



# Diversity of Soil arthropods in Contai Municipality, Purba Medinipur, WB, India

Kallol Kumar Hazra

Department of Zoology, P.K. College, Contai, Purba Medinipur

State Aided College Teacher, WB

**Abstract:** Soil is one of the most diverse habitats on Earth and contains one of the most diverse assemblages of living organisms, mostly the arthropods. The soil samples were collected from two study sites: one agricultural area and one near litter in Contai Municipality from March 2019 to February 2020. Different kinds of soil arthropods like Collembolan, Acarina, Pseudoscorpion, Diptera larvae, Diplopods, Coleoptera, Isopoda, Chilopoda, Symphyla, Pauropoda, Thysanura, Isoptera were recorded from two study sites. Seasonal variation of these arthropods was more or less similar. Out of these arthropods, Isoptera are more abundant near agricultural sites, whereas Acarina were abundant near litter sites.

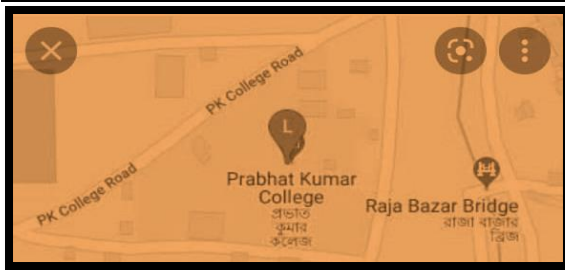
**Key Words:** Soil, Soil Arthropods diversity, Threats.

**Introduction:** Soil is the loose surface material that covers most land. It consists of inorganic particles and organic matter. Sand, silt and clay particles are the primary mineral building blocks of soil. Soil structure affects water and air movement through soil, greatly influencing soil's ability to sustain life and perform other vital soil functions. From the standpoint of habitats, soil fauna are divided into three groups which are associated with three sub-layers or horizons of organic layer, as for example soil fauna of litter horizon, soil fauna of fermentation horizon and soil fauna of humus horizon. Actually, Arthropods represent more or less 85% of soil fauna and therefore it indicates species richness. Among the soil arthropods, macrofauna plays an important role to improve the soil structure and aeration. Soil arthropods play their vital role in formation of soil, nutrient cycling, distribution of microbial population. Generally, the work is done on soil-related arthropods, particularly within litter and agriculture field and during this work it is focused that nowadays the availability of these arthropods are gradually declining from the Contai Municipality due to several causes.

**Methodology:**

**Study Sites:**

Kanthi is a small town, situated near the coastal area of Purba Medinipur district. The distance from Kolkata to Kanthi is 150 km. The latitude and longitude of the study site is 21°50' N and 87°48' E. Two sites were mentioned, one is agricultural field of Contai Municipality, ward no.6 and other at Contai P.K. College Campus near vermicompost production area.



**Sampling:** The author was collected soil from two study sites ten days intervals during March 2019-February 2020. Sampling was done by using quadrates (2mx2m) with a depth of 5cm and soil samples were collected. After that soil sample were taken in polythene bags from each sites for extraction of soil arthropods and in this respect Tull gren funnel with 40 watt electric bulbs at high light intensity for 48 hrs were used.

**Result:** After extraction, identification and counting of soil arthropods diversity measurement is too much essential. Here author mentioned number of observed arthropods in month wise which are listed in Table II Here the author applied *Sinpson's Diversity Indices*.

