CHAPTER V

EDAPHIC FACTORS AND SOIL MICROARTHROPOD POPULATION
INTRODUCTION

Like many other tropical countries where deforestation is occurring at high rates, the North eastern part of India has a very high rate of land conversion to different landuse patterns. Much of this land has been converted to farmland, including pastures, teak and rubber plantations and human habitation.

The soil contains various physical, chemical and biological features which play great influences on the vitality of soil microarthropods. These soil characteristics showed wide range variation in ecosystem level, regional level and landuse level. It is well known, that there is a formidable biological component to soils (Petersen and Luxton, 1982; Eisenbeis and Wichard, 1987; Edwards et al., 1988; Dindal, 1990) and the fauna, microbes, and plant roots in healthy soils play a number of interactive functional roles (Coleman and Crossley, 1996). There are at least twelve kinds of activities by which soil animals effect the soil (Hole, 1981). These activities include mounding, mixing, forming voids, back-filling voids, forming and destroying peds, regulating soil erosion, regulating movement of water and air in soil, regulating plant litter, regulating animal litter, regulating nutrient cycling, regulating biota, and producing special constituents through the processes of regurgitation, mixing of saliva or excreta with soil materials. High soil organic matter content is usually beneficial for most soil animal groups is a well documented fact (Edwards and Lofty 1969, Ghilarov 1975, Andrén and Lagerlof 1983, Bandyopadhyaya et al. 2002), and that biodiversity is relatively strongly linked...
to available energy resources and essential nutrients (Pokarzhevskii and Krivolutskii 1997). Numerous publications come to describe the importance of different edaphic properties on the life history, vital activity and dynamics of soil microarthropods through out the globe. Some progress has been made towards the understanding of the effects of different edaphic factors on the ecology of soil microarthropods through out the country (Mukherjee and Singh, 1970; Joy and Bhattacharya, 1981; Sanyal, 1981a,b, 82; Sanyal and Sarkar, 1983, 93; Hazra and Choudhuri, 1990; Hazra, 1991; Gope and Ray 2006a; Ray and Gope, 2006).

The objective of present study aims at describing (i) Physical properties of soil and their variation among the four vegetational types, (ii) Edaphic factors and their dynamics, (iii) Correlation between population densities and edaphic factors.

MATERIALS AND METHODS

Sampling strategy

Soil samples of three replicates were collected at a depth of 0-10 cm separately for all the investigated sites. Site-wise composite sample was prepared, air-dried, ground and passed through a 2 mm sieve and stored in plastic container.

Soil analysis procedures

Soil texture

Soil texture of selected vegetational types was analyzed by Bouyoucos soil hydrometer method (Allen et al. 1974). 100gm of soil was taken in a 250 ml beaker and 10% sodium hexa meta phosphate (w/v) was added upto a
flooded condition. The solution was kept for overnight and stirred in a high speed stirrer for 10 minutes. After that the solution was taken in a 1000 ml plastic measuring cylinder and made the volume up to the mark. Then with a plunger the solution was thoroughly mixed and first hydrometer reading and aerial temperature reading was taken after 40 second of plunging. Prior to collection of reading the solution was kept undisturbed for 2 hours and then second reading was taken. The percentage of sand, silt and clay were calculated by following formula.

\[
\text{Sand} (%) = \frac{100 - \text{Corrected reading after 40 Sec}}{\text{Weight of the soil}} \times 100
\]

\[
\text{Silt} (%) = \frac{100 - \text{Corrected reading after 2 hour}}{\text{Weight of the soil}} \times 100
\]

\[
\text{Clay} (%) = 100 - (\text{Sand} + \text{Silt})
\]

**Soil bulk density**

Soil Corer Method (Brady and Weil 2004) from duplicate soil sample after oven drying at 105°C was employed to determine the soil bulk density. The soil samples from the selected vegetational types were collected using soil corer at a depth of 10 cm and sealed in polythene bags. The collected samples were brought into the laboratory with appropriate level of the vegetational types and stone particles and fine roots were separated. Thereafter, samples were oven dried at 105°C for 48 hours and weighted. Bulk density was calculated by using the following formula.

