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HARELA: An Easier Approach to Sustain the Environment

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Abstract—*The role of socio-cultural values in environment conservation is an integral part of the people living in India. This study explains that how an important ritual is beneficial for making the green and clean environment. Respect of nature is an integral part of our culture and has been passed across generations. Protection of environment comes naturally to us. The main aim of this study is to promote the awareness towards the soil flora called HARELA.*

In this study, the aim of the present investigation was to evaluate the effect of Malathion on soil fauna at HARELA SITE and the soil environmental variables such as soil temperature, soil water content, pH, Available nitrogen, Organic carbon content which may affect the soil faunal population. There is less studied in Northern India and indeed more widely in India. Besides this, being human there should be our first priority to promote such revolutionary movements at global level which are helping hand to our green and clean environment. The result showed that Soil faunal communities are influenced by some selected factors which also influence above and below ground animals. Soil temperature, moisture and pH are the principal factors affecting the diversity and distribution of all the soil animal groups. Pearson correlation coefficient (r) was used to determine the relationship of soil faunal population densities with edaphic factors such as soil temperature, soil moisture, organic carbon content, available nitrogen etc. of soil.

Keywords: *Environment, Indian culture, Soil fauna, edaphic factors, HARELA.*

1. INTRODUCTION

Today India is the fourth largest economy of the world and we are all known that Indian economy is approx 70% dependent on agriculture. In India, the study of soil fauna and flora concerning with any cultural ideology are very scanty. To promote the awareness towards soil flora there is a famous festival called HARELA. This traditional festival is one of the festivals in the state of Northern India (Uttarakhand) which encourages people to conserve, manage their traditional crops and plantation also. Now-a- days this festival in the form of a mission has widely spread in other state of Northern India (Uttar Pradesh). These kind of the activities of the people need to be emphasized in detail, keeping in view that rapid socio-economic and caring nature about the environment taking place in the societies. But due to increasing population, Industrialization, Urbanization our environment becomes so much polluted which direct affects human health as well as the population of wild life (fauna and flora) also.

In this research paper, we simply tried to evaluate the effect of Malathion on soil fauna the places where Harela programme executed and to understand the fact that today is the necessary necessity to sustain our environment through these festivals such as HARELA. It becomes very painful for every Indian that the nature whom we called our mother is going to be exhausted just because of our mistakes. There is an urgent need to promote such types of environmental festivals for our healthy environment. The Soil fauna is essential for ecosystem dynamics as it is involved in biogeochemical processes, promotes nutrient availability and affects the animal communities. There is increasing research interest and focus on the roles of soil fauna in above and belowground processes and their interactions (Johnson et al., 2013).

2. MATERIAL AND METHODS

The study was conducted in Aligarh (India).The climate of the area is semi arid characterized by low precipitation, high evaporation hot summer days and moderate winter temperature. The soil through the study area is clay loam. To determine the population density of fauna found in the depth of 0-10 cm of soil, soil fauna was collected randomly with the help of a corer modified by Averbach and crossley (1960). The soil samples were collected bimonthly for a period of twelve months at both the sites. Extraction of soil fauna was done in a modified Tullegren-Funnel. The soil fauna collected were preserved in 70% alcohol and identified in a steriozoom microscope. Analysis of edaphic factors such as soil temperature, soil moisture, and pH, content of organic carbon, nitrate and phosphate were done by standard laboratory methods. Temperature was measured by directly inserting the soil thermometer into the soil up to the required depth, Relative humidity by a Dial Hydrometer, pH by electric pH meter and soil moisture (water content) by Dowdeswell's (1959) method. Organic carbon was estimated by rapid

titration method as described by Walkey and Black (1934), Nitrogen content (N) by Jackson (1966) method, Phosphorus content (P) by Molybdenum blue test and Potash content (K) by Jackson (1966) method.

3. RESULT AND DISCUSSION

We accept the importance of plants in our country from the beginning of the life. We are well known that plants are the only sources from which we can get pure oxygen essential for the human life but now days the life of plants is in danger zone itself due to environmental pollution. There were two sites for study. The first site of our experiment was inspired by Harela in which, *Saraca asoca* (the ashoka tree) *Dalbergia sissoo*, as North Indian rosewood, *Mangifera indica*, as mango plants ,among flowering plants Rose (*Hibiscus Rosa-Sinesis)*, Marigold, Bougainvillea, sunflowers etc. were planted under programme named HARELA SITE (HS). Whereas, another site was without plantation named NON- HARELA SITE (NHS). During the experimental period at both the sites, insecticide Malathion was applied at the recommended rate. In Malathion treated plots, the residue after day 1 was significantly higher than those after day 14. This is because of the half-life of Malathion in soil which is 1-25 days (EXTOX 1996). In addition, the degradation of Malathion in soil is rapid and related to the degree of soil binding. Breakdown occurs by a combination of biological degradation and non-biological reactions (beyond pesticides), Washington DC 2003. The total population density of the soil fauna at HARELA SITE (HS) was higher than the NON HARELA SITE (NHS). Results showed that Dipterans on a higher side followed by Hymenopterans, Coleopterans and Mites. Among Apterygotes, Springtails (order: Collembola) was dominant during the investigation period.

