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Diversity and Abundance of Insect Fauna in Ghatanji Region, Yavatmal District, Maharashtra, India

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Abstract: *Insects represent the most diverse and ecologically significant group within the animal kingdom, constituting approximately 90% of all known animal species. They play indispensable roles in pollination, nutrient cycling, pest regulation, and serve as sensitive bioindicators of environmental health. The present study was conducted from December 2025 to March 2026. The present investigation documented the diversity of insect fauna in the Ghatanji region of Yavatmal district, Maharashtra, India. Ghatanji, known as the 'Cotton City,' is characterized by a tropical savanna climate (Aw), with an annual average temperature of 27.6°C and average rainfall of 1093 mm. The region encompasses diverse habitats including agricultural fields, forest areas with teak and Nilgiri trees, and aquatic ecosystems associated with the Waghadi River. A total of 23 insect species belonging to 6 orders and 19 families were identified from the study area during the survey period. The order Lepidoptera was found to be dominant with 6 species, followed by Diptera with 5 species, Hemiptera with 5 species, Coleoptera with 4 species, Hymenoptera with 2 species, and Orthoptera with 1 species. Analysis indicates that Hemiptera represents the highest relative dominance (25.00%), followed by Coleoptera (22.65%) and Lepidoptera (20.61%). These findings highlight the ecological significance of the region's diverse habitatsThe findings highlight the rich insect diversity of the Ghatanji region and underscore the need for continued biodiversity monitoring, particularly in the context of expanding agriculture and urbanization.*

Keywords: Diversity, Insects, Ghatanji, Yavatmal, Faunal species, Cotton City.

I. INTRODUCTION

Insects, belonging to the class Insecta, represent one of the most diverse and dominant groups in the animal kingdom, comprising nearly 90% of all known animal species. To date, approximately 800,000 living insect species have been recorded globally (Mandal & Ray, 2006), with many more yet to be discovered. India alone is home to about 75,000 species, accounting for nearly 10% of the global insect fauna. Insects are small, segmented arthropods characterized by three body parts, six legs, and often wings and antennae. They play vital ecological roles including pollination, nutrient cycling, pest regulation, and serving as indicators of environmental health. Among the 29 insect orders, Coleoptera, Diptera, Hymenoptera, and Lepidoptera comprise over 80% of described species. The Lepidoptera order, including butterflies and moths, is especially significant due to its ecological roles as both pests and pollinators. Hemipterans, including aphids and stink bugs, are notable for their widespread impact on agriculture, with over 4,400 species identified worldwide. Assessing insect diversity at the level of major entomological orders provides a practical and informative approach for understanding community structure and ecological dynamics, particularly in regions where species-level identification is constrained by limited taxonomic expertise (Ballal et al., 2022). Order-level studies enable researchers to identify dominant taxa, evaluate relative abundance, and analyze functional roles within

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ecosystems. Such baseline data are essential for long-term monitoring, comparative ecological studies, and conservation planning (Hajam et al., 2024).

The Ghatanji region, situated in the Yavatmal district of Maharashtra, presents a unique ecological landscape for entomological studies. Known as the 'Cotton City' due to its production of fine quality cotton, the region encompasses agricultural fields, forest areas with teak and Nilgiri trees, and aquatic ecosystems associated with the Waghadi River. The region experiences a tropical savanna climate with an annual average temperature of 27.6°C and average annual rainfall of 1093 mm. The warmest months are April, May, and June, with daily mean temperatures ranging from 31 to 36°C. This climatic condition, combined with diverse habitats, creates favorable conditions for a wide variety of insect species. Despite the clear ecological and agricultural importance of this region, research has historically been fragmented. While previous studies have addressed specific taxa such as the survey of mosquito diversity in Ghatanji a comprehensive baseline inventory of the broader insect community is currently lacking. As the region experiences the twin pressures of agricultural intensification and increasing urbanization, understanding the existing insect fauna becomes a prerequisite for effective environmental stewardship. The present study aims to bridge this gap by providing a foundational inventory of insect biodiversity in Ghatanji, thereby establishing a critical data set for future ecological monitoring and sustainable agricultural management.

