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# ANALYSIS OF THE PHYTOSOCIOLOGICAL STRUCTURE AND FLORISTIC DIVERSITY OF THE BUSH-ARBOREAL VEGETATION IN A FRAGMENT OF CAATINGA IN THE STATE OF SERGIPE

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ABSTRACT: The study of vegetation makes it possible to know its characteristics and state of conservation. Given this, the aim of this study was to analyze the phytosociological structure and the floristic diversity of the shrub-tree component in a fragment of Caatinga, in Porto da Folha, Sergipe. Vegetation sampling was performed using 25 plots of 20 x 20 m. All shrubby-tree individuals with circumference at 1.30 m above ground level) ≥ 6.0 cm were identified and recorded, and the phytosociological structure and floristic diversity were analyzed. The total density was 2,641 individuals/ha and the basal area, 15.52 m²/ha. The Shannon-Wiener (H') and Pielou (J') evenness indices were 2.4 nats/ind, respectively. and 0.62. *Bauhinia cheilantha* (Bong.) Steud. represented 38.89% of the total density, being the second largest total basal area. The conservation status of the studied fragment allows its use as a control area for comparison with future studies on the Caatinga vegetation in Sergipe.

KEYWORDS: Phytosociology, Diversity indices, Semiarid.

# ANÁLISE DA ESTRUTURA FITOSSOCIOLÓGICA E DIVERSIDADE FLORÍSTICA DA VEGETAÇÃO ARBUSTIVO-ARBÓREA EM UM FRAGMENTO DE CAATINGA NO ESTADO DE SERGIPE

RESUMO: O estudo da vegetação permite conhecer suas características e estado de conservação. Diante disto, o objetivo deste estudo foi analisar a estrutura fitossociológica e a diversidade florística do componente arbustivo-arbóreo em um fragmento de Caatinga, no município de Porto da Folha, Sergipe. A amostragem da vegetação foi realizada por meio de 25 parcelas de 20 x 20 m. Foram identificados e registrados todos os indivíduos arbustivo-arbóreos

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com circunferência à 1,30 m do nível do solo ≥ 6,0 cm e analisadas a estrutura fitossociológica e a diversidade florística. A densidade total foi de 2.641 indivíduos/ha e a área basal de 15,52 m²/ha. Os índices de diversidade de Shannon-Wiener (H') e equabilidade de Pielou (J') foram, respectivamente, 2,4 nats/ind. e 0,62. *Bauhinia cheilantha (*Bong.) Steud. representou 38,89% do total da densidade, sendo a segunda maior área basal total. O estado de conservação do fragmento estudado possibilita a sua utilização como uma área controle para comparação com futuros estudos sobre a vegetação de Caatinga em Sergipe.

PALAVRAS-CHAVE: Fitossociologia, Índices de diversidade, Semiárido.

## ANÁLISIS DE LA ESTRUCTURA FITOSOCIOLÓGICA Y DIVERSIDAD FLORÍSTICA DE LA VEGETACIÓN ARBUSTAL-ARBOREAL EN UN FRAGMENTO DE CAATINGA EN EL ESTADO DE SERGIPE

RESUMEN: El estudio de la vegetación permite conocer sus características y estado de conservación. Dado esto, el objetivo de este estudio fue analizar la estructura fitosociológica y diversidad florística del componente arbusto-árbol en un fragmento de Caatinga, en Porto da Folha, Sergipe. El muestreo de la vegetación se realizó utilizando 25 parcelas de 20 x 20 m. Se identificaron y registraron todos los árboles arbustivos con circunferencia a 1,30 m sobre el nivel del suelo ≥ 6,0 cm, y se analizaron la estructura fitosociológica y la diversidad. La densidad total fue de 2.641 individuos/ha y el área basal, 15.52 m²/ha. Los índices de uniformidad de Shannon-Wiener (H ') y Pielou (J') fueron de 2,4 nats/ind, respectivamente. y 0,62. *Bauhinia cheilantha* (Bong.) Steud. representó el 38,89% de la densidad total, siendo la segunda mayor área basal total. El estado de conservación del fragmento estudiado permite su uso como área de control para su comparación con futuros estudios sobre la vegetación de Caatinga en Sergipe.

PALABRAS CLAVES: Fitosociología, Índices de diversidad, Semiárido.

## INTRODUCTION

In phytogeographical studies, Caatinga has been addressed as a single vegetation unit, belonging to seasonally dry forests of the neotropical region (PRADO, 2000; PENNINGTON et al., 2000; OLIVEIRA-FILHO et al., 2006). However, studies compare physiognomically homogeneous areas located on sedimentary sandy surfaces and soils derived from crystalline basement, suggesting that there is difference in the flora composition across these different geological formations (LEMOS; RODAL, 2002; MENDES; CASTRO, 2009; CARDOSO; QUEIROZ, 2007; LEMOS; MEGURO, 2010; COSTA et al., 2015).

