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A Taxonomic Checklist of Insect Biodiversity in Loyola College Campus, Chennai, Tamil Nadu, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Biodiversity, which refers to the entire array of life forms, genes, and ecosystems, was born as a result of the outcome of billions and billions of years of evolutionary development. In contrast to that, increasing the number of people and economy will impact biodiversity in the global level as it will not only destroy the ecosystems but also make them vulnerable to disruption. Preservation of biodiversity is undoubtedly one of the fundamental aspects that is necessary to keep species and

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genetic variations along with ecosystems. There is a large variety of insect species (more than half of all known life) and they are crucial for ecosystem functioning via pollination, nutrient recycling, and food web maintenance; However, they also act as vectors of diseases and pests. This research is focused on the insect diversity in Loyola College located in Chennai which was done through the Area Search Survey Method. Using a smartphone camera, the insects were imaged and then identified via iNaturalist. The reported data confirm the occurrence of various beetle classes, among which Lepidoptera is noted as the top order. The discussion delves into the ecological significance as well as economic influence of different insect groups which include services that they provide by way of pollination, pest control and so on. Awareness of insect biodiversity is important because of its role in ecosystem balance, agricultural stability, and human wellness.

Keywords: Biodiversity; insects; ecosystem functioning; conservation; pollination.

1. INTRODUCTION

The term "biodiversity" refers to the vast array of living organisms comprising microorganisms, animals, plants, along with the genetic diversity within these species and the intricate ecosystems they form. This abundance of life is the result of millions of years of evolutionary development [1]. The diversity of living organisms is constantly evolving and expanding through the creation of new genetic variations, the formation of new species and ecosystems, and shrinking due to declining genetic variations, extinction of species, or loss of ecosystem complexity. As population growth increases the demand for food and land, we have become focused on increasing food production with limited resources. The composition and diversity of species within ecosystems have a significant impact on their stability and functioning [2]. However, the rapid expansion of human population and economic activities has significantly reduced global biodiversity, causing severe disruptions to ecosystems and our way of life. Therefore, one of the most significant challenges facing our planet today is the conservation of biodiversity, which includes genetic variations within species, assemblages of genera and families, and the spectrum of ecosystems that house communities of organisms [3]. Insects, which are often carriers of diseases and pests, have significant impacts on agriculture, human health, and natural resources. Despite this, they also play a crucial role in pollination, producing useful compounds, managing pest insects, scavenging, and providing food for other animals and potentially humans in the future. Due to their rich biodiversity, insects are excellent subjects for research in biology, evolution, and ecology. Studies on fruit flies and the population biology of flour beetles have significantly contributed to our understanding of genetics. Insects are also frequently used in research on hormones, nerve and sense organs, and various physiological processes, and serve as indicators of environmental quality. Insects are the predominant group of living species on our planet, comprising 1.75 million known species, accounting for 54% of all known life forms. This is especially apparent when considering the 10.32 million known animal species. However, the classification and status of insects are not yet precisely defined. Although around 7.51 million insect species have been cataloged, the estimates of the number of unidentified insect species are even more astonishing. Insects and arthropods account for over 50% of all species on Earth and play essential roles in almost every ecosystem, such as pollinating plants, breaking down organic matter, controlling invasive species and pests, serving as sources for scientific and medical discoveries, and providing food for other organisms. Unfortunately, human activities like the introduction of non-native species, climate change and habitat destruction are major challenges to maintaining biodiversity. In a recent statement, the Entomological Society of America emphasizes the importance of conserving and researching the most diverse and prominent group of living things on the planet, arthropods. Insects hold great ecological significance and contribute to the diversity of eco-systems while playing a vital role in natural resources, human health, and agriculture. The ubiquity of insects in nature and their role in driving numerous scientific discoveries [4]. Insects are essential in providing the biological foundation for all terrestrial ecosystems, maintaining soil structure and fertility, pollinating plants, seed dispersal, nutrient cycling, controlling other species' populations, and serving as a significant food source for various taxa. The introduction of non-native insect species without their natural biological control mechanisms is responsible for most of the significant insect pests in agriculture.

Biomechanics and bioengineering experts are fascinated by insects' unique qualities that have developed in recent times within the animal kingdom [1].

