STUDIES ON SEASONAL VARIATIONS IN THE DIVERSITY PATTERN OF SOIL ARTHROPODS IN RUBBER PLANTATIONS - CENTRAL TRAVANCORE AREA

B. Bini*, M.G. Sanal Kumar, P.Vinod*****
P.G. & Research Department of Zoology, N.S.S. College, Pandalam
Kerala, India – 689 501

Abstract- *The diversity of soil arthropod fauna inhabiting in rubber plantations at Central Travancore area of South Kerala regions were studied. The soil arthropods were collected during the year 2014. Soil samples were periodically and regularly collected from 10 different sites of rubber plantation. At each station, soil samples were collected between the hours of 8 am to 10 am. 17 orders of soil arthropod were collected and extracted using Berlesse tullgren funnel. Arthropods were collected, using 70% alcohol. The obtained soil arthropods belonging to order Isopoda, Diplopoda, Pauropoda, Chilopoda, Symphyla, Araneida, Acari, Chelonethi, Collembola, Protura, Diplura, Hymenoptera, Isopteran, Psocoptera, Diptera, Coeleoptera, Dermaptera and Psocoptera. Seasonal variations of soil arthropod fauna in rubber plantations were studied. Data collected from the rubber plantation sites were subjected to appropriate statistical analysis. Shannon Weiner Diversity, Simpson's dominant index, Berger parker dominance, Hill's abundance, Mergaleff richness and McIntosh territorial indices were calculated. The order Collembola, Acari, Hymenoptera, Diplopoda, Isopoda were the dominant and abundant groups in all rubber plantation study sites. Diversity of soil arthropod population in each season was similar among all of the study sites. In all the sites, maximum diversity, richness, dominance, abundance and evenness were noted in monsoon and post monsoon seasons, while the minimum was during the summer season. Seasonality exerted a strong effect on the abundance and diversity of rubber plantation arthropods.*

Index Terms- Soil arthropods, Diversity, Berlesse tullgren funnel, Rubber plantation, Isopoda, Collembola

I INTRODUCTION

Biodiversity is the key factor of the structure and function of ecosystems (Lee, 1991 and Wall *et al.*, 2005). Soil is an extremely dynamic, complex and highly heterogeneous system that allows the development of large number of ecological habitats, home of an array of live organisms and performs important functions for the ecosystem (Gardi and Jeffery, 2009). Soil creates a favorable habitat for micro organisms and it is inhabited by a wide range of them namely; algae, fungi, bacteria, arthropods and protozoa (Koehler 1992). Soil organisms range from microscopic forms to the macroscopic forms (Franke, 2003). Arthropods are the most diverse group of animals on earth and functional component of the major soil food web, such as soil accumulation of organic matter, soil structure and nutrient cycling also encouraging plant root development (Basset *et al*., 2003; Gardi and Jeffery 2009).

Soil arthropods are a vital link in the food chain as decomposer (Samways,1994; Mattson, 1997; Trombetti and Williams, 1999; Coleman *et al.*, 2004, Devi and Singh, 2006;). Acarina and collembolans usually account for 90% of the soil arthropod fauna. Arthropods are the dominant animal group throughout the world. Population density and composition of the fauna in soils are indicators of soil condition (Lussonhop, 1992; Stork and Eggleton, 1992). The abundance of microarthropods in soil determined by resource availability, pH, disturbance and climatic factors (Curry, 1994). Without arthropods most terrestrial ecosystem would rapidly collapse (Iloba and Ekrakene, 2008). (Wallwork 1970).Hence an attempt has been taken to estimate the biodiversity of soil arthropods in rubber plantations, Central Travancore area of South Kerala.

II METHODOLOGY

a) Study area:

The study was conducted in ten rubber plantation sites at Central Travancore area of South Kerala state during the year of 2014.

b) Sampling sites:

Ten study sites were selected in random from the study area for soil and soil arthropod sampling.

c) Collection, extraction, sorting and preservation:

Soil samples were collected from 10 rubber plantation sites. Soil samples of 5×5 cm^2 area, from a depth of 5 cm randomly collected with soil auger. Soil samples were collected in all seasons this was carried out between the hours of 8.00 am to 10.00 am in the morning. Soil samples were placed in a labelled polythene covers and taken to the laboratory.

