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Variability of a vegetation in Caatinga areas in the Northeast of Brazil. Variabilidade de uma vegetação em áreas de Caatinga no Nordeste Brasileiro.

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Abstract

The objective of this study was to characterize the variability of a native vegetation of Caatinga (7°23'30" S and 36°31'59" W) in five areas, two of which were used for animal grazing. A floristic survey was carried out using the parcel method with systematic distribution. A phytosociological survey was carried out in which the following indices were obtained: equability, similarity, dominance and diversity for data evaluation. The predominant species were: *P. pyramidalis*, *A. pyriformis*, *P. gounellei*, *C. sonderianus* and *J. molíssima* for all the study areas. Areas 1 and 2 presented 46% of Fabaceae family taxa. The diversity and richness of families and species found in the study areas were low with a dominant presence of *P. pyramidalis* species.

Keywords: Catingueira plant, floristic rise, phytosociological rise, semiarid

Resumo

Objetivou-se caracterizar a variabilidade de uma vegetação nativa de Caatinga (7°23'30"S e 36°31'59"W) em cinco áreas, sendo duas utilizadas para pastejo animal. Realizou-se um levantamento florístico pelo método de parcelas com distribuição sistemática. Foi realizado o levantamento fitossociológico no qual os seguintes índices foram obtidos: equabilidade, similaridade, dominância e diversidade para a avaliação dos dados. As espécies predominantes foram: *P. pyramidalis*, *A. pyriformis*, *P. gounellei*, *C. sonderianus* e *J. molíssima* para todas as áreas em estudo. As áreas 1 e 2 apresentaram 46% de táxons da família Fabaceae. A diversidade e riqueza de famílias e espécies encontradas nas áreas de estudo foram baixas com presença dominante da espécie *P. pyramidalis*.

Palavras-chave: Catingueira, levantamento florístico, levantamento fitossociológico, semiárido.

Introduction

The Caatinga biome has a vegetational complex of arboreal size, mostly composed by arboreal / shrub legumes, used as fodder support in systems of extensive creation of small ruminants. Edaphoclimatic conditions of the Caatinga favor the development of vegetal species well adapted to the region.

However, most of the Caatinga vegetation is in secondary succession, and in the majority, towards degradation, however Araújo Filho et al. (2002) state that if appropriate measures are taken regarding pasture management, much of it can be worked sustainably. In this particular case, Pereira Filho et al. (2007) state that the rational breeding of goats and sheep is a determinant for the adequacy of Caatinga vegetation management techniques and the correct use of their forage potential guarantees, in the final analysis, the improvement of rural man's living conditions.

In addition, small ruminants, when kept under grazing, express all their selection ability, either by different forage species or by parts of the plant. Gihad (1976) points out that sheep and goats in native pasture areas make up their diets with about 60% and 20% of grasses, 30% and 20% of broadleaf herbs, 10 and 60% of shrubs respectively, which led the authors to denominate the sheeps and the caprines branchies. However, Bartolomé et al. (1998) point out that sheep and goats behave as opportunistic gherkiners and, depending on floristic diversity, may present ingestive behavior in a differentiated way.

Gonzaga Neto et al. (2001) state that the Caatinga is the most important source of food for the herds in this region, reaching up to 90% of the diet of goats and sheep throughout the year, especially for those herds raised in an extractive way. However, the Caatinga presents a dynamics of phytomass production variable according to the seasons of the year, presence of the vegetative stratum, chemical composition of the soil, among others, and few studies are carried out with a greater approach on the characterization of these areas under grazing, periods of shortage of bulky ones. Therefore, the objective of this work was to characterize the spatial variability of a vegetation in areas of Caatinga with or without animals in the Paraíba Cariri.

Materials and Methods

The experiment was conducted at the Experimental Station belonging to UFPB, located in the municipality of São João do Cariri-PB, at coordinates 7o23'30 "S and 36o31'59" W, at an altitude of 458 m.

