



## Assessment of diversity and abundance of blister beetles (*Coleoptera: Meloidae*) in Jhunjhunu district of Rajasthan, India

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### Abstract

A two-year field study (January 2021–December 2022) conducted at four sites in the Jhunjhunu district (Rajasthan, India) documented the diversity and abundance of blister beetles (family: *Meloidae*, subfamily: *Meloinae*). A total of five species across four genera were recorded, with the genus *Mylabris* emerging as the most species-rich and abundant. *Mylabris pustulata* and *M. cichorii* collectively accounted for over 60% of the total individuals sampled, indicating their ecological dominance and adaptation to the arid agro-climatic conditions of the region. While the overall species composition remained largely stable across both years, the emergence of *Pyrota* in the second year suggests potential habitat shifts or colonization. Diversity indices revealed moderate species diversity (Shannon-Weiner index  $H_x = 1.518$ ) and low to moderate richness (Margalef's index  $M_x = 1.091$ ), with a relatively high evenness ( $J_x = 0.847$ ) despite the skewed dominance of *Mylabris*. These findings highlight a stable but unevenly structured Meloidae community and underscore the importance of continued monitoring to detect long-term ecological changes.

**Keywords:** Diversity, abundance, jhunjhunu, blister beetles

### Introduction

Blister beetles, members of the Meloidae family of coleopteran insects, were traditionally believed to comprise roughly 80 genera and three subfamilies, as documented by Bologna (1991) [2], Ruiz and Avila (1993) [15], and Whitehead (1999) [18]. However, in a more recent study by Akbar *et al.*, (2017) [11] an astonishing discovery emerged, revealing an extensive diversity of over 2,500 species related to 120 genera distributed across three subfamilies. A preliminary checklist of blister beetles from Pakistan and Kashmir was prepared, with the inclusion of 79 species. *Stenoria osellai* from northern Pakistan, *Hycleus pakistanus* from Balochistan, and *Meloe (Micromeloe) pintoi* from Indian Kashmir were described by Bologna *et al.*, (2018) [3]. Saha (2012) [16] studied Indian blister beetles (*Coleoptera: Meloidae*) and described 4 new species of *Mylabris* viz., *Mylabris pardoi*, *Mylabris gonostylus*, *Mylabris rajasthanicus* and *Mylabris kapuri* from Rajasthan. Gohil and Solanki (2013) [12] described population dynamics of blister beetles during monsoon in Victoria Park Reserved Forest, Gujarat. Population of blister beetles was calculated highest in monsoon season due to availability of food and shelter. Ghoneim (2013) [13] prepared a review on agronomic and biodiversity impacts on the blister beetles (*Coleoptera: Meloidae*) in the world. Sharma and Singh (2018) [17] studied host range and abundance of blister beetles in Sub-mountainous Punjab. Blister beetle, *Mylabris pustulata*, was found in corn fields in Almora district, Uttarakhand, according to Joshi and Gaur (2019) [13]. According to Ghahari and Campos-Soldini (2019) [11] annotated catalogue of Iranian blister beetles the country possesses a remarkably diversified blister beetle fauna. Nezhad-Ghaderi *et al.*, (2021) [14] prepared a list of species of blister beetle in Kerman province, Iran and reported 30 species belonging to

10 genera under two subfamilies viz., Meloinae and Nemognathinae

### Material and Methods

Jhunjhunu district (Photo Plate-1), located between latitudes 27°38' to 28°31' North and longitudes 75°02' to 76°06' East, covers a geographical area of 5,926 sq. km. The region experiences extreme temperatures, reaching up to 48°C in the summer and dropping below 0°C in the winter. The district's altitude ranges from 312 to 368 meters above sea level. Rainfall in the area varies between 350 and 500 mm, predominantly occurring during the monsoon season from July to September.