Sergipe state's semiarid region comprises an area of approximately 11,056 Km², corresponding to 50.17% of the state total area (SERGIPE, 2011). However, its original vegetation cover is very devastated (SANTOS; ANDRADE, 1992), and is represented mostly by fragmented and very isolated areas (FERNANDES et al., 2017). The recurring forest fragmentation processes occurred in Caatinga have been a big problem to the region, affecting not only its fauna/flora, but also human populations, due to the environmental degradation and gradual losses of ecosystemic services (LEAL et al., 2005; COELHO, et al., 2014; JESUS et al., 2019; GAMA et al., 2022).

Pioneering studies on Sergipe's Caatinga vegetation were conducted by Souza (1983) in the municipalities of Glória and Frei Paulo, and by Fonseca (1991) in Canindé do São Francisco. Some works were later developed in this biome's conservation units (SILVA et al., 2013a; SILVA et al., 2013b; SILVA et al., 2013c; SILVA et al., 2014), or in other areas of the state with this type of vegetation, highlighting aspects of flora and phytosociology (including treatment of shrub-tree species, most of them herbaceous and climbing plants) (MACHADO et al., 2012; FERRAZ et al., 2013; FERREIRA et al., 2013; OLIVEIRA et al., 2013b; SILVA et al., 2013c; OLIVEIRA et al., 2015; SILVA et al., 2016), in addition to studies on successional characterization, dispersion syndromes (SILVA et al. 2013b; FREIRE et al. 2016), edge effect (OLIVEIRA et al., 2013a), aspects of landscape ecology and threats to biodiversity (SILVA et al., 2013a).

It's remarkable the relevance of studies that characterize and identify species in plant communities of Caatinga environments that did not undergo severe anthropic interference or are still conserved, in order to learn fundamental ecological processes and subsidize actions for biodiversity conservation and recovery of degraded areas. Thus, the present study was conducted with the aim of learning the phytosociological structure and flora diversity of the shrub-tree component in a fragment of Caatinga belonging to São Pedro farm, in Porto da Folha municipality, Sergipe state, and verifying their structural relations with other areas of Caatinga, so that the knowledge generated can assist the municipality in reordering land use, promote maintenance of permanent protection areas (PPA) and/or establish programs for recovery of degraded areas, contributing to the protection of biodiversity and improvement of people's quality of life.

