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Faunal diversity and habitat-wise distribution of insects in and around Dimbhe Dam, Maharashtra

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Abstract
The present study was carried out to investigate the insect faunal diversity and habitat-wise distribution of some insect orders in Dimbhe Dam and its surrounding area in Maharashtra. Insects are the most abundant and diverse group of organisms and play an important role in ecological balance as pollinators, predators, decomposers and bio-indicators of environmental health. The survey was conducted in three different habitats namely agricultural area, plant-rich area and residential area to understand the effect of habitat variation on insect diversity. The study was performed using photographic documentation during morning and evening hours, and insects were identified up to order and family level using standard identification guides. During the study, insects belonging to three orders — Lepidoptera, Hemiptera and Odonata — were recorded from all three sites. The results showed that insect distribution varied according to habitat conditions such as vegetation, moisture, availability of food and human disturbance. Residential area showed highest number of Lepidoptera due to artificial light and garden plants, while Odonata were more abundant in agricultural and plant-rich areas because of the presence of water and moist environment required for breeding. Hemiptera were found in all habitats showing wide adaptability. The study indicates that habitat type strongly affects insect diversity and provides baseline information useful for biodiversity assessment and conservation planning in the Dimbhe region.

Keywords: Insect diversity, habitat distribution, Lepidoptera, Hemiptera, Odonata, Dimbhe Dam, habitat variation, ecosystem, conservation

Introduction

Biodiversity refers to the variety of living organisms present in nature, including plants, animals, microorganisms, and the ecosystems they form (Wilson, 1987) [1]. It represents the complexity of life on Earth and the interactions among different biological components. Among all animal groups, insects are the most diverse and abundant organisms, occupying nearly every ecological niche (Chapman, 2013) [2]. They are found in a wide range of habitats such as forests, freshwater systems, agricultural lands, grasslands, and urban environments. Due to their immense diversity and distribution, insects play a crucial role in maintaining ecological balance (Gullan & Cranston, 2014) [3].

Insects perform several essential ecological functions. They contribute significantly to pollination, decomposition of organic matter, nutrient cycling, and biological control of pests (Samways, 1994) [4]. Many vertebrates such as birds, reptiles, amphibians, and mammals depend on insects as a primary food source. Therefore, insect diversity is widely considered an important indicator of ecosystem health. High insect diversity usually reflects a stable and resource-rich environment, whereas a decline in insect diversity may indicate environmental stress or habitat disturbance (Wilson, 1987) [1].

The distribution and abundance of insects are influenced by various environmental factors such as habitat type, vegetation structure, climate conditions, water availability, and anthropogenic activities. Areas with rich plant diversity tend to support a higher number of insect species, as plants provide food resources, shelter, and breeding grounds (Jaganmohan *et al*., 2013) [5]. In contrast, activities such as deforestation, urbanization, excessive pesticide use, and intensive agriculture negatively impact insect diversity and alter community composition (Samways, 1994) [4].

India is one of the mega-diverse countries in the world and supports a vast number of insect species due to its varied climate and habitats (Chandra *et al*., 2014) [6]. Maharashtra, located in peninsular India, has a variety of ecosystems including dams, rivers, agricultural lands, grasslands, and residential areas, which support many insect groups such as Lepidoptera, Coleoptera, Odonata, Diptera, and Hymenoptera (Bharti & Yeole, 2024) [7].

The study area, Dimbhe Dam and its surrounding region, consists of diverse habitats including water bodies, vegetation patches, agricultural lands, and human settlements. Such habitat diversity provides favorable conditions for various insect species (Samways, 1994) [4]. Therefore, studying insect diversity in this region helps in understanding species distribution and provides baseline data for biodiversity conservation.