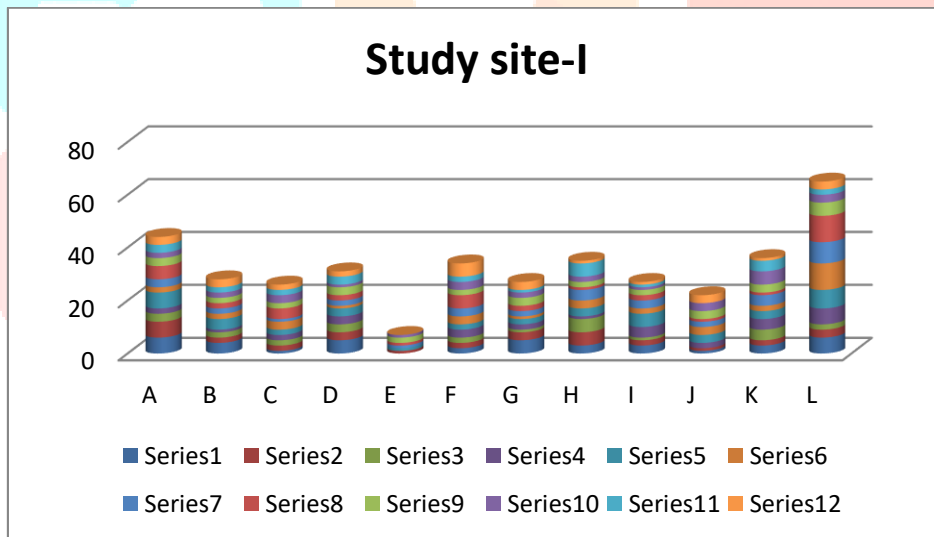
**Table -I List of observed Soil Arthropods: Taxonomic Group**

Order/Class		Identifying Characters
Collembola	(A)	Wingless with forked structure on penultimate abdominal segment.
Acarina	(B)	Unsegmented abdomen with eight legs and broad jointed cephalothorax
Diplopoda	(C)	Worm like cylindrical body with two pairs leg on each segment.
Isopoda	(D)	Dorsoventrally flattened body with more or less equal sized seven pairs leg like appendages
Pseudoscorpionida	(E)	Segmented abdomen with apparently ten legs where first pair large and chelate or claw like
Coleoptera	(F)	Front wing, a hardened shell, cover the hind wing in adults.
Chilopoda	(G)	Elongated worm like flattened segmented body with one pair of legs per segment
Diptera larvae	(H)	Leg absent but head pointed
Symphyla	(I)	Body with 10-12 pairs leg and antennae not branched
Pauropoda	(J)	Body with 9pairs leg and branched antennae
Thysanura	(K)	Presence of 2 or 3 abdominal cerci
Isoptera	(L)	Winged and antennae about size of head

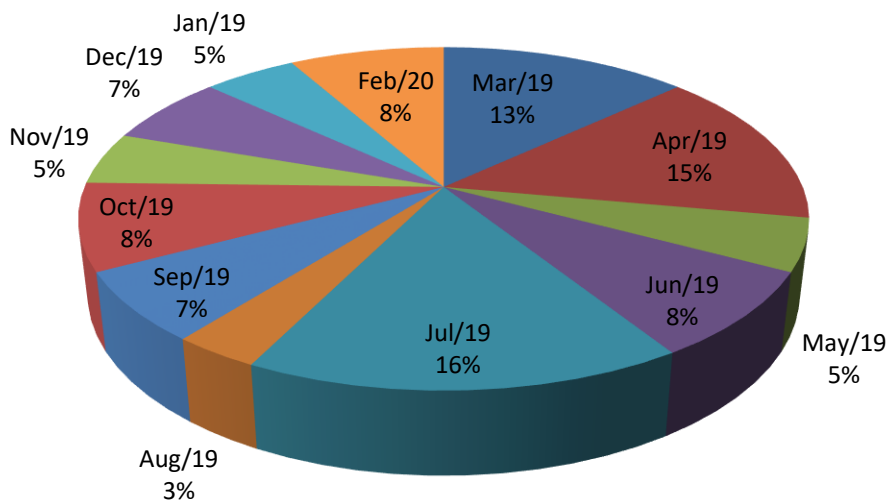
Table –II Number of observed arthropods

Study Site –I : Table-I

Duration	Order/Class												Total
	A	B	C	D	E	F	G	H	I	J	K	L	
Mar-19	6	4	1	5	0	2	5	3	3	1	3	6	39
Apr-19	6	2	2	3	1	2	3	5	2	1	2	3	32
May-19	3	2	2	3	0	2	1	5	1	0	4	2	25
Jun-19	2	1	2	3	0	3	2	1	4	2	4	6	30
Jul-19	6	4	2	3	1	2	2	3	5	3	3	7	41
Aug-19	2	2	3	1	0	3	1	3	2	3	2	10	32
Sep-19	3	2	1	2	1	3	2	4	3	2	4	8	35
Oct-19	5	2	4	2	1	5	2	1	2	1	1	10	36
Nov-19	3	2	2	3	2	2	3	2	2	3	3	5	32
Dec-19	2	2	3	1	1	3	2	2	1	3	5	3	28
Jan-19	3	2	2	3	0	2	1	5	1	0	4	2	25
Feb-20	3	3	2	2	0	5	3	1	1	3	1	3	27
	44	28	26	31	7	34	27	35	27	22	36	65	382



