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Original Article

Conservation of Nature

Structure and Diversity In Ombrophilous Forest in the Zona da Mata of Pernambuco

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ABSTRACT

The objective of this work was to evaluate the arboreal component of a Dense Ombrophilous Lowland Forest fragment through evaluations of richness, structure and diversity. For the sampling of this component, we implanted 40 sample units of 10 × 25 m. We measured all arboreal individuals who presented circumference at breast height ≥ 15 cm, 1.30 m from the ground level. The tree stratum presented 1324 individuals, 100 species, 64 genera and 38 families. The Fabaceae family had the highest wealth and Anacardiaceae was the most abundant. The Shannon index and Pielou equability were 3.60 nats.ind.$^{-1}$ and 0.78, respectively, suggesting the existence of relevant ecological dominance in the community. The results of this work emphasize the ecological importance of this remnant for maintaining the local flora and fauna, also emphasizing the importance of preserving Atlantic Ombrophilous Forests, particularly in the Zona da Mata of Pernambuco.

Keywords: phytosociology, atlantic forest, floristic.

1. INTRODUCTION

Forests constantly change their structure, physiognomy and floristic composition until climax (Téo et al., 2014). A way to detect the current state of these forests is through floristic and vegetation structure analysis, which provides a necessary ecological basis for quantitative and qualitative inferences of the forest structure (Silva & Bentes-Gama, 2008). Studies of this nature provide us with important data for restoration, conservation and management of natural resources, contributing to the maintenance of the high diversity of species and habitats (Silva et al., 2011).

The situation of tropical forests is disturbing due to several factors that promote fragmentation, loss of habitat and biodiversity (Laurance et al., 2017), such as: logging, agricultural area expansion, extensive livestock production, and especially the increase in the population (Roa-Romero et al., 2009; Vega et al., 2016). As the population increases, the consumption standard rises, which increases the demand for natural resources, promoting the degradation of ecosystems with serious consequences for the present society and future generations (Philippi et al., 2012).

Such degradations cause important ecosystems to be decharacterized even before their original floristic composition is known (Silva et al., 2008). According to Cordeiro et al. (2011), floristic composition knowledge is the first step towards understanding the real dimensioning of local biodiversity.

In addition to assisting in ecosystem management and conservation, the information generated in floristic-structural studies also helps in planning management practices aimed at recovery of degraded areas (Hernández-Ramírez & García-Méndez, 2015). In this aspect, the objective of the present study was to characterize the floristic composition and the structure of an Atlantic Forest fragment in order to obtain basic information that will result in support tools for management and conservation of the Atlantic Forest, especially in the Zona da Mata of Pernambuco.

2. MATERIAL AND METHODS

2.1. Study area

The study was conducted in an Ombrophilous Lowland Forest fragment (Martins & Cavararo, 2012). This fragment has 42 ha called Coelhas and belongs to the Usina Trapiche S/A, municipality of Sirinhaém, located in the southern region of Pernambuco state (Figure 1).

Forests in this region are currently circumvented by extensive sugar cane plantations or even by urban areas, clearly reducing the extent of areas with large forests. The fragment studied is in this situation and has already suffered deforestation, being surrounded by the sugar cane matrix, but currently it is well preserved.

According to the Köppen classification, the region presents an Am monsoon climate (Alvares et al., 2013) with annual average temperature of 25.6 °C. The average altitude is 60 m and the period of greatest rainfall begins in April and ends in September. The average annual rainfall of the region from March/2011 to April/2016 was approximately 1,860 mm (Oliveira et al., 2016). The predominant soils in the study area are: Yellow Latosol; Yellow, Red-Yellow and Greyish Argisols; Gleysol; Cambisol; and Flossic Neosols (Silva et al., 2001; Santos et al., 2013).

2.2. Data collection

For the tree component sampling we systematically implanted 40 sample units of 10 × 25 m (250 m^2), the equivalent of 1 ha of sampled area and distance between 42 m plots. We georeferenced all sample units and sampled all tree individuals that presented circumference at breast height (CBH) ≥ 15 cm, at 1.30 m above ground level. We measured this using a tape measure, and estimated height with high pruning shears of six meters in length. All the sampled individuals received PVC plates (3 × 5 cm) with increasing numeration, which were nailed 15 cm above the measurement point.

We identified the species whenever possible in the field. When necessary, we collected plant material to help the identification by professionals from the Dárdano de Andrade Lima Herbarium of the Agronomic Institute of Pernambuco (IPA). We used the Angiosperm Phylogeny Group classification system to classify the families (APG IV, 2016). Spelling and the names of the species were checked through the Missouri Botanical Garden website (Tropicos.org, 2017).

