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Seasonal Influence on Entomological Diversity in Two Forest Types (Intact and Disturbed) at Bagbasende Village, Tshopo, DR, Congo.

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ABSTRACT

The forest ecosystem of BAGBASENDE village in TSHOPO province, DRC was a target to bring a comparative study of insects between the two seasons in two forest types (intact and disturbed), with four traps that we used to capture insects In the case of the light traps, fermented bait aerial traps, pot barbers and invertebrate traps, the species richness in the wet season was higher than in the dry season; the Shannon index gave a high value in the wet season and the Wilcoxon statistical test gave a significant difference between the two seasons.

Introduction

In tropical regions, rainfall abundance seems to be regular regardless of the season. Understanding the distribution of rainfall also allows us to understand the diversity of insect activities in the ecosystem. In tropical regions, it is well known that rainfall is present throughout the year, and insects are also abundant throughout the year, but there are certain months when rainfall decreases (Degallier et al., 2004). However, perhaps because of the high entomological richness of the tropical forest, ecological studies on seasonality are negligible and rare (Gombauld et al., 2004). With the multiple services that insects provide to humanity, their loss or decline seems to be very costly and dangerous in the forest than in the agricultural sector (Chevassus et al., 2009).

Yet, Many insects facilitate the pollination of crops, put a perfect balance to the ecosystem with the predation mechanism, promote the process of leaf decomposition on the soil surface and put permeability at the soil level (Candau, 2008; Lamarre, 2013; Adroit, 2018; Rader et al., 2016; Baldock, 2020). On the other hand, the negative points of the insects are also very dangerous on the ecosystem, as some beetles are very harmful to the trunks of trees, yet others attack the tender parts of the leaves that can stunt both the growth of plants (Thiery, 2008; Nicolas et al.; 2013; Traore and Dicko, 2021). It is with this in mind that this article aims to make an entomological inventory more specifically to see the entomological trend between two seasons (rainy and dry) between two forest types, (intact forest and disturbed forest) in the village BAGBASENDE, TSHOPO province, DR. CONGO.

Materials and Methods

Study site

The present research was carried out in the village BAGBASENDE from February to May 2022, in two types of habitats : 1 hectare in intact forest and 1 hectare in disturbed forest. This site is located in the large block of the Congo Basin and more precisely in the Democratic Republic of Congo, 11 kilometers from the MASAKO Forest Reserve, 25 kilometers from the city of Kisangani. This village has the following geographical coordinates: N 00°40'08,6"; E 025°19'13,5

Methods

The first step was to delimit two plots in these forests, 1 hectare in intact forest and 1 hectare in disturbed forest. After the delimitation of these two plots, a total of 4 traps were installed in a random manner. The following traps were installed: 5 light traps, 5 air traps with fermented bait, 5 pot barbers and 5 invertebrate boards, in total 40 traps for two types of forest (intact forest and disturbed forest) per month, 4 days to capture fauna, so we chose 2 dry months (February and March) and 2 rainy months (April and May) After this stage of data collection in the field, the jars of insects were transported to the lab, mixed with 70° alcohol to keep the initial position of the insects, to prepare the sorting phase, based on the document DELVARE and ABERLENC (1989) which helped us to identify the insects. The specific richness

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allowed to see the trend of each month, the Shannon and Morisita-Horn indices allowed to make the comparison of two seasons, the Kruskal-Wallis test was used in the absence of adjustment of the data to the normal law. These analyses were carried out with the R software version R 4.1.3 and Past software.

Results

As a result of this research we have captured a total of 11 orders belonging to 65 families and 9485 individuals.

I.1 Distribution of the Abundance of Insects Captured by Month

This distribution of insect abundance in months is represented in this figure 1

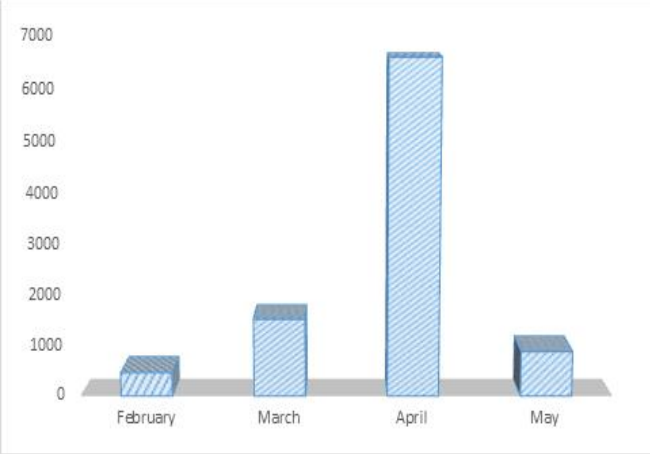

Figure 1. Insect Abundance by Month

These results show that during the whole phase of data collection, the month of April has a high abundance of insects and is in 1st position followed by the month of March which is in 2nd position, in 3rd position the month of May and at the end the month of February which is in 4th position ; This high abundance in April can be explained in the sense that this month according to the seasonal distribution is the month of high rainfall, the abundance of insects in March is explained in the sense that the capture was made towards the end of this month or according to the distribution from 15 March is considered just the resumption of rain, This decrease in abundance in February is explained by the fact that this month is just in the middle of the dry season.