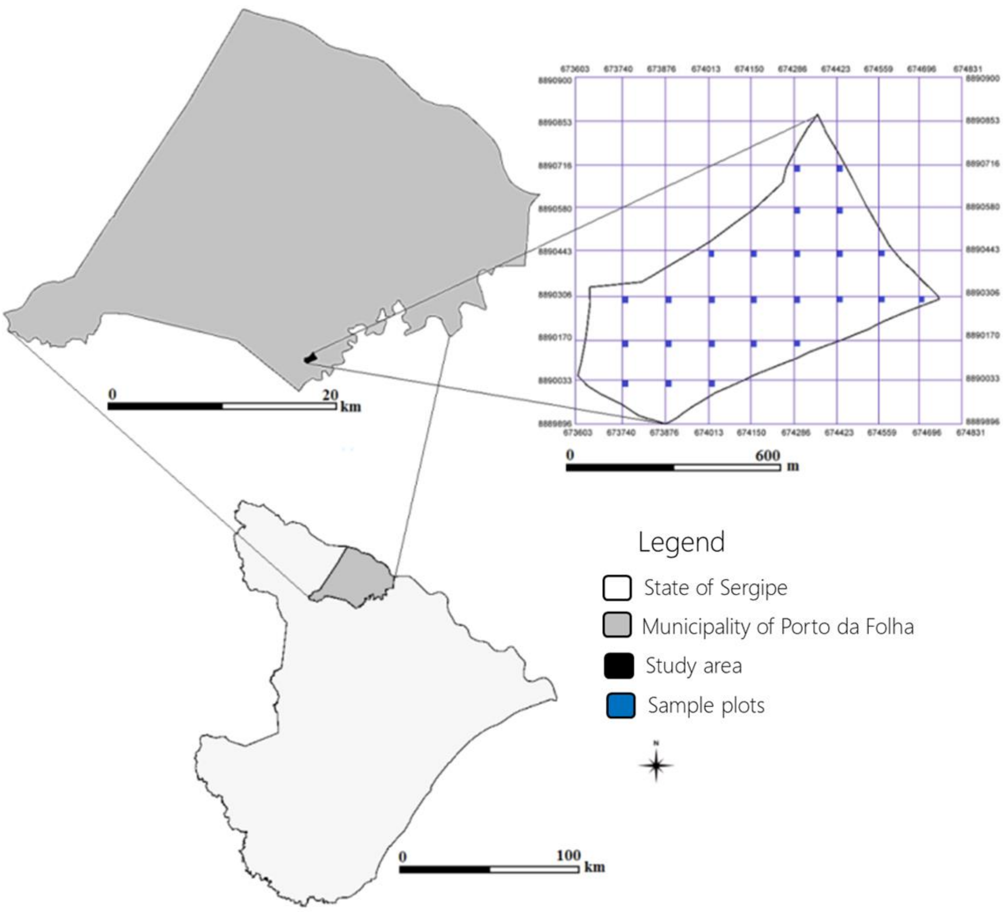
## MATERIAL AND METHODS

### CHARACTERIZATION OF THE STUDY AREA

The study was conducted in a fragment of arboreal Caatinga, a Legal Reserve area, belonging to São Pedro farm, located in Lagoa Grande village, in Porto da Folha municipality, Sergipe state. Porto da Folha municipality's territory is formed by land structure, most of it (63.69%) by rural establishments with areas of less than 2 to 10 hectares. From the municipality total population, 63.33% reside in the rural area. The main economic activities regarding alternative soil use are agriculture and livestock (SILVA; MENEZES, 2018).

The fragment was chosen due to its good state of conservation, very representative to the region vegetation, with a history of over 60 years free of any type of anthropic impact, like vegetation cutting for timber harvesting, predatory hunting, or fire processes, for example (OLIVEIRA et al., 2013b). The fragment total area is approximately 50 ha, and is located between geographic coordinates 10º01'45.57'' and 10º02'18.69'' S (latitude), and 37º24'57.71'' and 37º24'19.03'' W (longitude), with average altitude of 168 m (Figure 1).

Figure 1. Localization of the study area and distribution of Caatinga fragment plots, in Porto da Folha municipality, Sergipe, Brazil. Source from Sergipe vector data (2011).




Source: Prepared by the author.

According to Köppen climate classification, the region is Bsh type, Semiarid Megathermal climate, characterized for recording high potential evapotranspiration rates generated by irregular rain distribution, and the atmospheric circulation system (ALVARES et al., 2013). The average annual rainfall is 548.9 mm, with rainy period from March to July and average annual temperature of 26.2°C (SERGIPE, 2011). The dry station can last from seven to eight months.

The relief is characterized by geomorphological units pediplain surface and sertanejo pediplain, containing reliefs dissected in hills and crests with tabular interfluves (SERGIPE, 2011). The types of soil distributed in Porto da Folha are Litholic

Neosols, occupying 66.6% of the municipality, Regosols (23.65%), Albaqualf soils (6.98%) and Chromic Luvisols representing 1.59% of the municipality.

## SAMPLING OF THE SHRUB-TREE COMPONENT

The study was conducted between the rainy and dry season of 2011. The period favored the collection of exsiccates due to low leaf fall and presence of reproductive organs, which facilitated the botanical recognition of the species.

The survey of the shrub-tree component was made by systematic sampling method by portions of fixed area. Twenty-five 20m x 20m pots (400 m2) were allocated, amounting to 1 ha of the total area, distributed at intervals of 141m in two perpendicular directions (FELFILI et al., 2013).

All shrub-tree individuals with diameter at breast height (DBH at 1.30 m from ground level) ≥ 6,0 cm, were identified and recorded, also included those bifurcated and standing dead, in case they met the norms established by the Rede de Manejo Florestal da Caatinga (CTC/RMFC, 2005) (Caatinga Forest Management Network). The diameter at breast height (DBH) and total height (Ht) of each individual were measured using measuring tape and telescopic stick, respectively. The individuals were tagged with numbered aluminum platelets and the regional name of the species diameter and total height were written down.

The species were collected according to usual techniques suggested by Mori et al. (1989), and identified in Federal University of Sergipe herbarium (ASE), with assistance of experts, taxonomic keys, specialized bibliography, and comparisons with material in exsiccates. The whole material was incorporated to the ASE collection, according to each specimen voucher. The adopted classification system was APG IV (2016) Angiosperm System and confirmation of orthography and authorship was obtained from consultation to Flora e Funga do Brasil (REFLORA, 2022) data bank.