OBJECTIVES

1. To identify and document the current status of insect diversity in the Ghatanji region of Yavatmal district.
2. To study different orders of insects and their families present in the study area.
3. To document the habitat preferences and behavioral observations of identified insect species.
4. To enhance public awareness and knowledge about the insect fauna of the region.
5. To establish baseline data on insect diversity that can serve as an indicator of the environmental conditions of the study area.

MATERIALS AND METHODS:

STUDY AREA

Location and Geography

The present study was conducted in the Ghatanji region of Yavatmal district, Maharashtra, India. Ghatanji is a municipal town situated at approximately 20.13°N latitude and 78.32°E longitude. The town is located in Kelapur tahsil, settled on the banks of the (Waghadi) stream, lying approximately 38.62 km southeast of Yavatmal. The total area of the town is 10.88 sq km, with an elevation of 274 m (899 feet). The region has ample water resources due to the Waghadi River and a dam over it.

Fig 1: Study Area

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Climate

Ghatanji experiences a tropical savanna climate according to the Köppen–Geiger climate classification. The climate is characterized by hot summers, cool winters, and a distinct wet and dry season. The annual average temperature is 27.6°C, with May being the hottest month (average temperature ~35.7°C) and December the coldest (average temperature ~22.0°C). The annual average rainfall is 1093 mm. There is significant rainfall during the summer monsoon season compared to winter. Temperatures typically range between 14°C and 42°C throughout the year.

Vegetation and Habitat

The Ghatanji region has ample forest area consisting of teak wood, Nilgiri trees, and many other species of trees. The region supports various types of fauna inhabiting these jungles. The predominant land use is agriculture, with cotton being the major crop, earning the region its epithet 'Cotton City'. The diverse habitats, including agricultural fields, forest patches, grassland, and aquatic ecosystems along the Waghadi River, provide suitable niches for a wide range of insect species.

Survey Period and Sampling

The present study was carried out from December 2025 to March 2026 in the Ghatanji region of Yavatmal district, Maharashtra. The survey period was strategically chosen to cover both the post-monsoon and early summer seasons, allowing for documentation of insects active during different climatic conditions.

Collection Methods

Insects were collected using a variety of techniques to ensure comprehensive sampling across different habitats:

1. Handpicking: Manual collection of insects from vegetation, soil surfaces, and under debris.
2. Sweep Netting: Sweeping nets were used to collect insects from grassy areas, agricultural fields, and low vegetation.
3. Aerial Netting: Flying insects were collected using aerial nets.
4. Light Trapping: Night-active insects were attracted using light sources.

Preservation and Identification

Collected insects were euthanized using naphthalene as a repellent to avoid secondary infection of the preserved specimens. Specimens were properly preserved and stored in insect storage boxes with appropriate pinning and labeling. Identification was carried out using standard taxonomic keys, research articles, journals, and reliable literature on Indian insects. Expert consultation was sought from entomologists at the local agricultural college for confirmation of species identification. Photographic documentation was maintained for all identified species.

III. OBSERVATION AND RESULT

The present study revealed a rich diversity of insect fauna in the Ghatanji region. A total of 23 insect species belonging to 6 orders and 19 families were identified from the study area. The order Lepidoptera was found to be the most dominant with 6 species, followed by Diptera with 5 species, Hemiptera with 5 species, Coleoptera with 4 species, Hymenoptera with 2 species, and Orthoptera with 1 species.

