Rec. zool. Surv. India, 94 (1) : 63-73, 1994

COLLEMBOLAN POPULATION OF UNDISTURBED GRASSLAND AND FOREST FLOOR OF BURDWAN

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INTRODUCTION

In West Bengal the Collembolan ecology is largely confined to the alluvial soils. Attempts have been made by workers like Choudhuri and Roy (1966, '67 and '72) and Mitra *et al* (1977), Hazra (1978a, b) to study the qualitative and quantitative ecology of Collembolan population in undisturbed grassland, wood land soils and agricultural lands of gangetic West Bengal. However, most of these have been sporadic, moreover, most cases have failed to give a comparative account of the Collembolan population extracted from different habitats in same geographical area. In this communication therefore an attempt has been made to give a comparative picture of species composition and seasonal variation of Collembolan community in undisturbed grass land and forest floor of Burdwan.

LOCATION AND CHARACTERISTICS OF THE SAMPLING SITES

Two sampling sites were selected for this study. One of these was in the University Campus which was uncultivated and covered with thick carpet of grass and contained few herbs and shrubs like *Croton sparsiflora* (Euphorbiaceae), *Oldenlandia* sp. (Rubiaceae) and *Boerhaavia repens* (Nyclaginaceae) etc. The other plot was in the Baburbag Reserve forest near the University Campus. It was also uncultivated and undisturbed but thickly vegetated and contained a good number of herbs and shrubs like *Vitis trifolia* (Vitaceae), *Lantana camara* (Verbinaceae), *Mikania seandens* (Compositae), *Eclipta alba* (Compositae) and *Croton separsiflora* (Euphorbiaceae). Besides herbs and shrubs the plot also contained trees like *Tectona grandis* (Verbinaceae), *Shorea robusta* (Dipterocarpaceae), *Ficus religiosa* (Urticaceae), *Bombax malabaricum* (Bombacaceae) and *Dalbergia sisso* (Leguminosae) etc. Shade was found to prevail throughout the day in the forest plot.

Both these plots experienced moderate amount of rainfall (90-120 cm/yr) and contained soils which were alluvial in nature, sandy loam in texture and slightly acidic in reaction.

METHODS AND MATERIAL

Both plots were sampled at 10 days' interval and altogether 216 samples (108 samples from each plot) were collected over a period of 3 years (January 1986 to December 1988). The plots were sampled by a steel borer as employed by Dhillon and Gibson (1962) and the cores were extracted by a Tullgren funnel modified by MacFadyen (1952). Soil moisture was determined directly by an infrared moisture balance and walkley and Black's method (1934) was followed to evaluate organic carbon content of soil. Soil temperature was recorded by a soil thermometer and pH was determined by an electric pH meter.

RESULTS

The Collembolan fauna obtained from the two sites were different in faunal composition as well as in numerical abundance. The population recorded at forest floor was found to be higher than that of grassland (Fig. 1). The fauna extracted from the forest site included 4 genera, like *Lepidocyrtus*, *Cyphoderus*, *Hypogastrura* and *Lobella* and the grassland plot contained forms like *Lepidocyrtus*, *Cyphoderus*, *Proisotoma* and *Onychiurus*. The genus *Lepidocyrtus* was found to be predominant in both the plots. The forest samples in general yielded a higher population than those collected from the grassland throughout the period of investigation.

The total fauna extracted from both the plots showed to some extent an irregular trend of fluctuation with a maxima in August-September and a minima in April-May (Fig. 1) The population in both the plots, exhibited a decline from February onwards and reached its peak in August-September. From October to January very little numerical variation was observed. The dominant species *Lepidocyrtus* showed its peak in August (Table 1).

Soil factors like temperature, moisture, pH and organic carbon did not exhibit remarkable variation. The temperature in grassland varied between 18°C to 34·33°C and in forest between 19·16° to 33·83°C. Soil reaction in both the cases was acidic and the value of

pH ranged between 5·8 to 6·7 in grassland and between 5·5 to 6·5 in forest. The moisture content in forest and grassland varied between 3·7% to 7·53% and 3·51% to 7·2%