Collected soil samples placed into a 15×25 cm tray and hand sorted to collect large soil microarthropods. Remaining soil samples were transferred to the Berlese Tullgren funnel for soil arthropods extraction. Berlese Tullgren Funnel extractor is the best extraction method for extracting soil arthropods (Hopkins, 1970; Frith and Frith, 1990; IIoba and Ekrakene, 2008). The soil micro arthropods were extracted overnight into a picric acid

Index	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
Shannon H' Log Base 10.	1.128	1.131	1.121	1.134	1.127	1.133	1.132	1.124	1.121	1.114
Berger-Parker Dominance (d)	0.158	0.157	0.16	0.151	0.148	0.151	0.156	0.161	0.164	0.165
Simpsons Diversity (D)	0.085	0.084	0.087	0.083	0.085	0.083	0.084	0.086	0.088	0.09
Hill's Number H0	17	17	17	17	17	17	17	17	17	17
Hill's Number H1	61.181	61.794	59.79	62.319	60.94	62.246	62.047	60.28	59.71	58.383
Margaleff M Base 10.	7.065	7.014	7.043	7.057	7.028	7.007	7.007	7.05	7.072	7.079
Mackintosh Distance (U)	0.299	0.423	0.521	0.6	0.67	0.733	0.791	0.846	0.899	0.951
Mackintosh Eveness (E)	1.318	1.317	1.317	1.316	1.316	1.315	1.315	1.314	1.314	1.313

medium (Haarlov, 1947). Extracted micro arthropods were identified with the help of a binocular stereo microscope and used identification key (Kuhnelt, 1961 and Wallwork 1970).

After the organisms were extracted and collected, they were sorted. This was done under a binocular dissecting microscope. The individual numbers of species were counted.

d) Statistical analysis

Shannon Weiner index, Berger-Parker Dominance, Simpson's Diversity, Hill's Number, Margaleff richness, MacIntosh Territorial indices were calculated by using bio diversity pro.

III RESULT

The collection of soil arthropods fauna from rubber plantation lasted for a period 2014 and 17 orders were recorded. Ten rubber plantation sites from Central Travancore area were selected for the soil arthropods sampling and biodiversity indices analysis. The obtained results provide an overview on the seasonal variation of soil arthropod diversity in rubber plantations. Study confirms that the seasonality has an effect on the diversity of soil arthropods in rubber plantation soil. Diversity of soil arthropods during four seasons Pre monsoon season (March-May), Monsoon season (June-August), Post monsoon season (September–November), Summer season (December-February) were analyzed.

i. Pre monsoon season: (March- May)

During pre monsoon season seventeen orders of soil organisms were collected. Order wise soil arthropods K dominance value showed in table 1.1. Pauropoda, Chilopoda, Chelonathi, Psocoptera orders showed maximum K dominance value of 100 in some sites but order Isopoda, Diplopoda, Hymenoptera and Collembola showed less K dominance value in some sites. K Dominance value 100 represented there had more arthropods occupying space.Table1.1a showed the biodiversity indices of soil arthropods. Shannon-Weiner diversity index, showed minimum 1.122 and maximum 1.143, indicating moderate diversity of soil organisms in all rubber plantation sites. Berger-Parker Dominance (d) showed value between 0.136-0.15, there was no over dominance showed among the arthropod orders. Simpson's dominant index, exhibited values between 0.079-0.085, indicating more dominance of soil arthropods in all sites.

1.1: K dominance value of different order of soil arthropods during pre monsoon season.

Table1.1a: Biodiversity indices of soil arthropods during pre monsoon season.

Order	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
Isopoda	56.805	55.682	58.48	65.476	57.396	57.059	57.558	57.627	58.14	55.747
Diplopoda	48.521	47.727	50.877	49.405	49.704	49.412	50	50.282	50.581	48.276
Pauropoda	90.533	97.727	94.152	94.048	100	100	96.512	91.525	89.535	93.678
Chilopoda	82.249	81.25	96.491	98.214	91.124	88.824	92.442	93.785	98.256	100
Symphyla	92.899	84.091	83.041	79.762	93.491	80.588	98.256	96.045	91.86	95.977
Araneida	75.148	75	71.345	76.786	71.006	71.765	65.116	64.972	65.698	62.644
Acarina	27.811	13.636	14.62	14.286	28.994	14.706	14.535	14.689	14.535	13.793
Chelonethi	95.266	100	100	100	95.858	91.176	100	100	100	98.276
Collembola	14.201	27.273	28.655	27.976	14.793	28.235	28.488	28.249	29.07	27.011
Protura	85.207	86.932	98.83	82.738	79.882	93.529	94.767	83.616	94.186	85.632
Diplura	97.633	89.773	85.965	96.429	98.225	83.529	84.302	98.305	96.512	88.506
Hymenoptera	39.645	39.205	41.52	40.476	40.828	40.588	40.698	40.113	40.698	39.655
Isoptera	69.822	69.318	76.608	71.429	76.923	77.647	77.907	71.186	77.907	75.287
Psocoptera	100	92.614	88.889	85.714	82.84	95.882	87.209	86.441	84.302	91.379
Diptera	88.166	95.455	80.117	88.69	85.799	86.471	90.116	89.266	87.209	82.759
Coleoptera	63.905	63.068	66.082	57.738	64.497	64.706	72.093	77.401	72.674	69.54
Dermaptera	79.29	78.409	91.813	91.667	88.757	98.235	81.395	80.791	81.395	79.31