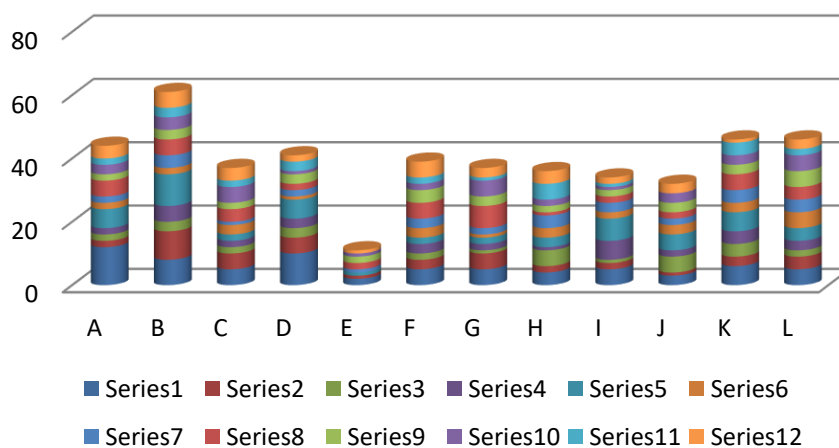
### Order/Class

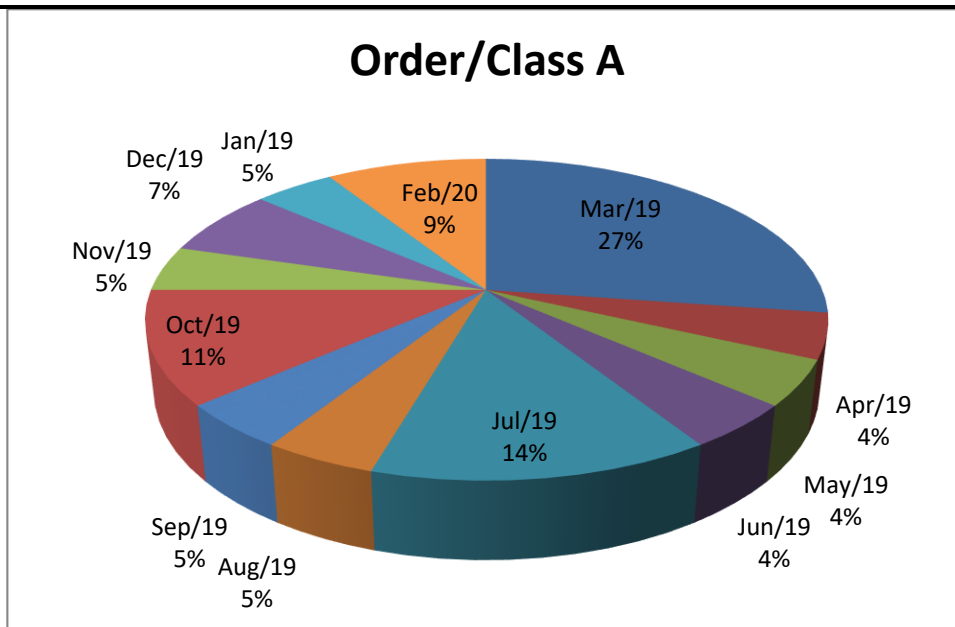


Study Site-II : Table II

Duration	Order/Class												Total
	A	B	C	D	E	F	G	H	I	J	K	L	
Mar-19	12	8	5	10	2	5	5	4	5	3	6	5	70
Apr-19	2	9	5	5	1	3	5	2	2	1	3	4	42
May-19	2	3	2	3	0	2	1	5	1	5	4	2	30
Jun-19	2	5	2	3	0	3	2	1	6	2	4	3	33
Jul-19	6	10	2	6	1	2	2	3	7	5	6	4	54
Aug-19	2	2	3	1	0	3	1	3	2	3	3	5	28
Sep-19	2	4	1	2	1	3	2	4	3	2	4	4	32
Oct-19	5	5	4	2	2	5	7	1	2	2	5	4	44
Nov-19	2	3	2	3	2	4	3	2	2	3	3	5	34
Dec-19	3	4	5	1	1	2	5	2	1	3	3	5	35
Jan-19	2	3	2	3	0	2	1	5	1	0	4	2	25
Feb-20	4	5	4	2	1	5	3	4	2	3	1	3	37
	44	61	37	41	11	39	37	36	34	32	46	46	464

### Study Site-II





**Diversity Measurement:** Here the author used **Simpson's Index** -

ORDER/CLASS	STUDY SITE-I l(n)	(n-1)	n(n-1)	STUDY SITE-II	(n-1)	n(n-1)
Collembola (A)	44	43	1892	44	43	1892
Acarina (B)	28	27	756	61	60	3660
Diplopoda (C)	26	25	650	37	36	1332
Isopoda (D)	31	30	930	41	40	1640
Pseudoscorpionida (E)	07	06	42	11	10	110
Coleoptera (F)	34	33	1122	39	38	1482
Chilopoda (G)	27	26	702	37	36	1332
Diptera larvae (H)	35	34	1190	36	35	1260
Symphyla (I)	27	26	702	34	33	1122
Pauropoda (J)	22	21	462	32	31	992
Thysanura (K)	36	35	1260	46	45	2070
Isoptera (L)	65	64	4160	46	45	2070
Total	382		13868	464		∑n(n-1)=18962

The formula for calculating **Simpson's indices** :

$$D=1-\left(\frac{\sum n(n-1)}{N(N-1)}\right)$$

n = the total number of organisms of a particular species

N = the total number of organisms of all species

So, the community analysis of **Study Site –I :**

$$D=1-\left(\frac{\sum n(n-1)}{N(N-1)}\right)$$

$$= 0.91$$

So, the community analysis of **Study Site –II :**

$$D=1-\left(\frac{\sum n(n-1)}{N(N-1)}\right)$$

$$=0.92$$

### Discussion:

The soil arthropod specimens from two study sites for a period of March 2019 to February 2020 were collected. During that time total 846 soil arthropods specimen were observed. Out of which total 382 no. of samples were found in site –I, where as total 464 no. of samples were found in site –II. Those are represented