

# **RESEARCH ARTICLE**

# STUDIES ON THE DIVERSITY, ABUNDANCE AND SEASONAL VARIATION OF BUTTERFLIES, IN AND IN AND AROUND THE DALMA WILDLIFE SANCTUARY JHARKHAND, INDIA

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#### Manuscript Info

#### Abstract

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*Key words:-*Diversity, Butterflies, Dalma Wildlife Sanctuary, Bio Indicator Butterflies are the most important biota of the class Insecta, belonging to the order Lepidoptera. They are very sensitive and are severely affected by the slightest variations in the environment. They form Butterflies have large, often brightly coloured and conspicuous wings used for fluttering type of flight. They form an important part of food chain and are good bio-indicators for evaluation of habitat change and variations in landscape structures The objective of the present survey is focussed on the assessment of the diversity and seasonal abundance of butterfly with vegetation composition of habitat and conservation priorities in the study area. The diversity of butterfly species of Dalma Wildlife Sanctuary during the study period which were conducted for one year (November 2018 to October 2019) a total of of 50 butterfly species belonging to 28 genera and Five families. Represented by 50 species followed by Papilionidae (8), Pieridae (10), Lycaenidae (12), Nymphalidae (17) and Hesperiidae (3) Among all the individual Papilionidae contains 16%, Pieridae 20 % Lycaenidae 24% Nymphalidae 34 % and Hesperiidae 6%. This field work represent 20 species are Wide spread, 15 species are Common, 7 species found in Occasional and 8 species are Rare. The field study shows most of the butterfly active in the Monsoon and the Post Monsoon season, few members are active during winter. Monsoon represent 28 number of species, post monsoon contain 28 species Where in 18 species observe in summer, we notice 10 species in winter.

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#### **Introduction:-**

Butterflies are one of the most important assemblages of insects that act as biodiversity indicators as well as nature's gardeners. Owing to habitat destruction for developmental activities in urban environment and unscientific management of natural resources, much of our native butterflies are fast disappearing and at present, their survival is under threat. Arthropods are good indicators of habitats biodiversity because they respond quickly to environmental changes, and are highly diverse taxon. Lepidoptera (butterflies and moths) are the second largest order of arthropods and are most easily identified, making them particularly useful for biodiversity survey. Butterflies occur in a wide range of situations but are particularly characteristics of humid tropical forests, in which the known species occur. Two important aspect of diversity are species richness and relative abundance of individuals. Species richness is a critical variable in conservation planning and natural resource management. Biologists around the globe are facing

particularly great conservation challenges under the mounting threats of anthropogenic disturbances to biodiversity. Moreover, holistic inventory of diversity requires nearly impossible levels of time and effort. Consequently insects remain mostly undiscovered and are frequently omitted from conservation assessments. Butterflies are generally regarded as one of the best taxonomically studied group of insects. Worldwide there are more than 28,000 species of butterflies, with about 80 percent found in tropical regions. The Indian subcontinent bearing a diverse terrain, climate and vegetation hosts about 1,504 species of butterflies. Butterflies enable sustenance of ecosystem services through their role in pollination and serving as important food chain components. Being potential pollinating agents of their nectar plants as well as indicators of the health and quality of their host plants and the ecosystem as a whole, exploration of butterfly fauna thus becomes important in identifying and preserving potential habitats under threat. They are always used to monitor indication of climate change and environment degradation. Like other animals now butterflies are also studied as living ecological components. Butterflies are sensitive biota, which get severely affected by environmental variations and changes in habitat structure They form an important part of the food chain in the nature and also respond to disturbances and changes in the habitat quality and landscape structure variation. Butterflies and their caterpillars are dependent on specific host plants for food, thus the diversity of butterflies indirectly reflects the overall plant diversity especially that of shrubs and herbs in the given area There is a need to study community structure and dynamic group of lepidopterran's with respect to different regions of our country to know the impact of changing natural habitats on diversity and distribution of butterflies.