Hill's abundance, showed values between 60.01-64.23. Margaleff richness index showed value 7.1 representing moderate diversity of soil arthropods in all sites. McIntosh eveness index was used for describing the distribution of soil organisms and showed a value of 1.31. Among the orders of soil organisms, majority of orders showed random and regular aggregation.

ii. Monsoon season: (June-August)

During monsoon season, the data showed that orders Diptera and Dermaptera show maximum K dominance value (100) and minimum for the order Isopoda, Collembola, Hymenoptera and Acari(Table 1.2). In biodiversity analysis, Shannon-Weiner index ranged between 1.088-1.119, indicated the soil arthropods in the rubber plantation have moderate diversity. Berger-Parker

Table 1.2: K dominance value of different order of soil arthropods during monsoon season.

Table1.2a: Biodiversity indices of soil arthropods during monsoon season.

Index	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
Shannon H' Log Base 10.	1.105	1.093	1.112	1.109	1.119	1.103	1.101	1.117	1.093	1.088
Berger-Parker Dominance (d)	0.167	0.168	0.156	0.163	0.153	0.148	0.149	0.15	0.167	0.179
Simpsons Diversity (D)	0.09	0.093	0.087	0.088	0.086	0.09	0.089	0.085	0.093	0.095
Hill's Number H0	17	17	17	17	17	17	17	17	17	17
Hill's Number H1	56.736	54.528	58.099	57.391	59.332	56.321	56.002	59.047	54.513	53.628
Margaleff M Base 10.	7.695	7.793	7.669	7.656	7.643	7.669	7.779	7.695	7.779	7.736
Mackintosh Distance (U)	0.312	0.446	0.541	0.623	0.694	0.761	0.823	0.877	0.933	0.986
Mackintosh Eveness (E)	1.317	1.315	1.314	1.314	1.313	1.312	1.311	1.311	1.309	1.309

iii. Post monsoon season (September–November)

17 orders of soil arthropods were collected during the post monsoon season. Order wise K dominance values showed in table 1.3. Psocoptera and Diptera orders showed maximum K dominance value (100) in some sites; represents less dominance in ecosystem. Table1.3a showed the biodiversity indices of soil arthropods. Shannon-Weiner diversity index, showed minimum 1.114 and maximum 1.134, indicating moderate diversity of soil organisms in all rubber plantation sites. Berger-Parker

Order	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
Isopoda	16.667	16.814	15.574	16.26	15.323	14.754	14.912	15	16.667	17.949
Diplopoda	65	66.372	63.115	63.415	52.419	64.754	64.912	62.5	55.263	66.667
Pauropoda	85.833	96.46	89.344	89.431	91.129	86.885	99.123	91.667	84.211	82.051
Chilopoda	76.667	84.071	80.328	91.87	79.032	84.426	86.842	94.167	86.842	84.615
Symphyla	88.333	74.336	91.803	77.236	82.258	89.344	89.474	79.167	89.474	87.179
Araneida	80	86.726	68.033	68.293	75.806	91.803	77.193	82.5	74.561	89.744
Acarina	54.167	44.248	53.279	53.659	62.097	55.738	55.263	53.333	66.667	56.41
Chelonethi	90.833	89.381	77.049	80.488	85.484	94.262	80.702	71.667	92.105	92.308
Collembola	42.5	56.637	28.689	30.894	29.839	29.508	28.947	28.333	43.86	44.444
Protura	69.167	70.796	83.607	83.74	66.935	68.852	69.298	75.833	71.053	71.795
Diplura	93.333	92.035	72.951	73.171	71.774	72.951	84.211	85.833	94.737	94.872
Hymenoptera	30	31.858	41.803	43.089	42.742	43.443	42.982	41.667	30.702	31.624
Isoptera	83.333	77.876	94.262	94.309	93.548	77.049	92.105	89.167	78.07	76.068
Psocoptera	95.833	94.69	96.721	96.748	95.968	96.721	94.737	96.667	96.491	96.581
Diptera	100	98.23	98.361	98.374	100	98.361	100	98.333	98.246	79.487
Coleoptera	73.333	81.416	86.885	86.992	88.71	81.148	73.684	67.5	81.579	98.291
Dermaptera	98.333	100	100	100	98.387	100	97.368	100	100	100

