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A STUDY ON THE POPULATION OF SOIL ARTHROPODS FAUNA IN TOBACCO LEAF LITTER BAGS BURIED UNDER SOIL, A PRELIMINARY REPORT

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INTRODUCTION

The role of soil micro arthropods during decomposition of tobacco-ribs under the soil in litter bags has been conducted. A total of seven micro-arthropods groups were collected of which Collembola showed maximum population and this species *Lepidocyrtus medius* was most dominant. The arthropod population showed their maximum activities during first two months March-April. The interaction between the arthropod population and soil factors have been analyzed and discussed. Various author like Choudhuri and Roy (1971), Hazra (1976), Mitra (1977), Hazra and Choudhuri (1983) have studied the distribution of soil micro-arthropod particularly on Collembola in different ecosystem in India. But so far there is no record on the population structure on the soil micro-arthropods on tobacco leaf litter. Therefore, to fill up this lacuna the present investigation has been taken up.

MATERIAL AND METHODS

A total of twelve (12) nylon bags (mesh size–0.01 mm) were buried at the depth of 10 cm under the soil containing 200 gram of dry tobacco leaf ribs in the month of March, 2005. At the end of each month one litter bag was drawn up to the month of February 2006. The decomposed leaf litter was given on the Tullgren Funnel for extraction. The extraction was made by a modified Tullgren Funnel in the laboratory. A 40 watt bulb was used for heat and light source. Soil samples were placed on wire screen (2 mm mesh) in the funnels approximately 15 cm below the bulbs. Collection jars (200 ml) with approximately 50 ml 70% ethanol plus 5% glycerin were attached below the funnels and the extraction period was 3 days. Specimens collected were identified as far as possible to species level and quantified to estimate the collembolan densities of the sites.

The soil temperature was recorded by soil thermometer at the field. Soil moisture was determined by an Infra Red Moisture Balance (Model A). The pH of the soil was measured by glass electric pH meter. The organic carbon was estimated by titration method. (Walkley and Black, 1934). The particle size of soil sample was determined by mechanical analysis following the standard procedure.

LOCATION OF SAMPLING SITE

The site is located at Shyamnagar in North 24-Parganas, West Bengal. The site was covered with different types of grasses, herbs and shrubs. The soil was gangetic alluvium in nature, brownish black in colour and silty loom in texture.

OBSERVATION

1. *Faunal make-up* : The soil arthropod fauna obtain from this study belongs to seven different groups of soil micro-arthropods. Among the soil micro- arthropods, Collembolan fauna were most dominant (55.49%). The Collembola fauna were identified which belongs to five species under five genera. The *Lepidocyrtus medius* was dominant taxon comprising (18.45%) of the total Collembolan population followed by *Cryptopygyus javanus* (13.89%), *Isotomina thermophila* (11.06%), *Sinella* sp. (6.92%) and *Willowsia* sp. (5.09%) respectively. The second dominant group was *Acarina* (21.45%), followed by *Diptera larvae* (9.68%), *Isopoda* (6.93%), *Diplura* (1.84%), *Chilopoda* (3.23%), and *Centipede* (1.38%) (Fig. 2).

2. *Soil factor* : The soil of this site was alluvium in nature, clay and silty in texture. The mechanical analysis of soil sample of this site shows maximum percentage of clay (38.66%), Silt (33.59%), Fine sand (22.45%) and coarse sand (4.08) respectively (Table 1).

Table 1. : Mechanical analysis of soil (%) at Shyamnagar, West Bengal.

Coarse sand	Fine sand	Silt	Clay
4.08	22.45	33.59	38.66

Among the edaphic factors, the percentage of organic carbon (%) was maximum (1.83) in the month of April when the number of soil arthropod also shows their highest density. The minimum and maximum soil temperature recorded was 18.5°C and 39.3°C. Soil moisture (%) recorded was minimum 23.5 and maximum 30.5 (Fig. 1).

