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Insect Diversity in the Shahuwadi Tahsil of Western Ghat

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ABSTRACT: The Western Ghats are well known Global hot spot of biodiversity. Insects are incredible ancient group of creatures that have dominated all other terrestrial animals. They play an important role to balance life within ecosystem. butterflies recorded from Western Ghats, 213 in Maharashtra, of which 40 species of butterflies found in this study region. As Arthropods, butterflies are members of the second biggest order in the class Insecta, the Lepidoptera order. There are over 1,50,000 species of moths and butterflies in the Order Lepidoptera. Moths and butterflies are fairly similar to one another, yet there are some surface differences. During the day, most butterflies fly, as When basking and feeding, they prefer the warmth of the sun, while most moths take to the air after sunset. Butterflies are significant creatures. They serve as both an excellent indicator and pollinator. Butterflies exhibit high sensitivity to alterations in their surroundings and human activity.

KEYWORDS:- Butterfly diversity, Western Ghat, Shahuwadi Tehsil, Lepidoptera

I. INTRODUCTION

Biodiversity can be described as the richness and diversity of all life on earth. It is not just about the individual species, but also about the diversity of ecosystems, species and genes, and the relationship between them. Insects are the world's most diverse group of animals, making up more than 58 per cent of the known global biodiversity (Foottit and Adler, 2009) which make them one of the major ecological and evolutionary radiations on Earth (Condamine et al., 2016).They evolved into a hyper-diverse fauna (Grimaldi and Engel, 2005) and inhabit all habitat types and play major roles in the function and stability of terrestrial and aquatic ecosystems (Foottit and Adler, 2009) because of great diversity of life forms and developmental strategies (Grimaldi and Engel, 2005). Insect diversity in India is characterized by high level of endemism at the generic level as well as the species level.

Kolhapur district shows three distinct parts viz, Eastern ranges, Central ranges and Southern ranges. Eastern and Southern ranges have black soil while, Western ranges are mostly hilly and have red soil and mostly with thick forest coverage. The district receives the rainfall from 700 –6000 mm. From Western Ghats, eastwardly flowing rivers refer to Panchaganga, Vedganga, Bhogavati, Hiranyankeshi and Ghataprabha. Kolhapur districts is having 12 Tahsils out of which Shahuwadi have been selected for diversity, abundance and distribution. Since, Kolhapur is considered to be one of the richest centres of biodiversity in the Maharashtra. The current study conducted in Sahuwadi Tahsil which is the part of Western Ghats (Sahyadri Mountain Ranges) to know the diversity of insects an important factor to balance the ecosystem.

II. MATERIAL AND METHODS

Collection of Insects:

The Study comprised field work, was carried out from 2020 to 2023 to explore the diversity of the study area, survey and collect insect fauna from selected habitats. An 8×40 (magnification × lens diameter) binocular was used to observe Insects. The findings presented here are based on random survey and observations were made from morning 9am to evening 5.30pm (At the time of dusk). The insects were collected by netting, hand picking and trapping. The insect preservation was avoided. Insects were identified using field guide to Insects (Borror and White, 1970; Picker, 2012). The recorded species were listed according to the classification by Westwood,(1838) and Mani (1974). Study area: Waterbody Region, Forest Region, Agricultural Region, Hilly Region and Grass Region. Data collection was done through observation and by taking photographs of insects and their habitats using a good-quality camera. No insects were killed; however, naturally dead insects were collected. The collected specimens have been preserved in 70% alcohol. The collected data was studied for Shannon's Diversity Index (H) and Simpson's Dominance Index (D), which study diversity, species richness, and evenness.

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III. RESULTS

In the study region, which included a total of 341 species of insects belonging to 16 orders. As a part of the largest group of the animal kingdom, total 16 orders were reported from study area, that are Hymenoptera, Diptera, Lepidoptera, Hemiptera, Coleoptera, Dermaptera, Tricoptera, Embioptera, Zygentoma, Mantodea, Ephemeroptera, Neuroptera, Orthoptera, Blattodea, Coleoptera and Odonata. Five orders of insects stand out in their levels of species richness that are Hymenoptera, Diptera, Lepidoptera, Hemiptera, and Coleoptera. Diversity of insects showed variation according to the habitat. The total number of insects recorded and the percentage of insect's orders were presented in **Table 1 and 2** below.

Table 1: Total number of insects and the percentage of Insect's in the Study area Sahuwadi

Sr. No.	Insect Order	Total (Approx.)	Percentage
1	Waterbody Region	36	10.55
2	Forest Region	72	21.11
3	Agricultural Region	78	22.87
4	Hilly Region	68	19.94
5	Grass Region	87	25.51
6	Overall insects recorded	341	100%

Table 2: Total number of insects and the percentage of Insect's order in the Study area

Sr. No.	Insect Order	Total (Approx.)	Percentage
1	Coleoptera	39	13.43%
2	Dermaptera	05	1.11%
3	Diptera	54	14.92%
4	Hemiptera	32	13.05%
5	Hymenoptera	25	10.07%
6	Lepidoptera	51	17.91%
7	Mantodae	18	7.08%
8	Odonata	32	10.82%
9	Orthoptera	34	11.56%

Table 3: Relative abundance and **Shannon-Wiener Index Diversity (H')** in the study Area Sahuwadi. The diversity index was calculated by using the Shannon – Wiener diversity index (1949).