Dominance (d) showed value between 0.148-0.165, there was no over dominance showed among the arthropod orders. Simpson's dominant index, exhibited a value between 0.083-0.09, indicating Dominance (d) got value between 0.148-0.168, so there was no over dominance among the arthropod orders. Simpson dominant index showed that there was no chance of over dominance within the orders. Hill's abundance value between 53.628-59.332, indicated moderate soil arthropod abundance. Margaleff richness index showed the value range from 7.643 to 7.793 representing average arthropod richness. McIntosh eveness was used to analyse the distribution and got index value 1.31 (Table1.2a). Most of the soil arthropods orders from rubber plantation sites showed random aggregation.

moderate diversity of soil organisms in all rubber plantation sites. Berger-Parker Dominance (d) showed value between 0.148-0.165, there was no over dominance showed among the arthropod orders. Simpson's dominant index, exhibited a value between 0.083-0.09, indicating more dominance of soil arthropods. Hill's abundance, showed a value between 58.383-62.319. Margaleff richness ranged between 7.007 and 7.079 representing moderate diversity of soil arthropods in rubber plantations. McIntosh eveness index was used for observing the distribution of soil organisms and the value ranged between 1.313-1.318. Among the orders of soil arthropods, majority of them showed random and regular aggregation.

Table 1.3: K dominance value of different order of soil arthropods during post monsoon season.

Order	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
Isopoda	41.304	40.838	41.711	40	40.741	40.104	41.146	40.86	42.077	42.857
Diplopoda	51.63	51.309	52.406	50.27	50.794	50	51.563	51.613	53.005	53.846
Pauropoda	91.304	94.241	94.652	96.757	88.36	83.333	93.75	91.936	84.699	95.055
Chilopoda	80.435	76.963	70.053	76.216	64.55	63.021	63.542	95.161	87.978	82.418
Symphyla	84.239	80.628	73.797	80	68.783	67.188	67.708	73.656	91.257	85.714
Araneida	63.587	64.398	66.31	63.784	73.016	71.354	71.875	65.591	65.574	66.484
Acarina	29.891	29.319	30.481	29.73	14.815	28.646	29.167	29.57	30.601	31.319
Chelonethi	67.935	73.298	77.54	68.108	77.249	75.521	79.688	77.419	73.77	79.121
Collembola	15.761	15.707	16.043	15.135	29.63	15.104	15.625	16.129	16.393	16.484
Protura	72.283	69.11	81.283	72.432	81.481	79.687	76.042	69.892	77.596	70.879
Diplura	76.63	84.293	91.979	83.784	91.534	86.979	83.333	81.183	94.535	89.011
Hymenoptera	59.239	59.686	61.497	59.459	60.317	58.854	59.375	60.753	61.202	62.088
Isoptera	94.565	87.958	85.027	87.568	85.185	90.625	86.979	84.946	69.945	75.275
Psocoptera	98.913	100	98.396	98.378	100	100	100	100	100	100
Diptera	100	96.335	100	100	98.942	99.479	98.958	98.925	98.907	98.901
Coleoptera	88.043	91.623	88.77	90.811	94.709	94.271	90.625	88.71	81.421	92.308
Dermaptera	97.826	98.429	96.791	94.054	97.354	97.396	96.875	97.312	97.268	97.253

Table1.3a: Biodiversity indices of soil arthropods during post monsoon season.