ANALYSIS OF PHYTOSOCIOLOGICAL VARIABLES AND FLORA DIVERSITY

For the analysis of the horizontal structure of the shrub-tree component the following phytosociological parameters were considered: absolute and relative density (DAi and DRi), absolute and relative dominance (DoAi and DoRi), absolute and relative frequency (FAi and FRi) and importance value (VIi) (MUELLER-DOMBOIS; ELLENBERG, 1974). For the calculation of the flora diversity of the shrub-tree component, Shannon-Wiener (H') and Pielou Evenness (J') indices were used, according to Brower et al. (1998). The analyses were made in Mata Nativa 2.10® (CIENTEC, 2006) software, licensed by the Federal University of Sergipe.

## RESULTS AND DISCUSSION

### PHYTOSOCIOLOGICAL STRUCTURE

The total density analyzed for the plant community sampled was 2,641 individuals per hectare, distributed in 49 species (Table 1). The total density recorded in quantitative surveys of thorny deciduous formations inserted in the crystalline basement ranged from 1,350 to 5,920 ind./ha. The result found in this work was superior to that of most works mentioned for these plant formations (ANDRADE et al., 2005; RODAL et al., 2008b; CALIXTO-JÚNIOR; DRUMOND, 2011), including those conducted in Sergipe state (SOUZA, 1983; FERRAZ et al., 2013; MACHADO et al., 2012; SILVA et al., 2014). However, it is below those of studies by Alcoforado-Filho et al. (2003), Amorim et al. (2005), Santana and Souto (2006), Barbosa et al. (2007) and Fabricante and Andrade (2007). It is worth emphasizing that this comparison considers different inclusion criteria adopted in the mentioned studies. So, it is expected that works with more comprehensive inclusion criteria, that is, those that measure individuals with smaller diameters, will provide higher densities, while those with less comprehensive criteria will present smaller densities (ALCOFORADO-FILHO et al., 2003; SANTOS et al., 2007).

Table 1. Estimates of phytosociological parameters of the species sampled in the arboreal Caatinga, in Porto da Folha municipality, Sergipe, organized in descending order, by VI. DA – absolute density (individuals/ha); DR – relative density (%); FA – absolute frequency (%); FR – relative frequency (%); DoA – absolute dominance (m²/ha); DoR – relative dominance (%); VI – value of importance.