\[
\text{Bulk density (gm cm}^{-3}) = \frac{\text{Weight of the oven dry soil weight}}{\text{Volume of the correr}}
\]
**Water holding capacity (WHC)**

Keens box method (Piper 1966) was followed for determination of Water holding capacity (WHC) of soil samples. In this method weight of empty keen box and filter paper was taken by electronic balance and the weighted filter paper was kept in the keen box followed by filling of keen box tightly with the 2 mm sieved soil. Then the keen box was kept over water upto a mark of its soil level for over night. In the next day the soil of keen box become saturated and the weight of keen box with saturated soil sample was noted and kept in hot air oven for 48 hours at constant temperature of 105°C. The water holding capacity of soil was determined by the following calculation method.

\[
\text{Water holding capacity (\%)} = \frac{b - (c + d)}{b - a} \times 100
\]

Where, \(a\) = Empty keen box, \(b\) = weight of the saturated soil samples, \(c\) = weight of the oven dry soil sample and \(d\) = weight of filter paper.

**Soil pH**

The soil pH was measured in 1:2.5 soil-water (w/v) suspensions with a digital pH meter (Systronics). 20 gms of soil was taken in a 500 ml conical flask and 50 ml of water was added to it. The solution was then shaken properly over a mechanical shaker for 30 minutes at a constant speed of 120 revolutions per minutes (rpm). After that the solution was kept undisturbed up to its settlement and pH of the solution was measured by collecting the suspension in a digital pH meter (Systronics 361).
**Organic carbon content**

The determination procedure was followed by Walkley and Black’s rapid titration method (Jackson 1958). 1gm of soil sample was taken in a 500 ml conical flask and 10 ml of 1 N potassium dichromate (dissolved 49.04 AR grade K$_2$Cr$_2$O$_7$ in distilled water and make the volume up to 1000 ml) solution and 20 ml concentrated sulfuric acid was added. The solution was kept for 30 minutes to cool. After that 200 ml of distilled water, 10 ml of orthophosphoric acid (about 88%) and 1 ml of diphenylamine indicator was added in successive steps. The solution was then titrated against 0.5 N ferrous ammonium sulfate (dissolved 196 gm ferrous ammonium sulfate in 900 ml water and 20 ml of conc. sulfuric acid and made the volume up to 1000 ml after cooling of the solution) till the solution colour changes from blue-violet to green. Simultaneously, a blank was run without soil.

\[
\text{Percentage of organic carbon} = \frac{N \times (B - S) \times 0.003 \times 100}{\text{Weight of the soil}}
\]

Where, \(N\) = Normality of ferrous ammonium sulfate, \(B\) = blank reading (ml), \(S\) = Titration reading (ml).

**Total nitrogen (N)**

Total nitrogen of soil was determined by semi-micro kjeldahl method (Allen et al. 1974), using selenium metal powder catalyst (Bremner 1982) after digesting in sulfuric acid and hydrogen peroxide (Anderson and Ingram 1993) was added. The determination process was followed by three successive steps viz digestion, distillation and titration. In the digestion process 0.2 ± 0.001 gm of soil sample and 4.4 ml of digestion mixture (0.42gm selenium metal powder, 14 gm lithium sulfate, 350 ml hydrogen per oxide and 420 ml
concentrated sulfuric acid) was taken in a kjeldahl flask heated over a heating mantle until the colour of the solution turns to milky white. The digested soil sample was taken in a 100 ml volumetric flask to make its volume and allowed to settle. Then distillation process started with initial step of starting semi-micro kjeldahl apparatus and continued for 30 minutes to release of excess ammonia from the systems. Now 25 ml of aliquot and 12 ml of alkali mixture (Sodium hydroxide and sodium thiosulfate) was added to the equipments for the distillation purpose. The liberated ammonia was collected in 5 ml 4% boric acid with mixed indicators (15 ml mixture of bromocresol green and methyl red indicator) up to 30 ml. The collected leachate was then titrated against M/140 hydrochloric acid solution.