in Table-I and Table –II respectively. Here author also represent statistical diagram ( Column & Pie ) in both study sites. From these statistical data it is clear that month of July in Site –I was highly abundant than other months whereas month of March was more abundant than other months in Site-II . From both tables it is said that Pseudoscorpionida were less diverse ,Acarina were more diverse in study site II and Isoptera were more diverse in study site I. Further it was significantly found that Pauropoda were not found in the month of May-2019&January-2019 at site –I and only in month of January-2020 in site –II. So from the study it is said that as the site –II located near the vermicompost area of P.K.College Campus ,the population density of soil arthropods were more than site-I. Actually as Isopteran population were more in site –I ,it is clear that some physiochemical properties of soil was imbalanced. Further it is said that Acarina also plays an important role in maintaining the sustainability of an ecosystem through decomposition and mineralization maintenance of soil physical structure. Therefore it also enhance primary productivity. Actually a favorable soil structure ensure adequate nutrient retention, aeration, water holding capacity below ground which facilitates root penetration and prevent erosion of top soil. So from the study of Simpson's Index it is observed that both sites were diverse but population density in site- I indicate destabilization of soil structure due to gradual occurrence of heavy rainfall, high temp.

### Conclusion:

Soil arthropods performs much role in soil fertility, nutrient cycling, litter feeding etc. But now a days huge toxic pollutants and pesticides in agriculture also affect on arthropods population . Thus different kind of soil arthropods were not shown in study sites. It is also said that global warming also affect on habitat of soil arthropods. So the present study will be helpful for future researchers.

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