World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 6.129

SEASONAL ABUNDANCE OF SOIL INHABITING ARTHROPODS IN FOREST AND AGRO ECOSYSTEMS INWARANGAL DISTRICT

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Article Received on 18/10/2021 **Article Revised on 08/11/2021** **Article Accepted on 28/11/2021**

ABSTRACT

Present study is based on seasonal diversity, habitat quality and species specific differences of micro and macro arthropod abundance in forest and agro ecosystem at Gudur mandal Rajannapally village of Warangal district, Telangana State India from June to October, 2016. Total 5 samples were collected from each site at monthly intervals and soil macro arthropods were collected with the help of pit-fall trap method and identified by a binocular stereomicroscope. The results of this study stated that, the major soil arthropod faunal groups collembolan, Arenea, Hymenoptera, Orthoptera,Acari, Dermoptera, coleoptera and Blateria were recorded. Climatic interference and edaphic properties are also affecting the diversity and species specific structure of soil macro arthropods community thus habitat quality may serve for static nature of soil macro arthropods diversity. Soil arthropods are very useful and helpful in many commercial and biological aspects like silk, lac & honey production. Hence, this study clearly establishes that diversity of soil macro arthropods is affected by various properties in forest and an agro-ecosystem including qualitative and quantitative nature of external inputs, habitat quality, edaphic properties and regional climatic interferences.

KEYWORDS: Micro and Macro arthropods, Collembolan, Seasonal diversity, Climatic Interference.

INTRODUCTION

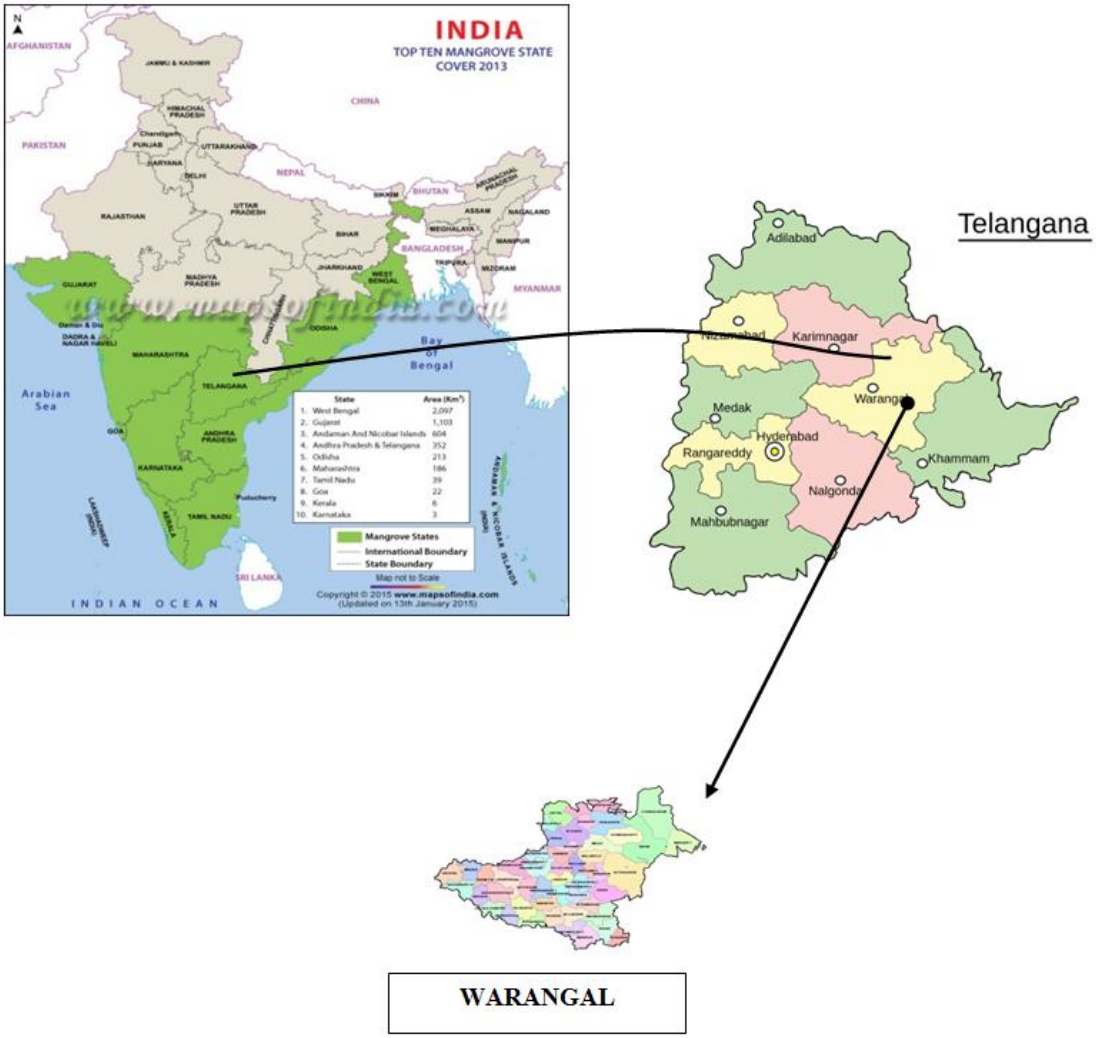
Soil arthropods are an important component of ecosystems, contributing significantly to their biodiversity and functioning, seasonal patterns, population dynamics, and functions of these insects. The biological characteristics consist of diversified communities of both micro and macro organisms, belonging to different groups of invertebrates. They are a diverse and functionally important component of forest ecosystems (P Zhao, C Song...et.al 2009). The activities of insects, such as ingestion, egestion, movement in search of food, mates, etc. help in various ecosystem processes, mainly litter decomposition and nutrient cycling (Zli, B Zou, Y Ding et.al., 2004) and other ecological processes like soil infiltration, (X Yin, W Zhong., et, al., 2002), Soil Arthropods are good ecological indicators under changing environmental conditions effecting forest and agro ecosystems in the study area.