\[
\text{Total nitrogen (\%)} = \frac{T \times S \times 0.01}{A \times W}
\]

Where, \(T\) = Titration reading (ml), \(S\) = Final digest solution volume, \(A\) = Aliquot volume, \(S=\) Weight of the sample

**Available phosphorus:**

Available phosphorus was estimated by molybdenum blue method after extracting soil samples with 0.03 N ammonium fluoride in 0.025 N HCl (Olsen and Sommers 1982). The following successive steps were employed to determine the soil available phosphorous. Extraction of soil: in this step 11.1 gm of AR grade ammonium floride (NH₄F) was dissolved in 100 ml distilled water and filtered the solution. Now 1000 ml of distilled water containing 20 ml of conc. hydrochloric acid was added and dilute the content to 10 litre. After the preparation of extracting solution, 5 gms of air dried sample was taken in a 150 ml conical flask and 50 ml of extracting solution
was added. The conical flask containing soil and extraction solution was then shaken for 5 minutes in a mechanical shaker. Now the solution was filtered through Whatman No. 42 filter paper.

**Preparation of solution for standard stock phosphorous for standard curve:** To prepare a stock solution of 100 ppm, exactly 0.439 gm of potassium dihydrogen orthophosphate (KH₂PO₄) was taken in a 1000 ml volumetric flask then dissolved it in water and made the volume up to the mark. Now to prepare standard curve 0, 1, 2, 3, 4 and 5 ml were taken from the stock solution in 50 ml volumetric flask and made the volume with extracting solution.

**Preparation of samples for colorimetric determination:**
I ml of standard or sample was taken in a test tube using pipette. Then 4 ml of ascorbic acid and 3 ml of molybdate reagent was added. After that the solution was mixed thoroughly and leaved 1 hour for colour development. Then the absorbance was taken by a colorimeter at 800 nm.

**Calculation**

\[ P \, (\mu g \, ml^{-1}) = C \times \frac{\text{Volume of the extractant}}{\text{Volume of the aliquot}} \times \frac{1}{\text{wt. Of the soil taken}} \]

Where, \( C = \mu g \, P \) in the aliquot (obtained from standard curve)

**Exchangeable Potassium:** Exchangeable potassium was determined by flame photometer (Allen *et al.* 1974). This process is followed to two successive steps. In the first step extraction was carried out by 1 M ammonium acetate solution at pH 7. in a 500 ml conical flask. 5 gm of soil samples and 30 ml of 1 M ammonium acetate solution at pH 7 was taken and
Fig. 5.1. Soil bulk density and water holding capacity in relation to four vegetational types. Result of ANOVA of the effect of vegetational types on the soil bulk density and water holding capacity. TP= Teak plantation, HG= Homegarden, SC= Secondary succession and FT= Forest. Vertical line indicates Standard Error of mean.
shaken thoroughly over a mechanical shaker at 180 revolution per minute for 1 hour and immediately filtered through Whatman No. 1 filter paper.

In the next step reading was taken for the samples by using flame photometer (Systronics 121).

**Preparation of solution for standard stock potassium for standard curve:** To prepare a stock solution of 1000 ppm, exactly 1.908 gm of potassium chloride (KCl) was taken in a 1000 ml volumetric flask then dissolved it in water and made the volume up to the mark. Now to prepare standard curve 0, 5, 10, 15, and 20 ml were taken from the stock solution in 100 ml volumetric flask and made the volume with extracting solution.

In the next step reading was taken for the standard and samples by using flame photometer (Systronics 121).