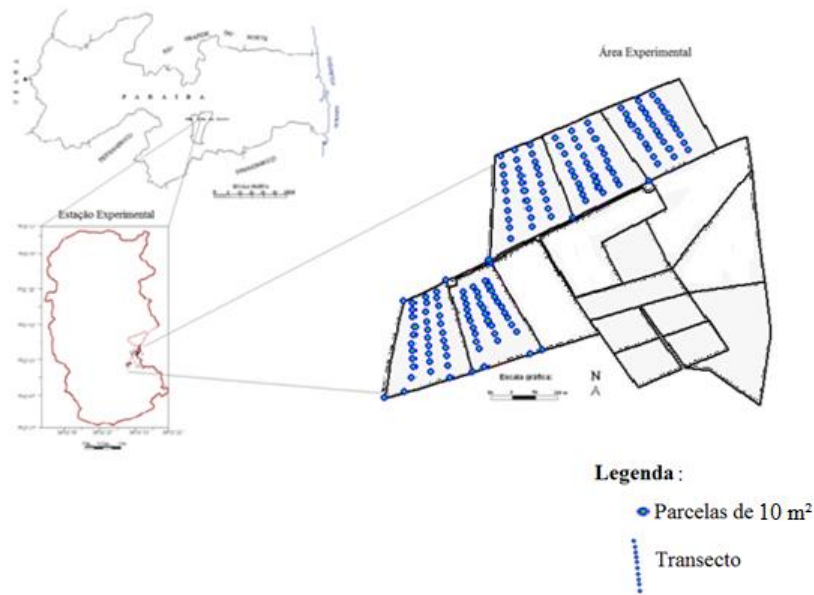


Figure 1. Mapping of the experimental area. Font: Data of research.

The municipality is inserted in the physiographic zone of the upland of Borborema, being part of the micro-region of the Eastern Cariri. In the area predominates the Bsh climate - hot semi-arid with summer rains. The vegetation that covers the studied region is the hyperoxerophytic Caatinga (prickly deciduous vegetation) and shrub.

The precipitation in the base year of 2013 was 221 mm. It is possible to see in figure 2, pulses of precipitation spaced during the months of April and October.