The present study was aimed to investigating the qualitative and quantitative composition and seasonal abundance of the soil inhabiting arthropods diversity in relation to the abiotic (physical) environmental factors in forest and agro ecosystems were reported.

STUDY AREA

The study area is about 60 km away from Warangal city, a part of the Deccan plateau and is situated in the Telangana region of eastern part of Warangal district. The sampling and experimental sites of natural forest and agro ecosystems are located in the Pakhal wildlife sanctuary covering an area of 860 sq.kms. The forests of the sanctuary contain predominantly teak with miscellaneous species of plants supporting a number of both herbivorous and carnivorous animals and micro and macro arthropods of soil fauna.

And the forest areas have different types of trees, shrubs, climbers, grasses (*Madhucaindica*, *Pterocarpus*, *Marsupium*, *Bambusaarundinacea*, Maddi (*Terminaliaarjuna*), Beedi-leaf (*Diosyrosmelanoxylan*), *Asparagus racemosus*etc; DM Finch, 2012). In agricultural ecosystems crops; like Maize, Cotton, Chillies, Wheat, Mustard, and Sugarcane….etc, are being cultivated in this area. Blocks of 1.05 ha of different fields are selected from each sampling site for arthropod collection. The sampling is carried out for two consecutive years throughout the cropping season.

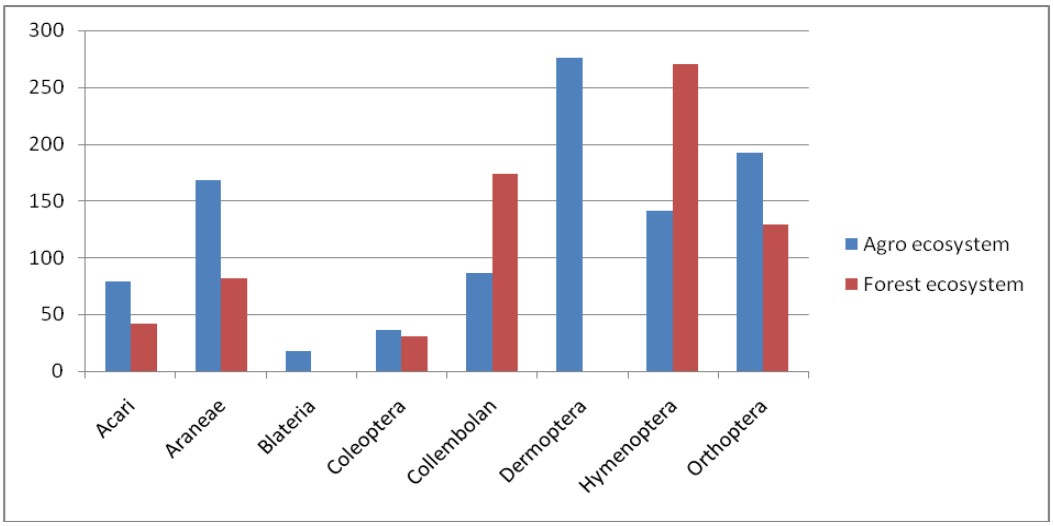


MATERIALS AND METHODS

The soil surface inhabiting arthropods fauna of both forest area, and maize crops were sampled by pit- fall trap method. In pit- fall trap method wide mouth bottles of 24 cm length and 5 cm mouth diameter with 100ml of 5% formalin solution were placed as pit fall traps by digging into the ground randomly at ten places, the distance between two traps being 20 feets, in each habitat. A flat stone kept over each traps allowing a minimum distance of 2 cm, between the mouth of the trap and the under surface of the stone to protect the trap from rain and dust. These bottles were collected monthly during the study period. Besides, the traps were inspected more frequently to avoid complete evaporation of formalin from the bottle due to the sun heat. The traps after collection from the fields, brought to the lab for identification.

