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Diversity of insect pollinators in Mount Carmel College campus, Bengaluru

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Abstract

An insect pollinator diversity study was conducted on the campus of Mount Carmel College, Bengaluru, south India. There was a total of 27 species recorded with the Subclass Endopterygota dominating with 25 species and Subclass Paraneoptera consisting of only two species. Order Hymenoptera was found to be the most abundant and Order Lepidoptera being the second most abundant. Among the Families, Apidae was the most abundant and Vespidae, Nymphalidae and Pieridae being the second most abundant followed by Formicidae and Papilionidae.

Keywords: Insects, pollinators, diversity, Bengaluru

Introduction

Insects belong to the Phylum Arthropoda contributing to over 30 million species worldwide. They make up to almost more than half of the rest of the organisms existing (Prabakaran *et al* 2014). Flowering plants have found to have mutualistic and antagonistic interactions with pollinating insects. They contribute to reproduction in floral plants by helping with cross pollination and enabling fruit set (Palatty Allesh Sinu and Shivanna, 2016). In return insects get rewards in the form of nectar and pollen to feed their larval young ones. The objective of this study was to analyze the richness of insect pollinator species on the campus of Mount Carmel College, Autonomous. The campus is located at a latitude of 12.9892 and a longitude of 77.5862 which is 3000 feet above sea level. It is spread over an area of 9.25 acres which has a Botanical garden and also small garden areas which includes trees, shrubs and a wide range of potted floral plants in and around campus which attract a large number of insect pollinators. In this study it was found that the campus has a very rich insect fauna belonging to Subclass Endopterygota which act as pollinators.

Materials and methods

The survey was conducted over a period of 8 months spanning from July 2019 to

March 2020. The photographs of the insects were taken from various sites of the campus. The areas surveyed on campus include the garden patch in front and within the LSCB block, the patch of floral plants opposite the GJB block and also the Bougainvillea bush floral patch near the administrative block. The garden patch in front of the chapel was found to be the most species abundant area on campus. The survey was conducted in day light as pollinators are most active at that time. It was carried out thrice a week between 9am to 3pm. The camera of the Phone Samsung SM-J500F with a resolution of 2322*4128 was used to document the insects. The butterfly species documented were identified using the field guide 'Bengaluru Butterflies' by O.K. Remadevi *et al*, 2018.

Fig 1. An aerial view of the campus

Results

The data that was analyzed suggested that Mount Carmel College campus has a very rich insect fauna diversity. The numbers indicated that there were a total of 27 species of insect pollinators in and around the campus. Subclass Endopterygota was dominating with a total of 25 species alone out of 27 rounding off to 92.5% of participation. Whereas subclass Paraneoptera was the second most dominant with only 2 species and 7.4% of participation. Among the 5 Orders, Hymenoptera consisted of 12 species (44.4%), Lepidoptera with 10 species (37%), Hemiptera and Diptera with 2 species each (7.4%) and Coleoptera with only 1 species (3.7%). There were a total of 15 Families documented out of which Apidae dominated with 4 species (14.8%), Vespidae, Nymphalidae and Pieridae being the second most dominant consisted of 3 species each (11.1%) followed by Formicidae and Papilionidae having 2 species each (7.4%).The rest of the families consisted of 1 species each (3.7%).

Table 1. Checklist of species.

