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Distribution and abundance of earthworms in Bangalore

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Abstract. Distribution pattern of 6 genera of earthworms in Bangalore has shown that one species was found dominant in a given locality. Causal factors for such niche differentiation might be seen in the nature of available organic matter in the area. However, the population density of the species is not at all related to the organic matter of the soil.

Keywords. Earthworm distribution; *M. mauritii.*

1. Introduction

Earlier studies have shown that the earthworms selectively feed on soil layers and settle in some other layer during their non-feeding activity. Such a zonal preference is also exhibited under laboratory conditions (Kale *et al* 1977). In our surveys around Bangalore, we have found one species always dominant in a locality. The causes for this dominance in horizontal distribution could be the result of a variety of soil factors. The present study is concerned with attempts to explain the causal factors for the relative abundances of earthworms in and around Bangalore.

2. Methods

Seventeen areas around Bangalore city, comprising of gardens, pastures and arable lands were selected for the study. These areas are widely separated; each one is at least 4–5 km away from the other. Each study area was 1 ha. In October 1976 the density of earthworm populations in each area was measured by quadrat random sampling method (Lewis and Taylor 1968). Soil samples were also collected from each sample area and assayed for oxidizable organic matter content (Walkey-Black 1947).

3. Results

Table 1 shows the distribution of earthworms in different locales of Bangalore. The soil oxidizable organic matter is also not constant and varies distinctly from area to area. The type of organic matter (not presented here) seems to be different as the composition of the vegetation and leaf decomposition in the areas differs greatly.

Table 1. Density distribution of earthworms in different localities of Bangalore with reference to organic matter of soils. (The numbers in parenthesis denote ranking abundance of species).

Sample plot	Organic matter μg/g dry wt. of soils	Number of earthworms/100 C ft. Total no. of worms	*Dravida barwelli impertusa*	*Megascolex mauritii*	*Octochaetoides beatrix*	*Pantoscolex corethrurus*	*Pheretima elongata*	*Perionyx excavatus*
Benniganahalli	12·6	2225	—	350 (3)	—	950 (2)	1250 (1)	—
Lakshmipura	12·0	3700	—	—	—	—	—	3700
Chelaghatta tank	11·9	8960	8700	260	—	—	—	—
Miller's road mango garden	10·7	579	—	206	—	373	—	—
Indian Oxygen Ltd.	9·15	1288	—	1288	—	—	—	—
Krishnarajapura	8·7	1400	—	1400	—	—	—	—
Kodihalli vineyard	8·05	355	—	355	—	—	—	—
Binnamangala tank	7·0	223	—	—	—	—	223	—
Sanky tank	6·8	1009	—	—	—	—	1009	—
Banaswadi tank	6·8	2833	2833	—	—	—	—	—
Lalbagh	6·7	4492	—	825 (3)	1200 (2)	2466 (1)	—	—
Forest Research Lab.	6·7	3666	—	250 (3)	2066 (1)	1150 (2)	—	—
Hebbal fields	6·0	1388	—	1388	—	—	—	—
Peenya	5·59	1466	—	1466	—	—	—	—
Hebbal tank	5·6	1000	—	—	—	—	1000	—
Thyagarajanagar	4·95	482	—	470	8	4	—	—
University campus	3·9	3908	—	833 (2)	250 (3)	2750 (1)	—	75 (4)

The soil structure and pH were similar. The soil in all the experimental areas had brown clay loam with neutral pH (pH 7·0–7·2) and salinity ranging from 0·36 to 0·98 mM. Thermal lag of soils in these areas varied from (temp. gradient 1·8–0·29 at 15 to 30 cm depth at 0720 hr, + 1·6 to + 2·18 at 1·5 to 30 cm depth at 1420 hr) and moisture varied from 13 to 20%.

Experimental results (table 1) show that each area has variable densities of worms, species-wise. Table 1 demonstrates that (a) all species are widely dispersed with respect to organic matter, (b) that the population density is not related to organic matter (No. of worms = Org. matt. × 17.67 + 2090·5; r = 0·0142) (c) that one species is found per plot most of the time (0·58) and (d) that in mixtures one species is generally (0·71) twice as abundant as the second most abundant species and (e) that when other species are present *Megascolex mauritii* is usually (0·66) the least abundant species.

4. Discussion

The occurrence of worms in most of the areas studied may be due to the adaptability of that particular worm to the soil strata studied, e.g. the *M. mauritii* is a versatile species found in many areas and in association with other genera. Community formation of *M. mauritii* in varied niches may be due to: (a) greater polytrophic adaptation, (b) adaptible morphological characters to suit the soil strata and (c) greater

tolerance to changing microhabitats (Hutchinson 1959; Nijhawan and Kanwar 1952; Marguire 1967). Subtle differences exist in the burrowing habits of these worms and in the functional movements of the prostomium (Kale *et al* unpublished).

Discrete microhabitat niche differentiation was noticed in many animal groups (Elton and Miller 1954; Hutchinson 1959; MacArthur 1965, 1968; Marguire 1967). Niche differentiation by the earthworms presented here is only 'niche hypervolumes' (Marguire 1967) because there is similarity in soil structure, pH and other physical characteristics. The heterogeneity in habitat selection is mostly due to the tolerance or preferences exhibited by the worms to measured extremes of organic matter. The specific morphological characters and the worm's affinity to different organic matter resources has also been shown by matrix analysis that might act as factors in niche hypervolumes of the genera described here in an otherwise homogeneous environment.

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