

A Study on the Diversity and Abundance of Insect at the Campus of Higher
Polytechnic Institute of Manica, Mozambique.

Abstract

A Study on of diversity and abundance of insect was studied at Campus of Higher Polytechnic Institute of Manica. The aim of the study was to assess insect diversity and abundance in eucalyptus plantation. Collection of insects was carried out by pitfall traps a long linear transects during 21 day of October 2019. Data were analyzed using descriptive statistical and Shannon diversity index.

A total of 1805 specimens of insectos belonging to 8 orders, 16 families and 28 species (*Hypopholis sommeri*, *Thermophilum homoplutum*, *Steel beetles*, *Anomalipus elephas*, *Gonocephalum simplex*, *Tenebrio molitor*, *Musca domestica*, *Chrysonmya chloropyga*, *Agelia petelii*, *Dysdercus nigrofasciatus*, *Cenaeus carnifex*, *Messor capensis*, *Myrmecaria natalensis*, *Pachycondyla tarsata*, *Crematogaster peringueyi*, *Hoplocoryphella grandis*, *Galinthias amoena*, *Hoplocorypha macra*, *Teleogryllus wernerinus*, *Acanthogryllus fortipes*, *Cophogryllus maindroni*, *Onosandrus splendens*, *Lamarckiana cucullata*, *Truxalis burtti*, *Gryllus bimaculatus*, *Macrotermes natalensis*, *Aptera fusca*, *Zehntneria mystica*), were collected. Highest relative abundance was observed in Hymenoptera order (91.36%), and the least were Blattodea (2.66%), Diptera (2.11%) e Coleoptera (1.93%), Orthoptera (1.50%), Phasmatodea (0.95%), Mantodea (0.28%) and Hemiptera (0.11%). The abundant specie was *Crematogaster peringueyi* (Hymenoptera) with 88.59% followed by *Macrotermes natalensis*(Blattodea) and *Chrysonmya chloropyga* (Diptera) with 2.44% and 1.61% respectively. Higher insect diversity was observed in Orthoptera order (Shannon, $H' = 1.76$), while the orders Diptera, Hymenoptera, Blattodea, Phasmatodea, Hemiptera, had the lowest diversity (Shannon, $H' < 1$). Further work need to be done in the study area, expanding the duration of the study and applying different sampling techniques.

Key words- Chave: Insects, diversity, Campus of ISPM

INTRODUCTION

It has long been recognized and documented that insects are the most diverse group of organisms, meaning that the numbers of species of insects are more than any other group. In the world, some 900 thousand different kinds of living insects are known. This representation

approximates 80 percent of the world's species. According to Ananthaselvi et al., (2009), in most habitats and ecosystems, the major components of animal diversity are the insects, they are adjudged the most diverse and largest group of organisms (Aslam, 2009). Insects intervene in many biological processes: nutrient recycling, seed dispersal, and pollination, which contribute in an important way to maintaining the diversity and functioning of the majority of terrestrial ecosystems (Erwin 1982; Didham et al. 1996).

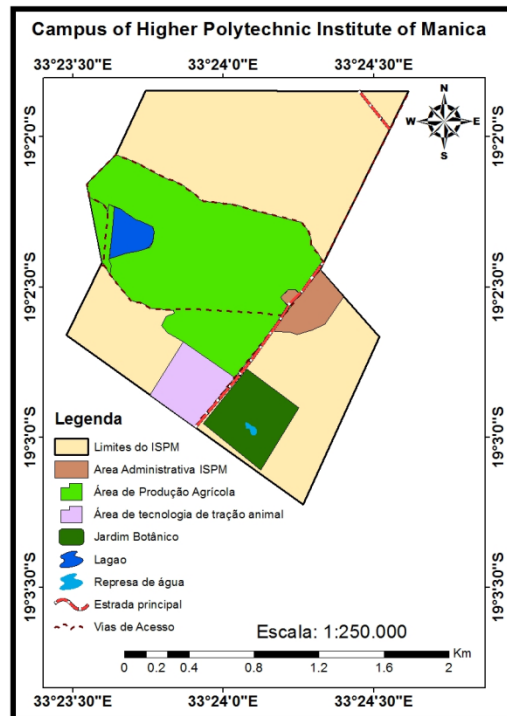
Yet this major group has been largely ignored in diversity and conservation assessments at the regional scale; instead most programs involve preventing wholesale ecosystem destruction, combating pollution, or taking deliberate measures to conserve vertebrates or plants (León-Cortés et al. 2004; New 2008). Insects inhabit all habitat types and play major roles in the function and stability of terrestrial and aquatic ecosystems (Godfray, 2002). Insects are unique in their own way and play an important ecological role for survival of life on earth, their diversity is indeed an intrinsic part of the earth's ecosystem (Samways, 1994).