Sl	Subclass	Order	Family	Scientific Name	Common Name
1	Endopterygota	Diptera	Muscidae	*Musca domestica*	House Fly
2	Endopterygota	Hymenoptera	Formicidae	*Myrmicaria brunnea*	Ants
3	Endopterygota	Lepidoptera	Nymphalidae	*Ariadne merione*	Dakhan Common Castor
4	Endopterygota	Diptera	Dolichopodidae	*Condylostylus*	Long Legged Flies
5	Paraneoptera	Hemiptera	Rhopalidae	*Boisea trivittata*	Boxelder Bug
6	Endopterygota	Hymenoptera	Vespidae	*Vespa crabro*	European Hornet
7	Paraneoptera	Hemiptera	Pentatomidae	*Halyomorpha halys*	Marmorated Stink Bug
8	Endopterygota	Lepidoptera	Papilionidae	*Graphium Agamemnon*	Tailed Jay
9	Endoperygota	Hymenoptera	Apidae	*Xylocopa violacea*	Carpenter Bee
10	Endopterygota	Coleoptera	Coccinellidae	*Menochilus sexmaculatus*	Lady Bugs
11	Endopterygota	Hymenoptera	Formicidae	*Camponotus floridanus*	Florida Carpenter Ant
12	Endopterygota	Lepidoptera	Pieridae	*Catopsilia pyranthe*	Oriental Mottled Emigrant (Male)
13	Endopertygota	Lepidoptera	Nymphalidae	*Hypolimnas bolina*	Oriental Great Eggfly (Male)
14	Endopterygota	Hymenoptera	Vespidae	*Vespa affinis*	Lesser Banded Hornet
15	Endopterygota	Lepidoptera	Papilionidae	*Papilio polytes*	Common Mormon
16	Endopterygota	Hymenoptera	Apidae	*Apis florea*	Dwarf Honey Bee
17	Endopterygota	Lepidoptera	Nymphalidae	*Elymnias caudate*	Tailed Palmfly
18	Endopterygota	Lepidoptera	Hesperiidae	*Baoris farri*	Complete Paint Brush Swift
19	Endopterygota	Hymenoptera	Vespidae	*Polistes versicolor*	Common Paper Wasp
20	Endopterygota	Lepidopetera	Pieridae	*Catopsilia pomona*	Common Emigrant (Female)
21	Endopterygota	Lepidoptera	Pieridae	*Catopsilia pomona*	Common Emigrant
22	Endopterygota	Lepidoptera	Hesperiidae	*Pelopidas mathias*	Small Branded Swift
23	Endopterygota	Hymenoptera	Halictidae	*Lipotriches*	Sweat Bees
24	Endopterygota	Hymenoptera	Apidae	*Amegilla cingulate*	Blue Banded Bees
25	Endopterygota	Hymenoptera	Colletidae	*Hylaeus*	Yellow Faced Bees
26	Endopterygota	Hymenoptera	Apidae	*Meliponini*	Stingless Bees
27	Endopterygota	Hymenoptera	Ichneumonidae	*Rhyssa persuasoria*	Sabre Wasp

Table 2. Species distribution with respect to the orders

Sl. No.	Order	Number of species	% of fauna
1	Hymenoptera	12	44.4%
2	Lepidoptera	10	37%
3	Diptera	2	7.4%
4	Hemiptera	2	7.4%
5	Coleoptera	1	3.7%

Table 3. Species distribution with respect to the families

Sl No.	Family	Number of species	% of fauna
1	Apidae	4	14.8%
2	Vespidae	3	11.1%
3	Nymphalidae	3	11.1%
4	Pieridae	3	11.1%
5	Formicidae	2	7.4%
6	Papilionidae	2	7.4%
7	Hesperiidae	2	7.4%
8	Muscidae	1	3.7%
9	Dolichopodidae	1	3.7%
10	Rhopalidae	1	3.7%
11	Pentatomidae	1	3.7%
12	Coccinellidae	1	3.7%
13	Halictidae	1	3.7%
14	Collectidae	1	3.7%
15	Ichneumonidae	1	3.7%