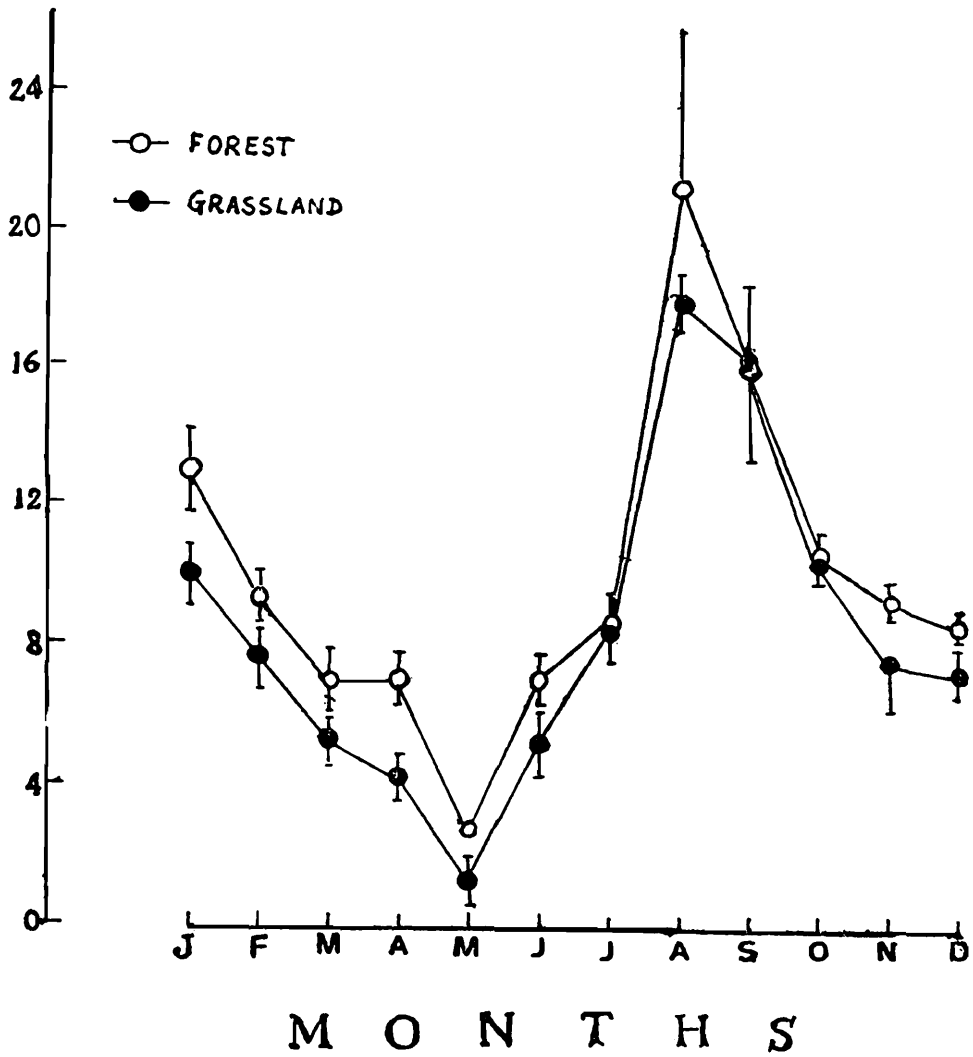

Fig. 1 : Seasonal Fluctuation of Collembola population in grassland and forest plot.

respectively. Organic carbon had a higher concentration in forest plot which ranged from 0·44% to 1·76% while the concentration in the grassland plot varied between 0·63% and 1·22% (Fig. 2).