Methods

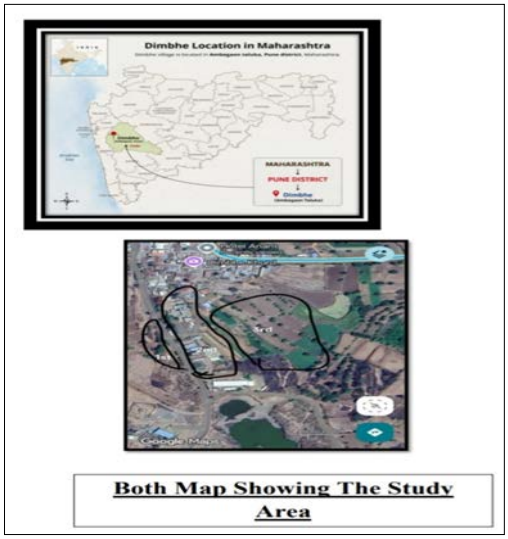
The present study was conducted in and around Dimbhe Dam and its surrounding region in Maharashtra. The study area comprised a variety of habitat types including residential zones, plant-rich natural vegetation patches, agricultural fields, and areas near the water body with riparian vegetation. This heterogeneity of habitats provided suitable ecological conditions for the occurrence and distribution of diverse insect groups.

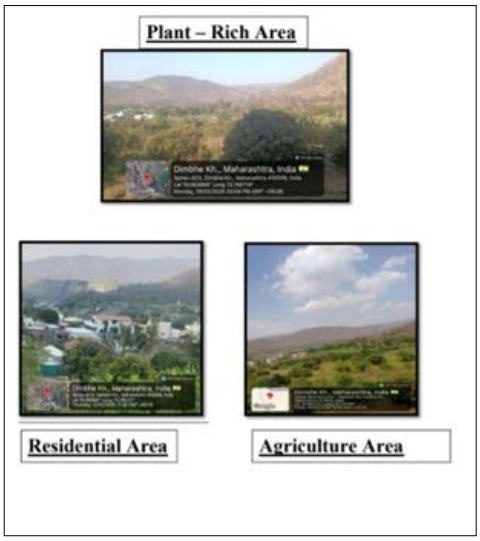
The insect survey was carried out over a study period extending from October 2025 to February 2026. This duration allowed for the observation of insect diversity across different seasonal conditions, which may influence their abundance and distribution patterns in the study area.

Sampling of insects was performed primarily through non-destructive methods. Insects were documented by photographing them in their natural habitats using a mobile camera. No specimens were collected, killed, or preserved

during the study. The photographs obtained were later used for identification purposes with the help of standard field guides, entomology books, and online identification tools. The survey was conducted across three major habitat types, namely residential zones, plant-rich areas, and agricultural lands. Each habitat was visited multiple times, and insects observed were recorded according to their respective habitats

For each observation, relevant data such as date, habitat type, insect order (and family where possible), and method of observation were recorded systematically. The collected data were later organized and used to compare insect diversity and distribution patterns across different habitats in the study area





Results

The study recorded the occurrence of three insect orders—Lepidoptera, Hemiptera, and Odonata—across three different habitat types: agricultural site, plant-rich area, and residential area. The distribution of insects varied among these habitats.

Lepidoptera showed the highest abundance in the residential area with a total of 17 individuals, while both agricultural and plant-rich areas recorded 4 individuals each. Hemiptera were also more abundant in the residential area (7 individuals), followed by the agricultural site (4 individuals) and plant-rich area (3 individuals). In contrast, Odonata were more commonly observed in agricultural and plant-rich areas, each with 6 individuals, while the residential area recorded only 3 individuals.

Overall, the residential area showed higher abundance for Lepidoptera and Hemiptera, whereas Odonata were more dominant in agricultural and plant-rich habitats.