2.3. Data analysis

2.3.1. Sample sufficiency

We evaluated the floristic sufficiency from the rarefaction curve using EstimateS 9.1.0 Software (Colwell, 2013). Sampling sufficiency was determined

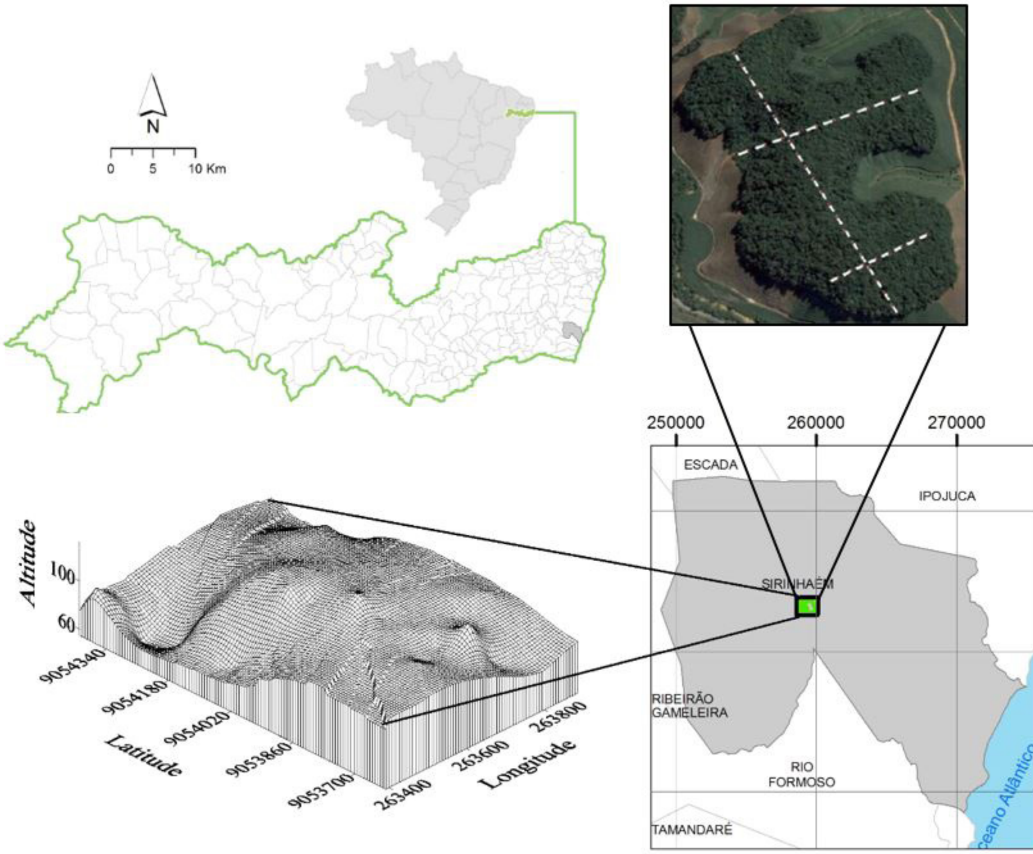

Figure 1. Geographic location of the Coelha Forest, Usina Trapiche S/A, Sirinhaém, Pernambuco, Brazil. (Source: Walter Lucena).

by considering the random sampling estimators based on three parameters: number of individuals, mean diameters and mean height, where we performed the calculations of sample errors (Ea%) at a 95% probability level, assuming a sample error of at most 15%.

2.3.2. Floristic composition and successional classification

After surveying and identifying the species, we compiled a list containing the species, genera, number of individuals and families of all individuals found in the tree component according to the APG IV classification system. We adopted the criterion suggested by Gandolfi et al. (1995) for species classification by successional group, in which the species were classified as pioneers, early secondary, late secondary or uncharacterized. We performed the classification through field observations and bibliographic research (Gandolfi et al., 1995; Brandão et al., 2009; Oliveira et al., 2011; Silva et al., 2010).

2.3.3. Phytosociological structure and diversity and equability indexes

We evaluated the following phytosociological parameters: Absolute Density (AD), Relative Density (RD), Absolute Frequency (AF), Relative Frequency (RF), Absolute Dominance (ADo), Relative Dominance (RDo), Coverage Value (CV), Importance Value (IV). These parameters were calculated using the Fitopac 2 software tool. We also calculated the Shannon diversity indexes (H’) and the Pielou equability index (J) (Pielou, 1975), as proposed by Magurran (1988).

2.3.4. Diametric and hypsometric distribution

For the analysis of the diametric distribution, we plotted the number of individuals per diametric class center, where the number of class centers and their amplitude were calculated based on Sturges (1926), through Equations 1 and 2:

$$NC = 1 + \left(3.322 * Log\ \left(N_{ind.}\right)\right) \quad (1)$$

$$TA = X - x / NC \quad (2)$$

Where: NC = number of classes; $N_{ind.}$ = number of individuals; TA = total amplitude; X = largest diameter and x = smallest diameter.

For analysing the hypsometric structure, we generated a graph with the number of individuals per height class center, with an amplitude of 5 m and the first class beginning at 2.5 m.