The species richness of insects of Mozambique is very poorly documented. Some information about the diversity of insects Mozambique comes from Ferreira (1961), Dias (1966), Muatinte (2000) and Garcia Flag (2010) and Chirindza (2014). Ferreira (1961) described 608 species of beetles (Coleoptera: Escarabaeidae) while Dias (1966) described 135 species of flies (Diptera: Tabanidae) in Mozambique. On the other hand, Muatinte (2000) estimated that over 25% of insect species of a group of 1135 species of animals inventoried the Collection of Zoology, Department of Biological Sciences. Garcia and Flag (2010) did a Biodiversity Survey of fruit flies of Mozambique. More than 1,500 insect species were inventoried in Insect Collection of the Museum of Natural History, Maputo, from this (Figure 1) number Chirindza (2014) found about 850 species of beetles. However, there is poor dissemination, sharing and use of results of scientific research done in this area in Mozambique. The absence of information on the diversity of insects in national publications also noted in official documents.

The objective of this study was to assess insect diversity and abundance in eucalyptus plantation at the campus of Higher Polytechnic Institute of Manica.

MATERIALS AND METHODS

Map 1: Study area



The campus of Higher Polytechnic Institute of Manica (19° 3' 0"S; 33° 24' 0"E) is located at Vanduzi district, in Manica province, about 15 km from Chimoio city, has 400 hectares.

The climate is humid; the mountainous registers the annual levels in the order of 1000 and 1020 mm of rain (Köppen, Ferro & Bouman, 1987). In general, the distribution of rainfall is uneven throughout the year, observing the existence of two distinct seasons, a rainy season and drought. The rainy season starts in November and ends in April. Evapotranspiration is an annual measure of 1220 1290, which is higher than the average value of annual abstraction. Annual average of 21.2 ° C (Statistical Yearbook, Province of Manica, 2017).

The Manica region is drained by the Revue river and its tributaries, which in turn drains its waters into the river Buzi which is the main watershed. The soils of Manica district show a close relationship with the geology and climate of the region, and are locally modified by topography and water regime, in general, they are basically deep, well-drained red or reddish red or brown clay soils. In addition to amphibians and reptiles, the fauna comprises small mammals (*Rattus rattus*, *Lepus saxatilis*, *Paraxerus palliatus*, *Heliosciurus mutabilis*), and birds. The vegetation consists mainly of grasses and plants such as (*Pennisetum purpureum*, *Panicum maximum*, *Cynodon dactylon*, *Hyparrhenia rufa*, *Mangifera indica*, *Acacia ataxacantha*, *Lantana camara*, *Acacia nigrescens*, *Eucalyptus camaldulensis*, *Kigelia africana* and *Acacia burkey*).

Data Collection Techniques

Twenty two pitfalls were placed at line transects in study area. Each pitfall trap consisted of 200 ml capacity plastic container were buried so that the top was flush with the ground surface and filled with 4 cm of dishwashing soap and water solution to prevent escape by captured insects.

Identification of insects

The insects collected were taken to the laboratory for identification and preservation in the 70% ethyl alcohol. The identification was based on comparison using insect Field guide.

Data analysis

Identified insect species were grouped into order, family and species. Data were analyzed using descriptive statistical and Shannon diversity index using the following equation:

RESULTS

A total of 1805 specimens of insects belonging to 8 orders, 16 families and 28 species were collected.

In this study the highest relative abundance was observed in Hymenoptera order (91.36%), and the least were Blattodea (2.66%), Diptera (2.11%) and Coleoptera (1.93%), Orthoptera (1.50%), Phasmatodea (0.95%), Mantodea (0.28%) and Hemiptera (0.11%).

Was noted that the abundant species was *Crematogaster peringueyi* (Hymenoptera) with 88.59% followed by *Macrotermes natalensis* (Blattodea) and *Chrysonmya chloropyga* (Diptera) with 2.44% and 1.61% respectively. Higher insect diversity was observed in Orthoptera order (Shannon, $H' = 1.76$), while the orders Diptera, Hymenoptera, Blattodea, Phasmatodea, Hemiptera, had the lowest diversity (Shannon, $H' < 1$).

