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Study of butterfly diversity with two new records of butterflies from Lalsot area of Dausa district Rajasthan

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Abstract
A study on butterfly diversity was carried out in sub division Lalsot district Dausa of Rajasthan, India. Following selected two sites in the study area for the surveyed of butterflies namely Meda bheruji and Pancheswar mahadev lalsot a total of 3258 individuals and 39 species of butterfly belong to 5 families were recorded during the study period. The present communication is based on the sightings of two new butterflies viz., recorded for the first time in the state of Rajasthan and represents one of the unique ecosystems in terms of species diversity and species richness.

Keywords: lepidoptera, Aravali range, Lalsot, Dausa, Rajasthan

Introduction

The Aravalli range in Rajasthan acts as a barrier between the Thar Desert and the eastern rajasthan. So as to prevent the desert from spreading to the eastern parts of the rajasthan where one of the town lalsot situated in distric Dausa. Dausa district is located in the eastern part of Rajasthan. It is bounded in the north by Alwar district, in the east Bharatpur district, south by SawaiMadhopur and Karauli districts and Jaipur district in the west. It Coordinates 26.56°N 76.32°E. The district is drained by three important rivers and the district falls within the three corresponding river basins namely 'Banganga River Basin' in northern part, 'Banas River Basin' in southern part, and 'Gambhir River Basin' is in lower eastern part. The general topographic average elevation in the lalsot is 298.0 m above mean sea level.

More than 17000 species of butterfly are found all over world of these India is home to about 1504 species of butterfly which constitute 65% of total Indian fauna. Various ecosystems of our country support different species of butterfly. Butterflies are highly reactive and respond to slightest changes in their habitat. Hence the conservation of habitats and butterflies must be given priority (Sidhu; 2011). Among insects, butterflies are ideal subject for ecological studies of landscapes *(Thomas and Malorie 1985),* and their value as indicators of biotope quality is being increasingly recognized because of their sensitivity to minor changes in micro-habitat in, light levels (*Kremen 1992*) [5]. Many of butterfly species are strictly seasonal and prefer only a particular set of habitats (*Kunte, 1997*) [6] and they are good indicators in terms of anthropogenic disturbance and habitat quality (Kocher and Williams, 2000) [4]. These were highly adapted to particular habitats and it is neglected by many ecologists. Being good indicators of climatic conditions as well as seasonal and ecological changes, they can serve in formulating strategies for conservation. It is hence encouraging that butterflies are now being included in biodiversity studies and biodiversity conservation prioritization programmes (*Gadgil* 1996). Increases in human population combined with advances in technology have directly subjected in the ecosystems of the world to many changes and leads to decline in the habitats of many species. *Kunte et al*. (2012) [7] indicated that India harbored total1504 of butterfly species which accounted 8.74% of the world's butterfly.

The forests are lost at higher rate in Asia (Sodhi et al., 2010) due to logging (Lambert & Collar, 2002) agricultural (*Koh & Wilcove*, 2008) even endemic regions (*Sodhi et al*., 2010). Effects in diversity if vertebrates (e.g., *Chiarello,* 1999; *Stouffer et al*., 2006) to smaller ratio on insects (e.g., *Didham et al*., 1996). Climatic change affects the diversity of species and is expected to exacerbate the ecosystems (*Scott and Lemieux,* 2005) [12]. The changes in parameters of temperature, rainfall patterns, and extreme weather conditions such as heat waves, prolonged drought or excessive rainfall, have to be taken into consideration.

Depletion of nectar and desiccation of host plants cause direct mortality and induce migratory behavior. In many regions of the world, Lepidoptera are widely accepted as ecological indicators of ecosystem health (*Rosenberg et al*., 1986; *New et al*., 1995; *Beccaloni and Gaston, 1995; Oostermeijer and Van Swaay, 1998)* [11, 8, 1, 9], *and meet a number* of criteria set forth by *Hilty and Merenlender* (2000) [2]. Their behavioral aspects towards light, temperature, and habitat requirements have been quantitatively assessed (*Warren*, 1985; *Thomas and Harrison*, 1992; Oostermeijer and Swaay, 1998; Pollard et al., 1998) [17, 14, 9, 10]. Considering the importance of butterflies as pollinators in natural ecosystem and role in development of new science. The present study were undertaken to explore and document the butterfly fauna of lalsot district dausa rajasthan.