| Species | Voucher | DA | DR | FA | FR | DoA | DoR | VI |
|---|---|---|---|---|---|---|---|---|
| *Bauhinia cheilantha* (Bong.) Steud. | 20375 | 1027 | 38,89 | 100,00 | 7,51 | 2,643 | 17,03 | 63,42 |
| *Cenostigma pyramidale* (Tul.) L.P. Queiroz | 20350 | 203 | 7,69 | 96,00 | 7,21 | 4,326 | 27,86 | 42,75 |
| *Anadenanthera colubrina* (Vell.) Brenan | 20361 | 151 | 5,72 | 88,00 | 6,61 | 1,447 | 9,32 | 21,64 |
| *Croton blanchetianus* Baill. | 20384 | 303 | 11,47 | 84,00 | 6,31 | 0,524 | 3,38 | 21,15 |
| *Manihot dichotoma* Ule | 20346 | 201 | 7,61 | 80,00 | 6,01 | 0,677 | 4,36 | 17,98 |
| *Astronium urundeuva* (M.Allemão) Engl. Allemão | 20367 | 76 | 2,88 | 80,00 | 6,01 | 0,820 | 5,28 | 14,16 |
| *Aspidosperma pyrifolium* Mart. | 20364 | 91 | 3,45 | 56,00 | 4,20 | 0,703 | 4,53 | 12,18 |
| *Monteverdia rigida* (Mart.) Biral | 20369 | 102 | 3,86 | 28,00 | 2,10 | 0,394 | 2,54 | 8,50 |
| *Guapira tomentosa* (Casar.) Lundell | 20348 | 29 | 1,10 | 60,00 | 4,50 | 0,090 | 0,58 | 6,18 |
| *Allophylus quercifolius* (Mart.) Radlk | 20345 | 32 | 1,21 | 56,00 | 4,20 | 0,062 | 0,40 | 5,81 |
| *Sarcomphalus joazeiro* (Mart.) Hauenschild | 20356 | 26 | 0,98 | 24,00 | 1,80 | 0,444 | 2,86 | 5,65 |
| *Schinopsis brasiliensis* Engl. | 20368 | 12 | 0,45 | 24,00 | 1,80 | 0,498 | 3,21 | 5,47 |
| *Parapiptadenia zehntneri* (Harms) M. P. M. de Lima & H. C. de Lima | 20391 | 47 | 1,78 | 24,00 | 1,80 | 0,243 | 1,57 | 5,15 |
| *Mabea* sp | 20832 | 59 | 2,23 | 28,00 | 2,10 | 0,109 | 0,71 | 5,04 |
| *Commiphora leptophloeos* (Mart.) J.B. Gillett | 20357 | 24 | 0,91 | 32,00 | 2,40 | 0,267 | 1,72 | 5,03 |
| *Pseudobombax marginatum* (A. St.-Hil., Juss. & Cambess.) A. Robyns | 21822 | 27 | 1,02 | 44,00 | 3,30 | 0,103 | 0,66 | 4,99 |
| *Cynophalla flexuosa* (L.) J. Presl | 20352 | 56 | 2,12 | 24,00 | 1,80 | 0,166 | 1,07 | 4,99 |
| *Jatropha mollissima* (Pohl) Baill. | 20347 | 16 | 0,61 | 52,00 | 3,90 | 0,027 | 0,17 | 4,68 |
| *Sideroxylon obtusifolium* (Humb. ex. Roem. & Schult.) T.D. Penn. | 20359 | 10 | 0,38 | 24,00 | 1,80 | 0,378 | 2,44 | 4,62 |
| *Ceiba glaziovii* (Kuntze) K. Schum. | 20372 | 7 | 0,27 | 24,00 | 1,80 | 0,242 | 1,56 | 3,63 |
| *Cedrela odorata* L. | 23124 | 6 | 0,23 | 20,00 | 1,50 | 0,274 | 1,77 | 3,50 |
| *Spondias mombin* L. | 23123 | 5 | 0,19 | 12,00 | 0,90 | 0,278 | 1,79 | 2,88 |
| *Lachesiodendron viridiflorum* (Kunth) P.G. Ribeiro, L.P. | 20565 | 5 | 0,19 | 16,00 | 1,20 | 0,218 | 1,40 | 2,79 |
| *Cereus jamacaru* DC. | 23125 | 14 | 0,53 | 20,00 | 1,50 | 0,089 | 0,58 | 2,61 |
| *Cordiera rigida* (K.Schum.) Kuntze | 20351 | 10 | 0,38 | 24,00 | 1,80 | 0,026 | 0,17 | 2,35 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Guettarda sericea* Müll. Arg. | 20354 | 17 | 0,64 | 20,00 | 1,50 | 0,030 | 0,19 | 2,34 |
| *Helicteres* sp. | 21819 | 18 | 0,68 | 20,00 | 1,50 | 0,018 | 0,11 | 2,30 |
| *Croton adenocalix* Baill. | 20355 | 11 | 0,42 | 24,00 | 1,80 | 0,012 | 0,08 | 2,3 0 |
| *Prockia crucis* P. Browne ex L. | 20353 | 5 | 0,19 | 16,00 | 1,20 | 0,049 | 0,32 | 1,71 |
| *Chloroleucon foliolosum* (Benth.) G.P. Lewis | 21811 | 6 | 0,23 | 16,00 | 1,20 | 0,031 | 0,20 | 1,63 |
| *Tabebuia aurea* (Silva Manso) Benth. & Hook. f. | 20371 | 5 | 0,19 | 4,00 | 0,30 | 0,151 | 0,98 | 1,47 |
| *Eugenia punicifolia* (Kunth.) DC. | 20828 | 6 | 0,23 | 12,00 | 0,90 | 0,029 | 0,18 | 1,31 |
| *Sapium glandulosum* (L.) Morong | 20358 | 3 | 0,11 | 12,00 | 0,90 | 0,012 | 0,08 | 1,09 |
| *Neocalyptrocalyx longifolium* (Mart.) Cornejo & Iltis | 20365 | 3 | 0,11 | 8,00 | 0,60 | 0,010 | 0,06 | 0,78 |
| *Amburana cearensis* (Allemão) A.C. Sm. | * | 4 | 0,15 | 8,00 | 0,60 | 0,004 | 0,03 | 0,78 |
| *Erythroxylum nordestinum* Costa-Lima, Loiola & M.Alves | 20580 | 4 | 0,15 | 8,00 | 0,60 | 0,005 | 0,03 | 0,79 |
| *Ptilochaeta bahiensis* Turcz. | 21817 | 3 | 0,11 | 8,00 | 0,60 | 0,005 | 0,03 | 0,74 |
| *Piptadenia retusa* (Jacq.) P.G.Ribeiro, Seigler & Ebinger | 20571 | 2 | 0,08 | 8,00 | 0,60 | 0,004 | 0,03 | 0,71 |
| *Solanum ovum-fringillae* (Dunal) Bohs | 21820 | 2 | 0,08 | 8,00 | 0,60 | 0,003 | 0,02 | 0,69 |
| *Eugenia ligustrina* (Sw.) Willd. | 20566 | 2 | 0,08 | 4,00 | 0,30 | 0,038 | 0,25 | 0,62 |
| *Spondias tuberosa* Arruda | 20363 | 1 | 0,04 | 4,00 | 0,30 | 0,041 | 0,27 | 0,61 |
| *Campomanesia eugenioides* (Cambess.) D.Legrand ex Landrum | 20827 | 3 | 0,11 | 4,00 | 0,30 | 0,005 | 0,03 | 0,45 |
| *Erythrina velutina* Willd. | 20390 | 1 | 0,04 | 4,00 | 0,30 | 0,018 | 0,12 | 0,46 |
| *Handroanthus impetiginosus* (Mart. ex DC.) Mattos | * | 1 | 0,04 | 4,00 | 0,30 | 0,003 | 0,02 | 0,36 |
| *Pilosocereus piauhyensis* (Gürke) Byles & G.D. Rowley | 19296 | 1 | 0,04 | 4,00 | 0,30 | 0,004 | 0,02 | 0,36 |
| *Spondias bahiensis* P. Carvalho, Van den Berg & M. | 20349 | 1 | 0,04 | 4,00 | 0,30 | 0,003 | 0,02 | 0,36 |
| *Cordia insignis* Cham. | * | 1 | 0,04 | 4,00 | 0,30 | 0,001 | 0,01 | 0,34 |
| *Coutarea hexandra* (Jacq.) K.Schum. | 23498 | 1 | 0,04 | 4,00 | 0,30 | 0,001 | 0,01 | 0,35 |
| *Capsicum parvifolium* Sendtn. | 21059 | 1 | 0,04 | 4,00 | 0,30 | 0,001 | 0,01 | 0,34 |
| Total | | 2.641 | 100,00 | 1.332,00 | 100,00 | 15,527 | 100,00 | 300,00 |

