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Abstract:

Eleven species of ants of family Formicidae in which 3 subfamilies; 7 species of Formicinae, 3 species of Myrmicinae, 1 species of + Sphecomyrminae, and 9 genera were detected during January to April 2022. In Radhanagari Tehsil, various observations were studied and recorded. According to the observations it is understood that the ants are important for agricultural fertile soil and the related crops, as compared to ants in non-agricultural areas. It is mainly to study various characteristics of species and changes around surrounding environments. It is important to understand that there is diversity in our ecosystem. It was also observed that spraying insecticides and pesticides on Agricultural land can cause harm to the ant species. The result also shows that there is a need to examine and spread information about preserving some ant species which are rare. The spraying of chemicals to gain high yield harms the ant species.

The ant species play vital role in soil fertility. It is a very mainly factor in maintaining the balance in the ecosystem. Formic acid is found in most ants and stingless bees. The first person to describe the isolation of this substance (by the distillation of large numbers of ants) was the English naturalist John Ray, in 1671. Ants secrete the formic acid for attack and defense purposes. Formic acid was first synthesized from hydrocyanic acid by the French chemist Joseph Gay-Lussac, in 1855. According to theoretical details, ants are a premium source of formic acid. In which some molecules contain iron (Fe) (Rumpold and Schluter, 2013). So, it can be very useful in future discoveries related to the invention of new tablets containing (Fe) element as the number of patients with anemia is increasing, it can be used for the production of drugs and medicines related to iron tablets for future generation of human species.

Key Words: Ant, Soil ecology, Diversity, fertile soil ecological balance.

Introduction:

Earth is blessed with amazing variety of living organisms consisting of both micro and macro-organisms such as bacteria, fungi, plants and animals. The variability among all these organisms from all sources such as terrestrial and aquatic ecosystems help to maintain the genetic variations among them. Ants are recognized as ecologically important invertebrates in many ecosystems (Hölldobler and Wilson 1990). They positively affect physical and chemical soil properties, plant and animal distribution, and forest health. Some species (e.g., carpenter ants [*Camponotus* spp.]) achieve direct

pest status because they may cause serious structural damage in buildings. Other species invade homes, and cause indirect damage to plants by harboring some aphids and scale insects. Ants serve as important food for many vertebrates, including woodpeckers (Torgersen and Bull 1995).

As all the living organisms play vital role in one or the other ways in nature, ants also play an important role in soil formation and fertility. The study of these interesting and diverse group of insects is known as “Myrmecology”. All ants are eusocial and they are considered as useful organisms for monitoring the soil fertility as they are abundant of ubiquitous in both intact and disturbed areas (Andersen, 1990; Pearson, 1994; Andersen, 1997; Folgarait, 1998; Hoffman, 2000).

Material and Method:

1. Study site:

I have selected the rural region of Solankur of Radhanagari Tehsil as the survey area for a research study. I have observed various agricultural and nonagricultural areas surrounding the village area. The agricultural area included crops like sugarcane, rice, various vegetables etc.

2. Survey Time:

A daily survey was carried out every week between 7 to 10 am and 4 to 6 pm in the study sites from August to February. Observations were made randomly based on habitat, structure availability of ant species and various other factors.

3. Collection:

Ants were collected from different areas using various methods suitable for respective habitats. Morning and evening collections provide the best results. Ant colonies will be deeper in the soil during the winter season, although a few foragers are at the surface. In present study collection of ants by digging to a depth of 1-3 meters. In the spring season, the colonies moved nearer the soil surface. The method used for the collection of ants is “Pit Fall Trap Method”. (Bedding, R.A. and Akhurst, R. 1975). The observed species were collected, photographed and preserved for further studies.

4. Killing and Preservation:

Ethyl acetate-coated blotting papers were used to kill the ants by placing them in the glass bottle to avoid direct contact with chemicals.

Preservation and identification of specimens Samples mixed with debris were separated from debris and washed with alcohol before preserving them. Immediately after collection, all the specimens were sorted out based on similar groups. The specimens were sealed and kept in separate vials of 70% alcohol with appropriate labels for further identification. The collected ants were identified up to genus and for a few, species-level identification was done with the help of keys given by Ali (1992); Bingham (1903); Bolton, B. (1994); Rastogi et. al., (1997); Tiwari (1999); Varghese (2002 & 2003).

5. Identification:

Several types of keys were used for taxonomic studies, to identify the collected ant specimens.

1. The collected specimens were identified based on the morphological characteristics such as, the number of segments in the antenna, the position of the antenna, type of eyes, number of lymph nodes, spines present in the petiole region, presence or absence of sting, body coloration, size, and hair etc.

2. The collected specimens were photographed and identified by using effective available keys and field guides from the net or books of ants (<http://antkey.org/en>; <http://www.ipm.ucdavis.edu/TOOLS/ANTKEY/>; Bolton, 1994).

