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A preliminary checklist of entomofauna in pachaiyappa's college campus, Kanchipuram, Tamil Nadu, India

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Abstract
Insect diversity and distribution are important for the determination of biodiversity in that area. In this study, an entomofauanl diversity was recorded in Pachaiyappa's College for Men (PACM), Kanchipuram (KPM). Entomofaunal species were collected during the morning and evening time by using a Sweep net, Pitfall Trap (PFT), Bait Trap (BT) and All Out Search Method (AOSM). The results shows that, a total of 8 orders, 16 families, 11 sub- family, 33 genera and 36 species were recorded in the college PACM campus. Insect order Hymenoptera (35%) was highly represented, followed by, Coleoptera (16%) Hemiptera (14%), Lepidoptera (11%), Diptera (8%), and Odonata (5%). Entomofaunal diversity, density, richness, and abundance in terrestrial, aquatic, mountain and agro-ecosystem mainly determined by climatic factors, followed by food, vegetation type, soil and water quality *etc*.

Keywords: insect diversity, richness, pitfall trap, ants, beetles and ecosystem

Introduction
Biodiversity conservation and management are of worldwide concerns. The use of surrogate taxa, i.e. taxa that site, has become important in biodiversity studies. It is impossible to study all the communities available in a particular ecosystem, in light of the need for rapid, reliable and cost-effective assessments that can be used in conservation and monitoring programs. Insect diversity, distribution and abundance are important for the determination of biodiversity in that area. Insects are good bio-indicators for any alteration or changes in the ecosystem the Insect population might be increase or decline.
Insects play a vital role in all ecosystems. It helps pollination, seed dispersal and acts as good bio-control agents. Insects particularly ants can be used in monitoring environment, ecosystem and ecological studies. They are sensitive to habitat variation and respond quickly to the changes in habitat quality. Dipterans fly they transmit vector born disease in animals. Abiotic factors such as litter temperature, humidity, litter depth, rainfall and slope of the terrain were found to influence the abundance and elevational distribution of litter insects Sabu *et al* (2008) [12].
In general, college campuses are not using any synthetic pesticides/ Insecticides for controlling insect species in India. Campus faunal diversity assessment is very essential and it helps to maintain the functional ecosystem. Entomofaunal diversity, density, richness, and abundance in terrestrial, aquatic, mountain and agroecosystem mainly determined by climatic factors, followed by food, vegetation type, soil and water quality, Indiscriminate use of synthetic insecticides in agro ecosystem, its leads to the depletion of insect biodiversity particularly beneficial insects such as bees, and wasps. The entomofaunal diversity and field survey studies were carried out by various authors globally, in Temperate deciduous forest (Hirao, *et al* 2009) [6], Wild Life Sanctuary (Bulganin, *et al*, 2015) [1], Ramsar site (Slim *et al* 2016) [4], University Campus (Nasiruddin and Shiuli, 2017) [5], Vegetable gardens (Sandrine *et al* 2018) [3], Kondakarla Lake (Amaravathi, *et al*, 2018) [2], Agro-ecosystems (Mohammedi *et al*, 2019) [7] and Sugarcane filed (Atencio *et al* (2019) [9]. There is no field survey or report on entomofaunal diversity in Kanchipuram city. Therefore, an attempt was made to conduct a preliminary checklist of entomofaunal diversity in the PACKM College campus. It gives some valuable information about the current status of the ecosystem.

Material and Methods
Study Area
Kanchipuram is situated on the northern East Coast of Tamil Nadu and is adjacent to the Bay of Bengal and Chennai city (Latitude: 12.8341735ºN and Longitude: 79.7036402ºE) India. Pachaiyappa's College for Men (PACM), Kanchipuram (KPM), the campus (front gate, library side, playground, Boys hostel, NCC camp office, college eastern side, and Vegavathi river canal sides) were selected for the diversity of entomofaunal species. An extensive survey was carried out from December to April.

Plate 1: Entomofaunal collection sites at PACM, Kanchipuram.