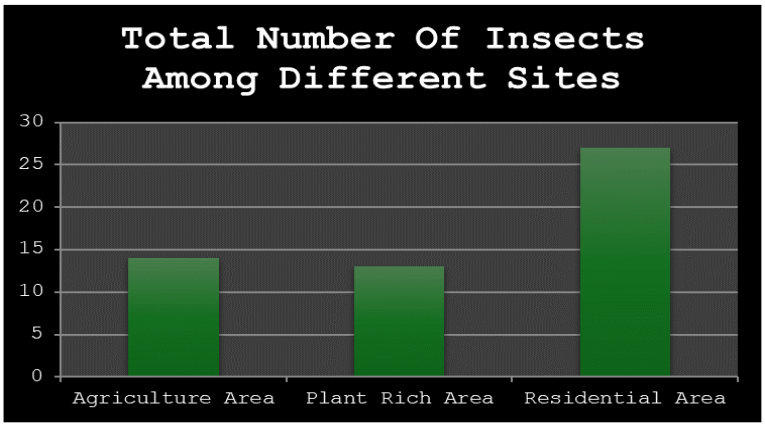
Discussion

The variation in insect distribution across different habitats highlights the influence of environmental conditions and habitat characteristics on insect diversity. The higher abundance of Lepidoptera in residential areas may be due to the presence of ornamental plants, gardens, and artificial lighting, which attract butterflies and moths. These areas often provide continuous nectar sources and relatively stable microhabitats.

Hemiptera showed moderate distribution across all habitats, which may be attributed to their adaptability and feeding habits. As sap-feeding insects, they are commonly associated with both cultivated crops and naturally occurring vegetation, explaining their presence in agricultural as well as residential and plant-rich areas.

Odonata were more abundant in agricultural and plant-rich areas, likely due to their dependence on water bodies for breeding. The proximity of these habitats to water sources such as Dimbhe Dam and moist environments provides suitable conditions for their larval development. The lower number of Odonata in residential areas may be due to limited availability of such aquatic habitats.

These findings indicate that habitat heterogeneity plays a significant role in determining insect distribution. Areas with water availability and natural vegetation support species like Odonata, while human-modified habitats such as residential zones favor adaptable insect groups like Lepidoptera and Hemiptera. Therefore, conservation of diverse habitat types is essential for maintaining overall insect biodiversity.



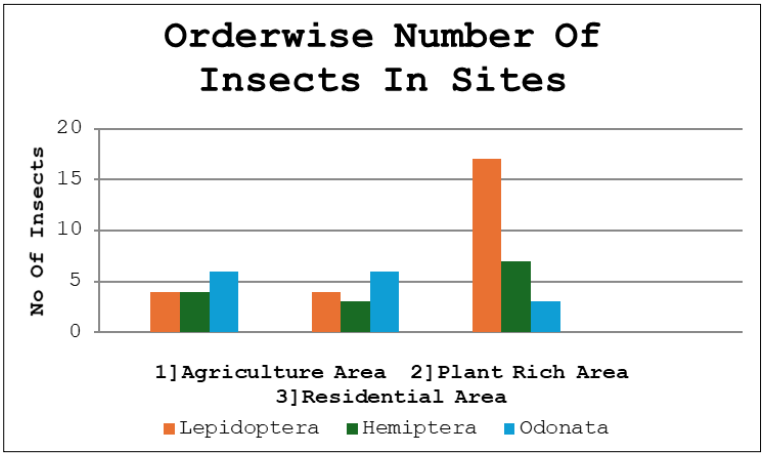


Table 1: Agriculture Area

Order	Family	Common Name	Scientific Name
Lepidoptera	Lycaenidae	African babul blue butterfly	*Azanus jesous*
	Torticidae	-	*Notocelia roborana*
	Geometridae	-	*Scopula flaccidaria*
	Lycaenidae	Slate flash butterfly	*Rapala manea*