Insects have an essential role in maintaining diversity of life and balance in ecosystem, where they perform critical services necessary for sustaining life on our planet. Certainly, the dramatically increased activity of people creates novel dangers for the existence of in-sects and the ecosystems they live. The chaos currently engulfs our comprehension of the importance of insect biodiversity, this study is aimed at exploring the diversity and abundance of insects within Loyola college campus of Chennai. Making use of area search survey method and employing modern technology for data documentation and identification of species, we aim to investigate the hidden world of insects and how they interact with their environment. Through highlighting the ecological role of insects and endorsement of provisions aimed at conserving their populations and maintaining their respective habitats, this research strives to supplement the knowledge base on insect diversity.

2. METHODOLOGY

2.1 Site Selection

Loyola College, situated in Chennai, Tamil Nadu, India, is a private Catholic institution of higher education that is managed by the Society of Jesuits. The college, which spans an area of 79.5 acres, was established in 1925 by Francis Bertram, a French Jesuit priest, and a group of European Jesuits. It is an autonomous college affiliated with the University of Madras and can be located by the coordinates 13303'43.20" N latitude and 83014'2.40" E longitude. The location of the college is shown in Fig. 1.

2.2 Instruments Utilized

Photographs of insects were captured on the campus of Loyola College using a smartphone, specifically the SAMSUNG A03 CORE. The choice of the smartphone was based on its portability, accessibility, and the quality of its camera.

2.3 Field Guide Book

The field guide book written by Foottit et al. 2009 is titled *"Insect Biodiversity: Science and Society"* [5]. It is a comprehensive guidebook that provides an overview of the science of insect biodiversity, including the many different types of insects, their ecology, and their role in society. The book covers a wide range of topics related to insect biodiversity, including insect classification, insect conservation, and the impact of insects on human societies. It is intended for researchers, students, and anyone interested in learning more about insects and their importance in our world.

Fig. 1. Geographical location of Loyola College, Chennai

2.4 Area Search

The Area Search Survey Method was employed as the primary survey approach for this research project. The objective was to document the insect biodiversity present in Loyola College Campus, Chennai. Specifically, this method was used to record species richness, insect community structure, and relative abundance, as well as to gather basic insect associations, natural history, and breeding records.

The survey was conducted during the day time, starting at 10 am, from the month of January to March. The researcher used a mobile phone camera to photograph all the insects observed in the study area. To ensure a better chance of capturing a perfect shot, several series of photographs were taken when insects moved fast.

All photographs were later examined and analyzed to identify the family and name of the insects, using an online database called *iNaturalist*. The method was found to be effective in capturing a diverse range of insects in the study area, including butterflies, beetles, moths, mosquitoes, and flies on trees and plants. Repeatedly photographing the same insect was avoided, and finding new and diverse species was challenging.

3. RESULTS

The identified and recorded insects found in the Loyola College campus are tabulated along with their scientific name, common name, family name and order in Table 1. The pictures of the spotted insects are displayed in Fig. 2 to Fig. 74.

Table 1. Tabulation of taxonomic classification of spotted insects in Loyola College