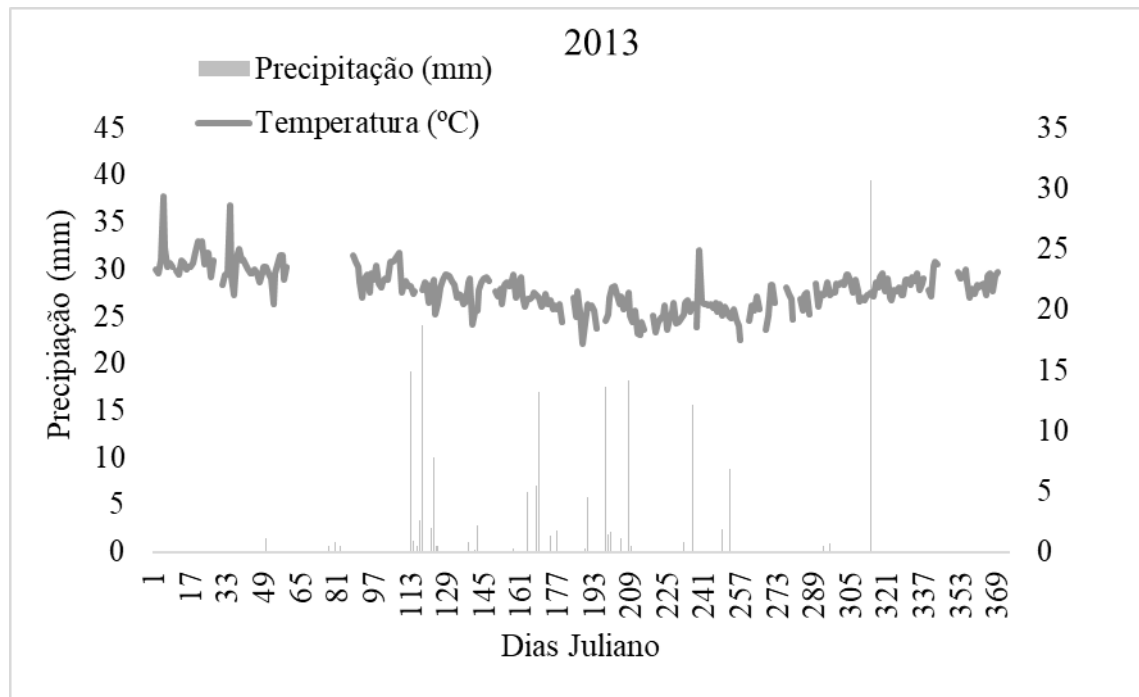


Figure 2. Data on rainfall and temperature in the base year 2013. Font: Data of research.

Five Caatinga areas of 3.3ha each were used. The areas had the following characteristics: area 1 had a load of 10 animals (1 animal / 3,200 m²), area 2 with a load of 5 animals (1 animal / 6,400 m²), and areas 3, 4 and 5 were characterized by different conditions. The animals belonging to the areas were adult male goats, with no standard age and no defined racial pattern.

The floristic and phytosociological survey was carried out in five areas of Caatinga by plot method, with a systematic distribution, disposed in equidistant form (10 m x 10 m). In each area were measured 30 plots of 10 m², resulting in a total of 1,500 m² of area sampled. The floristic survey was carried out by means of walks in the plots, where botanical parts of the plants (leaf, flower and fruit) were sampled with an apparent presence of descriptors. The material was conditioned in an oven with forced air circulation at 55°C for 48 hours, after which the exsicates were prepared.

In order to identify the individuals, the exsicates were sent to the Lauro Pires Xavier Herbarium in the Department of Systematics and Ecology of the Federal University of Paraíba (DSE-UFPB) for comparison with exsicates that are part of the herbarium collection and remain there for future consultation.

The species, height (≥ 1.0 m) and the circumference at the soil level of all living individuals (≥ 9 cm) of the tree stratum were measured in each plot (Rodrigues, 1989). The species were organized by family in the Cronquist system (1988), including information about the habit.

In order to verify the sample sufficiency of the areas, the collector curves were prepared for each study area (Rodal et al., 1992), plotting the number of plots adopted on the abscissa axis. For the identification of floristic similarity between the study areas a matrix of presence-absence of species was elaborated.

To quantify the diversity of the ecosystem in order to compare the different types of vegetation, the Shannon-Weaver diversity index was used (Magurran, 1988); to verify if the species are also abundant, the Pielou equability index (J') was used; to quantify the similarity of the communities, a cluster analysis was performed using the Jaccard's similarity index (Muller-Dombois and Ellenberg, 1974); to verify the dominance of floristic communities, the Simpson (C') dominance index was used (Brower; Zar, 1984); (McGinnies, 1934) and to characterize the structure of the tree community, the phytosociological parameters were calculated for each species according to Rodrigues (1989) and the Mata Nativa 3 program was used (see 3.11) for statistical evaluation.

Results and Discussion

In total, 1,288 individuals, 8 families, 12 genera and 12 species were found in this study (Table 1).

Table 1. Relationship of families found and frequencies of individuals in the five study areas.