Entomo faunal Collection

Insect species were collected during the morning and evening time by using a sweep net, Pitfall trap, and All Out Search Method (AOSM). An intensive All Out Search Method (AOSM) was carried out to collect insect species seen on the PACM campus. Pitfall traps: Ten pitfalls were placed randomly in the site A, B and C. Each pitfall contained 70% alcohol and a few drops of glycerin to reduce evaporation of alcohol. Collection was done 24 hrs after the traps were laid. The trapped insects were then transferred into vials containing 70% alcohol. Bait Trap (BT): Four bait types: Egg yolk, fried coconut, honey, un-boiled rice, millet and dead insects were used and placed in the college campus for collection of ants and other species (Alonso, 2000 [11]; Azhagu Raj, *et al* 2017) [10]. The collected insect's species were identified up to genus and species level identifications were done with the help of various taxonomic keys, field guides and monographs.

Results and Discussion

In this study, a checklist of entomofaunal species in Pachiyappa's College for Men (PACM), Kanchipuram (KPM), Tamil Nadu, India is documented. The results of the present study are tabulated in table no.1& figure1) and the insect order wise presented in the figure.2.

Table 1: Checklist of entomofaunal species Pachaiyappa's College for Men Campus (PACM), Kanchipuram

Common Name/Order	Family	Subfamily	Genus	species
Assassin bugs Hemiptera	Reduviidae	Stenopodainae	Oncocephalus	annulipes stal
		Stenopodainae	Sastrapada	Elongate Ravichandran & Livingstone
		Reduviinae	Acanthaspis	sp
Plant bugs Hemiptera	Pyrrhocoridae	-	Dysdercus	sp
	Pseudococcidae	-	Phenococcus	sp
Cockroach Blattodea	Blattodae	-	Caloamprodes	characterosa
	Blattodae	Blattinae	Periplaneta	americana
	Corydiidae	-	Therea	petiveriana
Dragonflies Odonata	Libellulidae	-	Brachythemis	contaminata (Fabricius, 1793)
	Libellulidae	-	Rhodothemis	rufa (Rambur,
Wasps Hymenoptera	Vespidae	Vespinae	Vespa	sp
	Vespidae	Polistinae	Ropalida	marginata
Honeybees Hymenoptera	Apidae		Apis	indica
Ants Hymenoptera	Formicidae	Formicinae	Camponotus	Rufoglaucus (Jerdon, 1851)
			Camponotus	Compressus (Fabricius, 1787)
			Solenopsis	Geminate (Fabricius,1804)
			Oecophylla	Smaragdina (Fabricius,1775)
			Paratrechina	Longicornis (Latreille,1802)
		Pseudomyrmicnae	Tetraponera	Rufonigra (Jerdon,1851)
		Myrmicinae	Myrmicaria	Brunnea (Saunders,1842)
			Crematogaster	sp
			Pheidole	sp
		Dolichoderinae	Trichomyrmex	Glaber (André, 1883)
Mosquitoes Diptera	Culicidae	Anophelinae	Anopheles	sp
			Culex	sp
Housefly Diptera	Muscidae	-	Musca	domestica
Beetles Coleoptera	Scarabaeidae	Scarbaeinae	Onthophagus	sp
	Tenebrionidae		Mesomorphus	sp1
			Mesomorphus	sp2
	Scarabaeidae	Scarbaeinae	Copris	sp1
			Copris	sp2
			Copris	sp3
Silverfish Zygentoma	Lepismatidae	-	Lepisma	sp
Butterfly Lepidoptera	Nymphalidae	-	Danaus	genutia
		-	Danaus	chrysippus
		-	Tirumala	limniace
	Pieridae	-	Eurema	blanda

In this study, a total of 8 orders, 16 families, 11 sub- family, 33 genera and 36 species of entomo-faunal species were Recorded Table 1and Figure2. In the study area, the following species were distributed in all four zones weaver ant, *Oecophylla smaragdina* (Fabricius, 1775), black ant, *Camponotus compressus* (Fabricius, 1787), red ant, *Solenopsis geminate* (Fabricius, 1804), assassin bug, *Sastrapada elongate* Ravichandran & Livingstone, dung beetles, *Onthophagus* sp. *Mesomorphus* sp. and *Copris* sp.

The college campus packed with a good number of trees but, the vegetation coverage is poor and soil is very loose and red soil. The eastern and northern side of the college campus was dominated by Hymenoptera species (35%) (Ants) mainly, due to the availability of water (canal) resources and vegetation. But southern and western side of the college campus was dominated by coleopteran (dung) beetles (16 %) (Table 1), due to

sewage disposal from the households, dumping of cow dung and anthropogenic activities.