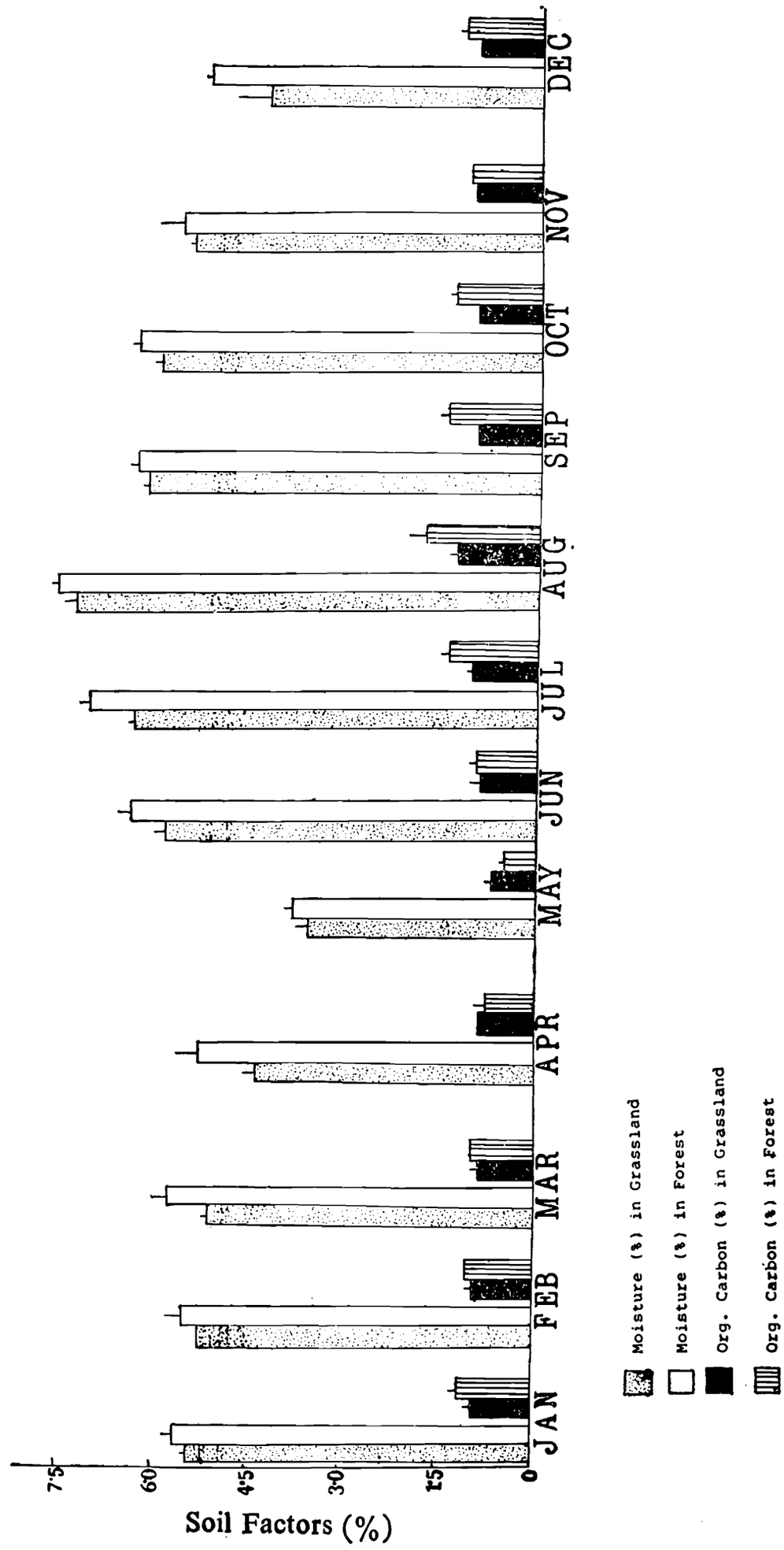

Fig. 2: Variation of Moisture and Organic Carbon in grassland and forest plot.

DISCUSSION

In both the plots the present data depicts a positive correlation of Cllembolan population with the edaphic factors like the moisture and organic carbon content (Fig. 3, 4). Similar results were also obtained by Choudhuri and Roy (1972), Davis (1963), Haarlov (1960), Hazra and Choudhuri (1981, 1983), Poole (1961).

In summer months (i.e. April-May) the samples yielded low population in both the plots when the temperature was significantly high and moisture was appreciably low. The temperature in this study showed significant but negative correlations with the population (Fig. 5). This might be due to the fact that the rise of temperature is expected to cause greater rate of evaporation from the soil making it dry in the minimum population in summer is generally attributed to both the lesser water content and the physical instability of the humus layer in this soil conditions. As a result a lean population was obtained in summer and this corroborates with the findings of Choudhuri and Roy (1972), Hazra and Choudhuri (1983).

The soil reaction in both the plots exhibited very little variation and was well within the tolerance range of most of the species (Choudhuri and Roy, 1967, 1971, 1972). Accordingly it did not exert any impact either on speeies composition or on seasonal variation.

The forest plots supported a larger population in comparison to that of grassland which might be due to prevalence of moist hnmid climate, relatively greater abundance of plant remains and high organic content and thus affording stable food supply. But the forest plot in this case did not support a very large fauna as reported by Murphy (1953), Price (1973, 1975) from temperate and coniferous forests where little layers were considerably thick. As both the plots remained undisturbed the changes in microclimate occurred due to changes in rainfull, temperature, growth of vegetation and inhabiting microflora.

The monsoon peak in both the plots was probably due to increased levels of organic carbon, moisture and moderate temperature.

