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A study on diversity of insects in two sites of Mysuru district

Dr Navyashree B[1*], A P Vindhya[2]
[1] Assistant Prfessor, Department of Zoology, JSS College of Arts, Commerce and Science, Mysore, Karnataka, India
[2] Department of Zoology, JSS College of Arts, Commerce and Science, Mysore, Karnataka, India

Abstract
In order to record the diversity of insects in the two lakes chosen for Mysore City, a field survey was carried out. A survey performed during the month of April to June using active searching, beating leaf sampling and net sweeping techniques. Observations were made from morning 6.00 am to 11.00 am and evening 4.00 to 6.00 pm for every 10 days interval. Photographs and Results were recorded accordingly. A total of 104 individuals belonging to 10 orders were recorded. The most dominant insect order was Hymenoptera. About 28% insects are from order Hymenoptera, 27% insects are from order Hemiptera, 13% insects are from order Diptera, 6% insects are from order Coleoptera, 6% insects are from order Araneae, 9% insects are from order Lepidoptera, about 6% insects are from order Orthoptera, 2% insect was from order Odonata, 1% insect from order Zygoptera, 2% of insects from Mantodea respectively. The result shows that species richness and diversity was highest in the Karanji lake which can attribute to the high diversity of plants and availability of resources and favourable habitat structure compared to Kukkaralli lake

Keywords: Insects, Insect diversity, Kukkaralli lake, Karanji lake, Diversity indices.

Introduction

As the most prevalent members of the phylum Arthropoda, insects are worldwide invertebrates that also act as vectors, parasites, and pests (Ananthakrishnan, 1988) [1]. Numerous researchers have studied them in the past and today. Biodiversity is the diversity of life. Biodiversity within agro-ecosystems is typically defined as the proportion of different kinds of organisms that are present (Balakrishnan and Easa, 1986) [2]. Stability and productivity are two particularly crucial ideas to take into account when analyzing how biodiversity affects a system (Clarke etal.,2008). In ecosystems, stability is a measure of the system's resilience to change and its capacity to recover from disturbances (Schowalter, 2006).

In terrestrial habitats, insects perform vital ecological roles. They are the most prevalent and varied invertebrates on Earth (Raghunandan and Basavarajappa 2014) [10]. Biomechanics, climate change, developmental biology, ecology, evolution, genetics, and physiology are just a few of the fields in which they have been thoroughly investigated (Khadijah *et al.*, 2013). They are well-known among entomologists for their wide range of traits, and conserving them is a major problem (Jalali and Ojha, 2015). According to Storck (2018), there are roughly 5.5 million bug species in the world. About 63,760 insect species from 29 orders and three classes may be found in India; eight orders account for 94% of the insect fauna, while the remaining 21 orders constitute only 6% of species, or about 7% of the insect variety worldwide (Linta, 2020) [8].

About 8,00,000 insect species are currently living. (Mandal and Ray, 2006) [9]. 2000 species of fossil insects have ben recorded and yet the large number of species to be discovered in future (Fiittotand Adler, 2009). About 75,000 species are reported from India comprising nearly 10% of entire insect fauna (State of Art Reporting Zoology, 1991). Insects are the most diverse group of animals on the planet earth, which includes more than a million described species (Gullan and Cranston, 2005).

Methods and Methodology

Study site

The present study was conducted from April to June 2024 in two different sites in Mysore (12.2958° N,76.6394° E). Studying sites rich in floral diversity. Site-1 (Kukkarahalli Lake - 12°18'0.00" N 76°37'48.00" E) is rich in vegetation such as trees, shrubs, and creepers. Where as site-2 (Karanji lake - 12°18'6.00" N 76°40'14.99" E). Is diverse with flora and a beautiful like attracting migratory birds, water flows and regular tourists. The shoreline is surrounded by marshy areas with wild grass species,

thick bushes, herbs and shrubs which attracts many pollinators. It is surrounded by nature park consisting of butterly park and a walk-through aviary. The temperature is the study sites ranged from 28° C -36° C, Humidity 46% - 53% with moderate rainfall condition. Insects from the trees, shrubs, and ground where observation was carried out by active search and visual observation. Hand picking was employed to collect dead and small insects.