Family	ANIMAL PRESENTS				ABSENCE OF ANIMALS					
	AREA 1		AREA 2		AREA 3		AREA 4		AREA 5	
	N of individuals	%	N of individuals	%	N of individuals	%	N of individuals	%	N of individuals	%
Anacardiaceae	1	0.24	-	-	1	0.32	-	-	-	-
Apocynaceae	97	23.49	49	14.58	56	17.78	24	11.16	34	19.10
Cactaceae	86	20.82	44	13.10	51	16.19	40	18.6	30	16.86
Capparaceae	-	-	2	0.60	1	0.32	-	-	-	-
Euphorbiaceae	17	4.12	93	27.67	88	27.94	93	43.26	69	38.76
Fabaceae	203	49.15	144	42.85	118	37.46	58	26.98	45	25.28
Vitaceae	9	2.18	3	0.90	-	-	-	-	-	-
Amaranthaceae	-	-	1	0.30	-	-	-	-	-	-
TOTAL	413	100	332	100	315	100	215	100	178	100

In relation to the number of individuals within the families found, the Fabaceae family recorded the highest number of individuals (476 individuals), followed by the families Euphorbiaceae (309 individuals), Apocynaceae (255 individuals) and Cactaceae (239 individuals).

In addition, the families Euphorbiaceae, Fabaceae, Apocynaceae and Cactaceae were present in all areas, regardless of grazing of animals. Such occurrence demonstrates the high resilience and opportunism of the natural regenerating species: *Jatropha molissima* (Pohl) Baill and *Croton sonderianus* Müll. Arg. (Euphorbiaceae), *Poincianella pyramidalis* (Tul.) And *Mimosa ophthalmocentra* Mart. ex Benth (Fabaceae), *Aspidosperma pyriforme* Mart. (Apocynaceae) and *Pilosocereus gounellei* Byles & Rowley and *Tacinga palmadora* N.P.Taylor & Stuppy (Cactaceae).

In the areas where the animals were present (areas 1 and 2), the Fabaceae family was predominant, while in the others (areas 4 and 5) the Euphorbiaceae family showed a larger number of individuals. This can be explained by the dispersion of tree legume seeds (*M. ophthalmocentra*) in areas grazed by goat manure, while the species Pinhão (*J. molissima*) and Marmeleiro (*C. sonderianus*) have shown to be opportunistic in unmanaged areas.

The Vitaceae family appeared only in pasture areas with low frequency species. Also no studies of consumption of the species *Cissus decidua* Lombardi (found in this study) by goats have been reported. This may explain the low dispersion of the species.

Two species were found within the families: Euphorbiaceae - *Jatropha molissima* (Pohl) Baill. and *Croton sonderianus* Müll. Arg. ; Cactaceae - *Pilosocereus gounellei* (F.A.C.Weber) Byles & Rowley and *Tacinga palmadora* (Britton & Rose) N.P.Taylor & Stuppy; Anacardiaceae - *Schinopsis brasiliensis* Engler and *Spondias tuberosa* L. ; and Fabaceae - *Poincianella pyramidalis* (Tul.) L.P. Queiroz and *Mimosa ophthalmocentra* Mart. ex Benth; As for the others, only one species was recorded, being: *Cissus decidua* Lombardi for the Vitaceae family; *Cynophalla flexuosa* (L.) J. Presl for the Capparaceae family; and *Aspidosperma pyriforme* Mart. for the family Apocynaceae. This confirms once again the resilient and opportunistic power of the euphorbiaceous, cactaceous and fabaceous species.

The most frequent species were *P. pyramidalis* (500 individuals), *A. pyriforme* (255 individuals), *P. gounellei* (189 individuals), *C. sonderianus* (154 individuals) and *J. molissima* (199 individuals) for all areas in study.

In the area 1, 49.15% of the individuals were represented by the Fabaceae family (table 1), while in area 2 42.85% and 37.43% were found in area 3. The areas with animals (1 and 2) represent 46% of the Fabaceae family.

In areas 4 and 5, they were represented by the family Euphorbiaceae, with 43.26 and 38.76%, respectively, differing from the others.

The equability indexes presented show a great similarity of the study areas, especially areas 3 and 5 (table 2).

Conclusions

The diversity and richness of families and species found in the study areas were low, requiring a Caatinga management to avoid degradation of the areas.

The evaluated areas are of secondary succession, with dominant presence of the species *P. pyramidalis*, of low population diversity.

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