3. *Monthly fluctuation of arthropods fauna* : It is evident from Fig. 2, maximum soil arthropods were present in the month of April (15.74%) of the total population collected during the present study and minimum population was recorded in the month of January (3.7%). The group-wise analysis was made and found that the population of Collembola was maximum (55.55%) followed by *Acarina* (26.38%), *Diptera larvae* (9.68%), *Isopoda* (6.93%), *Diplura* (1.84%), *Chilopoda* (3.23%) and *Centipede* (1.38).

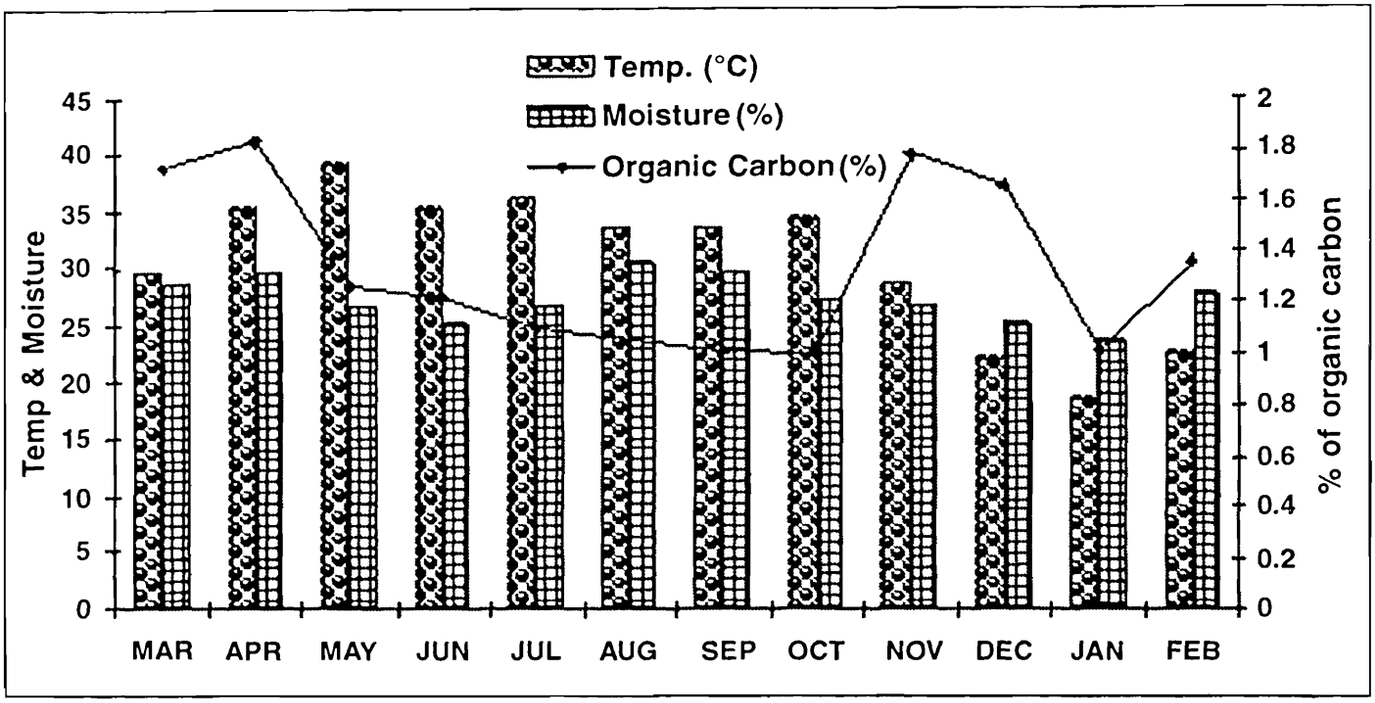

Fig. 1. : Monthly variation of edaphic factors (March, 05 to Feb., 06).

