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Assessment of Ant Diversity in Kizhakkumpuram Village, Palakkad Kerala, India

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Abstract:

Ants are inevitable part of our ecosystem. They play many roles as decomposers, predators, pollinators, scavengers, soil engineers etc but they are least studied with respect to taxonomy, in India. In this regard, a study on diversity of ants was conducted in the Kizhakkumpuram region of Palakkad, Kerala. Study was carried out for 6 months from October 2020 to March 2021. All out-search method, pitfall and sifting method were employed for collection of ants. Ants of 20 different genera were obtained. Of that about 14 were identified up to species level. The Ants in the collection belonged to five different subfamilies Dolichoderinae, Formicinae, Myrmicinea, Ponerinae and Psuedomyrmicinae. More number of ant species belonged to Formicinae followed by Myrmicinae, Ponerinae, Dolichoderinae, Pseudomyrmicinea. Camponitini and Ponerini are the most abundant tribes. The high species diversity of ants can be attributed to the high diversity of plants and insects.

Key Words: Ant, Formicidae, Species Diversity, Biodiversity

Introduction:

Ants! Ants! everywhere….

Ants belong to the single family Formicidae under Superfamily Vespoidea within the order Hymenoptera. In India there are 12 known subfamilies Aenictinae, Amblyponinae, Cerapachyinae, Dolichoderinae, Dorylinae, Ectaminae, Formicinae, Leptanillinae, Myrmicinae, Ponerinae, Proceratiinae, Pseudomyrmicinae (Bharti 2012) which comprises 297 genera of 828 species recorded so far. Ants occupy a variety of habitats such as soil, dead logs, trees, litter, leaves etc (Bharti and Sharma, 2009).

Their individual colonies may have millions of members and they together make up 3000 million tons biomass which is almost equal to the combined weight of all human beings on earth. Ants have multiple roles in an ecosystem they are leading predators, cunning competitors, deadly scavengers, unavoidable decomposers and are thereby inevitable part of nutrient cycling. They show mutualistic relationships with flora and fauna. Due to the nesting habits ants are agents of bioturbation, creates avenues for water, mixed soil horizon and exchange of gas through the chambers and tunnels make up their nest. These activities are responsible for altering soil, soil production and biotic profiles (Surekha Chate and Ramrao Chavan, 2021). In the recent years' inclusion of ground dwelling arthropods in biodiversity inventories and environmental assessment have increased (Oliver and Beattie, 1996).

Ants respond quickly to environmental disturbances. Considering the economic importance and great diversity of habitats of ants in India, they have been poorly scientifically explored (Sabu *et al*., 2008). There are difficulties associated with the sampling of ants as they are locally very numerous, with a wide range of mobility requiring enormous sampling efforts where complete enumeration is not possible as fauna may shift in relation to microclimate/environmental factors (Bestelmeyer *et al*., 2000; Bruhl *et al*., 1999; Elmes and Wardlaw, 1982). Most research to date has focused on providing vertebrate data for conservation assessment and for many groups of invertebrates. We lack even basic information in tropical ecosystems (Fisher and Robertson, 2002). This is particularly true for the ant fauna of subtropical Western Ghats forests, a recognized global hotspot of biodiversity in India (Myers *et al*., 2000; Myers, 2003; Bossuyt *et al*., 2004).

Materials and Methods:

Study area

Kizhakkumpuram, is a village in Palakkad, Kerala. The Latitude of the study area is 10.8058° N and longitude is 76.4802° E. Elevation is 86 meters above sea level. The village is about 31 kilometres from Silent valley. The tributaries of Bharatha puzha is very near to kizhakkumpuram. It is a semi-urban area; agriculture fields cover the study area. The collections are done from forest like areas. The climate is tropical type, may reach up to 42 degrees Celsius in summer and fall to 25 degrees Celsius in monsoon. High species diversity is seen, area is rich with flora and fauna.

Ant Sampling Method:

The collection of ants was done in morning and evening because it was observed that ants are seen more in that time. Intensive all out search method was carried out for the collection. Searching for ants in tree crevices, under the stones, by sifting leaf litter etc. Pitfalls were used. Plastic glass of 8 cm deep with an opening of 5.7cm diameter and was filled of water with a little colourless detergent. fifteen traps were fixed in site at five- meter intervals in a regular distribution. The collected specimens were identified to the lowest possible taxonomic level. The pit fall contained isopropyl alcohol, which is a killing agent and preservative. Sifting method was used to collect small ants that forage primarily in the layer of leaves and debris. Bait traps were also kept, for attracting the ants using honey, sugar etc. Irrespective of the scheduled time, ant specimens are collected whenever and from wherever possible during the study period from different habitats of the study area.