Photography

Observed insect species were photographed without disturbing their natural habitat with the help of mobile cameras (Redmi 9A). Study and identification of the insects are carried out through Photographic Atlas of Entomology and Guide to Insect Identification and iNaturalist insect identification.

Data analysis

Data Analysis was done based on their abundance and habit through Shannon diversity indices and Simpsons diversity indices for richness

Results and Discussion

In this study different types of insect orders are identified from the sites both Kukkarahalli Lake and Karanji Lake. Both the sites are comprising of herbs, shrubs, trees, and

thick bushes and having suitable environment for the survival and reproduction of insect orders. Moreover environmental conditions, temperature, humidity, are required for the growth and development of the insects.

Kukkarahalli Lake bears the following orders such as Araneae, Coleoptera, Hemiptera, Hymenoptera, Lepidoptera, Mantodea, Odonata, Orthoptera. About 44 insects are from Kukkarahalli Lake in which order Aranea contains 3 insects, order Coleoptera contains 4 insects, order Hemiptera contains 10 insects, order Hymenoptera contains 12 insects, order Lepidoptera contains 3 insects, order Mantodea contains 2 insects, order Odonata contains 1 insects, order Orthoptera contains 2 insects, order Diptera contains 9 insects, Zygoptera contains no insects respectively. In order Araneae *Telamona dimidiate, Hyllus giganteus*, and *Neoctenus comorus* were seen. In order Coleoptera *Chiasmetea limae* and *Chrysochora buqueti* were seen. In order Hemiptera *Metochus unigullatus, Ptilocnemus lemur, Chrysocoris stolli* and *Rhyparochromcis vulgaris* were seen. In order Hymenoptera *Componotus cruentatus, Messor arenarius, vespa tropica* were seen. In order Mantodea *Odontomantis planiceps* was seen. In order Odonata *Anotogaster sieboldii* was seen. In order Orthoptera *Trilophidia annulata* was seen respectively.

Karanji lake was comprising of numerous insects they belonging to the orders Araneae, Coleoptera, Diptera, Hemiptera, Hymenoptera, Lepidoptera, Odonata, Orthoptera, and Zygoptera. About 60 insects are found at Karanji lake. Order Araneae contains 3 insects, Coleoptera contains 2 insects, Diptera contains 5 insects, Hemiptera contains 18 insects, Hymenoptera contains 17 insects, Lepidoptera contains 7 insects, Odonata contains 1 insects, Orthoptera contains 4 insects and Zygoptera contains 1 insects mantodea is absent in karanji Lake In order Araneae *Oxyopes salticus* and *Hyllus giganteus* were seen. In order Coleoptera *Profaetia albogullata, Aulacophora femoralis* are seen, order Diptera *Sarcophaga carnaria* and *Musca domestica* are seen, order Hemiptera *Riptortus pedestris, Murcura viterate, Catacanthus incarnates, Dysdercus cingulatus, Haltomorpha H. halys, Graptlstethus apicalis* are seen, Hymenoptera order contains *Polyrhachis rastellate, Tetraponera nigra, Megachilr leachella and Componotus formica ligniperda, bears* order Lepidopera *Papilio polytes, Prosotas nora, Junonia iphita, Micronia aculeata,* order Odonata contains *Anotogaster sieboldii*, Order Orthoptera contains *Trilophidia annulata* and *Omocestus viridulus*, order Zygoptera contains *Pseudagrion microcephalum* respectively.

Percentage composition of each order are 28% of insects are from order Hymenoptera, 27% of insects are from order Hemiptera, 13% of insects are from order Diptera, 6% of insects are from order Coleoptera, 6% of insects are from order Araneae, 9% of insects are from order Lepidoptera, 6% of insect are from order Orthoptera, 2% of insects are from order Mantodea, 2% of insects are from order Odonata, and 1% of insect from the order Zygoptera.