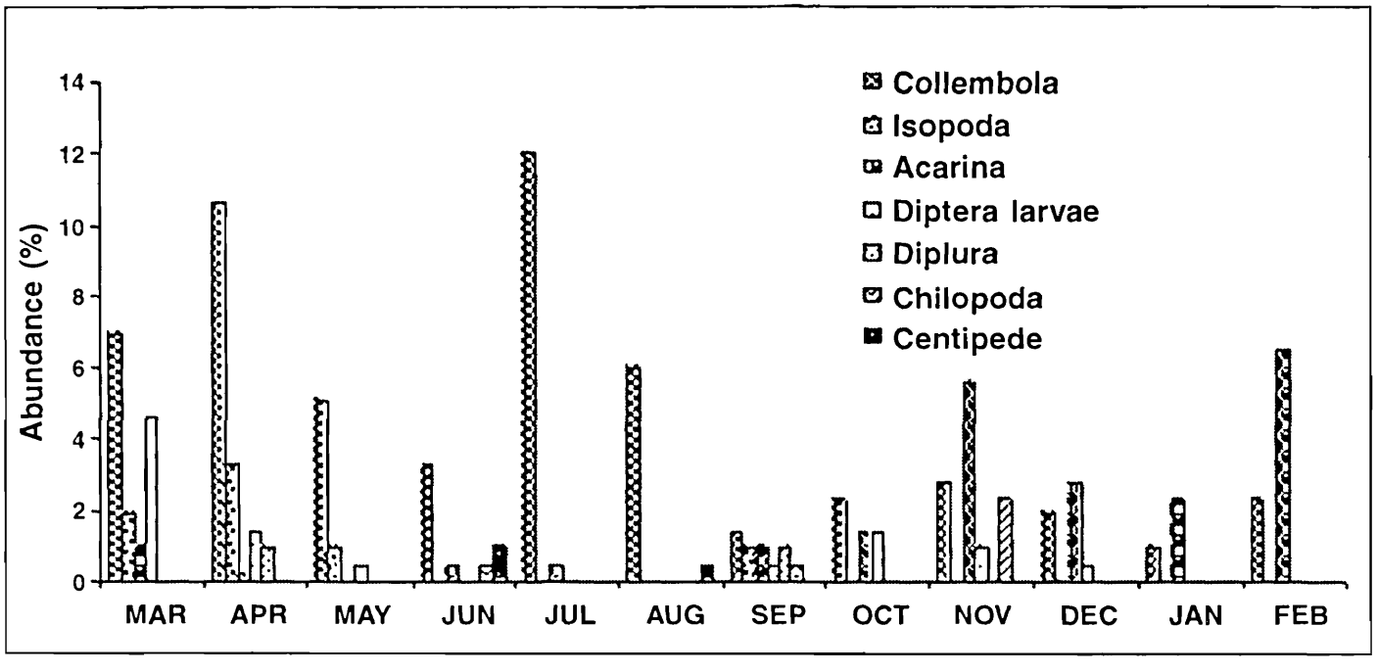

Fig. 2. : Monthly abundance of soil arthropods.

The population of soil micro-arthropod consisting of seven groups (Collembola, Diplura Acarina, Isopoda, Dipterans larvae, Chilopoda and Centipede) and five species of Collembola showed changes with the change of month (Fig. 3) being maximum in the month of March and April and minimum in January. These observations were coincided with the observations of Sheals (1956), Haarlov (1960) in the temperate countries and Hazra *et al.*, (1999) in a garbage dumping area at Kolkata.