Table 1: Diversity of soil inhabiting arthropods in two ecosystems.

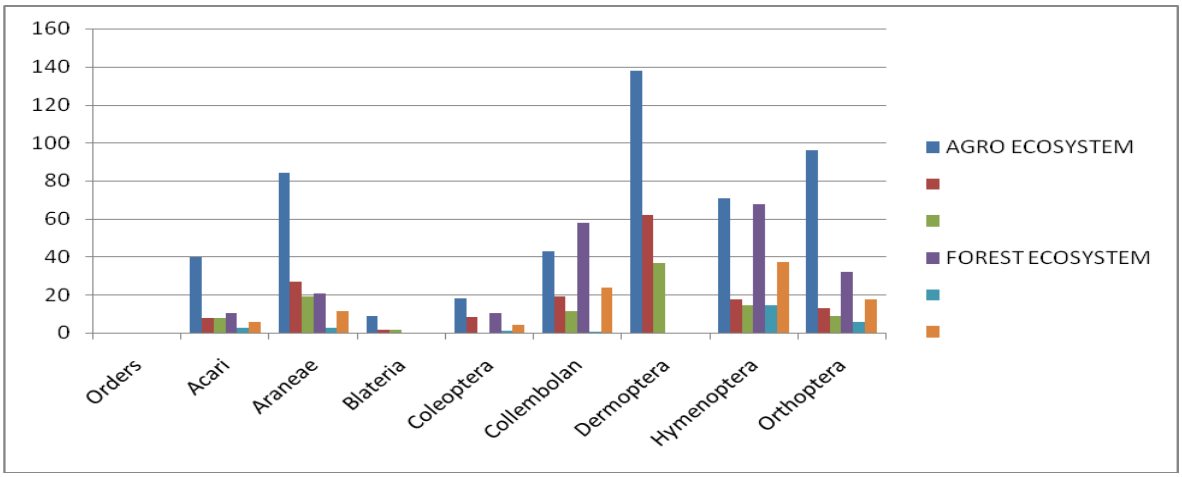
Order	Agro ecosystem	Forest ecosystem	Total	Mean	S.D	S.E
Acari	79	42	121	60.5	26.16	5.849
Araneae	168	82	250	125	60.81	13.59
Blateria	18	0	18	9	12.72	2.844
Coleoptera	36	31	67	33.5	3.535	0.79
Collembolan	86	174	260	130	62.22	13.91
Dermoptera	276	0	276	138	195.1	43.62
Hymenoptera	141	270	411	205.5	91.21	20.39
Orthoptera	192	129	321	160.5	44.54	9.959
Total	996	728	1724			
Simpson Index	**0.15**	**0.76**				



Histogram showing the diversity of soil inhabiting arthropods in two ecosystems.

Percentage of soil inhabiting arthropods in two ecosystems.

Order	Agro ecosystem Mean	S.E	%	Forest ecosystem Mean	S.E	%
Acari	39.5	7.826	7.579	10.5	2.7	5.76
Araneae	84	26.83	19.14	20.5	2.78	11.26
Blateria	9	1.341	1.595	0	0	0
Coleoptera	18	8.049	0	10.3	1.19	4.25
Collembolan	43	19.23	11.43	58	0.63	23.9
Dermoptera	138	61.71	36.7	0	0	0
Hymenoptera	70.5	17.66	14.62	67.5	14.5	37.08
Orthoptera	96	12.96	8.909	32.25	5.5	17.71



Histogram showing the percentage of soil inhabiting arthropods in two ecosystems.

RESULTS AND DISCUSSION

A total of over 1724 soil inhabiting arthropods were collected from 40 samples in the two different altitudinal environments belonging to eight orders were recorded in the study period of which Agro ecosystem contained 996 individuals of soil arthropods belonging to eight orders. And forest ecosystem having 728 individuals with 6 orders. In these ecosystems Dermoptera had maximum dominance in agroecosystem followed by hymenoptera. However dermoptera were not recorded in forest ecosystem. Blateria were recorded minimum number in agro ecosystem, but not recorded in forest ecosystem. Of this study revealed that qualitative and quantitative composition of soil arthropods in forest and agro ecosystems. Reddy M.V (1984) observed morecompositin of soil fauna in plantation forest area than grass land. Zodinduii B et.al (2019) stated that physico chemical parameters and vegetational coverers were influenced on the abundance of soil orthopod communities. Umesh kumar et.al (2016) soil arthropods play an important role in soil fertility Simpson Diversity Index shows that arthropods diversity was very high in agro ecostem and very low in forest ecostem. Why because Thus it is concluded that different habitats with different vegetation concerend within forest and agro ecosystems are different in arthropod faunal charecteristics.

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