3. RESULTS AND DISCUSSION

3.1. Sample sufficiency

The floristic sufficiency was considered satisfactory as given by the asymptote and stability in the confidence intervals of the rarefaction curve calculated for species richness (Figure 2).

The calculated sample errors were lower than the established error (15%). For the number of individuals, diameter means and height means, the sample error values were: Ea 6.79%, 4.59% and 3.76%, respectively. These results indicate that the sampling was sufficient to represent the plant community of the area.

3.2. Floristic composition and successional classification

Tree sampling recorded 1,324 individuals, belonging to 100 species, 64 genera and 38 families. Among these species, 81 were identified at the species level, 13 at the gender level, five at the family level and one was not identified (Table 1).

The families with the highest representativity of individuals were: Anacardiaceae (314 individuals), Burseraceae (141), Moraceae (133), Melastomataceae (100), Fabaceae (82), Lecythidaceae (71), Myrtaceae (68), Euphorbiaceae Lauraceae (39) and Salicaceae (38), added together totalled 1,044 individuals. These ten families represented 78.85% of the individuals sampled. The other families (28) accounted for 21.15% of the total, evidencing the low relative abundance of individuals in these families. The Anacardiaceae family, which obtained the largest number of individuals in this study, was also the most outstanding in a study by Costa et al. (2008) for the same typology. This higher representation may be related to the fact that this family has approximately 81 genera and 800 species, with occurrence in dry to humid environments, mainly in lowlands in tropical and subtropical regions around the world (Pell et al., 2011). Fruit from the *Thyrsodium spruceanum* species (Anacardiaceae) are drupe and are very appreciated by the fauna, suggesting

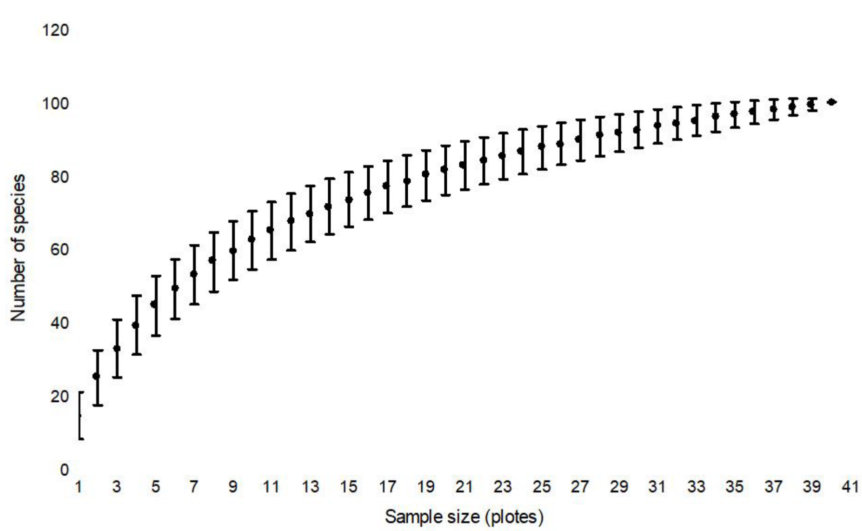

Figure 2. Species accumulation curve in the Coelha Forest, Usina Trapiche S/A, Sirinhaém, Pernambuco, Brazil (rarefaction method). Vertical bars represent the confidence interval (95%).

Table 1. Floristic composition of tree species (CBH ≥ 15 cm) registered in the Coelha Forest, Usina Trapiche S/A, Sirinhaém, Pernambuco. In alphabetical order of family, gender and species, where: N_i = Number of individuals and EG = Ecological group; P = Pioneer; IS = Initial secondary; LS = Late secondary; Nc = Not classified.