Sr. No.	Insect Region	n	Relative abundance (Pi)	ln "Pi"	Pi*ln (Pi)
1	Waterbody Region	36	0.1055	-2.2490	-0.2372
2	Forest Region	72	0.2111	-1.5554	-0.3283
3	Agricultural Region	78	0.2287	-1.4753	-0.3374
4	Hilly Region	68	0.1994	-1.6124	-0.3215
5	Grass Region	87	0.2551	-1.3660	-0.3484
6	No. of Individuals (N)	341			
7	Species richness	5			
8	Shannon-Wiener Index of Diversity (H')	1.5728			

Table 4: Relative abundance and **Simpan Index** in the study Area Sahuwadi.

Sr. No.	Insect Region	n	Relative abundance (Pi)	Pi^2
1	Waterbody Region	36	0.1055	0.0111
2	Forest Region	72	0.2111	0.0445
3	Agricultural Region	78	0.2287	0.0523
4	Hilly Region	68	0.1994	0.0397
5	Grass Region	87	0.2551	0.0650
6	No. of Individuals (N)	341		
7	Species richness	5		
8	Simpan Index(d)	0.2126		

Table 5: Species Richness Index in the study Area Sahuwadi

Sr. No.	Insect Region	s	s-1	Species Richness Index d = s-1/LogN
1	Waterbody Region	36	35	6.0015
2	Forest Region	72	71	12.1746
3	Agricultural Region	78	77	13.2034
4	Hilly Region	68	67	11.4887
5	Grass Region	87	86	14.7467
6	No. of Individuals (N)	341		

IV. DISCUSSION

Great insect diversity is indeed an intrinsic part of the Earth's ecosystem. However, the insect fauna of India is vast. It's worth mentioning that the absolute numbers provided are an underestimate of the total diversity as many microhabitats were not sampled. Our results showed that were the Lepidoptera (17.91%) most dominant insects in Sahuwadi Tahsil followed by Diptera (14.92%), Coleoptera (13.43%) and Orthoptera (11.56%). Lepidoptera are commonly known as 'butterflies' and 'moths'. The various publications on Butterflies and Moths of India have been published by Wynter-Blyth (1957), Marshall and De Niceville (1882), Mathew and Rahamathulla, 1993, Tiple et al. 2006, Tiple et al. 2007, Tiple, 2012. Butterflies & moths important pollinators like bees. They also acts as bioindicators of ecosystem. The Coleoptera (beetles) are the largest single order of insects. Many beetles are regarded as major pests of agricultural plants and stored products. They attack all parts of living plants as well as processed fibers, grains, and wood products. Scavengers and wood boring beetles are useful as decomposers and recyclers of organic nutrients. Predatory species, such as lady beetles, are important biological control agents of aphids and scale insects. The Hemiptera is the largest group of insects, they are hemimetabolic insects (where the young look like wingless adults). There are at least 80,000 named species globally. Hemipterans are important as they are Dipterans are one of the major success's of the insect world, and the145,000 species (about 160 families) are reported. Dipterans (flies) have been of incredible importance to mankind all over the world, this is because many of the primary diseases of humanity are transmitted by flies.The Diptera are a very significant group in the decomposition and degradation of plant and animal matter. They are plays an important role in the breakdown and release of nutrients back into the soil. Odonates are primarily aquatic insects and their life history is closely linked to specific aquatic habitats. This habitat specificity makes them a good indicator of wetland health. India with its unique geography and diverse bioclimatic regions, support a rich Odonate fauna. Adult Odonates feed on mosquitoes, blackflies and other blood-sucking flies and act as an important biocontrol agent of these harmful insects In addition to the direct role of predators in ecosystem, their value as indicators of quality of the biotope is now being increasingly recognized. Hymenoptera is one of the most diverse orders of insects, including over 115,000 described species representing 84 families. Hymenoptera are not only diverse in terms of structure, size, and numbers of species, but also in their habits and life histories. Some are phytophagous (plantfeeding), while others are herbivorous, predatory, or even parasitic. Many Hymenoptera lead a solitary lifestyle, while some of the bees, ants, and wasps show some of the highest degrees of social organization of any animals. The other orders that were sighted in the Sanctuary included the Mantodae, Orthoptera and Dermaptera are also ecologically important as indicator species. Several groups of insects are known to exhibit and live in social

groups. This arrangement is beneficial to the faunal forms as they can create a better impact on the environment. The most well known social insect is the Honey bee that has a high economic importance. The honey bee can also indicate the productivity of the ecosystem. During the study, insects living in colonies representing three orders including Hymenoptera, dipteral and Hemiptera were observed.

