

Richness and diversity of species forestry of Atlantic forest fragments in the state of Pernambuco**Riqueza e diversidade de espécies florestais de fragmentos florestais do Atlântico no estado de Pernambuco**

DOI:10.34117/bjdv5n11-012

Recebimento dos originais: 07/10/2019

Aceitação para publicação: 01/11/2019

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ABSTRACT

The Atlantic Forest is considered one of the main hotspots of biodiversity, although it presents a large part of its fragmented vegetation. In order to carry out a comparative survey concerning the richness

and diversity of species of Atlantic forest fragments in Pernambuco, the Alpha and beta diversities of six areas were calculated from secondary data. For this purpose, the absolute and relative densities of each species were used in each area. The species *Eschweilera ovata* showed the highest density when compared to the areas, besides being one of the eight species found in the six fragments. The fragments with the greatest are conservation units of integral protection. The fragment with the highest density, 1793 Ind. Ha, was not the most richness, indicating that the density was not the determinant factor for the richness and diversity of species in the areas.

Key words: Absolute density, beta diversity of Whittaker, Shannon Index, Simpson Index.

RESUMO

A Mata Atlântica é considerada um dos principais pontos críticos da biodiversidade, embora apresente grande parte de sua vegetação fragmentada. Para realizar um estudo comparativo da riqueza e diversidade de espécies de fragmentos de Mata Atlântica em Pernambuco, as diversidades alfa e beta de seis áreas foram calculadas a partir de dados secundários. Para tanto, foram utilizadas as densidades absoluta e relativa de cada espécie em cada área. A espécie *Eschweilera ovata* apresentou a maior densidade quando comparada às áreas, além de ser uma das oito espécies encontradas nos seis fragmentos. Os fragmentos com maior número são unidades de conservação de proteção integral. O fragmento com maior densidade, 1793 Ind. Ha, não era o mais rico, indicando que a densidade não era o fator determinante para a riqueza e diversidade de espécies nas áreas.

Palavras-chave: Densidade absoluta, diversidade beta de Whittaker, Índice de Shannon, Índice de Simpson.

1 INTRODUCTION

Considered the second largest forest in Brazil in size, the Atlantic Forest is behind only the Amazon Forest. It is a biome that has been extremely devastated since colonization, leaving only a part of native forest that is scattered throughout most of the Brazilian states, namely: Rio Grande do Sul, Santa Catarina, Paraná, São Paulo, Goiás, Mato Grosso do Sul, Rio de Janeiro, Minas Gerais, Espírito Santo, Bahia, Alagoas, Sergipe, Paraíba, Pernambuco, Rio Grande do Norte, Ceará and Piauí.

The Atlantic Forest biome that once occupied about 13% to 15% of the national territory, covering an area of 1,315,460 km², today occupies only 8.5% classifying an endangered vegetation. This was due to agricultural and agricultural activities and industrial exploitation by men over the years, which made the urban area grow even more, destroying part of this biome.

Because it is a biome that is spread in various parts of Brazil, the Atlantic Forest has several types of climate, predominantly humid tropical. It is also composed in parts by the humid subtropical climate and the semiarid. Overall, this biome is characterized by high year-round temperatures and high humidity levels.

The Atlantic Forest vegetation is related to the climatic diversity of each region, which are influenced by factors such as oxygen content, lighting, humidity and even temperature. This vegetation is characterized by taller trees with their crowns closest to each other, forming a canopy

that controls the amount of light that will reach the trees and lower vegetation. Small shrubs are common, as well as grass and weeds, mosses and buds, as well as vines that thrive on tree trunks.

As a low-light biome, as mentioned above, the Atlantic Forest soils can remain moist for a long time, but they are mostly poor. This is because they have high levels of acidity, little oxygen and little depth, characterizing low fertility soils. However, there is decomposition of the leaves of the tallest trees, which generate large accumulation of organic matter in the soil, supplying nutrients to plants and animals that need decomposition to survive.

In general, two most widely used types of diversity can be distinguished: alpha (α) and beta (β). The alpha diversity corresponds to the number and abundance of species within a community. The beta diversity is related to the differences in species composition and its abundances between areas within a community (MAGURRAN, 1988; RIBEIRO et al., 2009; MYERS et al., 2000).

In this context, this study aimed to carry out a comparative survey, related to the richness and diversity of intra and inter-habitats species, of some fragments of Atlantic forest, located in the state of Pernambuco.

2 MATERIAL AND METHODS

The study was carried out based on six studies carried out in fragments of dense ombrophilous forest in the state of Pernambuco (Table 1).

