Species

ANALYSIS

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Insecta diversity, species richness and evenness of "The walking mango tree"

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ABSTRACT

The present study was undertaken on 'The Walking Mango Tree' to find out the insect diversity, species richness and evenness. In this study we have observed a family 6 families of *Limacodidae sp*. (Slug Moth), *Salticidae sp*. (Jumping Spider), *Procontarinia sp*. (Leaf Gall Midge), *Anastatus sp*. (Wasp), *Chrysopidae sp*. (Lacewing) and India's rarest *Coccinellidae sp*. (Ladybird Beetle- *Affidentula minima*). The insects were photographed for identification. Shannon-Wiener Diversity Index, Simpson's Dominance Index of Diversity, Margalef Index and Menhinick Index was found to be 1.417, 0.306, 8.17 and 5.435. This species richness and its diversity underscore the importance of the site for insect species conservation to preserve the natural balance of the ecosystem.

Key words: Photographed, Conservation, Evenness, Richness & Diversity

1. INTRODUCTION

Insects are the major component of the world's biodiversity. By virtue of their vast numbers of both species and individuals, they are vital determinants of terrestrial ecological processes. Quantitatively, insects are important pointers for species-rich geographical areas. Qualitatively they are also important, whether the subjects of conservation themselves or as tools for identifying biotic areas with high endemism. Insects are the dominant and ancient group of animals on the earth. Insects have immense capacity of adaptation to extreme environments than any other animal groups. They are always equipped with very suitable defensive and attacking devices and are adapted to feed on a variety of resources. The classification of insects is such a vast assemblage that it poses great difficulties for taxa identification and lead to other taxonomic uncertainties (Uniyal V. P. and P. K. Mathur, 1998).

Insects have great potential for understanding ecosystem as measures of ecosystem health, but the incompleteness of knowledge and the limitation of resources increase the difficulty of work on insect biodiversity. The formal treatment of biodiversity and its measures is complex. Despite considerable interest in this subject, the use and application of measurement indices is heterogeneous (Williamson, 1995). Diversity can be defined as the number of different items and their relative frequency. For biological diversity, these items are organized at many levels, ranging from complete ecosystems to the chemical structures that are the molecular basis of heredity. Thus the term encompasses different ecosystems, species, genes and their relative abundance (OTA, 1987).

One characteristic attribute to multi-species populations is diversity, also probably one of the most misused and incorrectly calculated attributes. Perhaps the commonest misconception is that species richness and diversity are synonymous. Although related, they are distinct. Species richness is the total number of species presents in a given area or samples whereas diversity takes into account how individuals are distributed amongst those species, i.e., the species frequency distribution. In fact, it turns out that nearly all quantitative measures of diversity are some combination of two components, species richness and evenness, where evenness describes how equally individuals are distributed amongst the species (Wilson, 1992).

The main objective of this research study was to collect, identify and calculate diversity, species richness and evenness of insect species on '*the walking mango tree'*.

2. MATERIALS AND METHODS

a) Study Site:

The walking mango tree

b) Collection Method:

Insects were collected throughout the year. Each study area was visited once in 6 month. At the sites quadrats of 10m x10m were laid. In Sweep net method each quadrat was covered/swept several times. Every sweep was repeated after a gap of 10 minutes and 10 sweeps were performed each time. Hand collection was also carried in leaf litter, bare ground, tree bases, under stones, field margins and tree trunks.

c) Identification

The insects were identified by using insect manuals. The dead insects were stored in 70% alcohol and the alive insects were taken to entomologist for identification (National Bureau of Agricultural Important Insects, Bengaluru).

d) Data Analysis

The data was transferred onto electronic device format in spreadsheet layout (Microsoft excel 2007). The data was analysed by using

- Margalef Index **(MI) = (S - 1) / lnN**
  (Margalef, 1958)

- Menhinick Index **(Mh) = S/√N**
  (Pielou, 1966, 1969)

- Shannon-Wiener Diversity Index **(H) = n/N*ln (n/N)** (Shannon, 1949)

- Simpson's Dominance Index of Diversity **(D) = (n/N)²** (Simpson, 1949)

Where
S= number of species,
N= total number of individuals encountered,
n= sum total number of species.