For the present study, four sampling sites were selected: agricultural lands (Site-A), plains dominated by grasses and herbs (Site-B), rocky areas (Site-C), and water body banks (Site-D). The geographic coordinates for these sites are as follows: Site-A is located at 28°19'N, 75°31'E; Site-B at 27°89'N, 75°01'E; Site-C at 28°02'N, 75°63'E; and Site-D at 27°65'N, 75°41'E. Field surveys were conducted from January 2021 to December 2022 at the chosen sites, with sampling carried out once a month during both morning and evening hours throughout the study period.

Blister beetles were collected using sweep nets, hand picking, and light traps. After collection, the beetles were transported to the laboratory at the Department of Zoology, SRRM Govt. College, Jhunjhunu. The specimens were then pinned, stretched, and dried before being preserved in insect boxes with Paradichlorobenzene. The collected beetles were identified to the species level using a Stereo Zoom Binocular Microscope (Magnus MSZ-Bi), following taxonomic keys by Selander (1960, 1986) [6, 8]; Pinto and Bologna (1999) [2, 9]; Triplehorn and Johnson (2005) [7]. The beetles were also photographed for future reference.

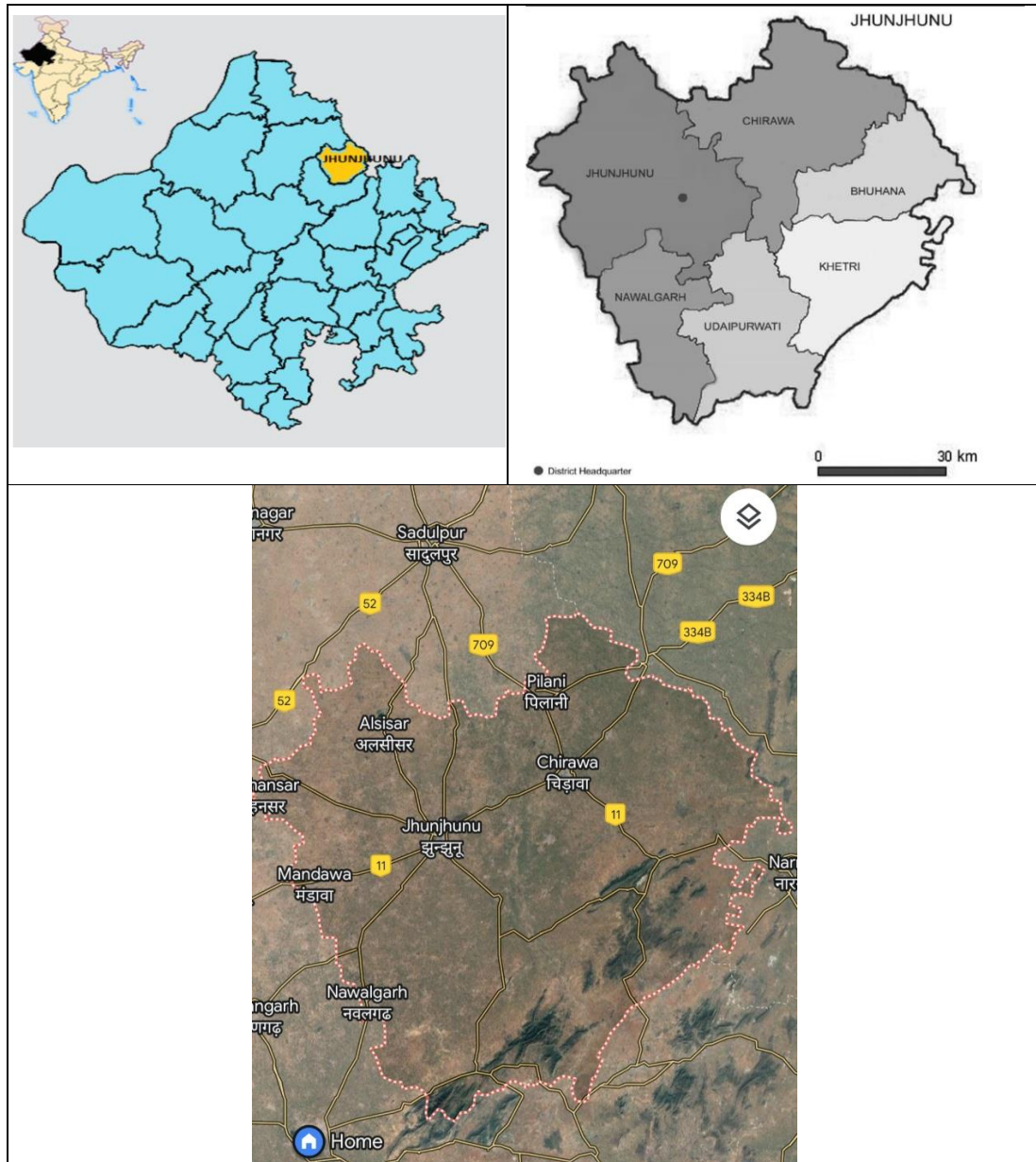


Photo Plate 1: Location of Jhunjhunu district with sampling sites

**Result**

A total of 5 species belonging to 4 genera under Meloinae subfamily of the family Meloidae were recorded from January 2021 to December 2022 from four study sites selected in the Jhunjhunu district (Table 1). As evident from species richness and abundance of different genera (Table 2), genera Mylabris was comprised of the highest number of