Results indicated that during the investigation period, Malathion applied at practical rates, had negative effect on total population of soil fauna. Besides applying Malathion, Soil fauna was found to be higher at HARELA SITE (HS) as compare to NON HARELA SITE (NHS). It may be perhaps due to plantation because plants affect the life of almost all the soil organisms (Antunes et al. 2008). The activity of these organisms influences soil processes that control the availability of plant nutrients such as nitrogen (Zou, Bashkin 1998) and also affect organic matter dynamics (Reich et al. 2005; Barrios 2007). Given our knowledge of turnover rates of nitrogen it has been calculated that a noticeable part of mineral nitrogen is produced by animals grazing on microflora, which excrete nitrogen as urea or ammonia, rather than by soil microorganisms themselves, which immobilize it (Anderson, R.V., Coleman, D.C., & Cole, C.V. 1981 Bååth, E., & Söderström, B. 1979 Verhoef, H.A., Dorel, F.G., & Zoomer, H.R. 1989. Persson, T. 1983). The insecticide contamination in the ecosystem may produce secondary ill effects especially when the amount of chemical is below the lethal limits of the organism (Badji, 2007).

As the role of edaphic factors it might be assumed that the factors studied in this study exerted significant or insignificant effect. Among the edaphic factors studied temperature showed a marked variation with the change of season ranging between 14˚ C to 34˚ C. Physical factors like soil temperature, soil moisture being interlinked are perhaps inseparable in natural conditions. Parwez H. et al. (2014) studied the impact of Co2 and temperature on the soil fauna boreal forest. Similarly, Choi Ti Won (2006) postulated a modeling study of soil temperature and moisture effects on population dynamics of *Paronychiurus Kimi* (Collembola; Onychiuridae) and suggesting that soil moisture is a major limiting factor on field population of P. Kimi. The Soil faunal population in the present investigation was attributed to cumulative effect of all physicochemical factors rather than a single factor influence (Parwez H. and Sharma N 2014 and Sharma N. and Parwez H.2017). The other reason may lie in the differences in physical properties of soil. Results showed that the soil moisture content was higher in HS than in NHS. These results are in agrees with Klironomos and Kendrick (1995) ,they reported on the most important variable that influenced microarthropod community structure as soil temperature, moisture content, soil pH and microbial community.

4. CONCLUSION

The results from the both experimental plots suggest that the soil fauna and many others co-exist in the community of the soil. They cooperate and compete, and they interact with each other to form an integrated system which functions in a manner as to affect the breakdown of organic material. The majority of soil animals are microscopic in size and their diversity is remarkable. The soil fauna are active partners of the soil flora. So, this could be the reason for higher availability of soil fauna at HARELA SITE. Therefore, there is an urgent need to investigate spatial and temporal variability of the dynamics soil attributes to refine the plantation practices for sustainable management of environment. Environmental pollution is one of the greatest environmental challenges the planet Earth is facing. Now it's time to take action to control the problem of our society. For this, a holistic approach is needed to bioremediation of environment for agriculture as well as the climate change through the deep study of Soil fauna.

Table 1: Pearson Correlation between soil faunal population and edaphic factors at experimental sites during sampling year.

Soil Microarthropods / Edaphic factors	Harela Site		Non-Harela Site	
	Pterygote	Apterygote	Pterygote	Apterygote
Soil Temperature	0.240	**-0.632***	0.395	**-0.620***
Soil Moisture	**0.612***	0.059	0.134	0.166
Relative Humidity	-0.185	-0.122	-0.278	-0.529
pH	-0.168	-0.264	**-0.529***	**0.525***
Organic Carbon	0.436	**0.634***	0.137	-0.306
Organic Matter	0.428	0.228	0.138	-0.309

Electrical Conductivity	0.265	0.097	0.288	-0.426
Available Nitrogen	**0.615***	0.111	0.395	0.156
Phosphate	-0.287	-0.254	0.189	-0.168
Potassium	-0.212	0.161	0.182	-0.451

*.Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

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