3. RESULTS AND DISCUSSION

During the study a sum of 443 insects were collected from the walking mango tree and the data were tabulated in the Microsoft excel spreadsheet. The highest number of insecta species (207) belonged to family Limacodidae (Table 1). Shannon-Wiener Diversity Index, Simpson's Dominance Index of Diversity, Margalef Index and Menhinick Index were calculated using respective formula and found to be 1.417, 0.306, 8.17 and 5.435 respectively (Table 1), which indicates its diversity index, species richness and evenness. Out of the collected species, *Limacodidae* insects were observed the highest and *Salticidae* the least (Graph 1). Graph 2 signifies the distribution pattern of insect families on walking mango tree.

Shannon-Wiener Diversity Index calculates the diversity of the community, which is a measure of the relative abundance of the different species making up the richness of an area. According to the calculations, Shannon index is equal to 1.417. This shows that the insect community is more diverse.

Simpson's Dominance Index of Diversity (D) measures the diversity which takes into accounts both richness and evenness. The value should be between 0 to 1. The greater the value, the greater the species diversity. The walking mango tree has the value of 0.306, which resembles that this tree has greater diversity of insects. Limacodidae species has the value of 0.218, which are the dominant insects on this tree, whereas Salticidae has the value of 0.001, which is least dominant on this tree.

Menhinick Index upon walking mango tree was 5.435, which signifies the difference in diversity between the species. Margalef Index provides the information about the distribution pattern. According to the results obtained, the insect evenness/heterogeneity of the insect was found to be 8.17.

The biodiversity of insect flora on the walking mango tree was largely attributed due to the absence of *Oecophylla longinoda* (red ants). The red ants are predominantly found on normal mango tree's across the country. But their absence on walking mango tree allows other insects get adapted.

The survival of a large number of endemic species in a community or habitat warrants frequent monitoring of the ecological processes besides adoption of appropriate conservation strategies in order to safeguard its rich genetic diversity (Mathew and Rahmatullah, 1993). This work was an attempt to describe the biodiversity on the walking mango tree. Further work is necessary periodically to estimate the faunal diversity on this tree.

Table 1

Insect diversity and diversity indices

Species	n	n/N	ln(n/N)	H= n/N*ln(n/N)	$D= (n/N)^2$	Ml= (S - 1) / lnN	Mh= S/√N
Affidentula minima	27	0.061	2.798	0.171	0.004	1.517	1.155
Anastus sp.	23	0.052	2.958	0.154	0.003	1.595	1.251
Chrysopidae	63	0.014	1.95	0.277	0.02	1.207	0.756
Salticidae sp.	15	0.033	3.386	0.115	0.001	1.846	1.549
Limacodidae sp.	207	0.467	0.761	0.356	0.218	0.938	0.147
Procontarinia sp.	108	0.243	1.411	0.344	0.059	1.067	0.577
	443			**H= 1.417**	**D= 0.306**	**Ml= 8.17**	**Mh= 5.435**

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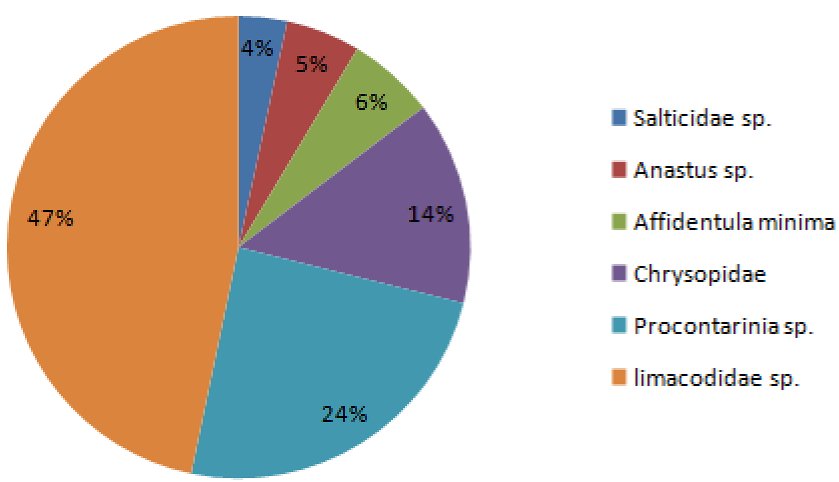
Graph 1: Insect diversity and diversity indices