Figure no.	Order	Family	Scientific Name	Common Name
2	Lepidoptera	Hesperiidae	*Taractrocera maevius.*	Common Grass dart.
3	Lepidoptera	Pieridae	*Catopsilia pomona*	Lemon Migrant
4	Lepidoptera	Crambidae	*Spoladea recurvalis*	Beet Webworm moth
5	Lepidoptera	Nymphalidae	*Acraea terpsicore*	Tawny Coster
6	Lepidoptera	Hesperiidae	*Parnara bada*	Oriental straight swift
7	Lepidoptera	Hesperiidae	*Udaspes Folus*	Grass Demon
8	Lepidoptera	Nymphalidae	*Euploea core*	Common Crow
9	Lepidoptera	Nymphalidae	*Tirumala limniace*	Blue Tiger
10	Lepidoptera	Hesperiidae	*Gomalia Elma*	African marbled skipper
11	Lepidoptera	Nymphalidae	*Junonia almana*	Peacock pansy
12	Lepidoptera	Pieridae	*Catopisilia pyranthe pyranthe.*	Mottled Emigrant
13	Lepidoptera	Eupterotidae	*Eupterote sp.*	Monkey Moth
14	Lepidoptera	Lycaenidae	*Chilades lajus*	Lime blue
15	Lepidoptera	Lycaenidae	*Curetis thetis*	Indian sun beam
16	Lepidoptera	Papilionoidea	*Papilio demoleus*	Common swallowtails
17	Lepidoptera	Lycaenidae	*Euchrysops cnejus*	Gram blue
18	Lepidoptera	Hesperiidae	*Telicota bambusae*	Dark Palm Dart
19	Lepidoptera	Geometridae	*Scopula sp.*	Small broom
20	Lepidoptera	Crambidae	*Omiodes indicata*	Bean leaf webworm moth
21	Lepidoptera	Erebidae	*Amata passalis*	Sandalwood defoliator
22	Lepidoptera	Nymphalidae	*Junonia lemonias*	Lemon pansy
23	Lepidoptera	Nymphalidae	*Junonia orithya*	Blue pansy
24	Lepidoptera	Hesperiidae	*Matapa aria*	Common Red Branded eye
25	Lepidoptera	Thyrididae	*Banisia sp.*	Sapodilla Moth
26	Lepidoptera	Hesperiidae	*Pyrgus malvae*	Grizzled skippers
27	Lepidoptera	Tortricidae		Catterpillar
28	Diptera	Syrphidae	*Asarkina*	Orange striped Hover fly
29	Diptera	Ephydridae	*Ochthera*	Mantid shoeflies
30	Diptera	Dolichopodiae	*Condylostylus sipho*	Longlegged flies
31	Diptera	Muscidae	*Musca domestica*	Common House fly
32	Diptera	Culicidae	*Armigeres subalbatus*	Culicine mosquito

Figure no.	Order	Family	Scientific Name	Common Name
33	Diptera	Culicidae	*Psorophora columbiae*	Dark ricefield Mosquito
34	Hemiptera	Coreidae	*Leptocorisa oratorius*	Slender Rice Bug
35	Hemiptera	Crambidae	*Probergrothius sanguinolens*	Indian Red Bug
36	Hemiptera	Erebidae	*Plautia*	Stink Bug
37	Hemiptera	Lygaeidae	*Spilostethus hospes*	Darth Maul Bug
38	Hemiptera	Nymphalidae	*Antilochus coquebertii*	True Bug
39	Hemiptera	Scutelleridae	*Calliphara Excellens*	Jewel Bugs
40	Hemiptera	Cicadellidae	*Jacobiasa formosana*	Common green leafhopper
41	Hemiptera	Membracidae	*Leptocentrus Taurus*	Eggplant horned planthopper
42	Hemiptera	Pyrrhocoridae	*Pyrrhocoridae*	Red bug
43	Hymenoptera	Blattodea	*Paratrechina longicornis*	Longhorn crazy ant
44	Hymenoptera	Formicidae	*Meranoplus bicolor*	Bicolored shield ant
45	Hymenoptera	Ichneumonidae	*Setanta compta*	Wasp
46	Hymenoptera	Syrphidae	*Scolia guttata*	Wasp
47	Hymenoptera	Apidae	*Apis Dorsata*	Giant honey bee
48	Hymenoptera	Apidae	*Apis indica*	Honey bee
49	Hymenoptera	Muscidae	*Camponotus spp.*	Carpenter ant
50	Hymenoptera	Vespidae	*Vespa*	Oriental hornet
51	Hymenoptera	Formicidae	*Camponotus japonicus*	Japanese carpenter ant
52	Odonata	Coenagrionidae	*Agriocnemis pygmaea.*	Damselfly
53	Odonata	Coenagrionidae	*Ceriagrion cerinorubellum*	Orange mersh dart
54	Odonata	Libellulidae	*Diplacodes trivialis*	Chalky percher
55	Coleoptera	Coccinellidae	*Coccinella septempunctata*	Lady bird beetle
56	Orthoptera	Pyrgomorphidae	*Poekilocerus*	GrassHoppers
57	Orthoptera	Acrididae	*Oedaleus infernalis*	Band winged grasshopper
58	Orthoptera	Acrididae	*Poekilocerus pictus*	Painted Grasshopper
59	Orthoptera	Acrididae		Short horned grasshopper
60	Orthoptera	Tettigoniidae	*Trigonidium cicindeloides*	Common Trig
61	Orthoptera	Pyrgomorphidae	*Neorthacris*	Wingless grasshopper
62	Orthoptera	Pyrgomorphidae	*Chrotogonus*	Grasshopper
63	Mantodea	Amo	*Humbertiella sp.*	Bark mantis
64	Mantodea	Liturgusidae	*Liturgusa maya*	mayan lichen mantis
65	Mantodea	Montidae	*Stagmomantis theophila*	Thorny armed mantis
66	Coleoptera	Curculionidae	*Pissodes strobi*	Pine flower weevils
67	Coleoptera	Chrysomelidae	*Colasposoma*	Leaf Beetles
68	Coleoplera	Chrysomelidae	*Zygogramma exclamationis.*	Sunflower Beetle
69	Coleoptera	Chrysomelidae	*Cassida viridis*	Green tortoise Beetles
70	Coleoptera	Chrysomelidae	*Eumolpinae*	Leaf Beetles
71	Coleoptera	Meloidae	*Hycleus biundulatus*	Blister Beetle
72	Coleoptera	Chrysomelidae	*Aulacophora indica*	Cucurbit Beetle
73	Blattodea	Ectobiidae	*Loboptera decipiens*	Lobe winged cockroach
74	Blattodea	Muscidae	*Therea petiveriana*	Indian Domino cockroach