species (2 species), followed by Hycleus, Epicauta and Pyrota (1 species each) (Figure 1). As compared to number of individuals, again Mylabris was the most abundant subfamily (60.20% of the total individuals), followed by Hycleus (5.86%), Epicauta (3.06%) and Pyrota (1.02%) (Figure 1).

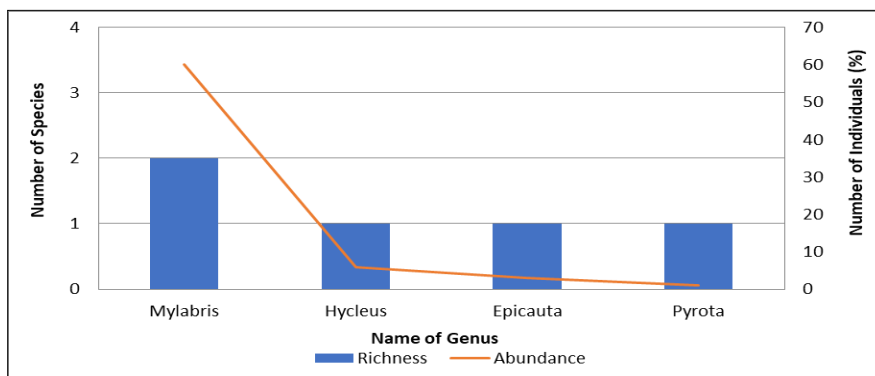


Fig 1: Species richness and abundance of Meloidae family in the study area from January 2021 to December 2022.

During the first year of study, maximum number of species belonged to the genera Mylabris constituting 2 species, followed by Hycleus and Epicauta (1 species each) (Table 2). On the other hand, again maximum number of individuals belonged to the genera Mylabris which constituted 60.86% of the total individuals, followed by Hycleus (28.26%) and Epicauta (10.86%).

During the second year of study, maximum number of species belonged to the genera Mylabris constituting 2 species, followed by Hycleus, Epicauta and Pyrota (1 species each) (Table 2). On the other hand, again maximum number of individuals belonged to the genera Mylabris which constituted 59.61% of the total individuals, followed by Hycleus (19.23%), Epicauta (13.46%) and Pyrota (7.69%).

**Table 1:** Blister beetles recorded from different study sites selected in the Jhunjhunu district from January 2021 to December 2022

S.No.	Family	Subfamily	Name of Species
1	Meloidae	Meloinae	<i>Mylabris pustulata</i>
2			<i>Mylabris cichorii</i>
3			<i>Hycleus scabiosae</i>
4			<i>Epicauta pensylvanica</i>
5			<i>Pyrota</i> sp.