#### Study Area:

Dalma Wildlife Sanctuary (22.8966° N, 86.2061° E) is located 10 km from the city of Jamshedpur in the Indian state of Jharkhand. It was inaugurated by Sanjay Gandhi in 1975. It is a notable wild life Sanctuary and contains significant population of Indian Elephants .Dalma Wildlife Sanctuary is situated around the Dalma Hills , Dalma Wildlife Sanctuary is a much larger area starting from Chandil to 40 km east. The sanctuary covers around 195 km<sup>2</sup>. It is about 100 km from the capital city Ranchi ,, and 15 km from the steel city Jamshedpur. The wildlife sanctuary runs parallel to the NH-33 with hills as high as 915 ft. from sea level. Dalma Sanctuary is spread over 193 sq km of forests of East Singhbhum and Saraikela-kharsawan districts of the state of Jharkhand. The forests of Dalma come under the category "Dry peninsular Sal" and "Northern Dry Mixed Deciduous forest . ". Most part of Dalma forests shed leaves in thesummer and attains its full bloom at the onset of monsoon .



Study AreaDalma Wildlife Sanctuary.

## Materials and Methods:-

#### Materials & Requirements:-

#### Point & Shoot Digital Cameras by Nikon:-

Expand the boundaries of everyday photography with the 16-megapixel COOLPIX B500, fitted with a high performance 40x optical zoom and 80x Dynamic Fine Zoom. A point-and-shoot camera, also known as compact camera, is a Still Camera designed primarily for simple operation.

#### Olympus Binocular 10x50 dps-1:-

The Olympus  $10\times50$  DPS I Binoculars are the perfect combination of high quality, endurance, 10 times optical power and affordabilityOlympus  $10\times50$  DPS I Binoculars are also work well for all outdoor activities including bird-watching, hiking or other sporting events.

#### **GPS Navigation Machine:-**

A GPS navigation device, GPS receiver, or simply GPS is a device that is capable of receiving information from GPS satellites and then to calculate the device's geographical position. Using suitable software, the device may display the position on a map, and it may offer directions. A GPS device can retrieve from the GPS system location and time information in all weather conditions, anywhere on or near the Earth.

#### The Book of Indian Butterflies:-

The Book of Indian Butterflies describes 734 species of butterflies that commonly occur in the Indian subcontinent. The book also includes color photographs showing the life history of different butterfly groups and their adaptation techniques. Besides highlighting the rich biodiversity of India's butterfly fauna.

#### Methods of data collection

The butterflies were observed and recorded directly in the field. A combination of direct search technique (Sutherland 1996) and opportunistic sighting methods were applied for the present study which were conducted for two consecutive years (November 2017 to October 2019) to record butterfly diversity and abundance. Observations were made at a frequency of twice a month for each study area (a total of 48 samples from each study site) involving different habitat types. Line transect count method according to Kunte (2000) were followed to find the butterfly abundance. The transects were fixed in the routes along the paths once in a week covering a section of 50 meter around a radius of 5 meter front from the observer and 2.5m on my either sides. Observations were made between 06.30hr and 16.30hr during periods of good weather (no heavy rain or strong winds). This timing was found ideal based on preliminary observations done during different times of the day in the study sites. Butterflies were photographed using digital camera 16-megapixel COOLPIX B500, fitted with a high performance 40x optical zoom and 80x Dynamic Fine Zoom and identified using suitable keys (Evans 1932; Wynter-Blyth 1957; Haribal 1992; Kunte 2000; Kehimkar 2008). Appropriate precautions were taken to ensure that the scales present on the wings of the butterflies were minimally affected. Photographs were preserved for taxonomic documentation. During each sampling, efforts were made to list the encounter frequencies of different butterfly species from different sampling sites. The observed butterflies were categorized under four groups on the basis of their abundance in the study area as W - Wide spread (75-100 sightings), C - Common (50-75 sightings), O - Occasional (25-50 sightings), R -Rare (1-25 sightings),) The diversity indices and evenness were worked out by following Shannon-Wienner diversity index. The diversity indices and evenness were worked out by following Shannon-Wienner diversity index. One complete year was divided into four seasons-), (1) summer (March to May), (2) monsoon (June to August), (3) post-monsoon (September to November), and (4) winter (December to February). Data of same season for the two successive years were accumulated for season wise analysis of the data. The data analysis was carried out using Microsoft Office Excel, 2010.