Order	Number of Species	Families
Diptera	5	Calliphoridae, Syrphidae, Culicidae, Tephritidae
Lepidoptera	6	Papilionidae, Nymphalidae, Pieridae, Noctuidae
Hemiptera	5	Pentatomidae, Aphididae, Cicadellidae, Coreidae
Coleoptera	4	Coccinellidae, Scarabaeidae, Chrysomelidae, Carabidae
Hymenoptera	2	Formicidae, Apidae
Orthoptera	1	Acrididae
Total	**23**	**19**

Table 1: Number of Insect Species with order and families

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Order	Sr. No.	Scientific Name	Family	Common Name	No. of insects	Key Observations
Diptera	1	Armigeres subalbatus	Culicidae	Cord Mosquito	25	Breeds in organic-rich water; found in rural areas
	2	Chrysomya megacephala	Calliphoridae	Oriental Latrine Fly	28	Greenish-blue metallic color; found near decaying matter
	3	Eristalinus taeniops	Syrphidae	Hoverfly (Bee mimic)	43	Batesian mimicry; yellow-black stripes; important pollinator
	4	Episyrphus balteatus	Syrphidae	Marmalade Hoverfly	34	Mimics wasps; harmless; important pollinator
	5	Bactrocera dorsalis	Tephritidae	Oriental Fruit Fly	59	Major agricultural pest; infests mango and other fruits
Lepidoptera	6	Papilio demoleus	Papilionidae	Lime Butterfly	29	Colorful; widely found across tropical regions; citrus pest
	7	Danaus chrysippus	Nymphalidae	Plain Tiger	20	Migratory; feeds on milkweed; aposematic coloration
	8	Pieris brassicae	Pieridae	Large Cabbage White	15	Agricultural pest; found on cruciferous crops
	9	Spodoptera litura	Noctuidae	Tobacco Cutworm	44	Polyphagous pest; causes significant crop damage
	10	Helicoverpa armigera	Noctuidae	Cotton Bollworm	68	Major pest of cotton; also attacks other crops
	11	Junonia almana	Nymphalidae	Peacock Pansy	26	Found in open areas; exhibits seasonal polyphenism
Hemiptera	12	Halyomorpha halys	Pentatomidae	Brown Marmorated Stink Bug	32	Agricultural pest; emits odor when disturbed
	13	Toxoptera citricida	Aphididae	Brown Citrus Aphid	89	Major pest of citrus; vector of citrus tristeza virus
	14	Amrasca biguttula	Cicadellidae	Cotton Leafhopper	35	Major pest of cotton; causes hopper burn
	15	Nezara viridula	Pentatomidae	Southern Green Stink Bug	56	Polyphagous pest; feeds on various crops
	16	Leptocorisa acuta	Coreidae	Rice Ear Bug	33	Pest of rice; causes grain discoloration
Coleoptera	17	Coccinella septempunctata	Coccinellidae	Seven-spotted Ladybird	45	Important predator of aphids; beneficial insect
	18	Oryctes rhinoceros	Scarabaeidae	Rhinoceros Beetle	67	Pest of coconut and oil palm; nocturnal
	19	Aulacophora foveicollis	Chrysomelidae	Red Pumpkin Beetle	45	Pest of cucurbits; feeds on leaves