Family	Specie	N_i	EG
Anacardiaceae	*Tapirira guianensis* Aubl.	68	IS
	Thyrsodium spruceanum Benth.	246	IS
Annonaceae	*Guatteria pogonopus* Mart.	17	Nc
	Xylopia frutescens Aubl.	3	IS
Apocynaceae	*Himatanthus phagedaenicus* (Mart.) Woodson	26	IS
Araliaceae	*Schefflera morototoni* (Aubl.) Maguire, Steyerm. & Frodin	33	IS
Boraginaceae	*Cordia sellowiana* Cham.	7	IS
Burseraceae	*Protium giganteum* Engl.	7	LS
	Protium heptaphyllum (Aubl.) Marchand	134	IS
Celastraceae	*Maytenus distichophylla* Mart. ex Reissek	3	LS
Clusiaceae	*Rheedia gardneriana* Planch. & Triana	1	LS
	Symphonia globulifera L. f.	12	P
	Tovomita mangle G. Mariz	3	IS
Combretaceae	*Buchenavia tetraphylla* (Aubl.) R.A. Howard	1	LS
Elaeocarpaceae	*Sloanea garckeana* K. Schum.	1	LS
	Sloanea guianensis (Aubl.) Benth.	1	LS
Erythroxylaceae	*Erythroxylum citrifolium* A. St.-Hil.	2	LS
	Erythroxylum mucronatum Benth.	14	LS
	Erythroxylum squamatum Sw.	1	LS
Euphorbiaceae	*Maprounea guianensis* Aubl.	29	IS
Fabaceae	*Abarema* sp.	3	Nc
	Albizia pedicellaris (DC.) L. Rico	6	P
	Andira ormosioides Benth.	2	IS
	Bowdichia virgilioides Kunth	12	LS
	Chamaecrista sp.	14	Sc
	Dialium guianense (Aubl.) Sandwith	3	LS
	Fabaceae 1	2	Nc
	Fabaceae 2	4	Nc
	Fabaceae 3	1	Nc
	Fabaceae 4	5	Nc
	Inga cayennensis Sagot ex Benth.	3	IS
	Inga sp.1	2	Nc
Fabaceae	*Inga* sp.2	1	Nc
	Inga thibaudiana DC.	6	IS
	Machaerium hirtum (Vell.) Stellfeld	1	IS
	Parkia pendula (Willd.) Benth. ex Walp.	8	LS
	Plathymenia foliolosa Benth.	3	IS
	Sclerolobium densiflorum Benth.	3	P
	Swartzia pickelii Killip ex Ducke	3	IS
Hypericaceae	*Vismia guianensis* (Aubl.) Choisy	1	P
Lacistemataceae	*Lacistema robustum* Schnizl.	5	IS
Lauraceae	*Nectandra cuspidata* Nees & Mart.	10	LS
	Ocotea gardneri (Meisn.) Mez	1	IS
	Ocotea glomerata (Nees) Mez	10	IS
	Ocotea sp.1	13	Nc
	Ocotea sp.2	3	Nc
	Ocotea sp.3	2	Nc

Table 1. Continued...

Family	Specie	N_i	EG
Lecythidaceae	*Eschweilera ovata* (Cambess.) Miers	52	IS
	Gustavia augusta L.	3	IS
	Lecythis pisonis Cambess.	1	IS
	Lecythis lurida (Miers) S.A. Mori	15	Nc
Malvaceae	*Eriotheca macrophylla* (K. Schum.) A. Robyns	6	IS
Melastomataceae	*Henriettea succosa* (Aubl.) DC.	16	Nc
	Miconia affinis DC.	31	Nc
	Miconia hypoleuca (Benth.) Triana	20	IS
	Miconia minutiflora (Bonpl.) DC.	3	IS
	Miconia prasina (Sw.) DC.	6	P
	Miconia pyrifolia Naudin	9	IS
	Miconia sp.	4	Nc
	Miconia tomentosa (Rich.) D. Don ex DC.	11	IS
Moraceae	*Artocarpus heterophyllus* Lam.	1	Nc
	Brosimum guianense (Aubl.) Huber	55	IS
	Brosimum rubescens Taub.	39	IS
	Helicostylis tomentosa (Poepp. & Endl.) Rusby	36	IS
	Sorocea hilarii Gaudich.	2	IS
Myristicaceae	*Virola gardneri* (A. DC.) Warb.	12	LS
Myrtaceae	*Eugenia umbelliflora* O. Berg	1	IS
	Eugenia umbrosa O. Berg	2	IS
	Myrcia guianensis (Aubl.) DC.	2	IS
	Myrcia silvatica Barb. Rodr.	43	IS
	Myrcia spectabilis DC.	11	IS
	Myrcia splendens (Sw.) DC	6	IS
	Myrtaceae 1	3	Nc
Nyctaginaceae	*Guapira opposita* (Vell.) Reitz	2	IS
Ochnaceae	*Ouratea polygyna* Engl.	15	IS
Peraceae	*Chaetocarpus myrsinites* Baill.	4	Nc
	Pera ferruginea (Schott) Müll. Arg.	16	IS
	Pogonophora schomburgkiana Miers ex Benth.	13	LS
Phyllanthaceae	*Hyeronima alchorneoides* Allemão	29	IS
Picramniaceae	*Picramnia* sp.	4	Nc
Primulaceae	*Rapanea guianensis* Aubl.	1	P
Rubiaceae	*Amaioua* sp.	1	Nc
Salicaceae	*Casearia arborea* (Rich.) Urb.	3	IS
	Casearia javitensis Kunth	35	LS
Sapindaceae	*Cupania emarginata* Cambess.	2	IS
	Cupania racemosa (Vell.) Radlk.	11	IS
	Cupania revoluta Rolfe	5	IS
	Cupania sp.	1	Nc
	Talisia retusa R.S. Cowan	1	IS
Sapotaceae	*Pouteria bangii* (Rusby) T.D. Penn.	11	LS
	Pouteria sp.	1	Nc
	Pouteria torta (Mart.) Radlk.	2	LS
	Pradosia sp.	1	Nc
Schoepfiaceae	*Schoepfia brasiliensis* A. DC.	5	IS
Simaroubaceae	*Simarouba amara* Aubl.	12	IS
Siparunaceae	*Siparuna guianensis* Aubl.	5	IS

Table 1. Continued...