Index	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
Shannon H' Log Base 10.	1.128	1.131	1.121	1.134	1.127	1.133	1.132	1.124	1.121	1.114
Berger-Parker Dominance (d)	0.158	0.157	0.16	0.151	0.148	0.151	0.156	0.161	0.164	0.165
Simpsons Diversity (D)	0.085	0.084	0.087	0.083	0.085	0.083	0.084	0.086	0.088	0.09
Hill's Number H0	17	17	17	17	17	17	17	17	17	17
Hill's Number H1	61.181	61.794	59.79	62.319	60.94	62.246	62.047	60.28	59.71	58.383
Margaleff M Base 10.	7.065	7.014	7.043	7.057	7.028	7.007	7.007	7.05	7.072	7.079
Mackintosh Distance (U)	0.299	0.423	0.521	0.6	0.67	0.733	0.791	0.846	0.899	0.951
Mackintosh Eveness (E)	1.318	1.317	1.317	1.316	1.316	1.315	1.315	1.314	1.314	1.313

iv. Summer season (December-Febuary)

In summer season, the K dominance data showed that the orders Chilopoda and Diplura showed maximum K dominance value (100), hence lower dominance (Table 1.4). Biodiversity indices showed that Shannon-Weiner index with a maximum value of 1.106 at site 8, this indicated that the soil arthropods in the rubber plantation with moderate diversity. Berger-Parker Dominance (d) showed value between 0.16-0.183, there was no over dominance showed among the arthropod orders. Simpson dominant index showed that there was no chance of over dominance within the orders. Hill's abundance index showed a maximum value of 56.025 at site 7 and minimum value of 55.914 at site 6, indicates moderate soil arthropod diversity in all study sites. Margaleff richness index showed value between 7.511-7.593, represents moderate soil arthropod richness. McIntosh eveness was used to indicate the distribution of soil arthropods

Table1.4a: Biodiversity indices of soil arthropods during summer

Index	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
Shannon H' Log Base 10.	1.101	1.1	1.087	1.097	1.09	1.101	1.102	1.106	1.087	1.091
Berger-Parker Dominance (d)	0.178	0.179	0.194	0.178	0.177	0.172	0.164	0.16	0.168	0.183
Simpsons Diversity (D)	0.091	0.09	0.096	0.091	0.094	0.091	0.09	0.088	0.091	0.092
Hill's Number H0	17	17	17	17	17	17	17	17	17	17
Hill's Number H1	100	100	100	100	99.343	96.884	100	99.2	99.21	54.049
Margaleff M Base 10.	7.511	7.522	7.581	7.581	7.569	7.593	7.593	7.557	7.63	7.618
Mackintosh Distance (U)	0.312	0.441	0.545	0.629	0.705	0.771	0.831	0.886	0.94	0.991
Mackintosh Evenness (E)	1.317	1.316	1.315	1.314	1.313	1.312	1.312	1.311	1.31	1.31

Table 1.4: K dominance value of different orders of soil arthropod during summer season.

Order	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
Isopoda	73.333	73.194	75.194	63.89	60	66.406	73.44	73.282	75.2	73.02
Diplopoda	79.259	79.104	79.045	72.67	80	78.906	79.69	79.380	80.8	79.37
Pauropoda	95.556	96.269	96.124	96.12	94.615	93.75	95.31	97.71	98.4	98.41
Chilopoda	91.852	55.893	55.79	53.303	55.169	53.927	55.944	56.025	56.828	53.433
Symphyla	97.037	97.761	97.674	89.92	96.154	96.875	86.72	91.603	88.8	97.63
Araneida	83.704	84.328	84.496	84.5	84.615	83.594	84.38	83.206	86.4	84.92
Acarina	32.593	32.09	35.659	33.33	34.615	33.594	32.03	31.298	32	33.33
Chelonethi	98.519	92.537	89.922	97.67	93.077	92.188	89.06	86.26	91.2	93.65
Collembola	44.444	42.537	44.961	43.41	44.615	43.75	43.75	41.985	42.4	42.86
Protura	94.074	94.776	92.248	92.25	97.692	98.438	98.44	89.313	97.6	96.03
Diplura	100	99.254	99.225	99.23	99.231	100	100	99.237	100	100
Hymenoptera	17.778	17.91	19.38	17.83	17.692	17.188	16.41	16.031	16.8	18.25
Isoptera	51.852	66.418	52.713	79.85	66.923	73.438	67.19	67.176	68	50.79
Psocoptera	86.667	87.313	94.574	87.6	87.692	86.719	91.41	93.893	93.6	88.1
Diptera	89.63	90.299	87.597	94.57	90.769	89.844	93.75	96.183	96	91.27
Coleoptera	59.259	50.746	60.465	51.16	53.077	51.563	60.16	59.542	51.2	58.73
Dermaptera	66.667	58.955	68.217	58.92	73.846	59.375	52.34	51.145	60	66.67