The simpson diversity index for Kukkarahalli Lake was 0.03 and for Karanji Lake was about 0.93 we can conclude that species richness and eveness both are high in Karanji Lake The Shannon diversity index for Kukkarahallin Lake was about -1.21 and for Karanji Lake -1.31 hence we can say that species richness is more in Karanji Lake than Kukkarahalli Lake.

When compare the insect fauna Karanji Lake is have more diversity than Kukkarahalli Lake due to the rich vegetation, have beautiful attractive migratory birds, water flows, shoreline is surrounded my marshy areas with wild grass species, thick bushes, herbs, shrubs etc these attracts the insects to pollinate. Hence the number of variety of insect fauna is more in site 2 Karanji Lake. Where as Kukkarahalli lake is rich in vegetation such as trees, shrubs, and creepers but the number of pollinating flowering plants are less compared to the Karanji Lake hence we can find less number of insect fauna compare to Karanji Lake.

Table 1: Checklist of the Insects Orders recorded at the survey sites of Lakes

Sl. No	Order	Scientific Name	Common Name	No of Individuals
1	Zygoptera	*Pseudagrion microcephalum*	Blue River damsfly	1
2	Hymenoptera	*Polyrhachis rastellate*	Armed spiny ant	3
3	Lepidoptera	*Papilio polytes*	Common mormon	4
4	Hymenoptera	*Tetraponera nigra*	Slender ant	6
5	Hymenoptera	*Megachilr leachella*	Silvery leaf cutter bee	2
6	Lepidoptera	*Prosotas nora*	Common line blue	1
7	Hemiptera	*Metochus unigullatus*	Seed bug	2
8	Coleoptera	*Chiasmetea limae*	Prionid beetle	2
9	Hymenoptera	*Componotus cruentatus*	Blood spotted sugar ant	3
10	Hymenoptera	*Messor arenarius*	Harvest ant	5
11	Hemiptera	*Ptilocnemus lemur*	Feather legged bug	2
12	Hemiptera	*Chrysocoris stolli*	Jewel bug	2
13	Hymenoptera	*Vespa tropica*	Greater banded hornet	1
14	Araneae	*Telamona dimidiata*	Jumper spider	2
15	Hymenoptera	*Oecophyllus smaragdina*	Weaver ant	6
16	Araneae	*Hyllus giganteus*	Jumping spider	2
17	Coleoptera	*Chrysochroa buqueti*	Jewel beetle	1
18	Hemiptera	*Rhyparochromcis vulgaris*	Seed bug	2
19	Araneae	*Neoctenus comorus*	Spider	1
20	Mantodea	*Odontomantis planiceps*	Asian ant mantis	2
21	Araneae	*Oxyopes salticus*	Striped lynx spider	1
22	Hemiptera	*Marcura viterate*	Green legume pod bug	3
23	Hemiptera	*Catacanthus incarnatus*	Man faced stink bug	5
24	Coleoptera	*Aulacophora femoralis*	Red pumpkin beetle	2
25	Orthoptera	*Omocestus viridulus*	Lime green grasshopper	3

26	Lepidoptera	*Junonia iphita*	Chocolate soldier	1
27	Hymenoptera	*Componotus formica ligniperda*	Carpenter ant	3
28	Hemiptera	*Dysdercus cingulatus*	Red cotton stainer	2
29	Hemiptera	*Haltomorpha H.halys*	Brown marmorated stink bug	2
30	Lepidoptera	*Micronia aculeata*	Grey swallow tail moth	1
31	Hemiptera	*Riptortus pedestris*	Bean bug	6
32	Coleoptera	*Profaetia albogullata*	Flower chafer	1
33	Hemiptera	*Graptlstethus apicalis*	Seed eating bug	2
34	Diptera	*Sarcophaga carnaria*	House fly	7
35	Lepidoptera	*Amata huebneri*	Hubner's wasp moth	3
36	Diptera	*Muscat domestica*	House fly	8
37	Orthoptera	*Trilophidia annulata*	Grasshopper	3
38	Odonata	*Anotogaster sieboldii*	Dragonfly	2