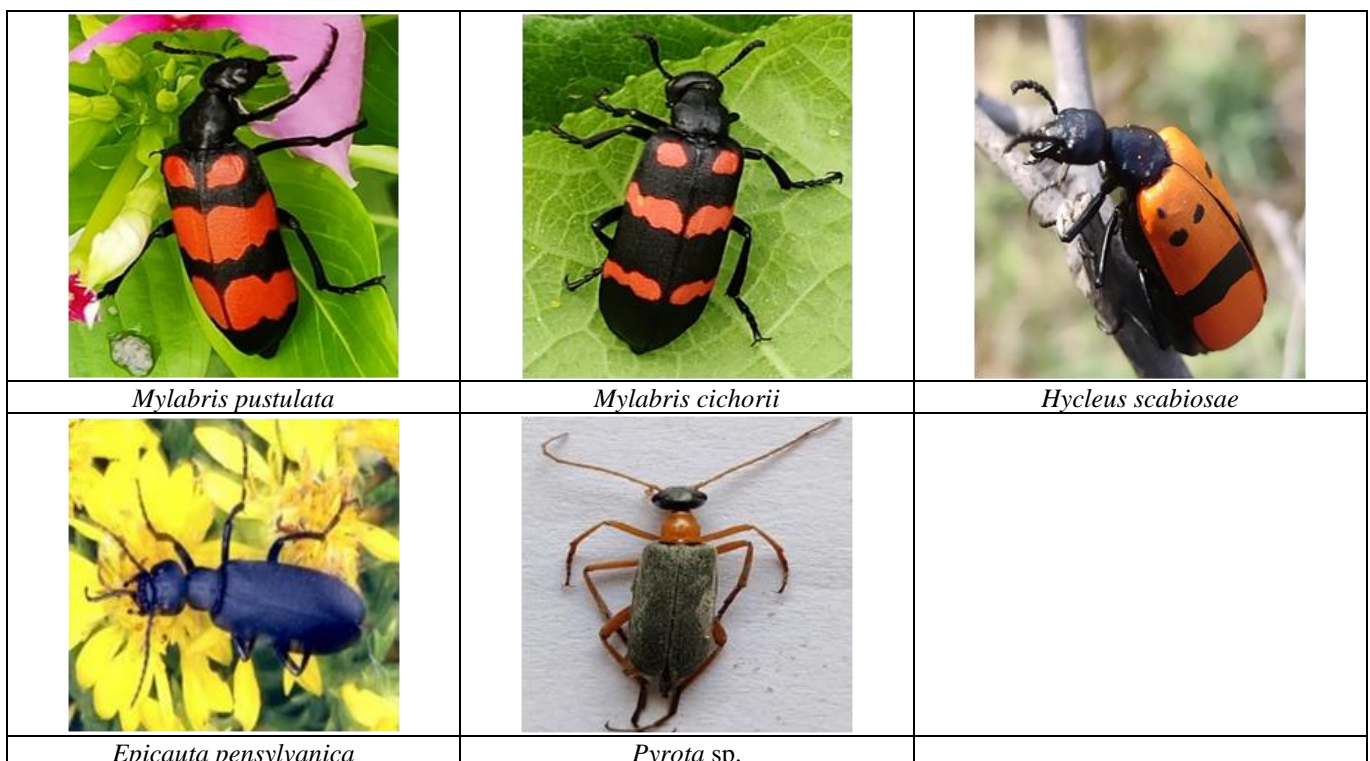
**Table 2:** Species richness and abundance of different subfamilies under the family Meloidae recorded from the study area from January 2021 to December 2022.

Meloidae	2021		2022		2021-22	
	Richness	Abundance	Richness	Abundance	Richness	Abundance
Mylabris	3	28	2	31	3	59
Hycleus	1	13	1	10	1	23
Epicauta	1	5	1	7	1	12
Pyrota	0	0	1	4	1	4
Total	5	46	5	52	6	98

Various diversity measures calculated for Meloidae family fauna in the study area have been provided in Table 3. During two consecutive years of sampling period (from January 2021 to December 2022), Shannon-weiner diversity index ( $H^x$ ) was 1.518, Simpson index ( $D^x$ ) was 0.245, Margalef’s richness index ( $M^x$ ) was 1.091 and Pielou’s evenness index ( $J^x$ ) was 0.847.