3.1 Photographs of Spotted Insects

Fig. 2. Common grass dart

Fig. 3. Lemon migrant

Fig. 4. Beet webworm moth

Fig. 5. Tawny coaster

Fig. 6. Oriental straight swift

Fig. 7. Grass demon

Fig. 8. Common crow

Fig. 9. Blue tiger

Fig. 10. African marbled skipper

Fig. 11. Peacock pancy

Fig. 12. Mottled emigrant

Fig. 13. Monkey moth eupterote sp.

Fig. 14. Lime blue

Fig. 15. Indian Sunbeam

Fig. 16. Common Swallow tail

Fig. 17. Gram Blue

Fig. 18. Dark Palm Dart

Fig. 19. Small Broom

Fig. 20. Bean leaf Webworm

Fig. 21. Sandalwood defoliator

Fig. 22. Lemon Pansy

Fig. 23. Blue Pansy

Fig. 24. Common Red Branded Eye

Fig. 25. Sapodilla moth

Fig. 26. Grizzled skippers

Fig. 27. Caterpillar

Fig. 28. Orange striped Hover Fly

Fig. 29. Mantid Shoeflies

Fig. 30. Longlegged flies

Fig. 31. Common Housefly

Fig. 32. Culicine Mosquito

Fig. 33. Dark ricefield Mosquito

Fig. 34. Slender rice bug

Fig. 35. Indian Red Bug

Fig. 36. Stink bug

Fig. 37. Darth Maul bug

Fig. 38. True Bugs

Fig. 39. Jewel Bugs

Fig. 40. Common green leaf hopper

Fig. 41. Eggplant horned planthopper

Fig. 42. Red bug

Fig. 43. Longhorn Crazyant

Fig. 44. Bicolored shield ant

Fig. 45. Setanta Compta

Fig. 46 Scolia guttata wasp

Fig. 47 Giant honey bee

Fig. 48 Indian Honey Bee

Fig. 49 Carpenter ant

Fig. 50 Oriental hornet

Fig. 51 Japanese Carpenter Ant

Fig. 52 Damselfly

Fig. 53 Orange marsh Dart

Fig. 54. Chalky percher

Fig. 55. Ladybird beetle

Fig. 56 Grasshopper

Fig. 57 Band Winged Grasshopper

Fig. 58 Painted Grasshopper

Fig. 59 Short horned Grasshopper

Fig. 60 Common trig

Fig. 61 Wingless grasshopper

Fig. 62. Chrotogonus

Fig. 63. Bark Mantis

Fig. 64 Mayan Lichen Mantis

Fig. 65 Thorny armed mantis

Fig. 66 Pine flower weevils

Fig. 67 Leaf beetles

Fig. 68 Sunflower beetle

Fig. 69 Green tortoise beetle

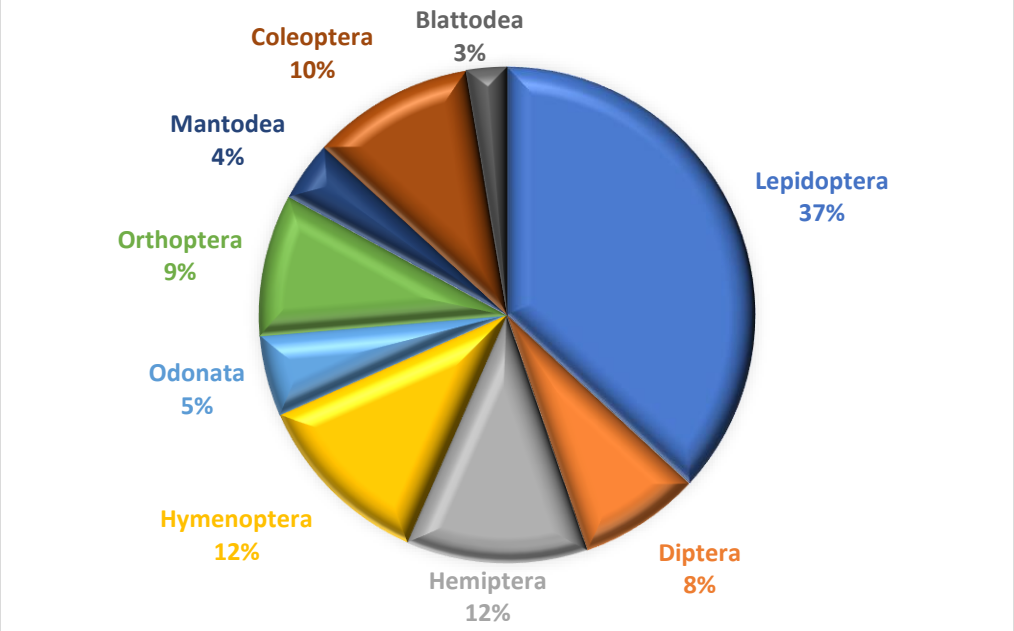
Fig. 70 Leaf Beetles

Fig. 71 Blister Beetle

Fig. 72 Curcubit Beetle

Fig. 73 Lobe winged cockroach

Fig. 74 Indian Domino Cockroach



Graph 1. Distribution of insects in various order

3.2 Presentation of Distribution of Insects in Various Order