In winter months all those factors showed little changes and the population was more or less constant. The trends of seasonal variation as observed in this study were consistent with the findings of Loots and Ryke (1966), Choudhuri and Roy (1972), Choudhuri and Hazra (1981, '83), Results presented in this study showed that the qualitative and

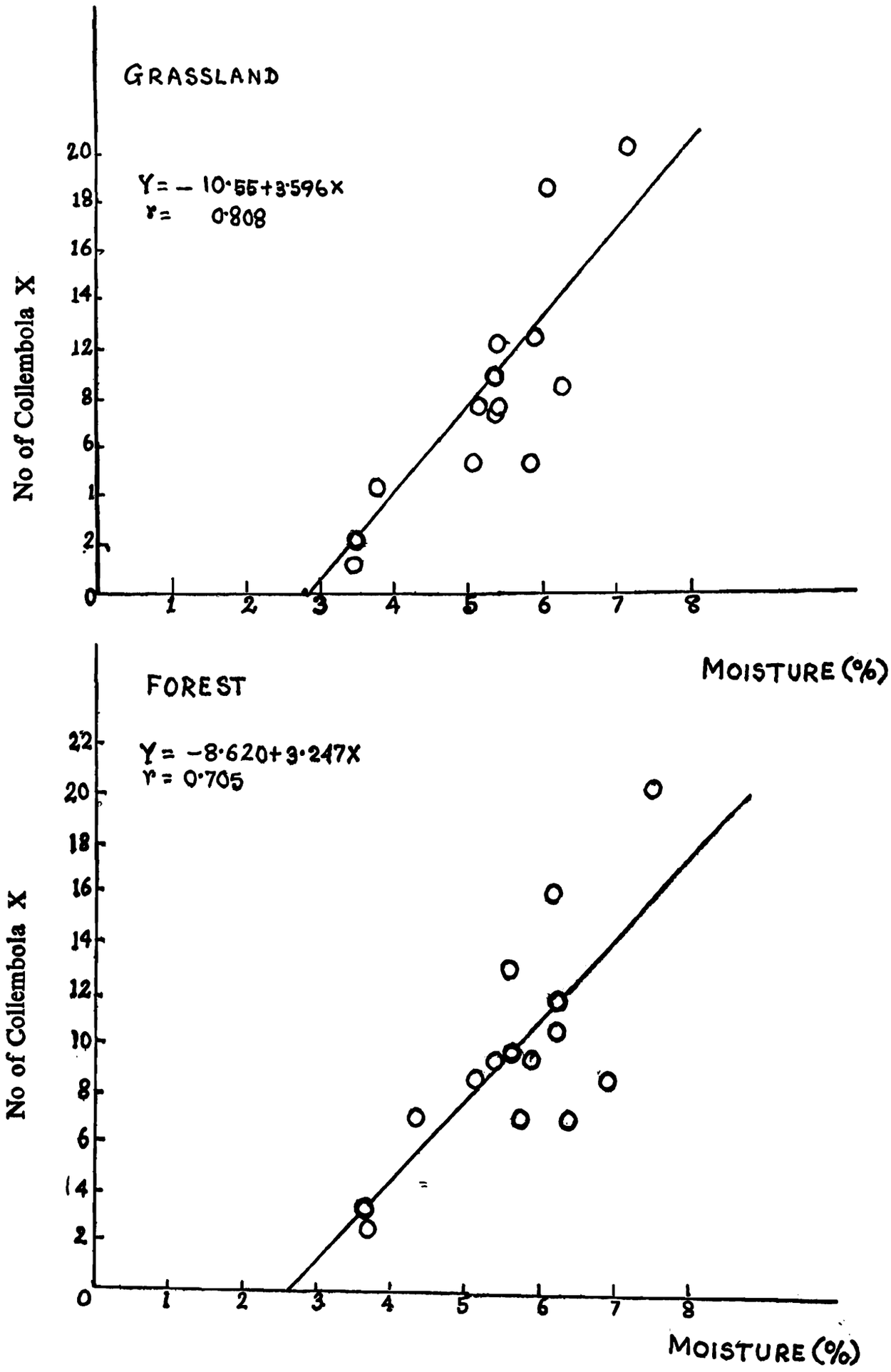

Fig. 3 : Showing regression line alongwith the scattered diagrams of Collembola on Moisture at grassland and forest plot.