Table 2: Checklist of the Insects Orders recorded at the survey sites of Lakes

Sl. No	Order	Scientific Name	Study Sites	
			Karanji Lake	Kukkarahalli lake
1	Araneae	*Telamona dimidiata*	-	+
2		*Hyllus giganteus*	+	+
3		*Neoctenus comorus*	-	+
4		*Oxyopes salticus*	+	-
5	Coleoptera	*Profaetia albogullata*	+	-
6		*Chiasmetea limae*	-	+
7		*Chrysochroa buqueti*	-	+
8		*Aulacophora femoralis*	+	-
9	Diptera	*Sarcophaga carnaria*	+	-
10		*Muscat domestica*	+	-
11	Hemiptera	*Riptortus pedestris*	+	-
12		*Metochus unigullatus*	-	+
13		*Ptilocnemus lemur*	-	+
14		*Chrysocoris stolli*	-	+
15		*Rhyparochromcis vulgaris*	-	+
16		*Marcura viterate*	+	-
17		*Catacanthus incarnatus*	+	-
18		*Dysdercus cingulatus*	+	-
19		*Haltomorpha H.halys*	+	-
20		*Graptlstethus apicalis*	+	-
21	Hymenoptera	*Polyrhachis rastellate*	+	-
22		*Tetraponera nigra*	+	-
23		*Megachilr leachella*	+	-
24		*Componotus cruentatus*	-	+
25		*Messor arenarius*	-	+
26		*Vespa tropica*	-	+
27		*Oecophyllus smaragdina*	-	+
28		*Componotus formica ligniperda*	+	-
29	Lepidoptera	*Papilio polytes*	+	-
30		*Prosotas nora*	+	-
31		*Junonia iphita*	+	-
32		*Micronia aculeata*	+	-
33		*Amata huebneri*	-	+
34	Mantodea	*Odontomantis planiceps*	-	+
35	Odonata	*Anotogaster sieboldii*	+	+
36	Orthoptera	*Trilophidia annulata*	+	+
37		*Omocestus viridulus*	+	-
38	Zygoptera	*Pseudagrion microcephalum*	+	-

Table 3: Diversity indices for different Habitat

Sl. No	Selected Site	Simpson Diversity Index	Shannon Diversity Index:
1	Kukkaralli Lake	0.93	-1.21
2	Karanji Lake	0.97	-1.31

