



EFFECT OF pH AND MOISTURE CONTENT ON GROWTH OF ANT COLONY AT DIFFERENT VEGETATION SITES

Neeru Agrawal, Divya K.Minj & Bhoj Kumar Manker

Govt. V.Y.T. P.G. Auto College, Durg (C.G.)

E-mail: neeru.bhilai@gmail.com

Abstract:

Ants are everywhere, but only occasionally noticed. Since their origin, ants have evolved to become the most dominant creatures in terrestrial ecosystem. They constitute 25% of the total animal weight in the tropics because of their great adaptability, these creature have occupied every possible niche or habitat found on land. Ants occupy a great variety of habitats. Their abundance and varied ecosystem roles make them influential in agricultural ecosystems around the world. These creatures are an important and indispensable part of our ecosystem. Ants in India occupy a variety of habitats such as leaf litter, tree, soil and dead logs. Most of the ants are soil dwelling. Ants range in size from 0.75 to 52 millimeters (0.030 – 2.0 in). Ants vary in colour, most ants are red or black, but a few species are green and some tropical species have a metallic luster. Complex nests are built by many ant species, but some are nomadic ants and do not built permanent structure. The material used for construction of nests include soil and plants matter. In the present study effect of pH & moisture content of soil at specific vegetation sites on availability of ant colonies were observed. Three types of plants i.e. Ornamental, Citrus & Medicinal plants were selected for study but the ant colonies were observed only near ornamental plants. Ants colonies were not observed in soil of many sites inspite of having similar pH as well as moisture content of soil where ants were found. The possible reason for such variation might be due to preference of leaf types by ant, amount of decomposing material, amount of sunlight present & effect of several other factors on ants.

Keywords: Soil turners, Ecosystem, Habitat, Creatures & Moisture

Introduction:

Ground ant together with earthworm and termites belong to the principal group of invertebrates that influence soil processes in terrestrial ecosystem (Levelle, et al. 1997). Ants are ecosystem engineers, greatly affecting physical, chemical and biological properties of the soil. Ants build their nest completely or partly in the soil. The building of such a permanent structure as a nest will affect the properties of the surrounding soil. (Petal, 1978 & Folgarait, 1998). Ant mediated chemical changes of soil are represented mainly by change in pH because in general ants shift nest pH toward a neutral value i.e. ants increase pH in acidic soils and decrease it in basic soils. (Dlusskij, 1967 & Frouz, et al. 2003). An increase in pH may result from an increase in basic cations whereas a decrease in pH may result due to accumulation of organic matter. (Petal, 1978 & Frouz, et al. 2003). Ants are sensitive to minute differences in moisture this sensitivity affects the diversity & abundance of ant species & nest distribution. (Levings, 1983). The water content of a soil has a strong effect on the growth rate of ant colony. Soil with very high moisture appear to be unsuitable for nest building (Elachi, 2004 & Xu, et al. 2009). Field observations have revealed that the soil wetness affects the nest building activity because an optimal soil wetness allows the most effective nest construction. In the present work the effect of pH and moisture content of soil on growth and development of

nests of ants at specific vegetation sites are studied.

Methodology

Survey was conducted during the months of December to February. Various sites near different types of plants like Rose, Hibiscus, Lemon, Orange, Neem and Tulsi were selected. Area of about 1 meter around each tree was sampled. Soil was collected from about 3 inches below the ground level and taken in to lab for recording pH and moisture content of it. Presence of nest colony was observed at sampling sites by looking on the surface of the soil around each tree. Colour of ants was observed and pH of each soil sample was also determined. Moisture content of soil sample was calculated by following formula (Sexena, 1987). Moisture content (%) = $\frac{I-F}{I} \times 100$

Where : I = initial weight of sample (gm) & F = final weight of dried sample (gm).

Observations and Results:

Table no. 1: Result near Rose plants where ant colonies are observed:

Sites	Moisture content	pH of soil	Ants colony	
			Colour	Observed in
A	13%	7.60	Red	Mound
B	11.3%	7.45	Red	Open
C	16.1%	7.20	Red	Open
D	18%	7.30	Red	Mound



Fig.1:Site(C) Red ants in open area



Fig.3:Site(A) Red ants in open area

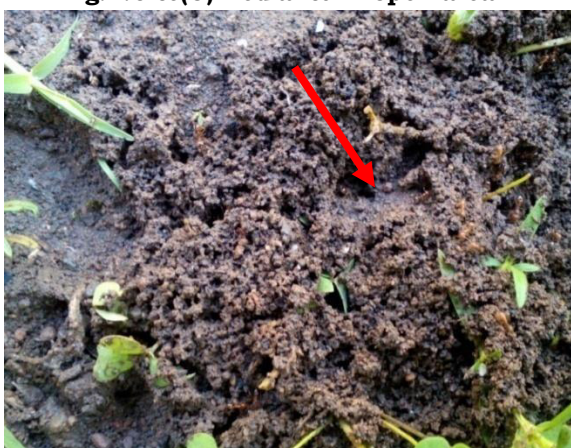


Fig.2:Site(D)Red ants in mound



Fig.4: Site(A) Black ants in mound

Table no. 2: Result near Hibiscus plant where ant colonies are observed:

Sites	Moisture content	pH of soil	Ants colony	
			Colour	Observed in
A	16%	7.50	Red, Black	Open Mound
B	6%	7.90	----	--
C	5.5%	7.80	-----	---
D	19.3%	7.40	Black	Open



Fig.5: Site (D) Black ants in open area

Table no.3- Mean value of pH & moisture content at various vegetation sites where ant colonies are not reported .

S.N.	plants	pH of soil	Moisture content
1	Lemon	7.54	24.75%
2	Orange	6.37	21%

3	Tulsi	8.2	15.75%
4	Neem	5.6	8.42%

Discussion:

In the present work out of three types of plants selected ants were found only near ornamental plants i.e. red ants were observed in all four sites of rose and two sites of Hibiscus (Table no.1&2).The pH value recorded in all four sites of rose as well as in two sites of Hibiscus soil is almost near to neutral . This was supported by the fact that ants shift nest pH toward neutral value. According to (**Dlusskij 1967& Frouzet al, 2003**) ants increase pH in acidic soil and decrease it in basic soil. At two sites of Hibiscus, ants were not observed this may be due to very less percentage of moisture content i.e. 5% to 6% because according to Levings, 1983 ants are sensitive to minute difference in moisture which affects the diversity and abundance of ant species, foraging activity and nest distribution. The increase in moisture content may be the cause for absence of ants in soil near citrus plants because soil with very high moisture appear to be unsuitable for nest building (**Elachi, 2004 & Xu, et al. 2009**).The alkaline nature of soil near Tulsi & acidic near Neem also confirm the absence of ants on these sites because as mentioned earlier ants shift nest pH towards neutral value.Overall study reveals that maximum ants were observed in soil near Rose this may be due to some special nectar exuding structures present in plants that provide food for ants (**Katayama & Suzuki, 2004**).According to Golden harvest organics for ant control, Lemon juice concentrate can be used to repel ants (**Ghorganics.com**). The leaves for Lemon tree might also have same effect of this kinds of repellent & this might be the another reason for absence of ants at all sites of Lemon. Tulsi & Neem were considered as medicinal plants and their extract or dried powder was used as insecticides , due to insecticidal effect of these, ants might be absent at sites of Neem & Tulsi.

Conclusion:

In the present study the ant colonies were observed only near ornamental plants.

The possible reason might be due to preference of leaf types by ants & amount of decomposing material.

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