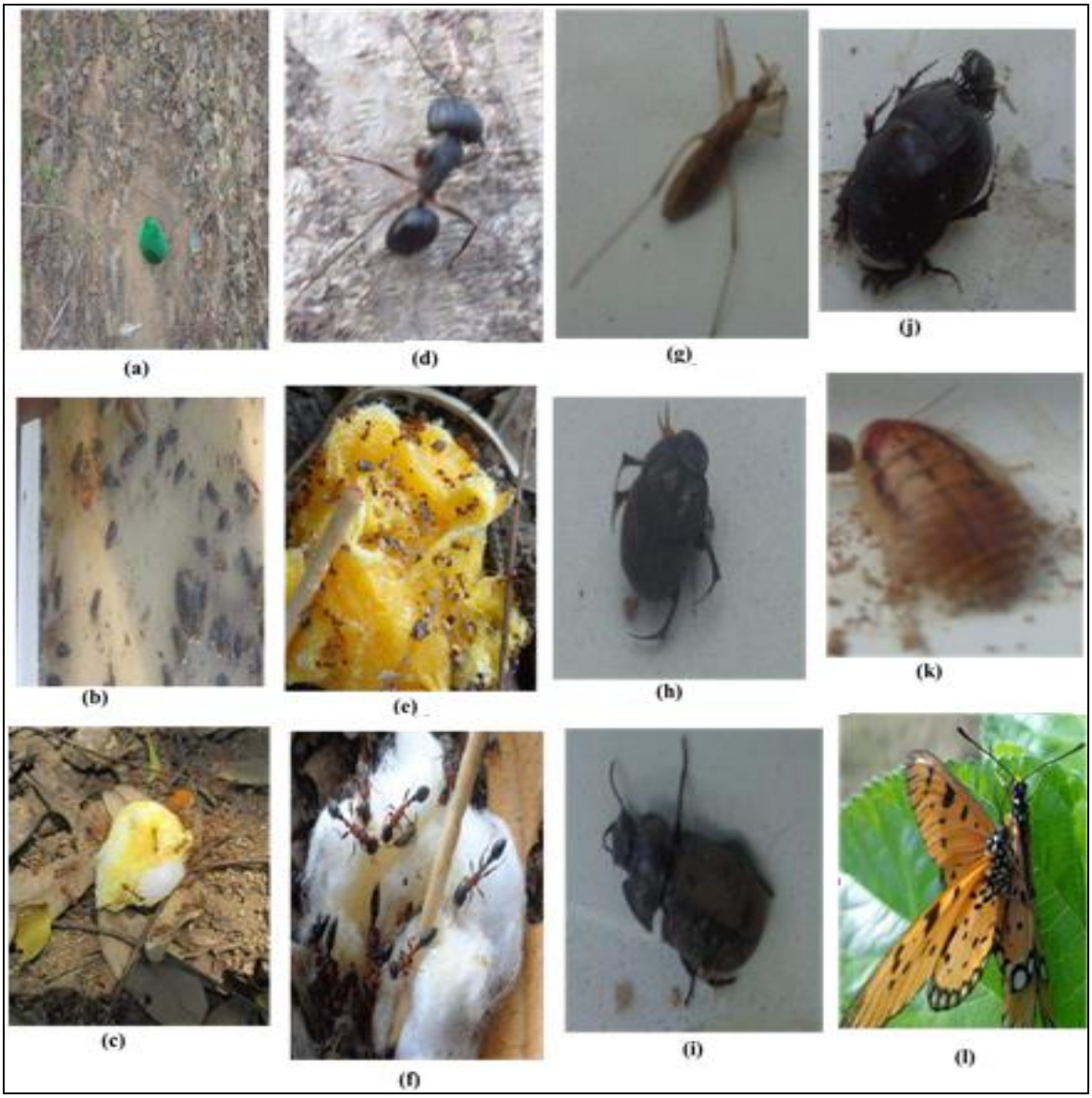

Fig 1: Entomofaunal species diversity in Pachaiyappa's College for Men Campus (PACM), Kanchipuram[(a) Pitfall trap, b) Pitfall trap-Collected Insect species, c) *Oecophylla smaragdina*(Fabricius, 1775), d) *Camponotus compressus* (Fabricius, 1787), e) *Solenopsis geminate* (Fabricius, 1804), f) *Tetraponera rufonigra* (Jerdon, 1851), g) *Sastrapada elongate* Ravichandran & Livingstone, h) *Onthophagus* sp.,(i) *Mesomorphus* sp.,(j) *Copris* sp].