# **Results and Discussion:-**

The diversity of butterfly species of Dalma Wildlife Sanctuary during the study period which were conducted forone year (November 2018 to October 2019) a total of of 50 butterfly species belonging to 28 genera and Five families. Represented by 50 species followed by Papilionidae (8), Pieridae (10), Lycaenidae (12), Nymphalidae (17) and Hesperiidae (3) Among all the individual Papilionidae contains 16%, Pieridae 20 % Lycaenidae 24% Nymphalidae 34 % and Hesperiidae 6%. This field work represent 20 species are Wide spread, 15 species are Common, 7 species found in Occasional and 8 species are Rare. The field study shows most of the butterfly active in the Monsoon and the Post Monsoon season, few members are active during winter. Monsoon represent 28 number of

species, post monsoon contain 28 species Where in 18 species observe in summer, we notice 10 species in winter. An abundance and seasonal variation containing common and scientific names along with season of sighting and encounter frequencies of each species are presented in Table . No. 1 Family wise NO of species, percentage of Butterfly Diversity of Joypur Forest represent in table No.- 2

Sl. No.	Common Name	Scientific Name	Family	Season	Status
1.	Common Lime	Papiliodemoleus (Linnaeus,1758)	Papilionidae	S	С
2.	Common Mormon	Papiliopolytes (Linnaeus,1758)	Papilionidae	S,M,PM	С
3.	Blue Mormon	Papiliopolymnester (Cramer, 1775)	Papilionidae	M,PM	С
4.	Common Jay	Graphiumdoson (Felder& Felder, 1864)	Papilionidae	M, PM,W	W
5.	Common Rose	Pachlioptaaristolochiae(Fabricius, 1775)	Papilionidae	S	W
6.	Five-bar Swordtail	Graphiumantiphates (Cramer, 1775)	Papilionidae	PM,W	R
7.	Spot Swordtail	Graphiumnomius (Esper, 1799)	Papilionidae	S	0
8.	Tailed Jay	Graphiumagamemnon (Linnaeus 1758)	Papilionidae	M,PM	W
9.	Common grass yellow	Euremahecabe(Linnaeus)	Pieridae	M, PM,W	W
10.	Psyche	Leptosianina(Fabricius)	Pieridae	M, PM,	0
11.	Common jezebel	Delias eucharis (Drury)	Pieridae	S,M, PM,	С
12.	Striped albatross	Appiaslibythea(Fabricius)	Pieridae	S ,M, PM,W	R
13.	Mottled emigrant	Catopsiliapyranthe(Linnaeus)	Pieridae	W	С
14.	Common emigrant	Catopsiliapomona(Fabricius)	Pieridae	S ,M, PM,W	W
15.	Yellow orange tip	Ixias pyrene (Linnaeus)	Pieridae	M,PM,	0
16.	Striped albatross	Appiasolferna (Linnaeus)	Pieridae	S ,M, P	W
17.	Indian cabbage white	Pieris canidia(Sparrman)	Pieridae	PM, W	0
18.	Three spot grass yellow	Euremablanda(Boisduval)	Pieridae	M, PM, W	С
19.	Long-banded silverline	Spindasislohita (Horsfield)	Lycaenidae	W	R
20.	Common pierrot	Castaliusrosimon(Fabricius)	Lycaenidae	W	С
21.	Plains cupid	Chiladespandava(Horsfield)	Lycaenidae	M, PM, W	0
22.	Tiny grass blue	Zizulahylax(Fabricius)	Lycaenidae	M, PM, W	R
23.	Lesser Grass Blue	Zizinaotis (Fabricius)	Lycaenidae	M, PM, W	С
24.	Common Silverline	Spindasisvulcanus(Fabricius)	Lycaenidae	W	W
25.	Dark grass blue	Zizeeriakarsandra(Moore)	Lycaenidae	S, M, PM, W	W
26	Pale grass blue	Pseudozizeeriamaha(Kollar)	Lycaenidae	M, PM, W	С
27.	Apefly	Spalgisepius(Westwood)	Lycaenidae	PM, W	С
28.	Tailless lineblue	Prosotasdubiosa indica ( Evans)	Lycaenidae	M, PM, W	C
29.	Forget-me-	Catochrysopsstrabo(Fabricius)	Lycaenidae	S ,M,	W