Family	Specie	N_i	EG
Urticaceae	*Pourouma acutiflora* Trécul	6	IS
Violaceae	*Paypayrola blanchetiana* Tul.	2	Nc
Undetermined 1	Undetermined 1	9	Nc
Total		**1,324**	

that the high number of individuals of this species is justified by the wide zoochoric dispersion.

The Fabaceae family presented higher richness (19 species), and also being of greater wealth in works carried out in Pernambuco state (Guimarães et al., 2009; Silva et al., 2010). The Fabaceae family is one of the three most representative families of angiosperm flora mainly due to its wide dispersion, as well as its important ornamental and ecological role, mainly in atmospheric and soil nitrogen fixation, thus emphasizing its importance and necessary knowledge (Malczewski et al., 2014).

Twenty species were represented by only one individual (20% of the total species), being considered locally rare. According to Brandão et al. (2011), these species are only rare in the numerical concept for a given area, in a given moment, and not necessarily from the biological point of view, since they may occur in higher densities in close fragments.

Among the characterized species, the group of initial secondary is highlighted with 67%, the pioneers represented 8%, and the late secondary 25%. A predominance of initial succession species was verified, since the pioneer and secondary species represented 75% of the species inventoried in the tree stratum. The results are similar to those reported by Brandão et al. (2009) and Silva et al. (2010) for the same typology, inferring that the studied environment is in an intermediate succession stage. An evaluation of the parameters contained in CONAMA Resolution no. 31 of December 7, 1994 was also performed, proving that the fragment is in the middle successional stage.

3.3. Phytosociological structure and diversity and equability indexes

The density was estimated at 1324 ind ha^{-1}. From the total, *Thyrsodium spruceanum* (246 individuals), *Protium heptaphyllum* (134) and *Tapirira guianensis* (68) species corresponded to 33.84% of the individuals sampled (Table 2). These species also stood out in number of individuals in other studies carried out in the Atlantic Forest of Pernambuco (Brandão et al., 2009; Silva et al., 2012).

The most frequent species in the sample area were *Thyrsodium spruceanum*, *Protium heptaphyllum*, *Eschweilera ovata*, *Tapirira guianensis*, *Brosimum guianense*, *Schefflera morototoni* and *Myrcia silvatica*. The species *Thyrsodium spruceanum* was recorded in 97.50% of the sample units, meaning it was present in 39 of the 40 plots. The occurrence of many individuals of species belonging to the Anacardiacea family is common in the Atlantic Forest. As previously mentioned, species of this family occur in different environments (dry and humid) from different regions around the world.

The wide distribution of these species is possibly related to the dispersion form, dormant seeds in the soil or seedlings, which indicates the conservation state of the ecosystem and its resilience capacity, meaning its capacity to regenerate even after having experienced strong anthropogenic actions in the past.

It was verified that the estimated basal area was 25.15 m^2 ha^{-1}, similar to that recorded by Silva et al. (2012) in a fragment close to the one studied where they registered 26.73 m^2 ha^{-1}, suggesting that the community is able to advance in terms of biomass accumulation as expressed by the accumulation of basal area, as the basal area tends to increase with the increase of forest age.

The species with the highest importance values (IV) were *Thyrsodium spruceanum*, *Protium heptaphyllum* and *Tapirira guianensis*, mainly being highlighted by the high number of sampled individuals and for having good distribution in the area.

Floristic diversity estimated by the Shannon index (H') resulted in 3.60 nats.ind.$^{-1}$ and the Pielou (J) equation was 0.78, indicating high diversity and uniformity among individuals and species within the plant community.

Table 2. Phytosociological parameters of tree species inventoried in the Coelha Forest, Usina Trapiche S/A, Sirinhaém, Pernambuco. Data in descending order of IV, in which: AD = Absolute density in ind/ha; RD = Relative density in %; AF = Absolute frequency in %; RF = relative frequency in %; ADo = Absolute dominance in m² ha⁻¹; RDo = Relative dominance in %; CV = Coverage value; And IV = Importance value.

