Ethnobotanical study of useful vegetal species in two rural communities in the semi-arid region of Paraíba state (Northeastern Brazil)

Cleilton Marques Alves[1], Camilla Marques de Lucena[2], Suellen da Silva Santos[2], Reinaldo Farias Paiva de Lucena[2*] & Dilma Maria de Brito Melo Trovão[1]

RESUMO: **Estudo etnobotânico das espécies vegetais utilizadas por duas comunidades rurais na região do semiárido do Estado da Paraíba (Nordeste do Brasil).** Na tentativa de compreender a relação homem/recursos naturais, a partir de estudos etnobotânicos, o estudo teve por objetivo estimar os valores de uso das espécies vegetais em duas áreas de Caatinga no Cariri Paraibano, além de buscar conhecer os usos múltiplos das plantas pelos moradores das comunidades rurais do Brito (Queimadas – PB) e Lagoa Salgada (Montadas, Areial, Pocinhos – PB). Foram feitas entrevistas semi estruturadas com especialistas locais e com a comunidade em geral. Com os especialistas utilizou-se a técnica de "bola de neve" e a técnica de turnê-guiada. Foram identificadas 77 espécies, sendo 40 na comunidade do Brito e 37 na comunidade de Lagoa Salgada, todas distribuídas em categorias de uso, que vão desde usos tecnológicos a alimentícios. Sete espécies obtiveram o valor de uso maior ou igual a 1: *Croton blanchetianus* Baill., *Mimosa caesalpinefolia* L., *Prosopis julifora* DC., *Mimosa tenuiflora* (Willd.) Poir., *Opuntia ficus-indica* Mill., *Aspidosperma pyrifolium* Mart. e *Myracrodruon urundeuva* Allemão. As categorias de uso foram iguais tanto entre as duas comunidades, como entre os informantes gerais e os especialistas locais, o que mostra a grande semelhança de uso e a preferências por determinadas plantas. As espécies menos citadas foram àquelas destinadas a alimentação e construções domésticas, e as mais utilizadas foram para uso medicinal. As famílias mais citadas foram Cactaceae, Euphorbiaceae e Fabaceae. Quanto às espécies, as mais valorizadas nas comunidades foram *Croton blanchetianus*, *Pilosocereus gounellei* e *Mimosa tenuiflora*. Apesar das comunidades apresentarem uma grande dependência

[1] Universidade Estadual da Paraíba (UEPB). Centro de Ciências Biológicas e da Saúde. Departamento de Biologia. Campina Grande, Paraíba, Brasil.

[2] Universidade Federal da Paraíba (UFPB). Campus II. Centro de Ciências Agrárias. Departamento de Fitotecnia e Ciências Ambientais. Laboratório de Etnoecologia. Areia, Paraíba, Brasil.
*Corresponding author: reinaldo@cca.ufpb.br
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da flora local para sobrevivência, o extrativismo e a falta de conservação de espécies são notórios em ambas.
Palavras chave: Etnobotânica; População Local; Caatinga.

ABSTRACT: Trying to understand the relationship between man/natural resources, from ethonobotanical studies, this study aimed to estimate the use value of vegetal species in two Caatinga areas in the Cariri of Paraíba state, besides knowing the multiple uses of plants by the residents of rural communities of Brito (Queimadas - PB) and Lagoa Salgada (Montadas, Areial, Pocinhos - PB). Semi-structured interviews were conducted with local specialists and the community. It was used by the specialists the technique "snow ball" and the technique "guided tour". It was identified 77 species, being 40 in Brito community and 37 in Lagoa Salgada community, all of them distributed into use categories, since food up to technological uses. Seven species had the higher use value: 1: *Croton blanchetianus* Baill., *Mimosa caesalpinefolia* L., *Prosopis julifora* DC., *Mimosa tenuiflora* (Willd.) Poir., *Opuntia ficus-indica* Mill., *Aspidosperma pyrifolium* Mart. and *Myracrodruon urundeuva* Allemão. The used categories were equal between the two communities and among the general informants and local specialists, which show great resemblance of use and their preference for certain species. The lowest cited species were those for food and domestic building purposes, and the most used were those ones for medicinal use. The most cited species are Cactaceae, Euphorbiaceae and Fabaceae. Regarding the species, the most valued in both communities were *Croton blanchetianus*, *Pilosocereus gounellei and Mimosa tenuiflora*. Although the current communities have a great dependence of the local flora for surviving, the extraction and the lack of conservation of species are notorious in both communities.
Key words: Ethnobotany; local population; Caatinga.

Introduction

The terrestrial Biomes are continuously ravaged in a great speed due the over exploitation and the neglect that human beings have got due their environment, often causing widespread extinction of fauna and flora, in the destruction of seeds and other forms of life present in the soil, and even the loss of the capacity for natural regeneration of the ecosystems (Cheida, 1992).