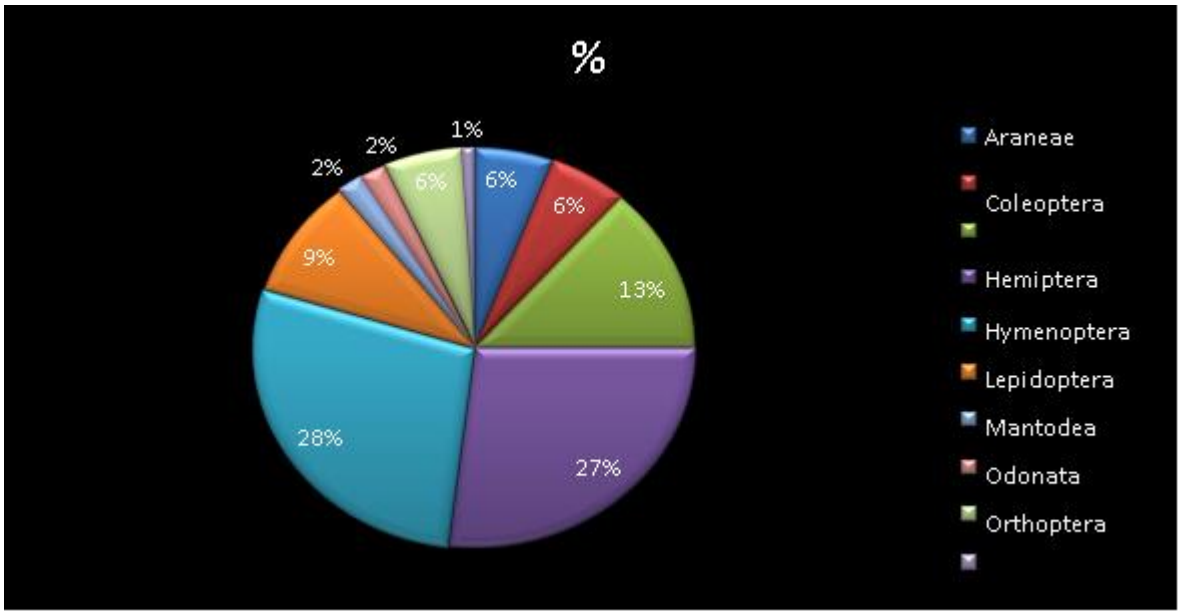

Fig 1: Percentage of different orders

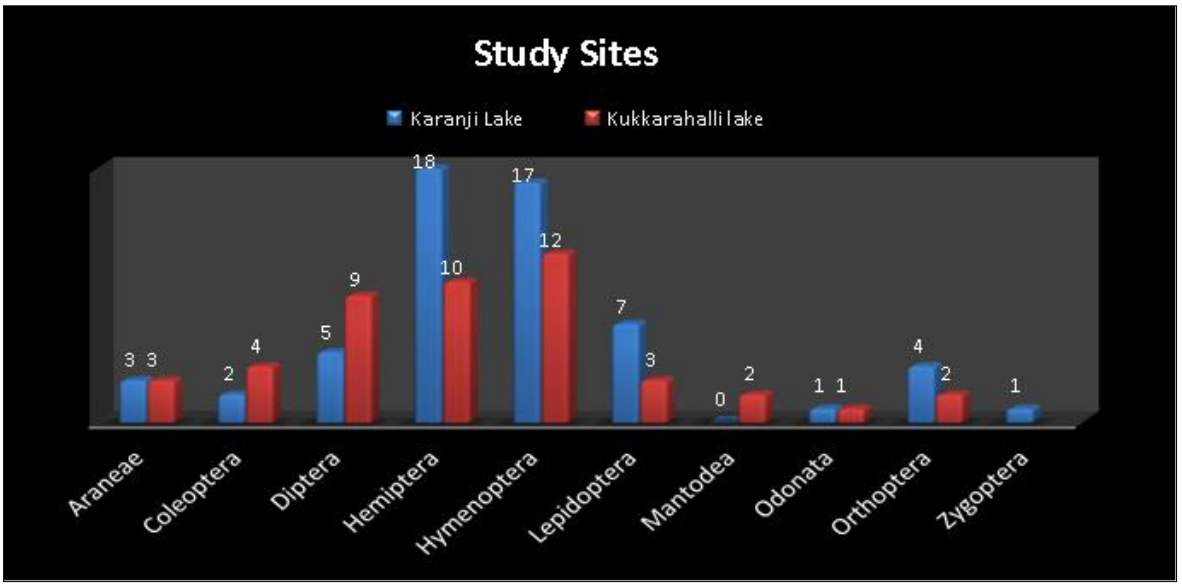

Fig 2: Number of individual in two differenr sites

Conclusion

The study identified 104 insect individuals from 10 orders, with the highest concentrations observed in April, May, and June due to favorable climatic conditions. Insect diversity was influenced by environmental factors such as temperature, humidity, and vegetation. Karanji Lake exhibited a higher insect population than Kukkarahalli Lake, likely due to better habitat conditions. Diversity indices indicated greater species richness and evenness, with Hymenoptera being the most dominant order.

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