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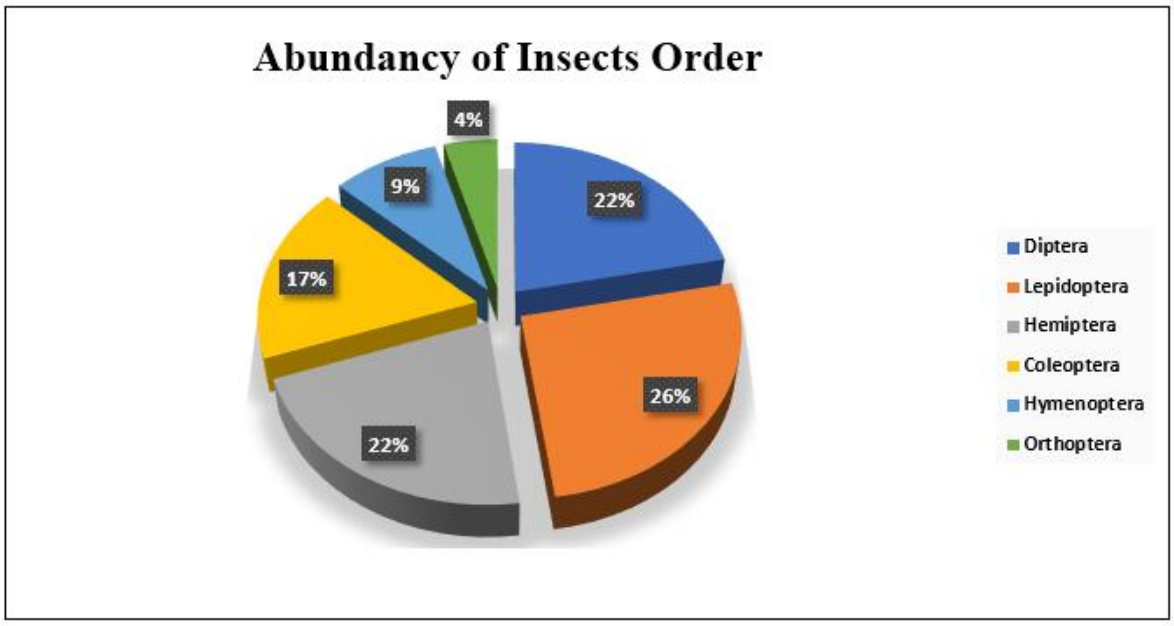
	20	Calosoma sycophanta	Carabidae	Caterpillar Hunter	65	Beneficial predator; feeds on caterpillars
Hymenoptera	21	Camponotus compressus	Formicidae	Carpenter Ant	43	Ground-nesting; scavenger; common in agricultural areas
	22	Apis cerana indica	Apidae	Indian Honey Bee	58	Important pollinator; found in colonies
Orthoptera	23	Locusta migratoria	Acrididae	Migratory Locust	21	Found in grassy areas; can form swarms

Table: 2 Abundancy of Insect species

Order	Total Abundancy	Species Abundancy	Relative Dominance (%)
Hemiptera	**245**	**5**	**25.00**
Coleoptera	**222**	**4**	**22.65**
Lepidoptera	**202**	**6**	**20.61**
Diptera	**189**	**5**	**19.29**
Hymenoptera	**101**	**2**	**10.31**
Orthoptera	**21**	**1**	**2.14**

Table :3 Analysis of Relative Dominance with relation to Order of insects



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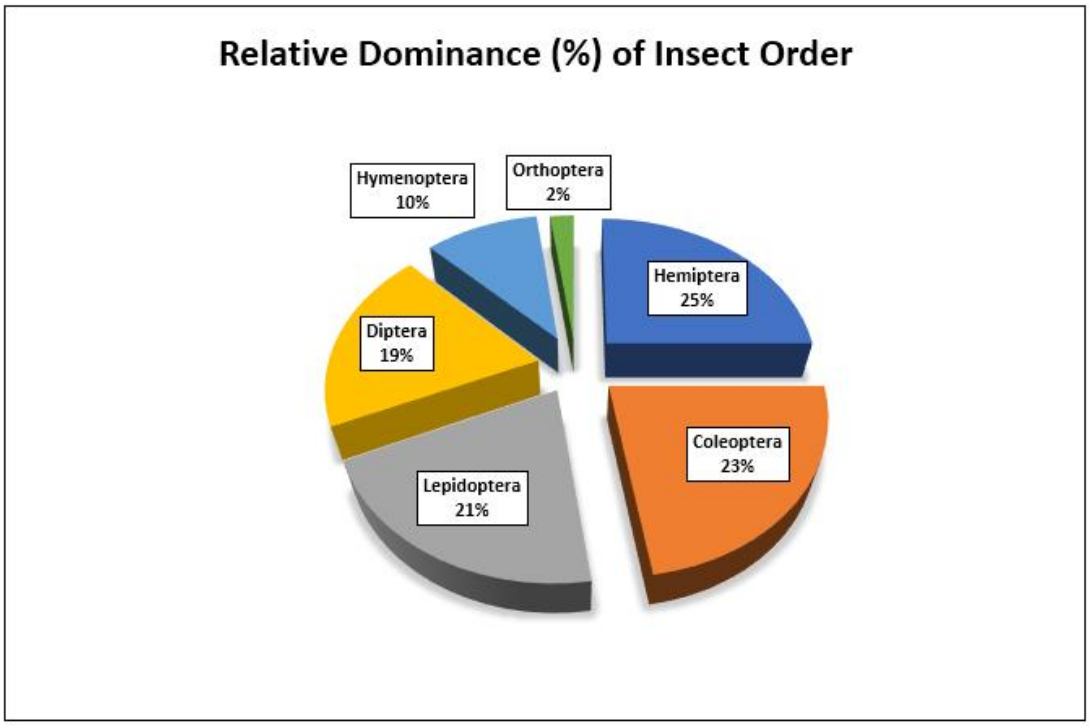