(*) without record of the exsiccata deposited in Federal University of Sergipe herbarium (ASE).
Source: Prepared by the author.

The total basal area (dominance) of 15.527 $m^2$/ha, verified in this work stood above the Caatinga areas (5.3 to 15.42 $m^2$/ha) sampled in Sergipe that used the same inclusion criteria (FERRAZ et al., 2013; FERREIRA et al., 2013; MACHADO et al., 2012; SILVA et al., 2014). This result was probably influenced by the presence of individuals of *Cedrela odorata*, *Schinopsis brasiliensis*, *Cenostigma pyramidale* and *Spondias mombin* that reached the greatest diameters (45.45; 44.87; 44.47 and 40.35, respectively) in this survey.

Considering the other areas with thorny deciduous vegetation (VCE) in the crystalline basement, variation of 6.1 to 30.08 $m^2$/ha was observed, much superior to the range observed for Sergipe. With regard to the other Caatinga plant formations inserted in the sedimentary basin, it was observed that most works presented dominance superior to that found in this work (16.1 to 38.51 $m^2$/ha), except for the work by Santos et al. (2008), which presented the smallest basal area (7.7 $m^2$/ha).

*Bauhinia cheilantha*, *Croton blanchetianus*, *Cenostigma pyramidale*, *Manihot dichotoma*, *Anadenanthera colubrina*, *Monteverdia rigida*, *Aspidosperma pyrifolium*, *Astronium urundeuva*, *Mabea* sp. and *Cynophalla flexuosa* species presented higher relative density. These species made up 85.92% of the total number of individuals sampled, which suggests marked ecological dominance in the community (see Pielou evenness). Among these species, *Astronium urundeuva* is outstanding. It is in the official lists of endangered flora species, and is often mentioned as less abundant in "sensu stricto" Caatinga surveys (ALCOFORADO-FILHO et al., 2003; ANDRADE et al., 2005; FABRICANTE; ANDRADE, 2007; RODAL et al., 2008a; SILVA et al., 2014). It presented population with considerable density. So, it can be suggested that the fragment studied is in good state of conservation.

The most abundant species mentioned in Caatinga areas survey were *Bauhinia cheilantha* (ALCOFORADO-FILHO et al., 2003; MENDES; CASTRO,2009; MACHADO et al., 2012; SILVA et al., 2014), *Croton* *blanchetianus* (ANDRADE et al., 2005; SANTANA; SOUTO, 2006; BARBOSA et al., 2007; FABRICANTE; ANDRADE, 2007; RODAL et al., 2008a; SILVA et al., 2014), *Cenostigma pyramidale* (FONSECA, 1991; ALCOFORADO-FILHO et al., 2003; ANDRADE et al., 2005; BARBOSA et al., 2007; FABRICANTE; ANDRADE, 2007; RODAL et al., 2008b) and *Aspidosperma pyrifolium* (FONSECA, 1991; ANDRADE et al., 2005; AMORIM et al., 2005; BARBOSA et al., 2007; RODAL et al., 2008a). It is worth mentioning that these four species are related to areas with thorny deciduous vegetation formations, where lower water availability is remarkable (381 to 733 mm), showing that they are more adapted to the local environmental conditions.