Table 1. Diversity and abundance of insects in the study area

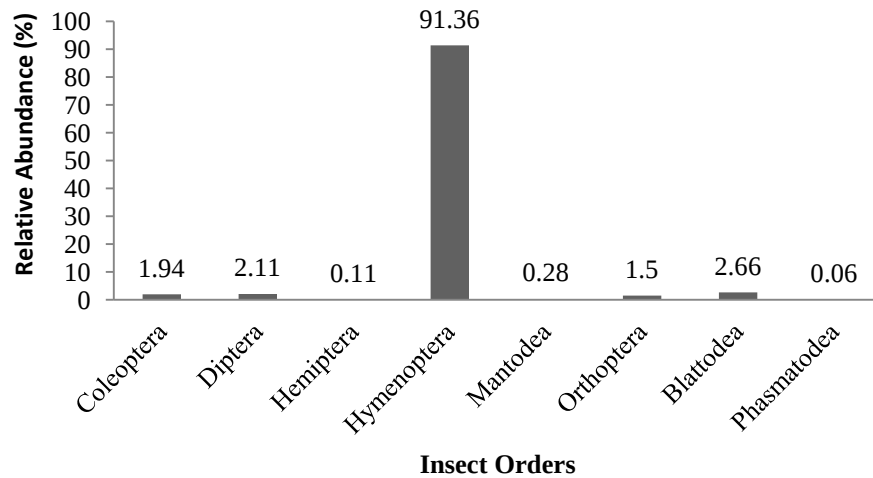
Order	Family	Genus/Specie	Abundance	Relative abundance (%)
Coleoptera	Scarabaeidae	<i>Hypopholis sommeri</i>	1	0.06
		<i>Thermpohilum homoplatum</i>	1	0.06
		<i>Steel beetles</i>	25	1.39
	Histeridae	<i>Anomalipus elephas</i>	2	0.11
		<i>Gonocephalum simplex</i>	4	0.22
	Tenebrionidae	<i>Agelia petelli</i>	1	0.06
		<i>Tenebrio Molitor</i>	1	0.06
		<i>Musca domestica</i>	9	0.50
	Muscidae	<i>Chrysonmya chloropyga</i>	29	1.61
		<i>Dysdercus</i>		0.06
Diptera	Calliphoridae	<i>nigrofasciatus</i>	1	
		<i>Cenaeus carnifex</i>	1	0.06
Hemiptera	Pyrrhocoridae	<i>Messor capensis</i>	20	1.11
		<i>Myrmicaria natalensis</i>	15	0.83
		<i>Pachycondyla tarsata</i>	15	0.83
Hymenoptera	Formicidae	<i>Crematogaster peringueyi</i>	1599	88.59
		<i>Hoplocoryphphella grandis</i>	3	0.17
		<i>Galinthias amoena</i>	1	0.06
		<i>Hoplocorypha macra</i>	1	0.06
		<i>Teleogryllus Wernerinus</i>	3	0.17
Orthoptera	Gryllidae	<i>Gryllus bimaculatus</i>	9	0.22
		<i>Acanthogryllus fortipes</i>	4	0.28
		<i>Cophogryllus maindrani</i>	5	0.11
	Anostostomatidae	<i>Onosandrus splendens</i>	2	0.06
		<i>Lamarckiana cucullata</i>	1	0.17
	Pamphagidae	<i>Truxalis burtti</i>	3	0.50
		<i>Macrotermes natalensis</i>	44	2.44
	Acridae	<i>Aptera fusca</i>	4	0.22
		<i>Zehntneria mystica</i>	1	0.06
	Blattodea			
Phasmatodea	Heteronemiidae			
8	16	28	1805	

Table 2. Diversity indices and abundance between orders

Nr	Order	Species	Abundance (%)	Shannon (H')
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1	Coleoptera	7	35 (1.94)	1.05
2	Diptera	2	38 (2.11)	0.54
3	Hemiptera	2	2 (0.11)	0.69
4	Hymenoptera	4	1649 (91.36)	0.16
5	Mantodea	3	5 (0.28)	0.00
6	Orthoptera	7	27 (1.50)	1.76
7	Blattodea	2	48 (2.66)	0.29
8	Phasmatodea	1	1 (0.06)	0.00
Total		28	1805 (100)	

Figure 1. Relative Abundance of insect orders



DISCUSSION

A total of 8 orders, 16 families and 28 species were collected in the study area. The result of this study showed that the highest insect diversity was observed in Orthoptera ($H' = 1.76$), similar results were found at the study of Ajayi *et al.*, 2018, the diversity indices of the orthoptera order had the highest Shannon diversity index ($H' = 2.438$). The results showed that the higher abundant order was observed in Hymenoptera. This finding is in contrast with Yager *et al.*; 2017,

that of who reported Lepidoptera as the dominant insect Order in Gulbarga District, Karnataka, India.

CONCLUSIONS

The study has shown that the campus of ISPM is more diverse in insects biodiversity. The study provides baseline information on the diversity of insects at the ISPM campus. So, further studies should be done in different annual seasons and using different sampling techniques.

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