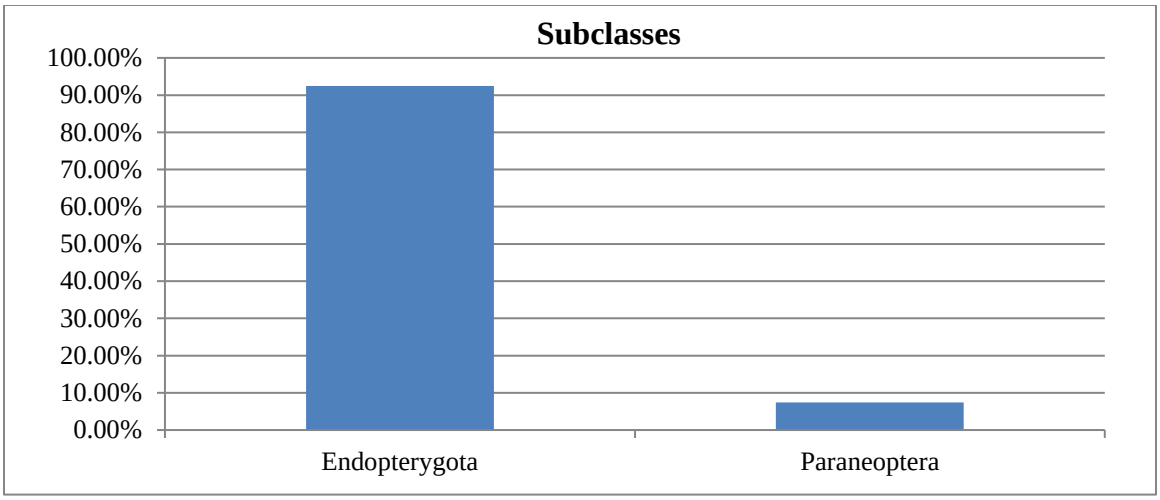


Fig 2. Graphical representation of Subclass comparison

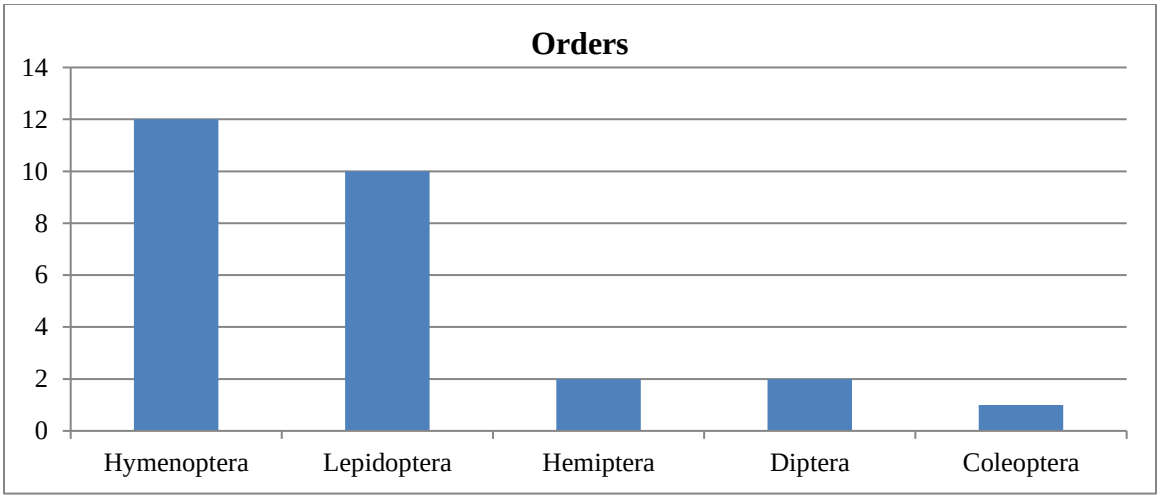


Fig 3. Graphical representation of Order comparison

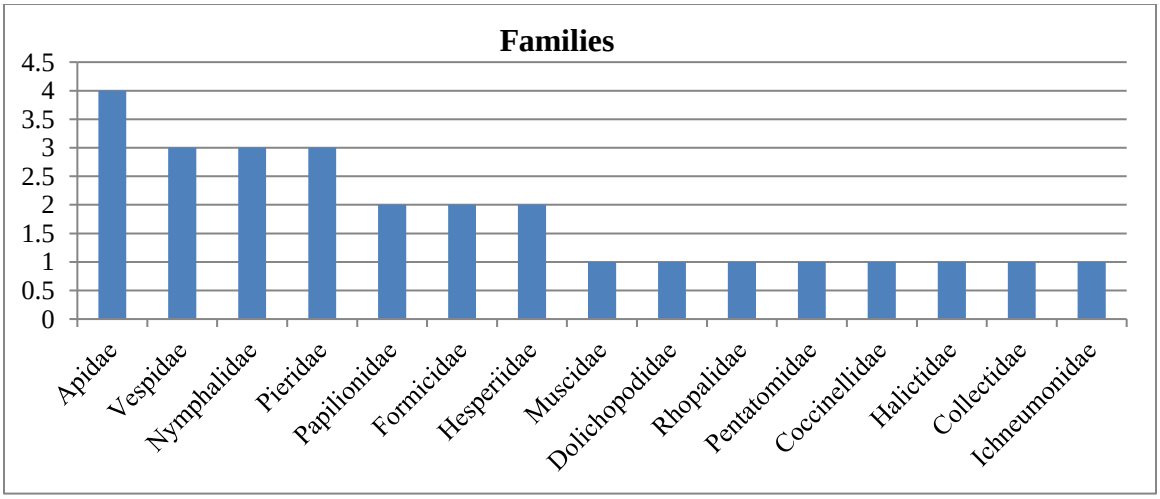