Table No. 1:- Butterfly Diversity of Dalma Wildlife Sanctuary.

	not			PM,W	
30.	Gram blue	Euchrysopscnejus(Fabricius)	Lycaenidae	M, PM, W	R
31.	Blue pansy	Junoniaorithiya(Linnaeus)	Nymphalidae	M,PM	W
32.	Commander	Moduzaprocris(Cramer)	Nymphalidae	M, PM, W	0
33.	Striped tiger	Danaus genutia(Cramer)	Nymphalidae	M, PM, W	С
34.	Common castor	Ariadne merione(Cramer)	Nymphalidae	W	W
35.	Common palmfly	Elymniashypermnestra(Linnaeus)	Nymphalidae	W	С
36.	Grey pansy	Junoniaatlites(Linnaeus)	Nymphalidae	PM, W	С
37.	Lemon pansy	Junonialemonias(Linnaeus)	Nymphalidae	PM, W	R
38.	Common crow	Euploea core (Cramer)	Nymphalidae	W	W
39.	Plain tiger	Danaus chrysippus(Linnaeus)	Nymphalidae	W	W
40.	Common	Mycalesisperseus(Fabricius)	Nymphalidae	W	W
	bushbrown				
41.	Peacock pansy	Junoniaalmana(Linnaeus)	Nymphalidae	W	W
42.	Common baron	Euthaliaaconthea(Cramer)	Nymphalidae	S ,M,	W
				PM,W	
43.	Blue tiger	Tirumala limniace(Cramer)	Nymphalidae	PM, W	W
44.	Common fourring	Ypthimahuebneri	Nymphalidae	S ,M,	W
		( Kirby)		PM,W	
45.	Common evening	Melanitisleda(Linnaeus)	Nymphalidae	S ,M,	W
	brown			PM,W	
46.	Common fivering	Ypthimabaldus(Fabricius)	Nymphalidae	PM, W	W
47.	Chestnut-streaked	Neptisjumbah (Moore)	Nymphalidae	PM, W	0
	sailer				
48.	Small branded	Pelopidas mathias(Fabricius)	Hesperiidae	PM	С
	swift				
49.	Brown Awl	Badamia	Hesperiidae	M ,PM	R
		exclamationis(Fabricius)			
50.	Common Snow Flat	Tagiadesjapetus	Hesperiidae	M ,PM	R
		(Stoll)			

W - Wide spread, C - Common, O -Occasional , R - Rare S-Summer, M-Monsoon, PM-Post Monsoon, W-Winter.

Table No.2:-Family wise Butterf	ly Diversity of Dalma	Wildlife Sanctuary
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Sl.No.	Family	Species Number	Butterfly Percentage
1	Papilionidae	8	16
2	Pieridae	10	20
3	Lycaenidae	12	24
4	Nymphalidae	17	34
5	Hesperiidae	3	6



**Fig.:-**Family wise Butterfly Percentage.





Fig:- Graphical representation the seasonal variation of butterfly species of Dalma Wildlife Sanctuary.







Zizinaotis(Lycaenidae )Zizeeriakarsandra(Lycaenidae ) Castaliusrosimon(Lycaenidae )



Elymniashypermnestra(Nymphalidae) Pelopidas mathias(Hesperiidae)

Abisarabifasciata(Riodinidae).

# **Conclusion:-**

Butterflies are one of the most important assemblages of insects that act as biodiversity indicators as well as nature's gardeners. Owing to habitat destruction for developmental activities in urban environment and unscientific management of natural resources, much of our native butterflies are fast disappearing and at present, their survival is under threat. The presence of high number of bio-indicator species represents the unpolluted and healthy environment. Conservation of the natural resources may be helpful for the survival of many of the butterfly species. In order to protect the diversity, proper conservation strategies may be followed. The survey was undertaken for only one year, hence Further samplings are necessary to confirm the butterflies species diversity and also richness. In fact, the study area may be with some endemic and protected species. Therefore, further investigation required on the biodiversity of this region covering more study areas may that's may generate awareness among the local people and government authorities to save wildlife and their habitats.

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