Regarding specific dominance, the ten more representative species, in descending order, were: *Cenostigma pyramidale*, *Bauhinia cheilantha*, *Anadenanthera colubrina*, *Astronium urundeuva*, *Aspidosperma pyrifolium*, *Manihot dichotoma*, *Croton blanchetianus*, *Schinopsis brasiliensis*, *Sarcamphalus joazeiro* and *Monteverdia rigida*, which amounted to 80.37% of the total of individuals sampled. Andrade et al. (2005) while surveying in São João do Cariri-PB, and Fabricante e Andrade (2007) in Santa Luzia-PB recorded *Croton blanchetianus*, *Cenostigma pyramidale* and *Aspidosperma pyrifolium* as the more dominant. Usually, these species have small diameters in the inventoried communities, however, the great dominance is associated to their high density, which contributes to their first positions in the ranking. On the other hand, *Astronium urundeuva*, *Sarcamphalus joazeiro* and *Schinopsis brasiliensis*, which are large size trees, were structurally important in the study area for presenting large diameters, despite the low densities (76, 26 and 12 ind/ha, respectively) compared to *Bauhinia cheilantha* and *Croton blanchetianus* (1,027 and 303 ind./ha, respectively). *Anadenanthera colubrina* and *Astronium urundeuva* were mentioned as the species with higher dominance in surveys conducted in fragments with seasonal deciduous forest (dry forest) in the north of Minas Gerais (SANTOS et al., 2007; SANTOS et al., 2011), demonstrating the capacity to efficiently explore these locations with higher rainfall indices (1,000 mm) and those drier as area of study (534 mm).

*Bauhinia cheilantha*, *Cenostigma pyramidale*, *Anadenanthera colubrina*, *Croton blanchetianus*, *Manihot dichotoma* and *Astronium urundeuva* were the species that presented higher frequency in the area (above 80%), demonstrating a broad distribution in the fragment, probably intensifies by the processes of seed dispersion, mainly zoochorous, in cases of forage species attracted by animals.

Except for *Manihot dichotoma*, which was restricted to thorny deciduous vegetation in the crystalline area, the other species were outstanding for occurring in most survey made in Northeast Semiarid and North of Minas Gerais areas. *Bauhinia cheilantha* and *Astronium urundeuva* species occurred in 70.58% of the surveys made in different plant formations (VCE, VCNE and VED, in addition to transition areas between these formations). *Cenostigma pyramidale* occurred in all Caatinga surveys in Sergipe, almost exclusively in areas with thorny deciduous vegetation installed in the crystalline basement, except for the area of transition between VCE and VED on the sedimentary basin (RAMALHO et al., 2009).

The high frequency values observed in the area of study and other works conducted on the different Semiarid plant formations can indicate higher adaptability of these species to the local environmental conditions. However, in these cases, possible changes that may occur in frequency and distribution caused by the potential use of species of economic interest should be considered when subject to plant extraction (timber, fruits, seeds, roots, etc.) or foraged by cattle, for example.

The species that obtained higher values of importance in descending order were: *Bauhinia cheilantha* (63.42%), *Cenostigma pyramidale* (42.75%), *Anadenanthera colubrina* (21.64%), *Croton blanchetianus* (21.15%), *Manihot* *dichotoma* (17.98%) and *Astronium urundeuva* (14.16%), which altogether represented 60.37% of the total of individuals sampled, indicating that they have high ecological importance and are well adapted to the different biomes of the fragment.

*Bauhinia cheilantha* was outstanding, despite being a small size species (ALCOFORADO-FILHO et al., 2003), due to the great abundance of individuals it represented (1,027 individuals/ha), making up 38.89% of the total, in addition to the high frequency observed (100%), revealing its broad distribution in the studied environment. Moreover, it is a species that presents autochorous dispersion of its seeds, contributing to a more aggregate distribution behavior (SILVA et al., 2013b).