Identification, Preservation and Labelling:

Ants were preserved in 70 % isopropyl alcohol in separate plastic vials. The vials were labelled with the place, date of collection. Photographs of the specimens were taken using macro lens and were sent to Dr kalesh sadasivan sir, Research Associate, TNHS who helped in identification of the ant specimens using standard identification manuals like, identification keys in Bingham (1975) Bolton (1994) to confirm their identity.

Results:

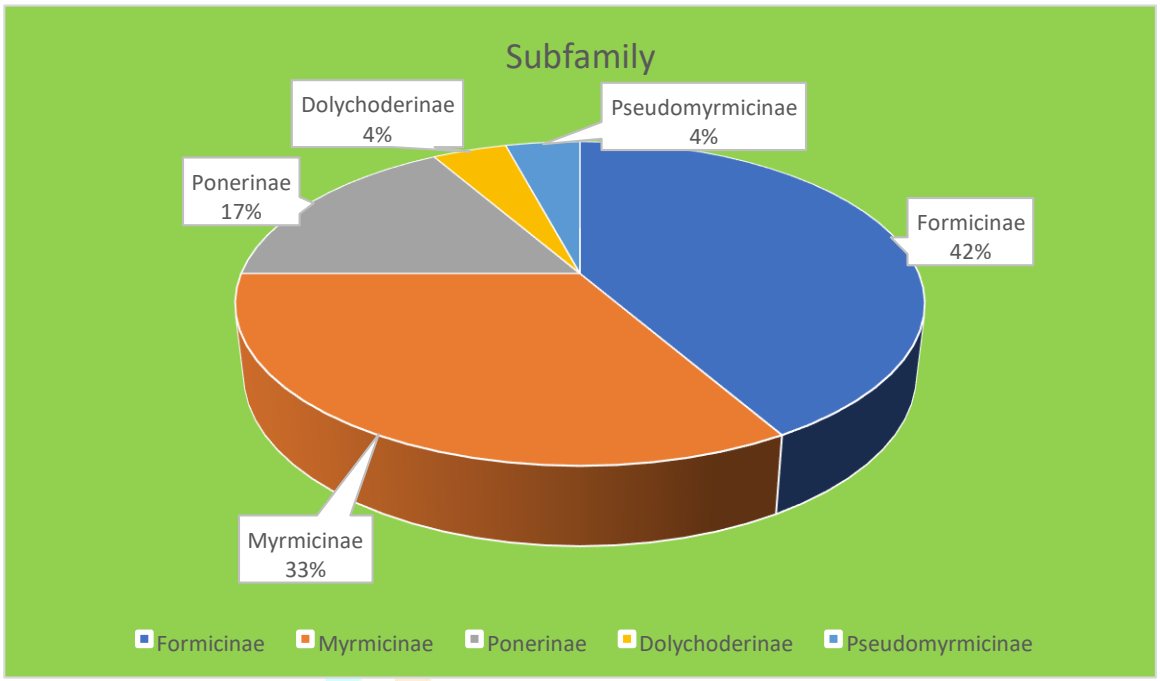
About 20 different genera of ants were obtained of which 14 were identified up to species levels. The Ants in the collection belonged to five different subfamilies Dolichoderinae, Formicinae, Myrmicinea, Ponerinae and Psuedomyrmicinae. From the graphs, we can easily understand that the majority of the ants in the study area belong to subfamily Formicinae (42%), followed by Myrmicinae (33%) and Ponerinae (17%). The least occurring subfamilies are Dolichoderinae (4%) and Pseudomyrmicinae (4%). Formicinea comprising of representatives, *Anoplolepis gracilepis*, *Camponotus irritans*, *Camponotus parius*, *Camponotus sericeus, Lasius niger,Oecophylla smaragdina* , *Paratrachina longicornis* , *Polyrhachis exercita and Tapinoma melanocephalum* . Subfamily Myrmicinea comprising of representatives *Monomorium minimum*, *Myrmicaria brunnea*, and *Solenopsis geminata* and sub family Ponerinae was represented by *Diacamma indicum*, *Odontomachus simulimus* .Camponitini and Ponerini are the most abundant tribes. The least occurring tribes are Tapinomini, Plagiolepidini, Leptomyrmicini, Oecophyllini, and Pseudomyrmicini.