**Calculation**

\[
K (\mu g \text{ ml}^{-1}) = C \times \frac{\text{Volume of the extractant}}{\text{Weight of soil taken}}
\]

Where, \( C = \mu g \) P in the aliquot (obtained from standard curve)

Data analysis and drawing of graphs was performed using M.S. Excel 2003, Origin 7 and minitab 11.

**RESULTS**

**Physical properties of soil under four vegetational types**

Physical characteristics of the described soil types are presented in Fig. 5.1 and Tab. 5.1. The bulk density showed significant difference between four vegetational types \( F = 8.14, p<0.001 \) but no significant differences were found in case of homegarden and teak plantation \( p>0.05 \). Similar pattern of
Table 5.1. Soil textural classes in the different vegetational types

<table>
<thead>
<tr>
<th>Vegetational types</th>
<th>Sand</th>
<th>Silt</th>
<th>Clay</th>
<th>Textural class</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP</td>
<td>55.4 ± 0.22</td>
<td>22.6 ± 0.52</td>
<td>22 ± 0.58</td>
<td>Sandy clay loam</td>
</tr>
<tr>
<td>HG</td>
<td>54.9 ± 0.5</td>
<td>22.1 ± 0.53</td>
<td>23.1 ± 0.75</td>
<td>Sandy clay loam</td>
</tr>
<tr>
<td>SC</td>
<td>84.7 ± 0.52</td>
<td>09.5 ± 0.45</td>
<td>05.8 ± 0.36</td>
<td>Loamy sand</td>
</tr>
<tr>
<td>FT</td>
<td>85.7 ± 0.50</td>
<td>08.8 ± 0.44</td>
<td>05.5 ± 0.52</td>
<td>Loamy sand</td>
</tr>
</tbody>
</table>
Figure 5.2 Showing the monthly fluctuation of (a) soil moisture content and (b) soil pH during the investigation period (May, 2003 to April, 2005). TP= Teak plantation, HG= Homegarden, SC= Secondary succession and FT= Forest.
insignificant ANOVA result was showed by forest and secondary succession. The maximum bulk density was recorded for teak plantation (1.37 ± 0.04) and minimum in forest (1.18 ± 0.03). ANOVA revealed water holding capacity among the investigated soil types differed significantly (F = 13.24, p<0.001). Like bulk density, forest (31.53 ± 1.79) and teak plantation (42.24 ± 1.00) showed lowest and highest water holding capacity values, respectively (Fig. 5.1). Textural class analysis exhibited the dominance of proportion of sand in forest and secondary successional soil type. Soil textural classes revealed the dominance of sandy loam in forest and secondary successional soil and loamy sand in homegarden and teak plantation (Tab. 5.1).

The soil moisture content of four vegetational types significantly (p<0.05) differ within four vegetational types throughout the investigation period. The range of soil moisture content showed differences from one vegetation to another. In forest and secondary succession the moisture were recorded during the month of June for both the investigated year ie May, 2003 to April, 2004 (23.65 ± 0.58) and May, 2004 to April, 2005 (24.49 ± 0.82). In secondary succession the peak level of soil moisture was found in the same month. The moisture content showed higher values in the wet month than that of dry month (Fig. 5.2). Soil pH of four vegetational types did not differ much more through out the investigation period. The soil pH showed significant differences between the four investigated sites (p<0.05) (Fig. 5.2).

**Chemical properties of soil under four vegetational types and their dynamics**

Soil organic carbon content was highest in the forest sites and lowest in the teak plantation through out the investigation period. The soil carbon
Figure 5.3: Showing the monthly fluctuation of (a) soil organic carbon content and (b) soil total nitrogen content during the investigation period (May, 2003 to April, 2005). TP= Teak plantation, HG= Homegarden, SC= Secondary succession and FT= Forest.
Figure 5.4. Showing the monthly fluctuation of (a) available soil phosphorous content and (b) extractable soil potassium content during the investigation period (May, 2003 to April, 2005). TP= Teak plantation, HG= Homegarden, SC= Secondary succession and FT= Forest.
Figure 5.5. Shows the correlation-coefficient (r) between population density and moisture content of soil.