The distribution of the insects over various orders that are identified in Loyola Campus is clearly depicted through pie chart as shown in Graph 1. This graph shows that the insects belonging to these particular orders are found in our campus during day time. The climate of observation was found to be sunny, hot and humid. The maximum number of insects belong to the order of lepidoptera which accounts for nearly 37 percentage. Blattodea has the least share among the insects that are found in the campus. Other than these both orders, insects belonging to orders like Diptera, Hemiptera, Hymenoptera, Odonatan, Orthoptera, Mantodea and coleoptera are found here. Among this insect diversity, most of them are spotted in NCC parade ground, Football ground, Backyard of boy's hostel and LIBA campus because of their huge green cover. The feeding habits and habitat of the spotted insects are explained below.

4. DISCUSSION

The order Lepidoptera comprises both butterflies and moths, encompassing around 180,000 described species across 126 families and 46 super families. Their body, wings, appendages are densely clothed with overlapping scales, which give color and strength. The pollination process heavily relies on Lepidoptera insects, as they extract nectar from flowers and facilitate the transfer of pollen to other flowers during their visits, underscoring their critical ecological role in ecosystem functioning, particularly in supporting the reproductive success of various plant species [6]. Several hundred Lepidoptera species cause damage to plants crucial for human utility, impacting vital resources such as timber, fabrics, food, and fodder. Most of the harmful species belong to the moth category, with the larval stage consistently identified as the destructive phase. Lepidopterans refrain from acting as vectors for plant diseases, and they also abstain from engaging in parasitic activities or posing direct risks to human health. Certain Lepidoptera species are known to consume the exudates from open wounds or bodily fluids of both wild and domestic animals. A comprehensive range of economically significant plants is vulnerable to damage by lepidopterans, spanning assorted fruits, various grains, leafy vegetables, diverse root crops, sugar beets, shade trees, cotton, timber, tobacco and sugarcane. Damage inflicted by lepidopterans can affect various plant parts, including fruit, stems, leaves or roots. Additionally, fungus moths from several genera, commonly referred to as clothes moths, are known to consume woolens, furs, silk, and even feathers. Significant harm within beehives is caused by the greater wax moth (*Galleria mellonella*). The silkworm (Bombyx mori), which was first domesticated in China, is among the few Lepidoptera species that directly benefit