Species	AD	RD	AF	RF	ADo	RDo	CV	IV
Thyrsodium spruceanum	246	18.58	97.50	5.72	2.8496	11.3285	29.91	35.63
Protium heptaphyllum	134	10.12	85.00	4.99	2.8481	11.3225	21.44	26.43
Tapirira guianensis	68	5.14	72.50	4.25	3.1792	12.6391	17.78	22.03
Maprounea guianensis	29	2.19	47.50	2.79	1.6629	6.6110	8.80	11.59
Eschweilera ovata	52	3.93	75.00	4.40	0.4767	1.8951	5.82	10.22
Brosimum guianense	55	4.15	72.50	4.25	0.4557	1.8116	5.97	10.22
Schefflera morototoni	33	2.49	57.50	3.37	0.9510	3.7805	6.27	9.65
Hyeronima alchorneoides	29	2.19	47.50	2.79	0.5798	2.3051	4.50	7.28
Myrcia silvatica	43	3.25	55.00	3.23	0.1820	0.7236	3.97	7.20
Fabaceae 1	2	0.15	5.00	0.29	1.6373	6.5091	6.66	6.95
Helicostylis tomentosa	36	2.72	45.00	2.64	0.3424	1.3611	4.08	6.72
Miconia affinis	31	2.34	47.50	2.79	0.3878	1.5418	3.88	6.67
Pera ferruginea	16	1.21	30.00	1.76	0.9105	3.6195	4.83	6.59
Casearia javitensis	35	2.64	52.50	3.08	0.1678	0.6671	3.31	6.39
Brosimum rubescens	39	2.95	42.50	2.49	0.2161	0.8591	3.80	6.30
Simarouba amara	12	0.91	25.00	1.47	0.8704	3.4604	4.37	5.83
Himatanthus phagedaenicus	26	1.96	37.50	2.20	0.1385	0.5504	2.51	4.71
Bowdichia virgilioides	12	0.91	25.00	1.47	0.5022	1.9965	2.90	4.37
Ouratea polygyna	15	1.13	27.50	1.61	0.2819	1.1209	2.25	3.87
Miconia hypoleuca	20	1.51	32.50	1.91	0.1044	0.4151	1.93	3.83
Ocotea glomerata	10	0.76	22.50	1.32	0.4078	1.6211	2.38	3.70
Albizia pedicellaris	6	0.45	10.00	0.59	0.6521	2.5924	3.05	3.63
Lecythis lurida	15	1.13	32.50	1.91	0.1065	0.4233	1.56	3.46
Ocotea sp.1	13	0.98	32.50	1.91	0.1400	0.5565	1.54	3.44
Henriettea succosa	16	1.21	32.50	1.91	0.0785	0.3121	1.52	3.43
Guatteria pogonopus	17	1.28	30.00	1.76	0.0492	0.1956	1.48	3.24
Pouteria bangii	11	0.83	20.00	1.17	0.2712	1.0781	1.91	3.08
Virola gardneri	12	0.91	20.00	1.17	0.2401	0.9545	1.86	3.03
Nectandra cuspidata	10	0.76	22.50	1.32	0.2176	0.8649	1.62	2.94
Eriotheca macrophylla	6	0.45	7.50	0.44	0.4605	1.8307	2.28	2.72
Symphonia globulifera	12	0.91	17.50	1.03	0.1960	0.7794	1.69	2.71
Pourouma acutiflora	6	0.45	12.50	0.73	0.3622	1.4398	1.89	2.63
Pogonophora schomburgkiana	13	0.98	17.50	1.03	0.1468	0.5837	1.57	2.59
Erythroxylum mucronatum	14	1.06	22.50	1.32	0.0438	0.1743	1.23	2.55
Parkia pendula	8	0.60	15.00	0.88	0.2183	0.8680	1.47	2.35
Undetermined 1	9	0.68	20.00	1.17	0.0917	0.3647	1.04	2.22
Chamaecrista sp.1	14	1.06	10.00	0.59	0.1244	0.4946	1.55	2.14
Myrcia spectabilis	11	0.83	15.00	0.88	0.0860	0.3419	1.17	2.05
Miconia tomentosa	11	0.83	17.50	1.03	0.0443	0.1759	1.01	2.03
Cupania racemosa	11	0.83	17.50	1.03	0.0336	0.1334	0.96	1.99
Miconia pyrifolia	9	0.68	15.00	0.88	0.0860	0.3418	1.02	1.90
Buchenavia tetraphylla	1	0.08	2.50	0.15	0.4111	1.6345	1.71	1.86
Cordia sellowiana	7	0.53	17.50	1.03	0.0642	0.2552	0.78	1.81
Plathymenia foliolosa	3	0.23	7.50	0.44	0.2197	0.8735	1.10	1.54
Protium giganteum	7	0.53	12.50	0.73	0.0477	0.1895	0.72	1.45
Inga thibaudiana	6	0.45	10.00	0.59	0.0906	0.3603	0.81	1.40
Ocotea sp.2	3	0.23	7.50	0.44	0.1710	0.6799	0.91	1.35
Siparuna guianensis	5	0.38	12.50	0.73	0.0377	0.1497	0.53	1.26
Myrcia splendens	6	0.45	12.50	0.73	0.0160	0.0636	0.52	1.25

Table 2. Continued...