Order	Family	Common Name	Scientific Name
Hemiptera	Cicadellidae	Rice green leafhopper	*Nepotettix nigropictus*
	Cicadellidae	-	*Ballana*
	Pentatomidae	Brown marmorated stink bug	*Halyomorpha halys*
	Pentatomidae	Stink bug	-

order	Family	Scientific name
Odonata	Libellulidae	*Pantala **flavescens***
	Libellulidae	*Brachythemis contaminata*
	Libellulidae	*Diplacodes trivialis*
	Libellulidae	*Orthetrum Sabina*
	Libellulidae	*Crocothemis servilia*
	Coenagrionidae	*Ceriagrion coromandelianum*

Table 2: Plant Rich Area

order	Family	Common name	Scientific name
lepidoptera	Pieridae	Common grass yellow butterfly	*Eurema hecabe*
	Nymphalidae	Common sailor	*Neptis hylas*
	Tortricidae	Light brown apple moth	*Epiphyas postvittana*
	Lycaenidae	Common Pierrot Butterfly	*Castalius rosimon*

Order	Family	Common name	Scientific Name
Hemiptera	Coccidae	Wax **scale**	*Ceroplastes ceriferus*
	Pentatomidae	Shield bug	-
	Pentatomidae	Four humped sting bug	*Brochymena quadripustulata*

Order	Family	Scientific Name
Odonata	Libellulidae	*Crocothemis servilia*
	Libellulidae	*Orthetrum glaucum*
	Libellulidae	*Orthetrum pruinosum*
	Libellulidae	*Trithemis festiva*
	Platycnemididae	*Copera marginipes*
	Libellulidae	*Trithemis aurora*

Table 3: Residential Area

Order	Family	Common name	Scientific Name
Lepidoptera	Saturniidae	Atlas Moth	*Attacus atlas*
	Tineidae	Webbing **clothes moth**	*Tineola bisselliella*
	Crambidae	Pearl moth	*Endocrossis flavibasalis*
	Tineidae	European grain moth	*Nemapogon granella*
	Erebidae	Gypsy moth	*Lymantria dispar*
	Erebidae	-	*Hydrillodes lentalis*
	Erebidae	-	*Hypena labatalis*
	Pyralidae	Indian meal moth	*Plodia interpunctella*

	Crambidae	Jasmine moth	*Palpita vitrealis*
	Geometridae	Common emerald	*Hemithea aestivaria*
	Geometridae	Lesser dusty wave	*Idaea seriata*
	Saturniidae	Luna moth	*Actias luna*
	Erebidae	Looper moth	*Mocis frugalis*
	Erebidae	Owlet moth	*Spirama retorta*
	Erebidae	Red banded lichen moth	*Hypoprepia miniata*
	Limacodidae	Slug moth	-
	Erebidae	White line snout	*Schrankia taenialis*

Order	**Family**	**Common name**	**Scientific name**
Hemiptera	Pentatomoidea	Shield bug	*Palomena prasina*
	Miridae	Meadow plant bug	*Leptopterna dolabrata*
	Reduviidae	Masked hunter	*Reduvius personatus*
	Cicadellidae	Green leafhooper	*Cicadella viridis*
	Rhyparochromidae	Dirt Coloured seed bug	*Rhyparochromus vulgaris*
	Pentatomidae	Brown marmorated stink bug	*Halyomorpha halys*
	Reduviidae	Assassin bug	-

Order	Family	Scientific Name
Odonata	Libellulidae	*Pantala flavescens*
	Libellulidae	*Brachythemis contaminata*
	Libellulidae	*Diplacodes trivialis*

Conclusion

The present study concludes that insect diversity is strongly influenced by habitat type and environmental conditions. Residential areas showed higher diversity of Lepidoptera due to the presence of artificial light, garden plants, and food sources, while agricultural and plant-rich areas supported more Odonata due to the availability of water and vegetation. Hemiptera were found in all habitats, indicating their wide adaptability. Overall, factors such as vegetation, moisture, and human activities play an important role in shaping insect diversity. Thus, maintaining diverse habitats is essential for conserving insect biodiversity and ensuring ecological balance.

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