Genus identified

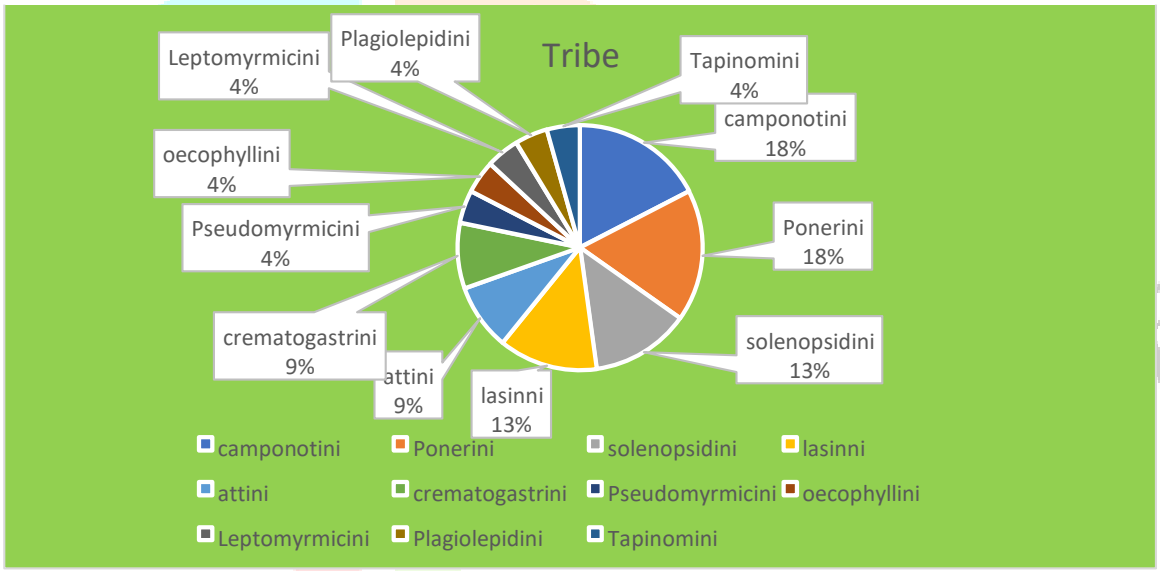
Sl.no	family	subfamily	tribe	genus
1	Formicidae	Formicinae	Plagiolepidini	*Anoplolepis*
2	Formicidae	Ponerinae	Ponerini	*Bothroponera*
3	Formicidae	Formicinae	Camponotini	*Camponotus*
4	Formicidae	Myrmicinae	Crematogastrini	*Crematogaster*
5	Formicidae	Ponerinae	Ponerini	*Diacamma*
6	Formicidae	Dolychoderinae	Leptomyrmicini	*Dorymyrmex*
7	Formicidae	Formicinae	Lassini	*Lasius*
8	Formicidae	Myrmicinae	Solenopsidinii	*Monomorium*
9	Formicidae	Myrmicinae	Solenopsidinii	*Myrmicaria*
10	Formicidae	Formicinae	Lasinni	*Nylanderia*
11	Formicidae	Ponerinae	Ponerini	*Odontomachus*
12	Formicidae	Formicinae	Oecophyllini	*Oecophylla*
13	Formicidae	Ponerinae	Ponerini	*Pachycondyla*
14	Formicidae	Formicinae	Lasini	*Paratrachina*
15	Formicidae	Myrmicinae	Attini	*Pheiodole*
16	Formicidae	Formicinae	Camponotini	*Polyrachis*
17	Formicidae	Myrmicinae	Solepsidini	*Solenopsis*
18	Formicidae	Formicinae	Tapinomini	*Tapinoma*
19	Formicidae	Pseudomyrmicinae	Pseudomyrmicini	*Tetraponera*
20	Formicidae	Myrmicinae	crematogastrini	*Tetramorium*