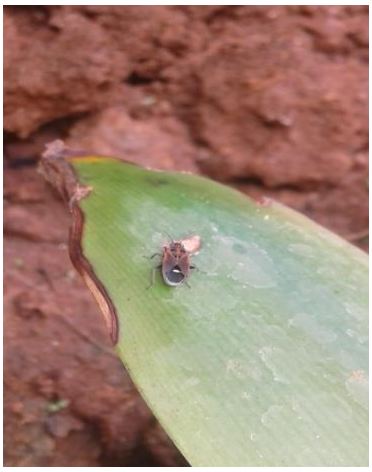
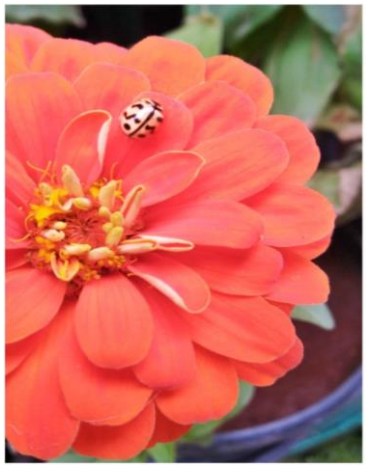
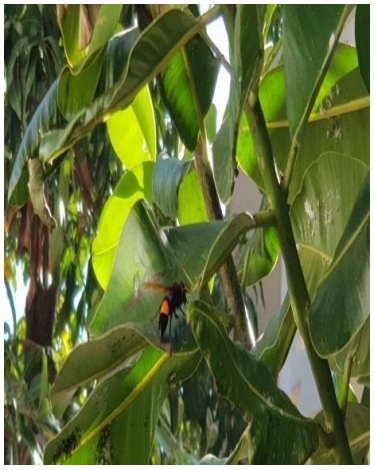
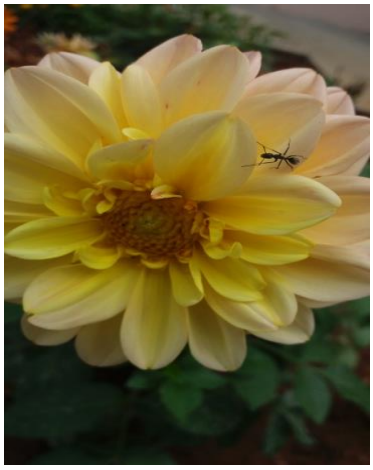
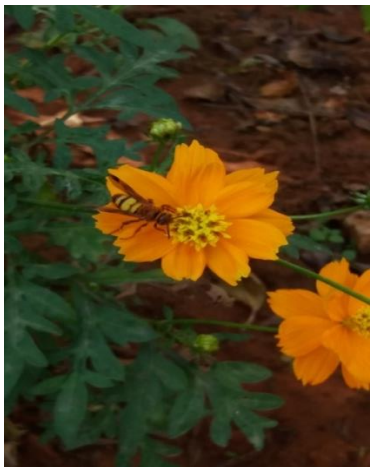


