



### Short Communication

## Assessment of Terrestrial Arthropods Diversity in Kallar Horticultural Farm, Mettupalayam, Western Ghats, South India

Elanchezhian M.\*, Gunasekaran C., Agnes Deepa A. and Mohana P.

Conservation Biology Laboratory, Department of Zoology, Bharathiar University, Coimbatore, Tamil Nadu- 641 046, INDIA

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### Abstract

Two third of the world occupied the special creation of organism is called invertebrates. Arthropods, the most diverse component of terrestrial ecosystems functioning and play a major roles for decomposition, soil fertility, plant nutrient and productivity in variety of functions. These are a one of the most powerful biological indicators and pollinators. Biological diversity is used to refer the (taxonomic, numerical, genetic, etc.) for the variety of organisms living in a particular place. Terrestrial arthropods are by far the most diverse groups of animals and important to contribute in soil. Assessing the terrestrial arthropods diversity is not readily available for many of those responsible for general assessments of biodiversity. This is the main general guidelines for planning the arthropod biodiversity study. The main objective of the study is to assessment of the terrestrial arthropods diversity and conservation of biodiversity pedestal on the vegetations. The present work is focused to notorious terrestrial arthropods diversity in six different sites based on the vegetations Grassland (plot-a), Mixed Plantation (plot-b), Mangoosten plantation (plot-c), Gooseberry plantations (plot-d), Nursery Bed's (plot-e) and Natural Forest (plot-f) at Kallar Horticultural farm, in Mettupalayam, The Western Ghats. The research is conducted during the period of November 2009 to April 2010. The arthropods were collected by the methods of Pitfall traps, Sticky traps and direct collection. The statistical findings were done by Shannon wiener diversity index (H) widely used for popular diversity indices. Totally the nine orders of diversity and richness were recorded. Diversity and abundance of terrestrial arthropods shows much difference between the natural and the plantation types to high productivity.

**Keywords:** Arthropods, biodiversity, kallar horticulture, pitfall traps, shannon wiener Index, conservation.

### Introduction

Invertebrates are extremely numerous and diverse but, despite being to play important roles in ecosystem services and functions, our knowledge of the status, ecology, interactions and sensitivity to change of many species is poor (Cardoso *et al.* 2011)<sup>1</sup>. The degraded landscapes are seen much in terrestrial ecosystem result the mining, farming and other anthropogenic activities, these activities results loss of species habitat in ecosystem and in the most terrible cases of soil erosion and water pollution<sup>2</sup>. Ecological restoration is helps to repair the damage caused by humans to the diversity of the ecosystem<sup>3</sup>. The conservation strategies are based on information given from well known taxa. Insects are integral to the initial shredding of the litter which exposes nutrients to microbial digestion. The recycling of nutrients in the forest and other agricultural involves the diversity of bacteria, fungi, protozoa, and invertebrates interactions. Plant growth involves more activity of various types of organism within the environment. Microbes enhance the enzymatic capabilities for processing soil resources and finally recycling entry of the soil nutrients into the plant root. Soil arthropod diversity can be useful as indicator of ecosystem function productivity or as direct estimator of ecosystem responding to different management protocols. The grazing of Microbes by arthropods mineralizes nutrients to

complete the nutrient recycling process. The result of biodiversity simplification for agricultural purposes is an artificial ecosystem it requires constant human intervention, whereas in natural ecosystems the internal regulation of function is a product of plant biodiversity through flows of energy and nutrients, and this form of control is progressively lost under agricultural intensification.

### Methodology

**Study Area:** The Horticultural farm (Kallar) was established in 1900. The total area is about 8.92 hectares. Its elevation is 360 mts above MSL with annual rainfall 1250-1400 mm and Humidity ranges from 70-80%. The major plantation crops include Jack fruits, Lime layers, Pepper, Clove seedlings, Nutmeg Crops, silver Oak, Mangoosten, Arecanut seed, Coffee and some minor fruits and ornamental plants. Perennial source of gravitational water from Kallar stream flowing from Coonoor along the hill slopes. The farm produces high quality of tree species fruit trees other economic crops and also serve as educational center for many students.

**Selection Sites:** The study area was divided into six different plots based on the vegetation's (Plot A- Grassland, Plot B- Mixed plantation, Plot C-Mangoosten plantation, Plot D-

Gooseberry plantation, Plot E-Nursery Bed, and Plot F- Natural forest area). The study was conducted by (November 2009- April 2010). Insects were collected from the each plot by using various methods.

**Collection Methods:** The method was used to collect insect's samples by using Pitfall traps, Sticky traps and direct collection methods. Specimens are destined for display cases that portray them in their natural habitats. It may be important to collect a sample of the host plant for the display.

**Statistical Analysis:** Insect diversity was calculated by the Shannon wiener diversity index. The Shannon wiener diversity index (H) which is one of the most widely used and popular diversity indices, was used for the comparison of the sites and independent samples<sup>4,6</sup>.