The insect fauna has impacted the lives of a variety of plants and animals, both negatively and positively. Class Insects have played a very important role in all major and minor ecosystems. During the study period from 2020 to 2023, data on insect species was documented. A total of 341 species of insects were observed in the entire study region. The diversity of the insect species is high in Kolhapur district, and it shows species richness as well. The study region documented different insect species belonging to 18 orders. The insect diversity was highest in the monsoon season. It will also help in assessing vector-borne diseases in the region and protect economically important plants from potential pests.

This study will be helpful in conservation of important plant species in Sahuwadi Tahsil from insect pest also as we know the general function insects incorporate which includes soil aeration, pollination, and pest control, with the help of these tools and the products they make, humans have always been used insects for beneficiary purposes. Numerous projects such as nuclear power plants, orchards, farmhouses, etc. have led to the degradation of natural forests in the study region. Therefore, this study is crucial to establish a plan to increase the number of economically significant insect species and to conserve the diversity of insects. However, very little attention is paid on their diversity from Sahuwadi Tahsil, Maharashtra.

V. CONCLUSION

The biodiversity (diversity index, species abundance) of insect fauna is mainly due to the rich vegetation in this area as vegetation plays an important role for the existence of insect fauna in a community as it provides the main source of food etc. for insects.

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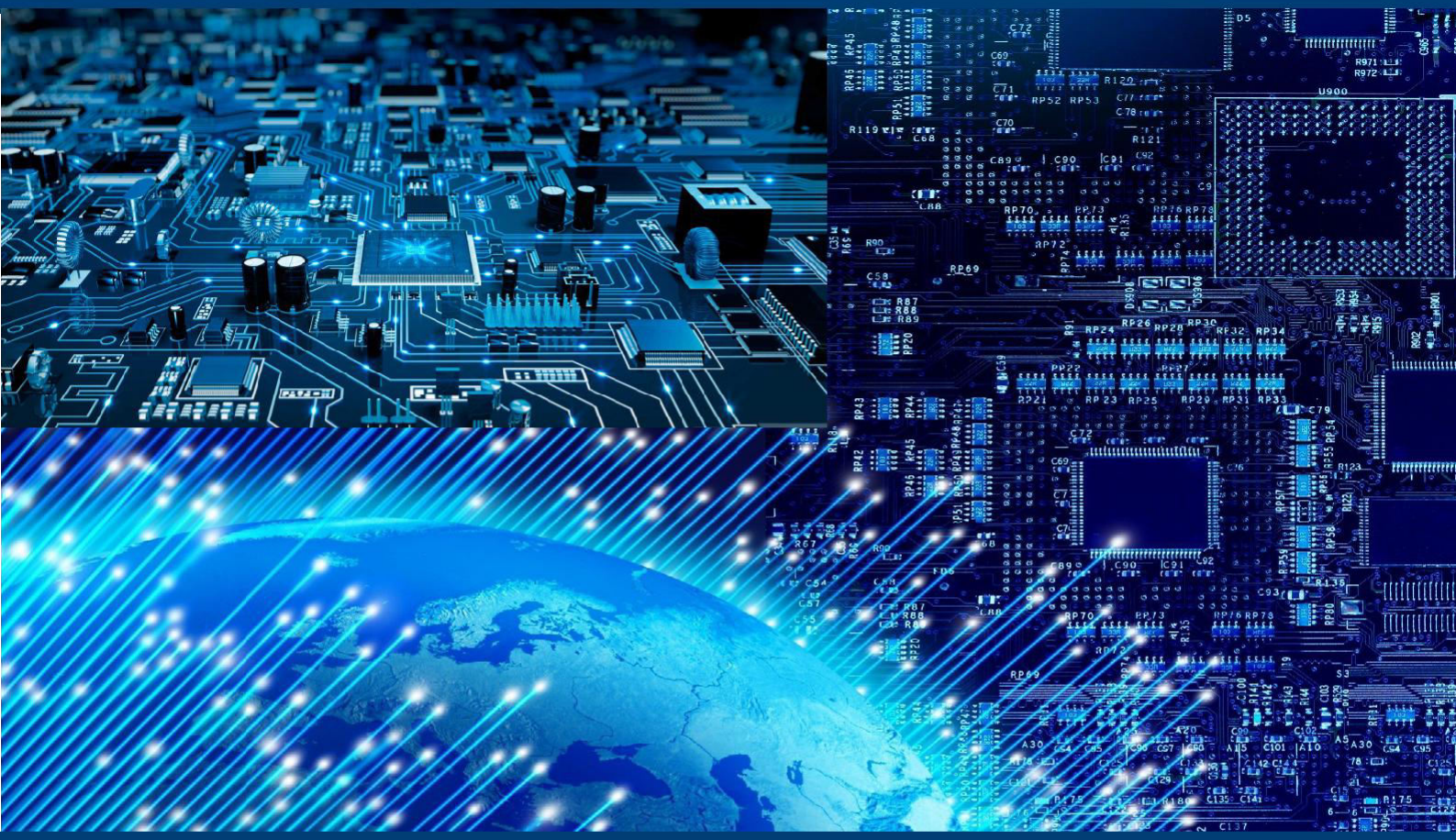

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