- TM = Total microarthropods
- TI = Total insecta
- TA = Total acari
- CRY = Cryptostigmata
- COL = Collembola
- TP = Teak plantation
- HG = Homegarden
- SC = Secondary succession
- FT = Forest

"***" denotes significant at 0.001 level.
Figure 5.6. Shows the correlation-coefficient (r) between population density and soil pH. TM = Total microarthropods, TI = Total insecta, TA = Total acari, CRY = Cryptostigmata, COL = Collembola. TP = Teak plantation, HG = Homegarden, SC = Secondary succession, FT = Forest. "**" denotes significant at 0.001 level and "*" denotes significant at 0.05 level.
content showed significant differences between the four investigated sites (p<0.05). Among months, the highest carbon content was found during August to October and lowest during December to March in all the vegetational sites for both the investigated years (Fig. 5.3).

The total nitrogen content of soil showed higher concentration in forest soil and lowest on teak plantation through out the investigation period. The nitrogen content of soil differ significantly between four vegetational types (p<0.05). An increment of nitrogen content was found from May to October and there after dwindled up to March and this fact was found in both of the years of investigation (Fig. 5.3).

The available phosphorous and exchangeable potassium content of soil differ significantly between the four vegetational types (p<0.05) and also showed similar dynamics as exhibited by total Nitrogen content (Fig. 5.4).

**Edaphic properties of selected vegetation and microarthropod population**

The soil moisture content exhibited significant correlations (p<0.001) with all the population groups of soil microarthropods in all the vegetational types (Fig. 5.5). In four investigated sites the great influence of moisture content was found for total acari (r=0.69, p<0.001), total insecta (r=0.77, p<0.001) in teak plantation and secondary succession, respectively, while in forest the best correlationship found for total microarthropod (r=0.64, p<0.001), total acari (r=0.64, p<0.001). The pH content of soil did not show any correlationship with the population density of soil microarthropods except in teak plantation where this factor found to be negative but significantly (p<0.05) correlated with all the population groups. But soil cryptostigmatid
Figure 5.7. Shows the correlation-coefficient (r) between population density and soil temperature. TM= Total microarthropods, TI= Total insecta, TA= Total acari, CRY= Cryptostigmata, COL= Collembola, TP= Teak plantation, HG= Homegarden, SC= Secondary succession, FT= Forest. "***" denotes significant at 0.001 level, "**" denotes significant at 0.01 level and "*" denotes significant at 0.05 level.
Figure 5.8. Shows the correlation-coefficient (r) between population density and soil organic carbon.

TM = Total microarthropods, TI = Total insecta, TA = Total acari, CRY = Cryptostigmata, COL = Collembola, TP = Teak plantation, HG = Homegarden, SC = Secondary succession, FT = Forest. "***" denotes significant at 0.001 level and "**" denotes significant at 0.05 level.
Figure 5.10. Shows the correlation-coefficient (r) between population density and available phosphorous content of soil.