Species	AD	RD	AF	RF	ADo	RDo	CV	IV
Fabaceae 4	5	0.38	7.50	0.44	0.0968	0.3850	0.76	1.20
Cupania revoluta	5	0.38	7.50	0.44	0.0774	0.3076	0.69	1.13
Cupania emarginata	2	0.15	5.00	0.29	0.1590	0.6321	0.78	1.08
Lacistema robustum	5	0.38	10.00	0.59	0.0095	0.0379	0.42	1.00
Chaetocarpus myrsinites	4	0.30	7.50	0.44	0.0630	0.2505	0.55	0.99
Miconia prasina	6	0.45	7.50	0.44	0.0189	0.0751	0.53	0.97
Miconia sp.1	4	0.30	10.00	0.59	0.0190	0.0756	0.38	0.96
Schoepfia brasiliensis	5	0.38	7.50	0.44	0.0233	0.0928	0.47	0.91
Fabaceae 2	4	0.30	7.50	0.44	0.0386	0.1536	0.46	0.90
Inga cayennensis	3	0.23	7.50	0.44	0.0540	0.2148	0.44	0.88
Dialium guianense	3	0.23	2.50	0.15	0.1226	0.4872	0.71	0.86
Abarema sp.1	3	0.23	7.50	0.44	0.0343	0.1362	0.36	0.80
Tovomita mangle	3	0.23	7.50	0.44	0.0308	0.1225	0.35	0.79
Maytenus distichophylla	3	0.23	7.50	0.44	0.0286	0.1137	0.34	0.78
Sclerolobium densiflorum	3	0.23	2.50	0.15	0.0966	0.3841	0.61	0.76
Casearia arborea	3	0.23	7.50	0.44	0.0185	0.0734	0.30	0.74
Xylopia frutescens	3	0.23	2.50	0.15	0.0901	0.3581	0.58	0.73
Myrtaceae 1	3	0.23	7.50	0.44	0.0084	0.0333	0.26	0.70
Picramnia sp.1	4	0.30	5.00	0.29	0.0088	0.0348	0.34	0.63
Andira ormosioides	2	0.15	5.00	0.29	0.0385	0.1531	0.30	0.60
Gustavia augusta	3	0.23	5.00	0.29	0.0089	0.0356	0.26	0.56
Guapira opposita	2	0.15	5.00	0.29	0.0258	0.1024	0.25	0.55
Pouteria torta	2	0.15	5.00	0.29	0.0104	0.0413	0.19	0.49
Ocotea sp.3	2	0.15	5.00	0.29	0.0104	0.0413	0.19	0.49
Erythroxylum citrifolium	2	0.15	5.00	0.29	0.0081	0.0322	0.18	0.48
Myrcia guianensis	2	0.15	5.00	0.29	0.0057	0.0226	0.17	0.47
Sorocea hilarii	2	0.15	5.00	0.29	0.0051	0.0205	0.17	0.46
Eugenia umbrosa	2	0.15	5.00	0.29	0.0046	0.0184	0.17	0.46
Paypayrola blanchetiana	2	0.15	5.00	0.29	0.0046	0.0183	0.17	0.46
Miconia minutiflora	3	0.23	2.50	0.15	0.0209	0.0830	0.31	0.46
Swartzia pickelii	3	0.23	2.50	0.15	0.0088	0.0350	0.26	0.41
Machaerium hirtum	1	0.08	2.50	0.15	0.0239	0.0950	0.17	0.32
Inga sp.1	2	0.15	2.50	0.15	0.0047	0.0189	0.17	0.32
Rapanea guianensis	1	0.08	2.50	0.15	0.0231	0.0919	0.17	0.31
Rheedia gardneriana	1	0.08	2.50	0.15	0.0215	0.0855	0.16	0.31
Amaioua sp. 1	1	0.08	2.50	0.15	0.0137	0.0545	0.13	0.28
Pradosia sp.1	1	0.08	2.50	0.15	0.0097	0.0388	0.11	0.26
Sloanea guianensis	1	0.08	2.50	0.15	0.0060	0.0239	0.10	0.25
Artocarpus heterophyllus	1	0.08	2.50	0.15	0.0058	0.0231	0.10	0.25
Ocotea gardneri	1	0.08	2.50	0.15	0.0054	0.0214	0.10	0.24
Inga sp.2	1	0.08	2.50	0.15	0.0039	0.0153	0.09	0.24
Coussarea andrei	1	0.08	2.50	0.15	0.0033	0.0130	0.09	0.24
Erythroxylum squamatum	1	0.08	2.50	0.15	0.0032	0.0127	0.09	0.23
Talisia retusa	1	0.08	2.50	0.15	0.0030	0.0118	0.09	0.23
Vismia guianensis	1	0.08	2.50	0.15	0.0029	0.0115	0.09	0.23
Sloanea garckeana	1	0.08	2.50	0.15	0.0029	0.0114	0.09	0.23
Lecythis pisonis	1	0.08	2.50	0.15	0.0029	0.0114	0.09	0.23
Eugenia umbelliflora	1	0.08	2.50	0.15	0.0026	0.0104	0.09	0.23
Pouteria sp.1	1	0.08	2.50	0.15	0.0024	0.0095	0.08	0.23
Fabaceae 3	1	0.08	2.50	0.15	0.0022	0.0086	0.08	0.23
Cupania sp.1	1	0.08	2.50	0.15	0.0021	0.0084	0.08	0.23
Total	**1,324**	**100**	**1,705**	**100**	**25.1541**	**100**	**200**	**300**

3.4. Diametric and hypsometric distribution

The diameter distribution showed a 12 cm amplitude with 8 class centers being characterized by small trees, mainly in the first class center, indicating the regeneration capacity of the plant species (Figure 3). The area mainly presents young individuals, since 60.65% of the total sampled individuals are in the first class center. The maximum diameter found was 142.50 cm, belonging to an individual only identified as Fabaceae 1.