IV. DISCUSSION

The data gathered from the Ghatanji region underscores a complex interplay between anthropogenic activity and ecological diversity. The dominance of the order Hemiptera (25.00%) and Coleoptera (22.65%) suggests that the agricultural landscape of Ghatanji dominated by cotton monocultures is a primary driver of the current species composition. The high abundance of hemipterans like the Cotton Leafhopper (*Amrasca biguttula*) and the Brown Citrus Aphid (*Toxoptera citricida*) confirms that the region is susceptible to significant pest pressure. These species are not only direct herbivores but often serve as vectors for viral and bacterial plant diseases, which can significantly impact crop yields in the 'Cotton City.'

However, the presence of Coleopteran predators like *Coccinella septempunctata* (Seven-spotted Ladybird) and *Calosoma sycophanta* (Caterpillar Hunter) provides a critical ecosystem service. These species act as natural biological control agents, preying upon aphid and caterpillar populations. The coexistence of these predatory beetles with their prey indicates that the existing agricultural-forest interface in Ghatanji still supports functional food webs.

The relative dominance of Lepidoptera (20.61%), while slightly lower than Hemiptera and Coleoptera in abundance, remains highly significant. As pollinators, these species are essential for the reproductive success of both wild flora along the Waghadi River and neighboring agricultural crops. The variation in species identified across different families highlights that the habitat heterogeneity the transition from riparian zones to forest patches to agricultural fields is essential for sustaining this diversity. Any further loss of forest patches or encroachment into the Waghadi River basin threatens to disrupt the delicate balance between these primary consumers (pests) and their natural predators.

V. CONCLUSION

The present investigation provides a fundamental baseline for understanding the insect biodiversity of the Ghatanji region. The documentation of 23 species across 6 orders reveals a surprisingly resilient ecosystem, yet one that is

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heavily influenced by agricultural practices. The results indicate that while the region supports beneficial organisms such as pollinators and predatory insects the dominance of specific agricultural pests highlights the need for strategic interventions.

The study reveals the presence of several agricultural pests, vectors of human diseases, and beneficial insects such as pollinators and predators. This underscores the need for integrated pest management strategies that balance agricultural productivity with biodiversity conservation. The baseline data generated from this study will be valuable for future ecological monitoring and conservation planning in the region. Further studies are recommended to cover different seasons and to include molecular approaches for accurate species identification. Long-term monitoring of insect diversity in the Ghatanji region is essential to understand the impacts of climate change, urbanization, and agricultural intensification on insect populations. This study serves as a diagnostic tool for local agricultural authorities and conservationists, emphasizing that protecting the riparian and forest corridors of Ghatanji is not merely an environmental goal but an economic necessity for maintaining the region's agricultural productivity. It is recommended that future studies focus on seasonal fluctuations of these species and the long-term impact of pesticide application on the non-target insect population.

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