In view of the range of methods, the criterion for choosing the work was in accordance with the area of the plots of 250 m² (10 x 25 m) sampled, all implanted in a systematic way. The data used for analysis were: absolute density (DA) (Ind. Ha⁻¹) and relative abundance of each species (p_i) (NI/N), for the calculations of Shannon Diversity index (H') and Simpson's Diversity Index (I) (MAGURRAN, 1988). In addition to these, the equability of Pielou (J) was calculated, adjusted to the Shannon index (EH) and Simpson (EI), for each area, and the β diversity index of Whittaker for the whole species of all areas.

Table 1. Location and characteristics of the sampled areas in fragments of dense ombrophilous forest in the state of Pernambuco.

	Atlantic Forest Fragment	Author (s)	Level of inclusion (CAP)	Number of parcels	Total area (ha)	Sampling area (ha)
Article 1	Igarassu (Usina São José)	Brandão et al. (2009)	10	40	48.84	1.00
Article 2	Cabo de Santo Agostinho (Refúgio de Vida Silvestre Gurjaú)	Silva Júnior et al. (2008)	15	40	1077.10	1.00
Article 3	Catende (Mata das Galinhas)	Guimarães et al. (2009)	10	14	30.95	0.35
Article 4	Moreno (Fazenda Haras Casa Branca)	Batista et al. (2012)	15	10	9.00	0.25
Article 5	Catende (Mata das Galinhas)	Costa Junior et al. (2008)	15	40	38.56	1.00
Article 6	Tamandaré e Rio Formoso (Reserva Biológica de Saltinho)	Teixeira (2009)	15	42	475.00	1.05

Due to identification difficulties, some species were identified only at the gender level and others were not identified. However, for the calculation of the β diversity, these species were not considered. All analyses were performed and all data from the six papers were reviewed using the Microsoft Excel 2010 program.

3 RESULTS AND DISCUSSION

The species *Eschweilera ovata* (Cambess.) Miers (Lecythidaceae), *Schefflera Morototoni* (Aubl.) (Araliaceae), *Simarouba Amara* Aubl. (Simaroubaceae), *Vismia guianensis* (Aubl.) Pers. (Hypericaceae), *Miconia Prasina* (Sw.) DC. (Melastomataceae), *Tapirira guianensis* Aubl. (Anacardiaceae), *Cupania racemosa* (Vell.) Radlk. (Sapindaceae) and *Protium Heptaphyllum* (Aubl.) Marchand (Burseraceae) were found in the six studied areas. Among these, we highlight the *E. ovata*, which showed higher density when compared all areas, being considered a species of high potential for forest conservation and restoration (GUSSON; SEBBENN KAGEYAMA, 2005).

Work 1 showed the highest absolute density. However, this was not the determinant factor for species richness, which was higher article 6 and 2, respectively. The areas that presented the lowest species richness were 3 and 4 (Table 2).

Table 2. Shannon index (H'), Simpson Index (I), minimum species quantity (Smin) and Maximum (Smax) and Shannon equability (EH) and Simpson (EI).

	Absolute density (Ind. ha)	N ° of species	Unique species	H' (nats.ind)	I	Smin	Smax	EH
Article 1	1793	99	35	3,6854	20,8222	1	99	0,8020 0,21033
Article 2	1172	108	37	3,9157	34,4170	1	108	0,8363 0,31868
Article 3	1251,44	63	4	3,4144	17,4917	1	63	0,8241 0,27765
Article 4	984	43	3	3,2509	17,2410	1	43	0,8643 0,40095
Article 5	1042	89	12	3,8126	27,8301	1	89	0,8494 0,31270
Article 6	1413,18	111	27	3,7171	26,0999	1	111	0,7893 0,23513

*The data were obtained based on the total number of species per area, including the species identified only at the gender level and the unidentified species, except for the data of the unique species.

The highest values of Shannon and Simpson indices were found for work 2, which is an integral protection conservation unit. This reinforces the choice of the area as a priority for conservation actions, since it possesses high biodiversity (SILVA JÚNIOR et al., 2008).

These variations found in the values of diversity indices may have occurred due to the different methodologies used in the studies, besides the different levels of inclusion (MARANGON; SOARES FELICIANO, 2003), not to mention the sample area that was inferior in the two studies (Article 3 and 4) that presented smaller numbers of species and unique species and lower diversity values. The values found for equability have not diverged considerably from one area to another. Moreover, when adjusted to the Shannon index, they were close to 1. This means that there is a local uniformity in all areas studied.

The β diversity found in this study was 1.70, which means that they do not present large differences from one area to another. It is worth remembering that the maximum β diversity that could have in this study would be 6, because it corresponds to the number of areas or habitats studied.

4 CONCLUSION

The studied fragments showed high richness and diversity of species. However, the data show that density was not a determinant factor for species richness and that greater richness was found in integral protection conservation units, which reinforces the value of protected areas for the conservation of diversity Biological.

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