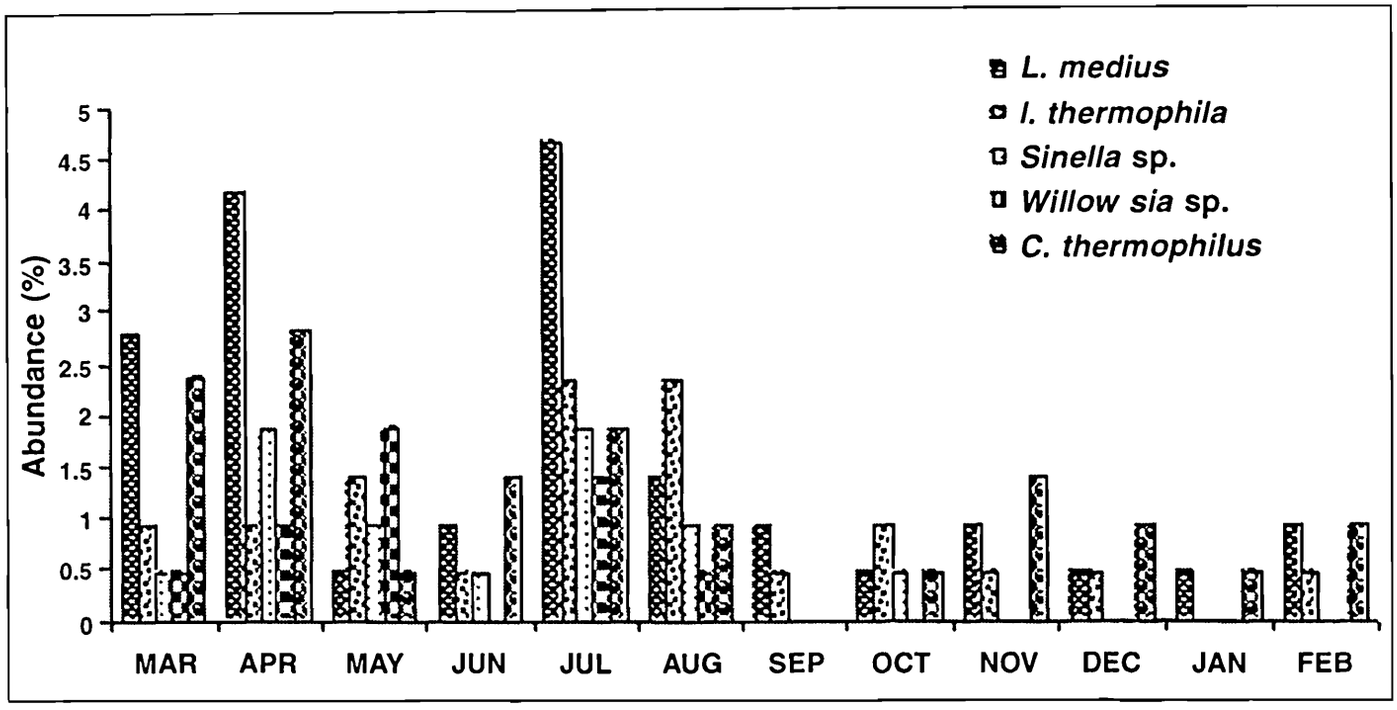

Fig. 3. : Monthly abundance of collembolan species.

Table 2. : Correlation coefficient (r) between edaphic factors and Collembola.

	C
C	1.00
T	0.544*
M	0.386 NS
OC	0.242 NS

Explanations : * = Significant at 1%, NS = Not Significant, C = Total collembolan population, T = Temperature, M = Moisture, OC = Organic carbon.

DISCUSSION

During 1st week of March the chopped Tobacco leaf ribs were buried under the soil it seems that the initial decomposition of leaves started and attracted the micro arthropod fauna as their nutrients and in the month of April population reached its peak. This might be due to the maximum organic carbon content (1.83%) in the surrounding soil (Fig. 1). Hazra (1978) showed the significant positive co-relation with the organic carbon and Collembolan population in West Bengal. Out of five species of Collembola, *Lepidocyrtus medius* showed maximum number (18.45%) followed by *Cryptopygyus javanus* (13.89%). The maximum concentration of these two species was also in the month of April when organic carbon level of surrounding soil was high (Fig. 3). It could be inferred from this study that all these groups of soil arthropod and the five species of Collembola

played an important role in detoxification of nicotine of tobacco leaves after few week when these are buried under the soil.

In order to find out as to whether there was any significant correlation between soil micro-arthro pods particularly, collembolan population, correlation coefficient (r) were worked out (Table 2). The population of collembolan throughout the period of sampling exhibited positive correlation with soil temperature but weak positive correlation with soil moisture and organic carbon.

However, it could not be concluded specifically the role of buried tobacco leaves on the soil arthropod fauna unless the experimental studies conducted under laboratory condition with each groups and species of soil arthropod and Collembola respectively. But the organic carbon and moisture played a major role on the fluctuation of population of soil arthropod fauna (Figs. 1 & 2). This observation confirms the finding of Hazra & Choudhuri (1983).

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