Materials and Methods

Species Identification

The species identification was done by consulting the pictorial field guides, catalogues and keys (*Evans, 1927; Varshney, 1983, 1993; Kunte, 2006; Pajni et al., 2006; Singh, 2010; Varshney and Smetacek, 2015; Kehimkar, 2016*) [18, 15, 16, 3]. Collection was restricted to those

specimens that could not be identified directly. All the scientific names follow *Varshney, R K & Smetacek* P (2015) [15, 16] A Synoptic Catalogue of the Butterflies of India and common English names follow *Wynter-Blyth.* The study area was fully explored during the period from March 2020 to December 2020 (table no. 1).The study area was visited twice in each season during above period.

The Study Area

Meda bheruji and pancheswar mahadev hills and plane area of lalsot district Dausa rajasthan fall in Aravali range of eaestern rajasthan. Lalsot is located at 26.56 N 76.32 E has an average elevation of 298 metres (978 feet). Lies at the latitudes of 32.732998 and the longitudes of 76.329091and has an average elevation of 298m amsl.

The climate of lalsot During summer months of April, May and June the temperatures can rise to 34- 42 ˚Celsius; winter are typically cold with minimum temperatures during December and January falling to 6- 14 ˚Celsius. February and March, October and November are climatically the best months. The climate of Dausa is generally dry and is subject to extremeness of cold and heat at various places. The minimum and maximum temperatures in the district are 10 ºC and 42 ºC respectively. The plant diversity in this area is mixed type with herbs, shrubs and trees.

Despite the very rich diversity, the area remains less studied in the last few decades thus there is not natural history and ecological knowledge on the butterflies of lalsot.

Results and Discussion

During the transect sampling, we recorded a total of 2844 individuals belonging to 39 species of butterflies were observed during the study. Nymphalidae found to be the dominant family during all seasons. The table-1 shows the species abundance graph shows uneven distribution of butterfly species with few family species being abundant and many species are rare. A total number of 39 species of butterflies belonging to 5 families (Pieridae, Papilionide, Lycaenidae, Nymphalidae and Hesperiidae) were collected from the selected areas during the study period (February-March and September-October, 2020). The major number of butterflieas collected were from Meda bheruji and pancheswar mahadev area of lalsot. This region is spread over small hills and plains where shrubs and high trees and abundant flowering plants provide excellent shelter to the adult butterflies. Their larvae can easily find the host plants and the dense vegetation provide excellent shelter to the adult butterflies. During the study, it was found that the dominating family of butterflies was of Family Lycaenidae commonly called as the gossamer-winged butterfly with 15 species followed Nymphalidae which is commonly known as brush-footed butterflies or four footed butterflies with 9 species, Peridae with 8 species, Hesperiidae with 5 species and least number of species was found from the family Papilionidae with only 2 species. The number of species identified under family Pieridae and Lycaenidae were eight respectively, while fifteen species belonged to this family, which accounted for around 61% of the species richness. And the abundance species richness more in Lycaenidae, Nymphalidae**,** and Pieridae families during the study period which may be due to the availability of host plant.

The present study is the first of this type of study in the area. Therefore, it is very difficult to say whether the diversity of butterflies in the area is increasing or decreasing. Therefore, it is suggested that the area under the study should be continuously monitored to observe any change in the discovery of butterflies, because the changes in the diversity can only observed through continuous monitoring and comparing the data of every year. As the district was undergoing urbanizing many new residential colonies were getting established. Establishing residential colonies means cutting of trees and other supporting plants for shelter of butterflies, in turn increasing pollution, soil erosion etc. All these factors add up destruct the natural habitat. Despite the dry weather of lalsot district dausa, occurrence of 39 species was a vital sign of healthy biodiversity. In order to maintain and further enhance this picture it is necessary to conserve the biodiversity for achieving sustainable development. There is no work being done in subdivision lalsot on butterfly diversity and if it is done it is not yet published hence this work is a pioneer work on butterflies of lalsot district Dausa. The purpose of generation of a authentic checklist of butterflies has been done successfully. There are about 39 butterflies species of the 5 family belonging to the sub divison lalsot. The family Lycaenidae is a diverse one and most abundant among all other families.