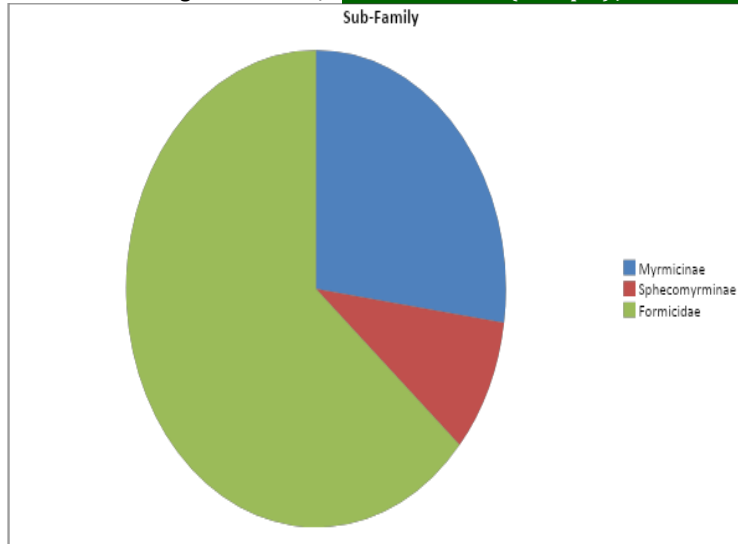
Result:

In the rural area near Radhanagari, some ant species from the family Formicidae were identified. A total number of 11 species were observed and found in which 3 subfamilies i.e. 7 species of Formicinae, 3 species of Myrmicinae, and 1 species of + Sphecomyrminae were detected during my study and observation. Therefore, according to the observations made it is understood that the ants are very important to agricultural fertile soil and the related crops as compared to ants in nonagricultural areas.

It is a very mainly factor in maintaining the balance in the ecosystem. According to theoretical details, ants are a premium source of formic acid. In which some molecules contain iron (Fe). So, it can be very useful in future discoveries related to the invention of new tablets containing (Fe) element as the number of patients with anemia is increasing, it can be used for the production of drugs and medicines related to iron tablets for future generations of human species.

Observation Table: Table No.1 Diversity of ant's species from Radhanagari Tehsil.

Sr.No	Name	Family	Sub-Family	Genus	species
1	Wasmaniaauropunctata	Formicidae	Myrmicinae	Wasmannia	W.auropunctata
2	Crematogasterrongenfori	Formicidae	Myrmicinae	Crematogaster	C. rogenhoferi
3	Pheidole dentate	Formicidae	Myrmicinae	Pheidole	P.dentata
4	Sphecomyrmafreyi	Formicidae	Sphecomyrminae	Sphcomyrma	S. freyi
5	Nylanderiafluva	Formicidae	Formicidae	Nylanderia	N.fluva
6	Lasius americanus	Formicidae	Formicidae	Lasius	L. americanus
7	Ocephyllasmaragdina	Formicidae	Formicidae	Oyecophylla	O.smaragdina
8	Paratrechinalongcornis	Formicidae	Formicidae	Paratrechina	P. longcornis
9	Componotuspennsylvanicus	Formicidae	Formicidae	Camponotus	C. pennsylvanicus
10	Componotusnovaeboracenis	Formicidae	Formicidae	Camponotus	C. novaeboracenis
11	Componotus japonicus	Formicidae	Formicidae	Camponotus	C. japonicus



Simpsons Diversity Index:

$$D = \frac{N(N-1)}{\sum n(n-1)}$$

N= Total number of organisms

n= Population of each individual species

D= Diversity index

Sr.No.	Species (subfamily)	Number of organism (n)	n-1	n (n-1)
1	Myrmicinae	3	3-1=2	3×2=6
2	Sphecomyrminae	1	1-1=0	1×0=0
3	Formicidae	7	7-1=6	7×6=42
	Total	11		48

$$D = \frac{N(N-1)}{\sum n(n-1)}$$

$$D = \frac{11(11-1)}{48}$$

$$D = \frac{11(10)}{48}$$

$$D = \frac{110}{48}$$

$$D = 2.29$$

Conclusion:

It is important to study various characteristics of species and changes according to surrounding environments. Present study elaborates diversity in our ecosystem. According to the

survey, it is understood that ant species are found in various fertile and non-fertile areas. It was also observed that spraying of insecticides and pesticides on Agricultural land can cause harm to the ant species. The result also shows that there is a need to examine and spread information about preserving some ant species which are rare. The spraying of chemicals to gain high yield harms the ant species. Therefore, it is more difficult to cognitively detect species that play a very important role in the ecosystem.

The ant species play an important role in soil fertility. It is a mainly factor to maintain the balance in the ecosystem. Some species of ants are extremely important forest defoliators, and as a primary food source for Woodpeckers (Torgesen and Bull 1995) helps to balance biodiversity and the food chain.

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