*Cenostigma pyramidale*, in second position, obtained the greatest dominance (4.32 $m^2$/ha), representing 27.86% of the total. Such result is due, mainly, to the large size of individuals of this species in the fragment, where 41.9% presented diameter superior to 15 cm. Another factor was its significant distribution in the area (frequency of 96%). Alcoforado-Filho et al. (2003) recorded this species as the most important in a survey conducted in Caruaru-PE and mentioned the fact that it frequently appears on the top of lists of studies made in Caatinga. The third position, *Anadenanthera colubrina*, according to Alcoforado-Filho et al. (2003), is one of the most common large size trees in thorny deciduous vegetation, usually presenting larger basal area, however with low relative density.

Opposite standard was presented by *Croton blanchetianus* and *Manihot dichotoma*, which occupied the fourth and fifth position of VI, respectively. They are species with small diameters, high relative density, and frequency above 80%. *Croton blanchetianus* cited in the different Semiarid plant formations (VCE and VCNE), presented the highest VIs in surveys made in thorny deciduous vegetation established in the crystalline (ANDRADE et al., 2005; SANTANA; SOUTO, 2006; BARBOSA et al., 2007; FABRICANTE; ANDRADE, 2007).

The sixth most important species, *Astronium urundeuva*, is another large size tree in the Northeast Semiarid thorny deciduous vegetation, since it presented half the density of *Anadenanthera colubrina*, 76 individuals, and its frequency was slightly inferior (0.82 m²/ha). It was also reported to VED in the North of Minas Gerais (SANTOS et al., 2007; SANTOS et al., 2011) among the species with higher value of importance, however, associated to high density (167 and 255 ind./ha) and frequency of species (85 and 90%), respectively.

FLORA DIVERSITY

Shannon-Wiener diversity (H’) and Pielou evenness (J’) indices, calculated for the fragment shrub-tree community, were 2.4 nats/ind. and 0.62, respectively. These indices values emphasize the extreme dominance of few species in the community. Jackknife estimated for Shannon-Wiener diversity index, considering t (95%) = 2.06, was 2.16 to 2.78 nats/ind.

The H’ value for the fragment studied presented intersection with most surveys made in environments with thorny deciduous vegetation inserted in the crystalline basement, which ranged from 1.39 to 2.35 nats/ind. (AMORIM et al., 2005; SANTANA; SOUTO 2006; BARBOSA et al., 2007; FABRICANTE; ANDRADE,2007; CALIXTO-JÚNIOR; DRUMOND, 2011; SILVA et al., 2014), however, this value was out of the limits observed by Jackknife estimate compared to the indices recorded for the same type of plant formation in the crystalline (MACHADO et al., 2012; FERREIRA et al., 2013) and sedimentary basin (MENDES; CASTRO,2009; LEMOS; RODAL,2002).

In the case of non-thorny deciduous (Carrasco) and deciduous seasonal vegetation (dry forest), the indices ranged from 2.29 to 3.3 nats/ind. (ARAÚJO et al., 1999; FARIAS; CASTRO, 2004; SANTOS et al., 2007; SANTOS et al., 2008; SANTOS et al., 2011), demonstrating that these formations present higher diversity compared to the area studied. That can be explained by the higher rainfall indices in regions were these surveys were made, which ranged from 916 to 1,280 mm. Moreover, influence of the level of inclusion and sample intensity used in these studies should be considered, because inclusion criteria adopted in this work were different.

The estimated evenness value (J'=0.62) suggests low evenness in the proportions of the number of individuals and the number of species within the plant community, that is, there is great ecological dominance in the area studied, fact that can be confirmed by the high density and dominance of some species like *Bauhinia cheilantha*, *Croton blanchetianus* and *Cenostigma pyramidale*, which, altogether, make up 58% of the total of individuals sampled. It can be observed because evenness is directly proportional to diversity and antagonistic to dominance. Theoretically, it would require the increment of more 38% of species to make the proportion more equitable and reach maximum diversity of the plant community (BROWER et al., 1998), which would be equal to 3.89 nats/ind.

## CONCLUSION

The species that presented higher value of importance in the fragment studied were: *B. cheilantha*, *C. pyramidale*, *A. colubrina*, *C. blanchetianus*, *M. dichotoma*, *A. urundeuva*, *A. pyrifolium M. rigida*, *G. tomentosa*, *A. quercifolius*, *S. joazeiro* and *S. brasiliensis*, indicating that they have high ecological importance and are well adapted to their different environments. Thus, inclusion of these species is recommended in future works on the recovery of degraded areas in Porto da Folha region.

The vegetation phytosociological structure presents good state of conservation, and can be used as control area to compare with future studies with Caatinga plants in Sergipe, and assist municipal managers of Porto da

Folha region in the preparation of rural master plans for the municipalities, subsidizing local development processes with sustainability.

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