Fig 4. Graphical representation of Family comparison

Table 4. Pictures of species

 House fly	 Ants	 Dakhan common castor
 Long legged fly	 Boxelder bug	 European hornet
 Marmorated stink bug	 Tailed jay	 Carpenter bee

 Ladybird beetle	 Oriental mottled emigrant (male)	 Oriental great eggfly (male)
 Banded hornet	 Common mormon	 Carpenter ant
 Dwarf honey bee	 Tailed palmfly	 Complete paint brush swift

		
Common paper wasp	Common emigrant (female)	Common emigrant
		
Small branded swift	Sweat bees	Blue banded bee
		
Yellow faced bee	Stingless bee	Sabre wasp

Discussion

Insect pollinators are considered to be a very important group of organisms in the environment. They promote the process of pollination in floral plants to increase fruit set. There are many plants which cannot take up cross pollination due to various environmental conditions. Insect pollinators help these plants to cross breed.The population of insect pollinators largely depend upon climatic variation and temperature. It is seen that they are most active during the hottest period of the day and less active when the temperatures are low. Though artificial pollination is possible nowadays and science has progressed to such an extent that we can breed plants by scientific methods but we still need to make changes in our environment to protect the pollinators.

Urbanization and increase in human activities which has led to pollution and aforestation have caused a decline in many species. We can promote increased urban garden space at schools, colleges and office premises to attract these pollinators. Pollinators may approach only specific plant species, so depending on the type of pollinators you want your garden to be approched you can decide the types of floral plants you would want to have in your garden. This can be a small contribution to the environment.(O.K Remadevi *et al*, 2018). Plant and animal interaction studies have to be included in the academic syllabuses of college students to increase awareness among students and young researchers to take up such small studies and projects to conserve nature.

Conclusions

This study provided knowledge about the diversity of insect pollinators on the college campus. There were a total of 27 species documented and more number of species may be added to it in the future studies. Thus this study makes the campus eligible for diversity studies and projects. There was a domination by Subclass Endopterygota in this study and further studies can be performed in order to make comparative analysis. Urban gardens space should be increased to protect and conserve these species which are important pollinators. Urban gardens serve to be an important food source for various pollinators. It is becoming difficult for pollinators to survive as floral plants and fields are being replaced by areas with single type of crops for agricultural purposes. By the development of urban gardens in our cities the pollinators will ensure they fly from one garden to the other by collecting maximum amount of nector for food.. Each one of us can contribute to these urban gardens by having a hedge, a bed of floral plants or even a window box with few flowers to attract these nector-lovers at our offices and apartment complexes. Depending on our preference and the season we would want to have a garden, we can decide the type of plants that would be most compatable and ensure that these species do not go extinct as

we really need them for natural cross pollination (Nicholas Tew *et al*, 2022).

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References

Prabakaran S., Chezian Y., Evangelin G. and John William S. 2014. Diversity of butterflies (Lepidoptera:Rhophalocera) in Tiruvallur district, Tamil Nadu, India. *Editor Biolife Journal*, **2(3):**769-778.

O. K. Remadevi., Sooraj S., Chaturved Shet R., K. H Vinaya Kumar and Ritu Kakkar. 2018. 'Bengaluru Butterflies: A field guide' . Centre for climate change, Environmental Management and Policy Research Institute, Bengaluru.

Pallatty Allesh Sinu and K. R Shivanna. 2016. 'Mutualistic Interactions between Flowering Plants and Animals'. Manipal University Press.

Nicholas Tew., Jane Memmott and Katherine Baldock. 2022. 'Urban gardens are crutial food sources for pollinators – here's what to plant for every season'. The Conversation, 2022

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