

CONCLUSION

This study provides a comprehensive account of the diversity of economically significant leaf beetles (Chrysomelidae) across three key wildlife sanctuaries in West Bengal Bibhutibhushan, Bethuadahari, and Kulik. The identification of 21 species spanning 14 genera and 6 subfamilies, with a notable dominance of Galerucinae, underscores the rich biodiversity of Chrysomelids in these protected ecosystems. Given that many of the recorded species are recognized agricultural and forestry pests, their presence within and around these sanctuaries carries important ecological and economic implications. The findings serve as a vital reference for future ecological monitoring and pave the way for the development of informed, area-specific integrated pest management (IPM) strategies. Continued studies are essential to better understand the dynamics of these beetle populations and their interactions with native flora and cultivated crops in the region.

ACKNOWLEDGEMENTS

We thank Dr. Dhriti Banerjee, Director of the Zoological Survey of India, Kolkata for providing necessary facilities and encouragement

CONFLICT OF INTERESTS

The authors declare no conflict of interest

ETHICS APPROVAL

Not applicable

AI TOOL DECLARATION

The authors declares that no AI and related tools are used to write the scientific content of this manuscript.

DATA AVAILABILITY

Data will be available on request

REFERENCES

- Basu, C.R. (1996). Insecta: Coleoptera: Chrysomelidae in State Fauna Series 3: *Fauna of West Bengal*, Part 6B, 559-773.
- Basu, P., Aditya, G., & Sanyal, A. K. (2017). Community structure of Coleoptera in Bethuadahari Wildlife Sanctuary, West Bengal, India. *Check List*, 13(3), 2154. <https://doi.org/10.15560/13.3.2154>.

- Bouchard. P., Smith A. B. T., Douglas, H. & Gimmel, M.L. (2017). Biodiversity of Coleoptera in *Insect Biodiversity: Science and Society*, Volume I (Robert G. Foottit and Peter H. Adler. eds.) 337-418.
- Jacoby, M. (1908). *The Fauna of British India, Including Ceylon and Burma. Coleoptera, Chrysomelidae*, Vol. 1. Taylor and Francis, London 1: xx+554pp.
- Kharel, B. P., Chakraborti, U. & Bhadra, K. & Sarkar, S. (2020). A preliminary report on Coleoptera fauna of Kalyani (a suburban city), West Bengal, India. *Bionotes* 22. 55-64.
- Maulik, S. (1919). *The Fauna of British India, including Ceylon and Burma. Coleoptera, Chrysomelidae (Hispinæ and Cassidinae)*. Taylor and Francis, London, 439p.
- Maulik, S. (1926). *Fauna of British India, including Ceylon and Burma. Coleoptera, Coleoptera, Chrysomelidae (Chrysomelinae and Halticinae)*. Taylor and Francis, London, 442p.
- Maulik, S. (1936). *The Fauna of British India, including Ceylon and Burma. Coleoptera, Chrysomelidae (Galerucinae)*. Taylor and Francis, London, 648p.
- Mitra, B., Aditya, G., & Sanyal, A. K. (2015). Community structure of Coleoptera in Bethuadahari Wildlife Sanctuary, West Bengal, India. *Check List*, 11(3), 1–8.
- Patra, B. & Bera, S. (2007). Herbivore Damage to Ferns Caused by a Chrysomelid Beetle from Lower Gangetic Plains of West Bengal, India, *American Fern Journal* 97(1), 19-29. [https://doi.org/10.1640/0002-8444\(2007\)97](https://doi.org/10.1640/0002-8444(2007)97) [19: HDTFCB]2.0.CO;2.
- Raychaudhuri, D. & Saha, S. (2017). *Atlas of Insects and Spiders of Buxa Tiger Reserve*. Nature Books India, Kolkata, 1-357.
- Saha, S. & Raychaudhuri, D. (1997). Tortoise beetles (Cassidinae) of Buxa Tiger Reserve, Jalpaiguri, West Bengal. *Insect Environment*, 2(4), 129-130.
- Sarker, M.N.I, Ali, M.A., Islam, M.S. & Bari, M.A (2016). Feeding Behavior and Food Preference of Red Pumpkin Beetle, *Aulacophora Foveicollis*. *American Journal of Plant Biology*. 1 (1), 13-17. doi: 10.11648/j.ajpb.20160101.12