I.2 Specific Richness of the Different Months, Shannon Index between the Different Months

Table 1. The species richness of the months and the Shannon index is represented in table 1

February	March	April	May
S = 28	24	40	29
H' = 2.5813525	1.6986672	0.8034763	2.1047539

The 4 months present the specific richness as follows: April 40, May 29, February 28 and March 24; the Shannon index: February 2.5813525, May 2.1047539, March 1.6986672, April 0.8034763, this high value in specific richness in the month of April is that the high rainfall among these 4 months was concentrated in this month

I.3 Abundance of Insect Catches between Two Seasons

The abundance of insects between the two seasons is shown in Figure 2

The results show that the rainy season has a higher value than the dry season. This peak in the rainy season can be explained in the sense that during the rainy season the plants produce flowers and by producing flowers the emergence of insects is ensured and during this rainy season the soil insects move easily because of the permeability of the soil.

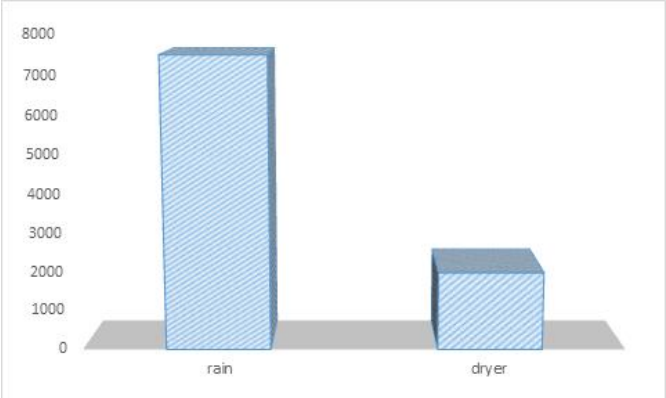

Figure 2 . Abondance des insectes entre deux saisons

I.4 Species Richness, Shannon and Morisita-Horn Diversity Indices between Two Seasons

The species richness and some indices of the two seasons are represented in Table 2

Table 2 : Species richness, H' and M

Specific diversity and indices	Rain	Dryer
S	55	36
H’	1,188	2,07
M	0,14714	

Observing the specific richness, the results show that during the rainy season, the specific richness is 55 and dry season 36, the index of H', in dry season 2.07 and in rainy season 1.188. The two forest types have a Morisita index of 0.14714, this p-value is less than 0.5 so the index tends towards 0, the two seasons are floristically different. The Wilcoxon statistical test W = 4296, p-value = 0.01674, the test shows that between the dry and rainy seasons the difference is significant

Discussion

The present study sampled 7478 insects in the wet season and 2007 insects in the dry season, but the H' index gave a higher value in the dry season than the wet season and the Morisita index showed a significant difference between the two seasons (see Table 2) towards the end the Wilcoxon statistical test confirms that the difference is significant between the two seasons. Our results are somewhat similar to (Andresen, 2002) of which he observed more species on average per trap in the wet season but found no significant difference in abundance during a two-year follow-up between dry and wet seasons in addition (Ratcliffe, 2013), in an annual setup in central Amazonia, observes fluctuations in abundance but not clearly related to climate pattern. (Boilly, 2015), shows that the peak of Deltochilum abundance, is rather centered in the middle of the rainy season.

However, for this group as for the Phanaeini, we observe a strong decrease in the dry season and a first peak at the beginning of the rainy season. These results corroborate our results, of course they targeted a species, because we noted at the end of the dry season an abundance that in the middle of the dry season and at the beginning of the rainy season a strong increase. According to the point of view of these (2011) made a study with two traps, but towards the end they emphasize a strong decrease of baited trap in dry season. (Cambefort, 1982; Janzen, 1983; Andresen, 2005) them say that the variations of specific richness and abundance of the insects in tropical regions are more marked in the regions where the dry season is long and pronounced; Little or no insects are present outside of rainy periods. Leading authors (Levings and Windsor, 1985; Smythe, 1985; Moron et al., 1985; Fowler et al., 1993; Degallier et al., 2004) point out that in the tropics, insects are always present regardless of the

period, but the dry season exceeds in abundance, Comparing with our results, we found a high abundance in the rainy season but according to the H' index is opposite but the statistical test also showed a difference between the two seasons. Andresen (1999) in Peru there is a constant peak at the beginning of the rainy season; the same situation in Brazil, the peak is located before the maximum rainfall (Andresen, 2002). These two researchers made the same constant in Côte d'Ivoire (Cambefort and Walter, 1991).

Conclusion:

At the end of this research, we made an inventory of the insects in the forest of village BAGBASENDE while comparing the influence of the seasons on the diversity of the insects under the two forest types (intact and disturbed). the specific richness is in favor of the rainy season, the H' index is in favor of the dry season. These types of extended studies should facilitate a knowledge as a guide to follow to the practitioners of the forestry sector to well maintain the balances within the forest ecosystem.

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