Species identified

Sl.no	family	Subfamily	Tribe	species
1	Formicidae	Formicinae	Plagiolepidini	*Anoplolepis gracilepis*
2	Formicidae	Formicinae	Camponotini	*Camponotus irritans*
3	Formicidae	Formicinae	Camponotini	*Camponotus parius*
4	Formicidae	Formicinae	Camponotini	*Camponotus sericeus*
5	Formicidae	Ponerinae	Ponerini	*Diacamma indicum*
6	Formicidae	Formicinae	Lassini	*Lasius niger*
7	Formicidae	Myrmicinae	Solenopsidinii	*Monomorium minimum*
8	Formicidae	Myrmicinae	Solenopsidinii	*Myrmicaria brunnea*
9	Formicidae	Ponerinae	Ponerini	*Odontomachus simulimus*
10	Formicidae	Formicinae	Oecophyllini	*Oecophylla smaragdina*
11	Formicidae	Formicinae	Lasini	*Paratrachina longicornis*
12	Formicidae	Formicinae	Camponotini	*Polyrhachis exercita*
13	Formicidae	Myrmicinae	Solepsidini	*Solenopsis geminata*
14	Formicidae	Formicinae	Tapinomini	*Tapinoma melanocephalum*



Graphical representation of percentage of subfamilies collected



Graphical representation of percentage of tribes collected

Discussion

Similar diversity studies have been done in the Wayanad Region, "Diversity of Forest Litter-Inhabiting Ants Along Elevations in the Wayanad Region of the Western Ghats", a study done by Thomas k babu *et al*., (2008), about twenty-nine species of ants were obtained. Myrmecinae and Ponerinae were most common. From the study it is concluded that species richness varied according to changes in elevations. Another diversity study, "Study on the Ant Diversity (Hymenoptera: Formicidae) of Periyar Tiger Reserve in Southwestern Ghats" was done by Gigi Joseph *et al*., (2013). About thirty-one species of ants belonging to 14 genera under 4 subfamilies were found to inhabit varying vegetation type of Periyar Tiger Reserve of southern Western Ghats. Similar study, "Checklist of Ants (Hymenoptera: Formicidae) of Silent Valley National Park, Western Ghats, Kerala, India", was done by V. Sabitha, K. Harsha, R. Lekshmi, K. Gopinath, C. Balalakshmi (2018). Around thirty genera of ground dwelling ants of 40 species belonging to 6 families were identified from Silent Valley National Park during the study period. Among them, Myrmicinae was the most abundant in the subfamilies reported, with 14 species, followed by Formicinae (12 species), Ponerinae (9 species), Dolichoderinae (3 species), Aenictinae and Cerapachyinae (1 species). Another study was

carried out by Kashmira *et al*., (2013) in Mumbai, Maharashtra. From the study, they recorded 28 species of ants coming under subfamilies – Myrmicinae, Formicinae, Aenictinae, Dolichoderinae, Ponerinae and Pseudomyrmicinae. The highest diversity was exhibited by the family Myrmicinae.

Conclusion

There is rich diversity of ants in the region, where the project is carried out. Ants of 20 different genera were obtained, of that about 14 were identified up to species level. More number of ant species belonged to subfamily Formicinae and least occuring subfamily was Pseudomyrmicinea. Many ground dwelling and arboreal ants could be seen. Further studies can be carried out in the area and more ants can be identified to the species level. Comparing the ecological importance of ants, there is very little data available about ants in most areas, so there are urgent, sustained efforts required to monitor and conserve the Kerala myrmeco-fauna.

PLATES

Anoplolepis gracilepis

Camponotus

Oecophylla smaragdina

Polyrachis

Crematogaster

Myrmicaria

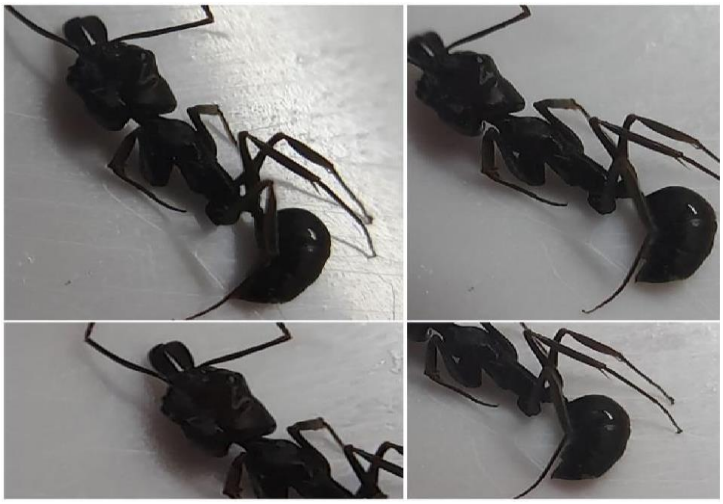
Pheiodole

Solenopsis

Tetramorium

Bothroponera

Diacamma



Odontomachus

Acknowledgement

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