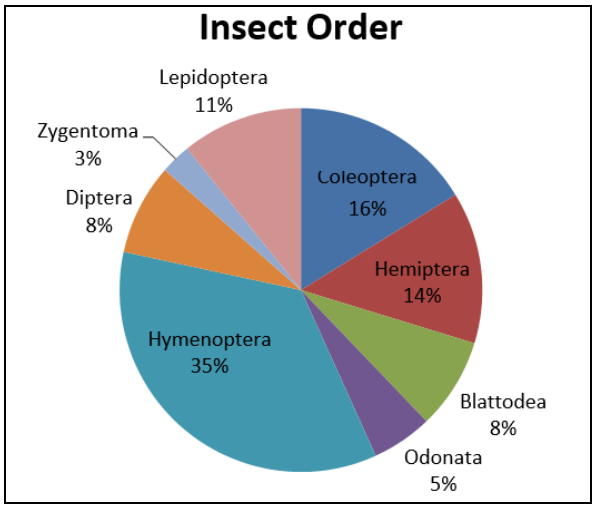

Fig 2: Entomofaunal diversity (Order) in Pachaiyappa's College for Men Campus (PACM), Kanchipuram.

Sandrine *et al* (2018) [3] reported that entomo-faunal diversity, a total of eight orders and 84 families of insects in urban vegetable gardens of Gabon were recorded. Bulganin, *et al* (2015) [1] found that 19 genera and 49 families of Insects in Bhibhuti Bhusan Wild life sanctuary, West Bengal was recorded. Similarly, Amaravathi *et al* (2018) [2] reported that, the aquatic entomofaunal distribution Kondakarla lake were 27 families and 7 orders were recorded in Andhra Pradesh India.

Hirao, *et al*, (2009) [6] studied that, the significance of entomo-faunal diversity in a Hirao, *et al*, (2009) [6] studied that, the significance of entomo-faunal diversity in a significantly higher comparison to other insect groups in the temperate deciduous forest area. Slim *et al* (2016) [4] reported that the terrestrial entomofauna diversity in the Ramsar site. The result reveals that a total of 73 species and 28 families recorded. Coleopteran beetles are highly represented in the Ramsar site followed by Orthoptera.

In this study, order Hymenoptera (35%) was highly represented followed by Coleoptera, Hemipetera, Lepidoptera, Diptera, and Odonata. Nasiruddin and Shiuli (2017) [5] carried out the survey of entomofauna at different sites of Chittagong University Campus, they concluded that butterfly and moths species are highly abundant followed by dragonfly and damselfly in the University Campus. Mohammedi *et al*, (2019) [7] study the entomofaunal diversity in agroecosystems in Algeria. In the agro-ecosystem the order Coleoptera and Orthoptera were highly represented. Diversity of entomofauna in agro-ecosystems in the arid region of Rajasthan, a total of 46 genera consists of beetles, moths, bugs, and grasshoppers (Saiga, *et al*.2007) [8]. An entomofaunal diversity in sugarcane in Panama was investigated by Atencio *et al* (2019) [9]. In his study the sugarcane agro ecosystem dominated by Ants followed by termites. In this campus faunal study provides a significant contribution in the fields of Ecology.

Conclusion

In this study, a total of 8 orders, 16 families, 11 sub- family, 33 genera and 36 species of entomo-faunal species were recorded in the college PACM campus. Insect order Hymenoptera (35%) was highly represented, followed by, Coleoptera, Hemiptera, Lepidoptera, Diptera, and Odonata species. Entomofaunal diversity, density, richness, and abundance in terrestrial, aquatic, mountain and agro-ecosytem mainly determined by climatic factors, followed by food, vegetation type, soil and water quality.

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Conflict of interest

The authors declare that they have no conflict of interest.

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