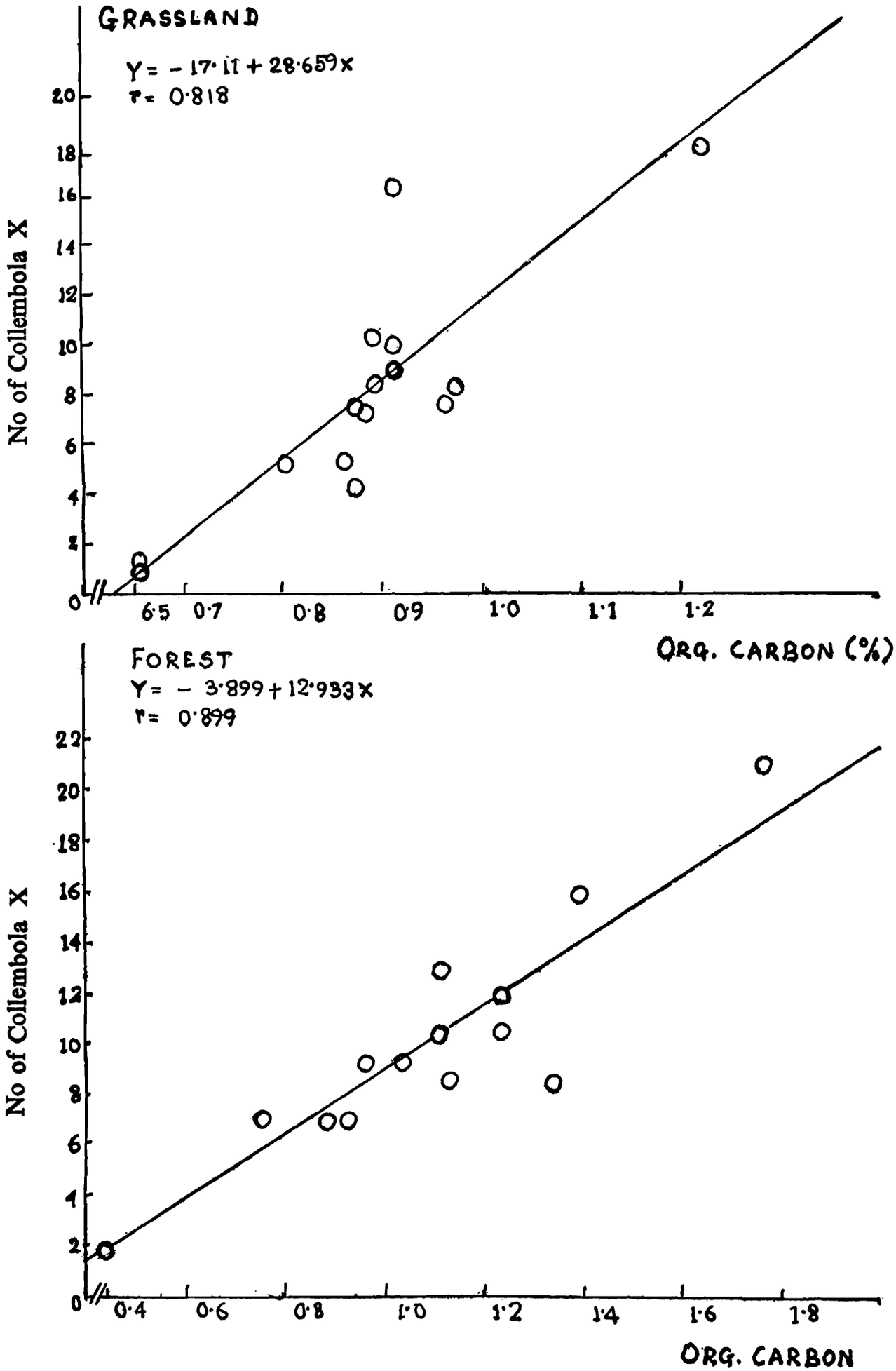

Fig. 4 : Showing regression line alongwith the scattered diagrams of Collembola on Organic Carbon at grassland and forest plot.

quantitative differences in faunal composition were due to local differences in the substrate composition which probably exerted profound influence on the pattern of population structure.