humans, primarily through silk production. The Saturniidae family comprises various Asiatic giant silkworm moth species, which produce silks such as shantung and tussah. Certain species are used as food sources, with larvae and occasionally adults harvested for consumption, such as the larvae of one skipper collected in large quantities in the Congo and the 10-cm (4-inch) caterpillars of giant skippers (family Megathymidae) consumed domestically and exported canned as hors d'oeuvres. The effectiveness of the South American cactus moth (Cactoblastis cactorum) in weed control is evident, as it has cleared more than 150 million hectares (60 million acres) of alien prickly pear cactus in Australia. Undoubtedly, humans also benefit from the vital pollination of flowers by adult insects and the frequently overlooked consumption of weeds by caterpillars [7].

Comprising about 150,000 described species and potentially exceeding a quarter of a million species across approximately 150 families, Diptera stands as a major order of insects [8]. Flies, including mosquitoes, primarily feed on dung and liquid substances from animals, while their adult counterparts consume plant or animal juices and prey on other insects [9]. Flies, frequently overlooked yet crucial pollinators, hold considerable significance in both agrobiodiversity and the overall biodiversity of plants worldwide, being ubiquitous across various habitats and biomes. They play a vital role in ensuring or enhancing seed and fruit production for numerous medicinal, food, and ornamental plant species [10]. Certain aquatic insect families have proven significant in water quality assessments and bioassessment studies, aiding in the classification of pollution levels within aquatic ecosystems [11].

The order Hemiptera, commonly referred to as true bugs, encompasses over 80,000 species, including groups such as aphids, cicadas, planthoppers, and others, playing a crucial role in various ecosystems [12]. Fluid-feeding insects known as true bugs extract juices from both plants and animals [13], yet they hold only minor economic significance initially, often feeding on weed, shrub, or tree branches before potentially migrating to soybean crops. The deltocephalinae, characterized by their flat, dark appearance, are commonly found in the neotropics but lack economic importance [14].

Order blattodea contains about 4000 species in at least seven families worldwide [8]. Cockroaches are omnivores, which means they eat both plants and animals. They particularly like starches, sweets, and greasy foods, but roaches are not picky eaters. they'll feast on almost anything that derived from something that was once a living organism, such as plants and animals. Considered pests, they cause food destruction and contamination through their foul-smelling excrement [15].

With an estimated 400,000 known species, Coleoptera stands as the largest of all insect orders, encompassing almost 40% of documented insects and a quarter of all known animal species [16]. With its vast diversity of 4,072 species distributed among 103 families, occupies a prominent ecological niche across diverse insect habitats. Beetles exhibit a broad dietary spectrum, consuming various plant and animal materials. Predatory, scavenging, and herbivorous behaviours are prevalent among beetles, with a minority engaging in parasitic interactions. Their selective feeding habits often target specific plant parts such as leaves, seeds, fruits, or wood, highlighting their nuanced ecological roles and substantial impact within ecosystems. [17]. Within agricultural and forest environments, Coleoptera pests are recognized for their significant role in causing crop damage. While larval feeding constitutes the primary source of harm, adult feeding or oviposition behaviour can also play a role. Most Coleoptera larvae are characterized as borers, feeding on various plant components such as dying, dead, living, decaying stems, twigs or branches.

In certain regions, this family exhibits both beneficial and pestiferous characteristics, as certain larvae assist in pest population control by targeting grasshoppers and locusts, while adults fulfil essential roles as pollinators through their flower visits and pollen transportation. Conversely, ground beetles contribute significantly to the advancement of sustainable agriculture by efficiently managing pests, thereby reducing harm to field crops. They also offer vital ecosystem services [18].

With a global distribution, Orthoptera comprises over 20,000 species [19]. Across different locations, individual species typically exhibit consistent dietary preferences and maintain similar niche breadths. Those with more specialized diets often consume predictable plant species such as grasses [20]. Orthopterans play significant roles in almost all terrestrial ecosystems, serving as consumers and prey.

Large outbreaks of certain grasshopper species can result in substantial losses for the forestry and food industry [21].