### Results and Discussion

There were orders and 5515 individuals of arthropod animals that commonly occurred in six different plots in horticultural farm (Kallar), which occupied (29%) of the total collected taxon are Lepidoptera and followed by the Coleopteran and Odonata (15%), Hymenoptera (14%), Orthoptera (11%), Araneae (9%),

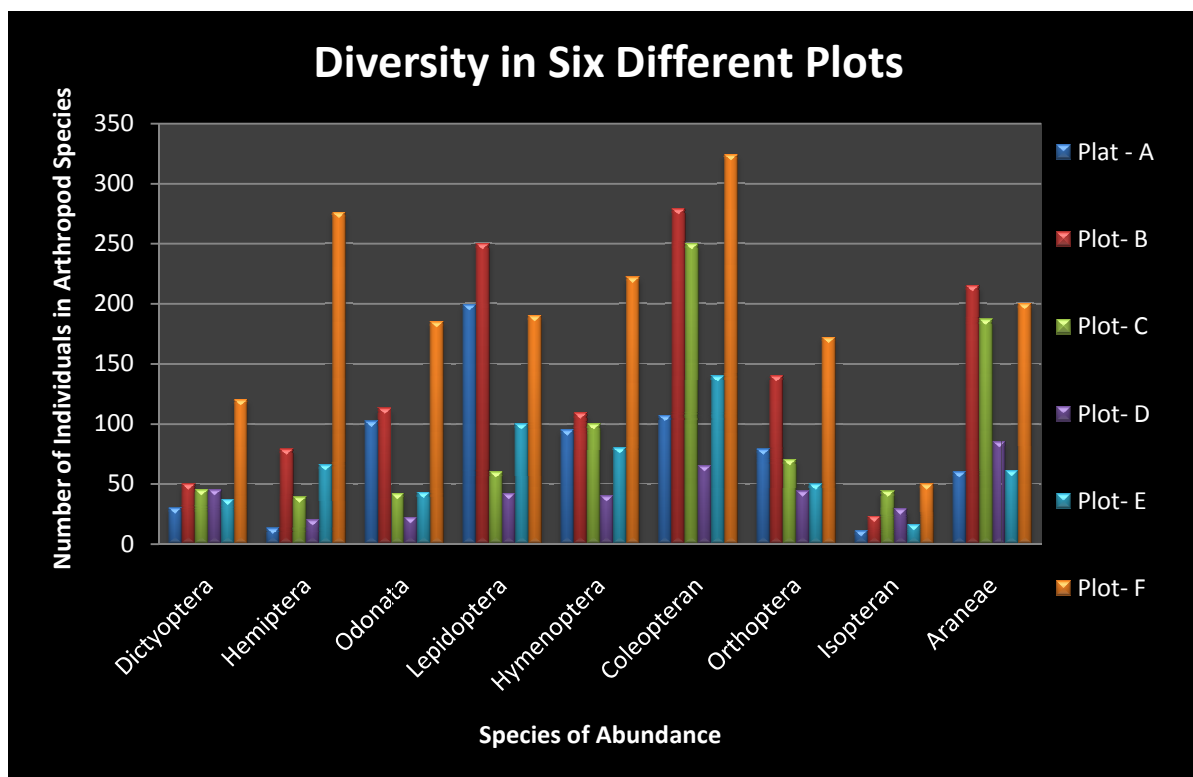
Dictyoptera (4%), Hemiptera (2%), Isopteran (1%) of the total collected individuals.

**Table-1**

**The table showing Shannon Wiener Diversity Index and evenness of Arthropods in six different plots from the study area. (Plot A- Grassland, Plot B- Mixed plantation, Plot C- Mangoosten plantation, Plot D- Gooseberry plantation, Plot E- Nursery Bed, and Plot F- Natural forest area)**

Plot Name	Shannon Wiener Diversity Index	Species Richness	Species Evenness
Plot- A	1.932807	4	0.879658
Plot- B	2.004968	13	0.9125
Plot- C	1.951067	7	0.887969
Plot- D	2.101693	3	0.956522
Plot- E	2.058908	5	0.93705
Plot- F	2.112348	15	0.961371

The species richness and diversity of arthropods were recorded as showed in figure 1. The arthropods were recorded during the study period showed more abundance in plot F (Natural Forest) and Plot B (Mixed plantation) Order Coleopteran showed more abundance in majority of the plots and Hemiptera occupies the next, abundances was very low in the order of isopteran in Plot - A).



**Figure-1**

The Bar diagram showed diversity of Arthropods in six different plots from the study area. (Plot A- Grassland, Plot B- Mixed plantation, Plot C- Mangoosten plantation, Plot D- Gooseberry plantation, Plot E- Nursery Bed, and Plot F- Natural forest area)

Microorganisms also play a central roles in organic matter decomposition and nutrient cycling, and consequently, in primary production. Macro arthropods fauna was similar among the sampling habitats by virtue of biogeography, Climatic or edaphic factors. The result indicated that there was a large scale environmental effect on soil macro arthropods.

The group numbers and individual density of arthropod animals generally decrease with the depth in the soil profile. Hence the results suggest that cultivations may change the vertical distributions of macro arthropods in the soil profile. The vertical structure of arthropods community in horticultural farm agrees with the general rule. We did not measure bulk density and pore size distribution at this study site, but we hypothesize that compaction due to tillage may have contributed to a greater pore size. In other studies, bulk densities were reduced, and soil pore size was greater in cultivated soil than in no till soil<sup>7</sup>.

Arthropods can be used as an integrative measure of soil quality because of their surviving in soil<sup>8</sup>. Different groups of arthropods had a different response to the land use changes. Isopteran, Areneae, Coleoptera is one of the most important families of litter decomposition and recycling process, soil formation, nutrient increasing capability from soil, and plant production also dense vegetation high is the most important variable for explaining insect diversity and abundance is in support of the study with orders Lepidoptera and Hymenoptera very good pollinators as well as biological indicator to environment quality based on the arthropod animals abundance in soil region.

## Conclusion

Diversity and abundance of arthropods showed much difference between the natural and the plantation forest due to high productivity. Hence, the overall diversity was more in Natural and mixed plantation area than monoculture cultivation. To conclude we believe in maintaining areas of natural vegetation

can be valuable for biodiversity conservation. From the above result it concluded that human interference can alter species richness as well as its diversity in a constructive manner.

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