Discussion

During present study, a total of seventeen orders of soil arthropods were extracted from ten sites of rubber plantation during the year 2014. Among the soil micro arthropods extracted from ten rubber plantation sites, Collembola, Diplopoda, Hymenoptera, Isopoda, Acari were found to be the most abundant arthropod orders in all study sites. The highest population of soil arthropods was found in post monsoon and monsoon seasons, lowest in summer season. Similar observation made by Bhattacharya and Raychoudhuri (1979), Bhattacharya

et al., (1980). Lowest abundance of soil arthropods during summer season due to high temperature and low moisture content in the soil.

Biodiversity Indices were used to study the diversity, richness, evenness of soil arthropods. Diversity of soil arthropods was high in post monsoon and monsoon season as compared to the dry season. Soil temperature influences the distribution of soil animals, as temperature increases soil micro arthropod population decreases, because the temperature directly affects the rate of physiological reactions and indirectly effect on the soil biological activities then the soil animals migrate into the deeper layer of soil profile (Swift *et al*., 1979) Shannon Weiner diversity index and evenness index were also recorded higher value in wet season as compared to dry season from all the study sites. Shannon Weiner diversity index and evenness index all are high during wet season may be due to the higher decomposition and nutrient release. Good habitat condition, higher the diversity index and the worse habitat condition lower the diversity index of soil arthropods.The diversity of soil animal groups in surface soil is abundant and decreases with the increasing depth of soil profiles.

From this study order Collembola, Diplopoda were more in number during wet season. Collembola more in number in monsoon periods due to high moisture content in the soil. Order Collembola considered as biological regulators, they help to increase soil respiration and also accelerate nitrogen mineralization (Kaneda and Kaneko, 2008). Collembolans are among the abundant soil arthropods and play an important role in decomposing grasses (Brown and Gange, 1989). Higher abundance of collembolans than acarines, also recorded by (Chattopadhyay and Hazra 2000) at Kolkata. Myriapods number was low during summer season.

Seasons had direct influence on the diversity, richness, abundance and evenness of soil arthropods in rubber plantation. Climatic seasons tend to translate into seasonal activity patterns in living organisms including arthropods which became active only at certain times of the year (Wolda, 1988). Soil temperature and moisture influence micro arthropod reproduction and development rates (Van Straalen, 1994).

Soil arthropods were not evenly distributed. Application of pesticides during agricultural activities, has strong influence on the diversity and abundance of soil fauna (Adan *et al*., 1991; Arroyo and Iturrondobeitia, 2006). The rubber plantation sites had moderate soil arthropod diversity, the rubber plantations had high organic matter contents. When the organic matter increases the soil arthropod population also increases. During various seasons the soil arthropods showed variations in their diversity, richness and evenness. Richness and evenness of arthropods were more in post monsoon and monsoon seasons, least in summer season.

CONCLUSION

Seventeen Orders of soil arthropods like Isopoda, Diplopoda, Pauropoda, Chilopoda, Symphyla, Araneida, Acari, Chelonethi, Collembola, Protura, Diplura, Hymenoptera, Isoptera, Psocoptera, Diptera, Coeleoptera, Dermaptera, Psocoptera were obtained during the study period. The order Collembola, Acari, Hymenoptera, Diplopoda, Isopoda were the dominant and abundant groups in all rubber plantation study sites. Seasons had direct influence on the diversity, richness, abundance, evenness of soil arthropods. During the study period post monsoon and monsoon seasons had maximum richness, diversity, abundance and evenness but showed minimum in summer season. From this study found that the rubber plantation sites had moderate soil arthropod diversity.

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AUTHORS

First Author – B. Bini, M.Sc. Zoology, Research scholar, Post Graduate and Research Department of Zoology, N.S.S. College, Pandalam binirohini@gmail.com

Second Author – Dr. M.G. Sanal Kumar, Ph.D., Assistant Professor, Post Graduate and Research Department of Zoology, N.S.S. College, Pandalam, Kerala, India. mgsanalkumar@gmail.com

Third Author – P. Vinod, M.Sc. Zoology, M. Phil., Assistant Professor, Post Graduate and Research Department of Zoology, N.S.S. College, Pandalam, Kerala, India. Vinod7175@yahoo.co.in

Correspondence Author – B. Bini, binirohini@gmail.com, +91 8606550799