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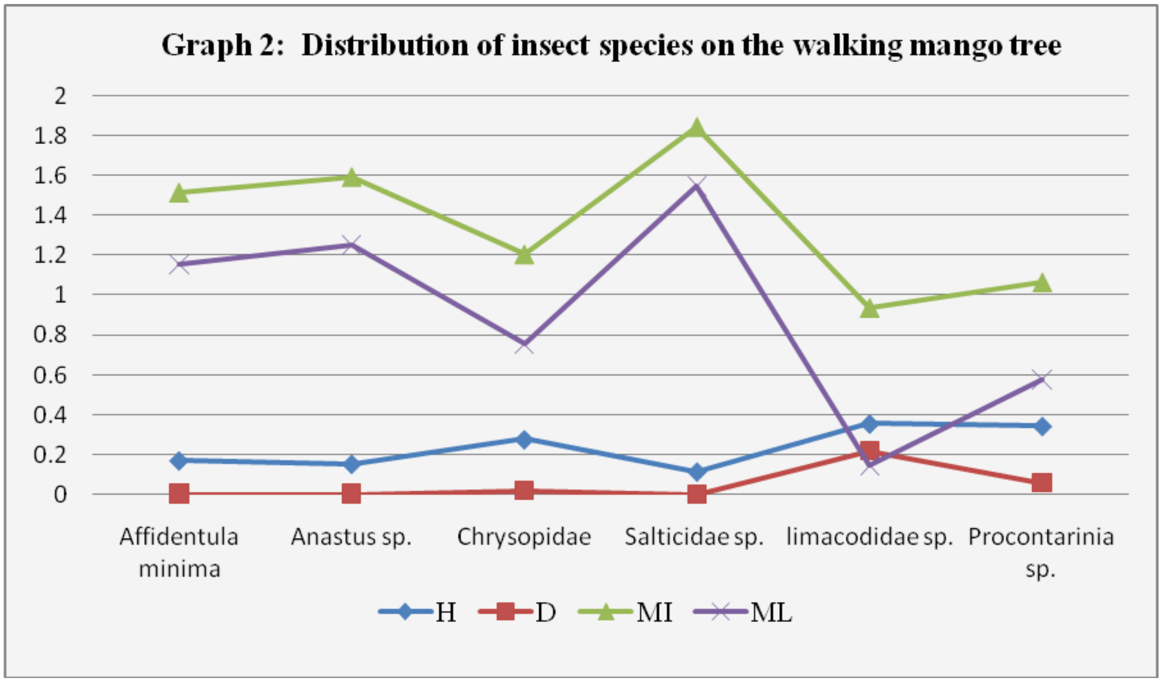

4. CONCLUSION

The absence of *Oecophylla longinoda* has made other insecta species to adapt onto walking mango tree than any other mango tree species. The presence of *Affidentula minima indicates* that this tree has higher concentration of microscopic fungi. This resembles that this tree has the potential biodiversity, which has to be conserved for the further studies and to observe their behavior upon this tree. We suggest that community- wide should approach a similar study for the conservation. For the world biodiversity, broad-brush studies offer the only way to gather biological information faster than the subject itself disappears.

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SUMMARY OF RESEARCH

The data reveals the insect's diversity, specie richness and evenness in a species abundance distribution, and relative measures which express the degree of evenness and richness of the community. Both kinds of measures are useful for the walking mango tree. According to the species richness index, the diversity is also good. However the tree is less protected from human interference in naturally maintained ecosystem. Therefore we can say that there is a natural balance of damage and reproduction. A lot of further work is necessary in this regard and further collections are essential for getting a detailed periodic estimate of the faunal diversity of insects in this tree.

FUTURE ISSUES

The rate at which the bark being collected by the illiterate people will bring down the entire species evenness and richness in the coming days. Hence it's the duty of every citizen to progress much more studies on this tree but not harm it without considering relevant measures and precautions.

DISCLOSURE STATEMENT

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