**Table 3:** Values of diversity indices for Meloidae family fauna recorded from the study area from January 2021 to December 2022.

Diversity measures	2021	2022	2021-22
Shannon-weiner diversity index ( $H^x$ )	1.434	1.503	1.518
Simpson index ( $D^x$ )	0.261	0.240	0.245
Margalef’s richness index ( $M^x$ )	1.045	1.012	1.091
Pielou’s evenness index ( $J^x$ )	0.890	0.933	0.847



**Photo Plate2:** Family-Meloidae

## Discussion

The present study, conducted from January 2021 to December 2022 across four selected sites in the Jhunjhunu district, documented a total of five species of blister beetles (family: *Meloidae*) belonging to four genera under the subfamily *Meloinae*. Among these, the genus *Mylabris* emerged as both the most species-rich and the most abundant, with *Mylabris pustulata* and *M. cichorii* accounting for the highest individual counts. The consistent dominance of *Mylabris* in terms of both richness and abundance across both years of the study underscores its ecological adaptability and potential resilience to the agro-climatic conditions of this arid region.

In the first year (2021), *Mylabris* represented 60.86% of all individuals recorded, followed by *Hycleus* (28.26%) and *Epicauta* (10.86%). A similar pattern was observed in 2022, where *Mylabris* again dominated (59.61%), with notable appearances of *Pyrota* (7.69%), which had not been recorded in the previous year. The detection of *Pyrota* in the second year may suggest a recent colonization, a shift in habitat suitability, or improved sampling accuracy, and merits further ecological monitoring (Triplehorn and Johnson, 2005)<sup>[7]</sup>.

Cumulatively, across both years, *Mylabris* accounted for 60.20% of all individuals sampled, reinforcing its ecological dominance. The genus's prevalence may be attributed to traits commonly observed in *Meloidae*, such as a broad host range, high reproductive potential, and larval hypermetamorphosis, which confer adaptive advantages in fluctuating environments (Selander, 1986).

Diversity indices calculated over the study period offer additional insights into community structure. The Shannon-Weiner index ( $H_x = 1.518$ ) reflects moderate species diversity, while the Simpson index ( $D_x = 0.245$ ) indicates the presence of dominant taxa—primarily *Mylabris*. Margalef's richness index ( $M_x = 1.091$ ) points to low to moderate species richness, a characteristic consistent with arid and semi-arid ecosystems such as that of Jhunjhunu (Magurran, 2004)<sup>[5]</sup>. The relatively high Pielou's evenness index ( $J_x = 0.847$ ) suggests a moderate level of evenness, though the dominance of *Mylabris* skews the distribution.

The limited fluctuation in genus-level composition across the two years suggests temporal stability within the *Meloidae* community. The emergence of *Pyrota* in the second year, however, may indicate dynamic changes within the local fauna, such as expansion of range or niche exploitation. Such occurrences are consistent with the sporadic and sometimes ephemeral distribution patterns observed in blister beetles across regions (Bologna and Pinto, 2001)<sup>[4]</sup>.

## Conclusion

The family *Meloidae* (blister beetles) played a complex and dual role in agriculture, being both pests and beneficial biological control agents. Adult blister beetles, particularly species from the genera *Mylabris*, *Hycleus*, and *Epicauta*, fed on the foliage, flowers, and reproductive parts of various cultivated crops. Their feeding caused significant economic losses, particularly in leguminous crops, solanaceous vegetables, and cereals. While adults were often phytophagous, the larvae of many *Meloidae* species were predatory, particularly on the eggs of grasshoppers, locusts, and sometimes bee nests. Blister beetles also held ecological importance due to their complex life cycle (hypermetamorphosis) and unique chemical defence mechanisms

(cantharidin). These aspects made them valuable for entomological, toxicological, and pharmacological research.

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