TM= Total microarthropods, TI= Total insecta, TA= Total acari, CRY= Cryptostigmata, COL= Collembola, TP= Teak plantation, HG= Homegarden, SC= Secondary succession, FT= Forest. "***" denotes significant at 0.001 level and "**" denotes significant at 0.01 level.
Figure 5.11. Shows the correlation-coefficient (r) between population density and Extractable potassium content of soil. TM= Total microarthropods, TI= Total insecta, TA= Total acari, CRY= Cryptostigmata, COL= Collembola, TP= Teak plantation, HG= Homegarden, SC= Secondary succession, FT= Forest. ** denotes significant at 0.001 level, *** denotes significant at 0.01 level and * denotes significant at 0.05 level.
mite community of forest site was found to be positive and significant correlation with the soil pH ($r=0.20$, $p<0.05$) (Fig. 5.6). Soil temperature of showed positive and significant influences on soil microarthropod communities in each investigated sites. The strong influence ($p<0.001$) was recorded for all the investigated sites except in homegarden ($p<0.01$) (Fig. 5.7). The influence of organic carbon on the soil microarthropod populations were clearly understood by their positive significant ($p<0.001$) correlationship (Fig. 5.8). Total nitrogen content of teak plantation soil did not show any correlation with the total microarthropod population ($r=0.28$, $p>0.05$), total insecta ($r=0.28$, $p>0.05$), total acari ($r=0.23$, $p>0.05$), cryptostigmatid mite ($r=0.26$, $p>0.05$), and collembola ($r=0.24$, $p>0.05$). In homegarden, except total insecta ($r=0.42$, $p<0.05$) and collembola ($r=0.41$, $p<0.05$) other population group not exhibited any relationship with soil nitrogen content. In secondary succession, total microarthropod population showed significant correlation at higher level ($r=0.68$, $p<0.001$), whereas except soil cryptostigmatid mites ($r=0.62$, $p<0.05$) rest of the population group showed positively significant relationship at 0.01 level. In forest system, total acari ($r=0.72$, $p<0.001$) and cryptostigmatid mites ($r=0.74$, $p<0.001$) showed positive correlationship at higher level of significance while collembola ($r=0.54$, $p<0.05$) showed positive correlationship at low level of significance (Fig. 5.9). In teak plantation available phosphorous content of soil was found to be positively correlated with total microarthropod ($r=0.68$, $p<0.01$), total insecta ($r=0.65$, $p<0.01$), total acari ($r=0.66$, $p<0.01$), cryptostigmatid mite ($r=0.66$, $p<0.01$) and collembola ($r=0.64$, $p<0.01$) populations at 0.01 level. For other sites also a strong influence of soil phosphorous content on the
microarthropod population was met. In homegarden strong relationship was found for total microarthropod \((r=0.90, p<0.001)\) and total acari \((r=0.90, p<0.001)\), whereas similar observation was found for cryptostigmatid mites \((r=0.89, p<0.001)\) and total acari \((r=0.87, p<0.001)\) populations of secondary succession and forest, respectively (Fig. 5.10). Exchangeable potassium content of soil showed significant correlation with all the population groups but among them strong correlation exhibited by total microarthropod population of all the investigated sites viz, teak plantation \((r=0.65, p<0.01)\), homegarden \((r=0.82, p<0.001)\), secondary succession \((r=0.91, p<0.001)\) and forest \((r=0.81, p<0.001)\) (Fig. 5.11).

**Discussion**

*Physical properties of soil under four vegetational types*

The moisture content dynamics in any soil solely depends on the precipitation. In the present study the moisture content of soil found to be higher in the months of July to October. The similar observation was also recorded by Hazra and Choudhuri (1983, 90), Guru et al. (1988) and Reddy and Ao. (1995). Soil physical characteristics revealed that for all the four sites, bulk density and water holding capacity were lowest for forest as this site was having higher sand values than that of other sites while reverse observation was also found for teak plantation and homegarden soil. The low bulk density in the forest and secondary succession may be due to the thick vegetational coverage, thick canopy coverage to prevent the sunlight and temperature which in turn increase litter decomposition and carbon content.
Chemical properties of soil under four vegetational types and their dynamics

Analysis of soil chemical characteristics revealed, forest had the highest organic carbon, total N, available P and exchangeable K than the other three soil types under the canopy of the heterogeneous vegetation and without anthropogenic disturbance, while teak plantation having single plant species and anthropogenic management. Though secondary succession and home garden having mixture of different plant species but the homegarden was having more human impact than that of secondary succession. Organic carbon content is an important constituent of the soil organic matter and determines the availability of other soil macronutrients. Higher organic carbon content in forest corresponds to the higher NPK in the soil. Soil organic carbon compounds hold basic cations and are a source of energy for decomposers, contributing to the increase supply of nutrients, such as N and K in soil (Stevenson 1986). The highest nutrient concentration of nutrient during July to October may be attributed to nutrient release during decomposition process because in this period high temperature, heavy rainfall and high relative humidity influence the high rate of decomposition.