The centers of classes 4, 5 and 6 presented few individuals; however, these are well represented in the smaller class centers, which indicates occurrence of the successional process. Nevertheless, the centers of classes 7 (*Buchenavia tetraphylla*) and 8 (Fabaceae 1), which presented one individual, do not occur in the centers of previous classes. This fact may be related to some biotic or abiotic factors.

The vertical distribution of the tree stratum presented five height class centers varying from 2.0 to 20 m, with a mean of 8.29 m in height. The high number of individuals in the second lowest height class center (Figure 4A) is an important indicator of the forest renewal capacity due to the establishment of these individuals in smaller classes (Pinheiro & Monteiro, 2009).

Analyzing the basal area values between height classes, it was observed that individuals with height less than 10 meters corresponded to 76.28% of the total sampled individuals with mean DAB of 8 cm, representing 27.43% of the total basal area (Figure 4B). A similar result was recorded by Brandão et al. (2009) in studying an Atlantic Forest fragment in Igarassu, Pernambuco state, where 74% of the individuals presented height less than 10 m and DAB lower than 10 cm.

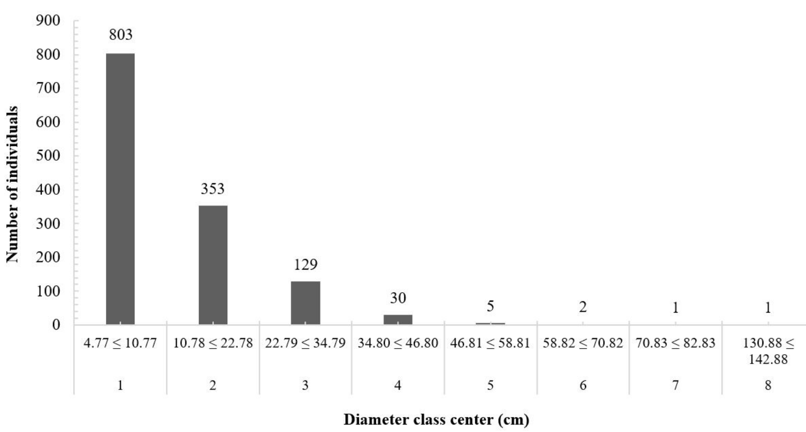

Figure 3. Diameter distribution of arboreal individuals in a Dense Ombrophylous Forest fragment located in the municipality of Sirinhaém, Pernambuco, Brazil.

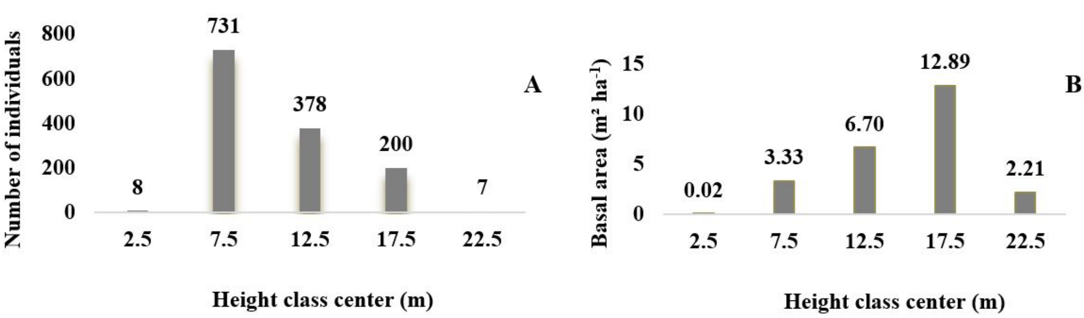

Figure 4. Distribution of number of individuals (A) and Absolute Dominance (B) in relation to the height classes in a Dense Ombrophylous Forest fragment located in the municipality of Sirinhaém, Pernambuco, Brazil.

4. CONCLUSION

The studied fragment is very relevant for biodiversity conservation since it presents a significant diversity of species, indicating high uniformity between individuals and species within the plant community.

The diametric structure of the vegetation shows that most of the individuals are in classes with smaller diameters, indicating a community with potential for regeneration, where any anthropic intervention, even if occasional, may directly interfere with its recovery, emphasizing the need for the area's conservation mainly for maintaining the local biodiversity.

The importance of preserving this fragment and others in the regions dominated by sugar cane cultivation must be emphasized, aiming at maintaining the flora and fauna associated with these forest environments.

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