Table 1: List of butterfly species and their abundance recorded in study area lalsot.

S.no.	Family	Name	Common name	Abundance
1	Pieridae	*Catopsilia pyranthe*	Mottled emigrant	300
2.	Pieridae	*Terias hecabe (Linnaeus)*	Common grass yellow	210
3.	Pieridae	*Catopsilia pomona*	Common emigrant	250
4.	Pieridae	*Anaphaeis aurota (Febricius)*	Pioneer	10
5.	Pieridae	*Ixias pyrene*	Yellow orange tip	20
6.	Pieridae	*Clotis aura*	Plane orange tip	15
7.	Pieridae	*Colotis danae*	Crimson tip	15
8.	Pieridae	*Anthocharis cardomines*	White orange tip	20
9.	Nymphalidae	*Junonia lemonias*	Lemon pansy	180
10.	Nymphalidae	*Junonia almona*	Peacock pansy	35
11.	Nymphalidae	*Danaus chrysippus (Linnaeus)*	Plain tiger	75
12.	Nymphalidae	*Telchinia violae (Febricius)*	Tawny coster	36
13.	Nymphalidae	*Phalanta phalanta*	Common leopard	20
14.	Nymphalidae	*Hypolimnas bolina*	Great eggfly	35
15.	Nymphalidae	*Hypolimnas misppus*	Danaid eggfly	30
16.	Nymphalidae	*Junonia orithya*	Blue pansy	65
17.	Nymphalidae	*Junonia hierta*	Yellow pansy	70
18.	Lycaenidae	*Chilades lajus*	Lime blue	67
19.	Lycaenidae	*Chilades trochylus*	Grass jewel	55

20.	Lycaenidae	*Zizeeria karsandra*	Dark glass blue	65
21.	Lycaenidae	*Tarucus indika*	Indian pierrot	120
22.	Lycaenidae	*Catochrysops strabo*	Forget-me-not	208
23.	Lycaenidae	*Tarucus nara*	Striped pierrot	75
24.	Lycaenidae	*Euchrysops cnejus*	Gram blue	90
25.	Lycaenidae	*Freyeria putil*	Black spotted grass jewel	73
26.	Lycaenidae	*Zizeeria karsandra*	Dark grass blue	79
27.	Lycaenidae	*Zizula hylax*	Tyni grass blue	80
28.	Lycaenidae	*Zizinz otis*	Lesser grass blue	56
29.	Lycaenidae	*Tarucus balkanicus*	Balkan pierrot	73
30.	Lycaenidae	*Polyommatus icarus*	Common blue	160
31	Lycaenidae	*Leptotes plinius*	Zebra blue	25
32	Lycaenidae	*Spindasis ictis*	Common Shot Silverline	10
33.	Hesperiidae	*Hasora chromus*	Common banded awl	55
34.	Hesperiidae	*Gegenes nostrodamus*	Dingy swift	10
35.	Hesperiidae	*Sarangesa purendra*	Spotted small flat	326
36.	Hesperiidae	*Brbo cinnara*	Rice swift	25
37.	Hesperiidae	*Pleopidas mathias*	Small branded swift	25
38.	Pepilionidae	*Papiliodemoleus*	lime	120
39.	Pepilionidae	*Pachliopta aristolochiae*	Common rose	75

Conclusion

The first record of these two new species Gegenes nostrodamous and Sarangesa purendra in lalsot rajasthan clearly depicts the rich diversity of butterflies in meda bheruji Aravali hill lalsot district dausa. Which is still lying unexplored. These records identify good butterfly localities, elevations and habitat types in lalsot district dausa where more thorough surveys and monitoring efforts are needed.

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