The Odonata order, despite its relatively modest size compared to other insect groups, includes around 6,300 species found globally across 26 different families [22]. Both nymphs and mature individuals in this order display carnivorous tendencies. Nymphs utilize an ambush technique, lying in wait for unsuspecting prey before rapidly extending their articulated lower jaw to spear them, a movement executed with such swiftness that it's hardly noticeable. In contrast, mature Odonata capture their prey, comprising insects like mayflies, mosquitoes, and midges, while airborne [23]. Due to their ability to regulate populations of troublesome insects like mosquitoes, blackflies, and other blood-sucking pests, odonates serve as valuable bio-control agents. Several nations have effectively utilized odonates for managing mosquito populations, particularly in urban settings [24]. The significant predatory capabilities of Odonata establish them as pivotal contributors to the biological management of disease vectors, such as mosquitoes and freshwater snails. Moreover, their participation in the assessment of aquatic ecosystems is attributed to their sensitivity to human disturbances, highlighting their indispensable role as indicators of environmental health in research endeavors [25].

The expansive order Hymenoptera, housing sawflies, wasps, bees, and ants, accounts for more than 150,000 extant species, as delineated by [26, 27], while an additional 2,000 extinct species have been documented by [28]. Within this diverse group, hymenopterans showcase a broad spectrum of feeding behaviors, contingent upon their specific species. Mature wasps predominantly consume nectar and honeydew, frequently observed foraging on blossoms. Certain species exhibit predatory or parasitic behaviors, actively seeking out invertebrate hosts for oviposition. In contrast, adult ants display diverse feeding habits, spanning from specialized to generalized Ingestion of honeydew, fungal feeding, omnivory, seed consumption, scavenging, predation, and dietary preferences are encompassed [29]. Hymenoptera play a vital role in human societies as essential pollinators for both native and cultivated flowering plants, natural adversaries to harmful insects, and honey producers. The honeybee, esteemed since antiquity for its honey and beeswax, maintains its significance in modern society. Beekeeping has transformed into a lucrative and advanced industry in contemporary times. Despite its use in cosmetics, royal jelly, produced by honeybee workers, lacks conclusive evidence of its purported benefits.

Some parasitic species, including wood wasps targeting braconids parasitizing Lepidoptera and wood-boring beetles, chalcids and trichogrammatids targeting orchard pests, tiphiids parasitizing the Japanese beetle, wood-boring beetles, eulophids preying on scale insects, and pteromalids attacking crop pests serve as invaluable agents for controlling insect pests. Additionally, fig insects from the Agaonidae family play a vital role as the exclusive pollinators of the Smyrna fig, a significant crop in the Western United States [30].

Mantises, belonging to the order Mantodea, comprise over 2,400 species across approximately 460 genera within 33 families [31]. Exhibiting carnivorous behavior throughout their life stages, they consume a diverse range of insects captured with their powerful forelegs. Often observed slowly stalking prey or lying in wait for ambush within vegetation, mantises demonstrate their predatory prowess [32]. In the realm of biological control, mantises are often hailed as beneficial insects due to their penchant for consuming other insects. However, their potential as biocontrol agents may be tempered by their tendency towards cannibalism and predation on other beneficial insect species. Functioning as hemimetabolous predators, male mantises typically exhibit smaller sizes compared to females. Their anatomy features a mobile, triangular head adorned with slender antennae, along with large, widely spaced eyes and mandibulate mouthparts. Notably, the prothorax boasts a narrow, elongated shape, while the meso and metathorax demonstrate shorter proportions [8].

5. CONCLUSION

This study illustrates the diversity of insects that thrive within Loyola College campus in Chennai which is documented for a duration of 3 months (January to March 2023) compiling for a total of 73 different insect species. Interestingly, more butterflies were observed in the B.Ed. campus. The diversity of insect orders, which mainly belonged to Lepidoptera, Hemiptera, Diptera, Blattodea, Coleoptera, Hymenoptera, and Mantodea was observed. This is an indication that insects play indispensable roles in the world

of ecosystems. However, the results also notify that insect populations are threatened by human induced effects such as habitat degradation and climate change. The role played by insects in the ecosystem, such as pollination and pest control, cannot be overlooked, thus there is a need for immediate implementation of the conservation measures to ensure the preservation of insect diversity which is also so crucial to the sustainability and resilience of ecosystems and agriculture. Such systematic information is of utmost importance for the extensive data as it reflects insect density and distribution over the area of Loyola College in detail, making it possible for us to identify hot spots as well as improve knowledge on diversity and taxonomy. Continuous studies and conservation activities are the backbones that guarantee the well-being of insects and all the gifts they provide to the environmental system of the current and future generations.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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