



ORIGINAL ARTICLE

Preliminary Study of Population Diversity of Collembola in Agra Regions

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ABSTRACT

Collembola, an important group of soil microarthropods are usually associated with moist habitats. However, some species show adaptation to ecosystems subject to periodic desiccation. This study examined population structure of Collembola communities was studied in native natural site at Agra. Soil apterygotes were dominated by collembolans belonging to the families, Isotomidae and Entomobryoidae. The highest density was of Entomobryoidae found during rainy season followed by Isotomidae. However the least population was that of Poduridae and Tomoceridae. The present study establishes a direct effect of high atmospheric temperature and low soil moisture on the population density of these microarthropods and this population is also affected by the soil management practices. These soil microarthropods especially Collembola are of great significance for the health of the soil and its fertility.

Key Words: Collembola, Population density

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INTRODUCTION

Class Collembola includes insects commonly known as springtails and snow fleas. These insects are abundantly occurring, primitive, wingless, soft-bodied, mostly elongate or globose, measuring generally 2-3 mm in length. Springtails have derived their name because of the presence of forked tail-like appendage or furcula or springing organ, on the underside of the 4th abdominal segment. With the help of furcula, most Springtails jump as far as 10-15cms. The collembolans inhabitant of snow, ice and glaciers, are called as "Snow fleas" like Isotoma, Proisotoma, Hypogastrura, Aackia [1].

The Collembolans have diverse range of habitats such as surface of stagnant water bodies, soils, grasslands, leaf-litter, vegetation, caves, snowfields, glaciers, and even homes. The majority of species feed on fungi, bacteria, decaying vegetation, mosses in damp places, saprophagous, organic detritus in soils and few are phytophagous. The most of species are inhabitant of soil and play an important role in decomposition of decaying plant material and releasing the nutrients in soil ecosystem also, serving as major food source for a wide variety of soil predators [2].

Soil conditions and vegetation cover influence the activities of diverse soil organisms including Collembola. Collembolan communities have been shown to vary in abundance and diversity negatively according to changes in vegetation, quality of litter materials, habitat structure and human induced disturbances related to land use practices [3].

Agricultural intensification leads to alteration of soil pH which disrupts niches of soil fauna. Previous studies on effect of soil disturbances on the abundance and diversity of mites and Collembola showed that soil disturbance negatively affects their diversity have showed that molding and burning of surface plant litter reduces populations Collembola.

In this half yearly progress report, I have examined and described collection sites, sampling methods and total sample collection for further work.

MATERIALS AND METHODS

The area selected for study was agricultural field at Aligarh. Soil samples were collected on monthly basis for one year with the help of a circular corer sampler based on the principle of

O'Connor [4]. The extraction of the soil mesofauna is based on the behavioural response by the animals which display downward movement after being subjected to the appropriate stimulus such as heat, illumination or desiccation. We used the Tullgren funnel for the extraction of insects from the soil samples. A stereoscopic binocular microscope (Olympus Model CX 21) was used for identification of soil microarthropods population. Identification will be carried out using the keys of Hopkin [5].

RESULT AND DISCUSSION

During six months of collembolan collection, we have recorded 6 families at Agra Regions at different sites.

A. Agra Regions

1. **Keetham:** In the present study, we have collected total 881 samples of various families of collembolan. The samples have found of different families are Isotomidae 234/881, Entomobryoidae 217/881, Poduridae 63/881, Sminthuridae 119/881, Tomoceridae 79/881 and Hypogastridae 169/881 samples collected from different keetham sites during 04 September 2013 to 03 March 2014 [Table 1].

Table2: Total population of Collembola in Keetham area of Agra Regions

Family	Months	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
Isotomidae	Sample	45	49	30	28	32	35	15	234
Entomobryoidae	Sample	78	45	40	19	8	15	12	217
Poduridae	Sample	19	13	7	7	9	5	3	63
Sminthuridae	Sample	30	35	15	12	8	10	9	119
Tomoceridae	Sample	18	14	20	11	4	8	4	79
Hypogastridae	Sample	46	28	23	25	20	16	11	169
	Total								881

2. **Tajganj Area:** In the present study, we have collected total 801 samples of various families of collembolan. The samples have found of different families are Isotomidae 188/801, Entomobryoidae 202/801, Poduridae 92/801, Sminthuridae 97/801, Tomoceridae 78/801 and Hypogastridae 144/801 samples collected from different Tajganj area during 04 September 2013 to 03 March 2014 [Table 2].

Table3: Total population of Collembola in Tajganj area of Agra Regions

Family	Months	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
Isotomidae	Sample	40	46	26	23	27	18	8	188
Entomobryoidae	Sample	69	40	38	19	10	15	11	202
Poduridae	Sample	19	6	14	10	9	25	9	92
Sminthuridae	Sample	19	25	15	12	11	9	6	97
Tomoceridae	Sample	19	14	20	10	4	8	3	78
Hypogastridae	Sample	41	30	20	14	18	10	11	144
	Total								801

The total number of soil insects especially apterygote insects collected from the soil samples showed fluctuations corresponding with monsoon peak and a winter low consistently. The apterygote insect population was represented by order-Collembola and order-Diplura. In the present study, we found that Isotomidae population highest in Keetham area during September to January; while Poduridae population lowest in this site. Entomobryoidae highest collected from Tajganj site during September to December. Collembolans being the major group of the sub soil community were found in dominant number. They are represented by members of family Poduridae, Isotomidae, Sminthuridae, Tomoceridae, Hypogastridae and Entomobryoidae. Entomobrya sp was highest in number along with other representatives collected in different proportions showed a monsoon peak and a summer minima [3]. The simple correlation coefficient between the apterygote insects mainly Collembola and Diplura with different physico chemical parameters such as temperature and moisture revealed that the variation of the insect and population.

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REFERENCES

3. Adl, M. S. and Coleman, D. C. (2005). Dynamics of soil protozoa using a direct count method. *Biology and Fertility of Soil*. 168-171.
4. Alvarez, T., Frampton, G. K. and Goulson, D. (1999). The effects of drought upon epigeal Collembola from arable soils. *Agricultural and Forest Entomology*. 1: 243-248.
5. Ashraf, M. (1971). Influences of environmental factors on Collembola. *Rev. Ecol. Biol. Sol.* 8: 243-252.
6. O'Connor, F. B. (1957). An ecological study of the enchytraeid worm population in a coniferous forest soil. *Oikos* 8: 161-199.
7. Hopkins SP (1997). *Biology of Springtails (Insect: Collembola)*. Oxford University Press, Cambridge, UK.

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