Edaphic properties of selected vegetation and microarthropod population

The moisture content of soil showed significant influences on the different groups of soil microarthropods vital activity and dynamics which corroborates the works of Joy and Bhattacharya, 1981; Hazra and Choudhuri, 1990; Hazra, 1991; Sanyal, 1991; Singh and Yadava, 1998, Gope and Ray, 2006a, b whereas reverse results of the present findings also reported by the
different researchers (Choudhuri and Pande, 1979, 1982; Sarkar, 1991; Sanyal and Sarkar, 1993) of Indian continent. The soil moisture is an important factor which leads the vital activity of soil acari have been argued by Kevan (1972) while Singh and Mukharjee (1970) during their investigation on soil microarthropods of rose garden of Varanashi viewed that excessive moisture content of soil also having negative impact on population. The level of moisture content decline in the dry months (November to February) due to low rainfall and excessive evaporation of soil water to atmosphere, which may compelled the soil permanent resident in migration to higher depths. The present investigated area habituated with high precipitation and may be for this reason the population could not withstand the dry period and this situation may lead their morality in this period. The insecta other than collemboleta, become low population in the winter because maximum of them are temporarily reside in soil, which effect the total soil arthropod’s population. The low population of soil collemboleta, total acari and cryptostigmatid mites in the soil may be due to less microfloral abundance, as they prefer high moisture to leads their own vital activities.

Soil pH in the present study did not exhibit wide range of variation among the vegetational types and its dynamics. Sanyal (1994) reported in his literature review on ecological studies on soil mites of India suggested that pH may have inhibitory role on the increase of mite population. Here in teak plantation pH was found to be negative but significant relationship with all groups of encountered arthropod populations. From the different parts of India several researchers during their works on soil cryptostigmata population also reported the similar relationship of present findings (Choudhuri and Banerjee,
1977; Bhattacharya and Raychoudhuri, 1979; Sanyal, 1981b; Sanyal and Sarkar, 1993) whereas reverse report also comes on same group where pH found to be positive impact on population (Joy and Bhattacharya, 1981; Sarkar, 1991). In homegarden, secondary succession and forest (except soil cryptostigmata) vegetation all the population groups exhibit positive but insignificant correlationship with the soil pH. Such type of reports supports the investigation of Sanyal (1982, 1991), Sanyal and Bhaduri (1982) during their works on soil cryptostigmata from various parts of India.

Soil organic carbon content having a significant correlationship with the soil acari, cryptostigmata and collembo were established by many workers of India as well as through out the globe. Here significant positive correlation between above mentioned populations and soil organic matter corroborates the findings of Mukherjee and Singh (1970), Joy and Bhattacharya (1981), Banerjee and Sanyal (1991), Hazra (1991), Hazra and Choudhuri (1990), Sanyal (1981a, 1981b, 1982), Gope and Ray (2006). Bhattacharya and Raychoudhuri (1979) and Sarkar (1991) reported the positive but insignificant relationship between the soil mites population and soil organic carbon content.

The total nitrogen content of soil was found to be positively but insignificant relationship with the population of teak plantation and homegarden (except for total insecta and collembo) and the other occasion this factor showed positive and significant relation with the population.

Although there is a scanty of reports on the influence of available phosphorous with the soil microarthropod population in India but available reports indicated positive and significant relationship (Choudhuri and Pande,
1979; Reddy and Ao, 1995). The observation in the present study favors the fact that, this factor having strong influence on the soil microarthropods dynamics.

Like available phosphorous the study on influence of exchangeable potassium over dynamics of different groups of soil microarthropods were few in Indian subcontinent. In the present investigation attempts were made to establish the effect of potassium on the ecology of soil microarthropod population. Here strong influences of exchangeable potassium on the ecology of different groups of soil microarthropod populations were noticed.