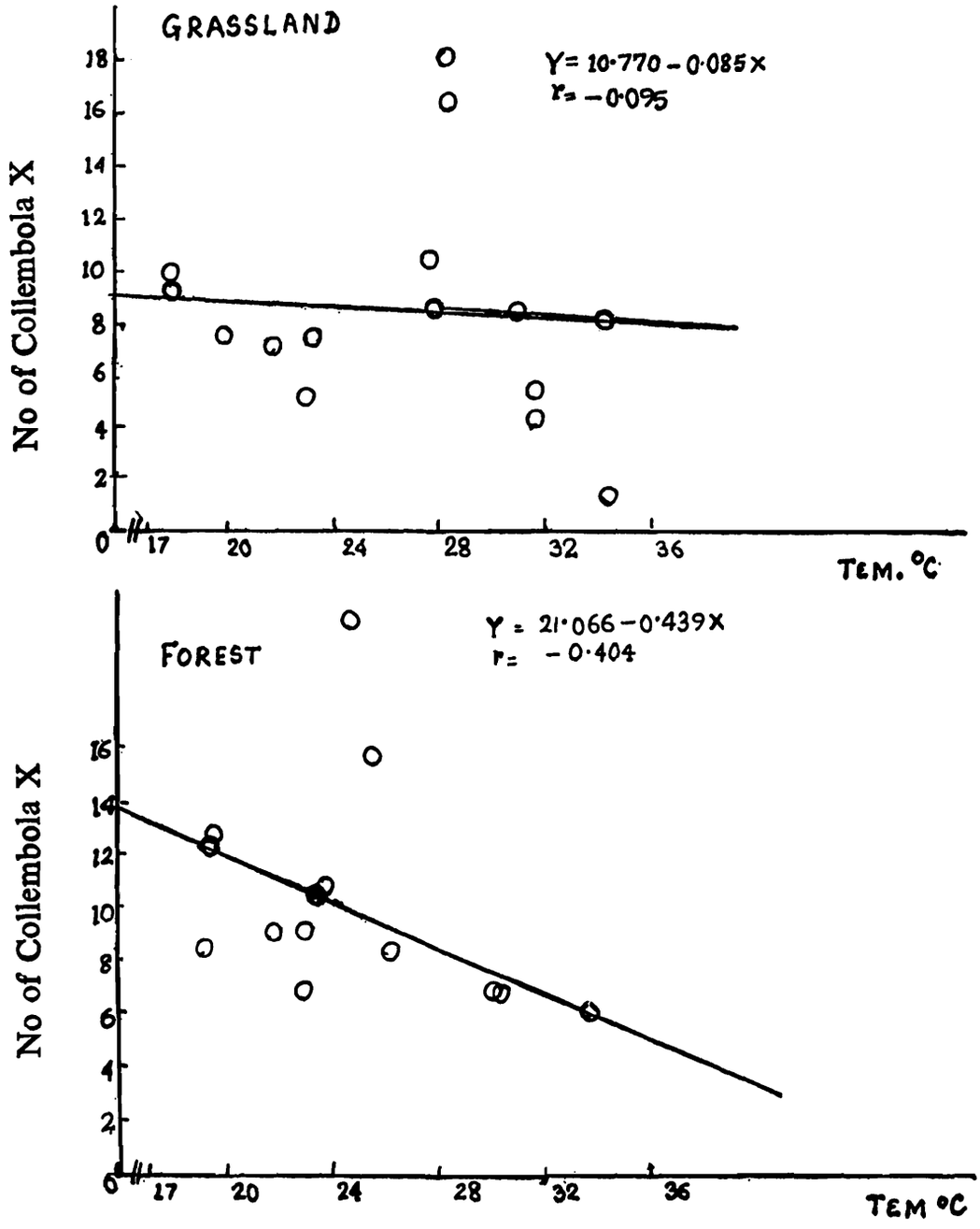

Fig. 5 : Showing regression line alongwith the scattered diagrams of Collembola on temperature at grassland and forest plot.

SUMMARY

This communication presents the results of an ecological study of Collembolan population of Burdwan. Two sampling sites, one in the University Campus and the other in the adjacent reserve forest were selected for sampling from where altogether 216 samples were collected over a period of three years. The uncultivated plots in the University Campus were covered with thick carpet of grass and contained few herbs and shrubs while the forest floor besides trees also contained a thick surface vegetation. The plots experienced an average rainfall and contained soils which were alluvial in nature, sandy loam in texture and grey in colour. The Collembolan fauna encountered belonged to six genera of which the genera *Lepidocyrtus* and *Cyphoderus* were common to both the plots. The forest floor supported a fauna which was numerically high. The total population in both the cases exhibited an irregular trend of fluctuation being maximum in August-September and minimum in April-May. Of the four edaphic factors studied moisture and organic matter exhibited significant positive correlation with population while the other two factors (temperature and pH) were either negatively correlated of showed no correlation at all.

ACKNOWLEDGEMENT

Authors are thankful to the authorities of Zoological Survey of India for identification of the Collembolan specimens.

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