The intense devastation of the ecosystems is a visible sign of the environmental crisis that the world is going through. Living systems are unable to neutralize the large environmental impacts caused by humans. Being the

disrespect and ignorance, the main factors which threaten the environment, therefore jeopardize the life quality (Vargens, 1998). For Silva (2004), the environmental crisis reflects the inadequate perception that humans have about the environment due a wrong and secular conception, whose the main idea that natural resources are inexhaustible. Thus, there is a dysfunctional relationship between human beings and nature which may result in the extinction of Homo sapiens species.

Ethnobotanical studies corroborate that the structure of vegetal communities and landscapes are always affected by people; however not only under negative aspects, but also benefiting and promoting the handled resources (Albuquerque & Andrade, 2002a). Human beings act as selective agent for plants, changing life cycles, mortality patterns, reproduction and survival of their populations, as well as modifying and taking advantage of chemical defenses for their benefit. One of the hypothesis tested in Ethnobotany, the hypothesis of Ecological Apparency precisely evaluates the chemical and environmental aspects which are related to the availability and use of certain species, whether from herbaceous to arboreal; trying to understand the dynamics of use of traditional populations is related or not to the environmental aspects of plants (Phillips & Gentry, 1993; Phillips & Gentry, 1993a; La Torre-Cuadros & Islebe, 2003; Albuquerque & Lucena, 2005; Cunha & Albuquerque, 2006; Lucena *et al*., 2007, 2008; Ayantunde *et al.,* 2009; Lucena *et al*., 2012).

The growing index of devastation and degradation of natural resources in the semi-arid regions has decimated a great part of native vegetation, allowing the agricultural activity, generating losses of soil which will sand the rivers and dams, compromising the water supply and making unlikely the ecosystem sustainability (Brasil, 1991). Despite being one of the most endangered ecosystems of the planet, there are few ethnobotanical studies in the Northeastern semi-arid, mainly in Paraíba state (Lucena *et al*., 2005; Lucena, 2009; Sá e Silva *et al*., 2009; Almeida *et al*., 2010; Lucena *et al*., 2012; Sousa *et al*., 2012), this way, such studies are needed to better characterize the pressure on forest resources of the Caatinga, analyzing the economic and social aspects of traditional populations who depend on natural resources available in this environment, in order to suggest an environmental management able to guarantee their sustainability (Albuquerque & Andrade, 2002a; Albuquerque & Andrade, 2002b). Based upon this deficiency, a group of researchers of the Ethnoecology Laboratory of the Federal University of Paraíba state is conducting searches in several cities in the semi-arid region of Paraíba state, trying to identify the use patterns of plant species, analyzing their various attributes, both within the corpus and praxis, since some studies about the genera Cactaceae and others, involving both timber and non-timber purposes.

In this context of use, sustainability and conservation of plant resources of the Caatinga, Lucena *et al*. (2007) have compared the species utilization data from the use value obtained in three semi-arid areas (two in the Agreste and another in the Sertão of Pernambuco). The authors have pointed out that in both areas the species are largely exploited, which there are species required for certain purposes. Thus, it is necessary to find out which plant species are the most important or locally preferred to be used in conservation plans. Based upon their results these authors have suggested some initiatives directed to the conservation: 1- "encourage and promote studies about the use, management and local perceptions of native natural resources used by rural communities"; 2 – "to encourage the use of alternative sources for timber resources, especially those used as fuel"; 3 – "involve the local community in the management and conservation of important resources locally"; and 4 – "evaluate the local stock of plants used and create strategies for handling in every situation".

Due the importance of forest goods and services for the populations from the Northeastern semi-arid, due the lack of possibilities to obtain means of survival from the economic exploitation of natural resources and the role of ethnobotanical studies to understand the relationships between people and these natural resources, this work aimed to estimate the use values of plant species in two areas of Caatinga in Paraíba state, in order to know the several ways to use these resources, and through this information, to create recovery strategies for the Caatinga in studies and later actions.

Material and Methods

Characterization of the areas of study. he study was developed in two areas of Caatinga, where the exploitation of natural resources by rural communities occurs. One at the rural community of Brito in Queimadas city (7° 25' 12"S, 36° 1' 37" W), located at the meso-region of the Agreste of Paraíba state and the micro-region of Campina Grande, and the other one in Lagoa Salgada community (7° 08' 26''S, 35° 54' 46''). This community has its own particularities, due its lands are divided into three municipalities, being them Areial and Montadas in the meso-region of the Agreste and micro-region of Esperança city, and Pocinhos at the same meso-region, however in the micro-region of western Curimataú.

The studied areas are inserted by PROBIO/2000 into the list of priority areas for conservation and further studies under the number 21 and 20, respectively, on the highest level of degradation, only remaining scattered small islands of native vegetation, where there are aspects of xerophytes, being

vegetal species adapted to long periods of water stress, resisting because the reserves of nutrients and water of roots/stems and leaves, as a result of their specialized metabolism. The typical taxonomic groups of the eco-region are the Cactaceae, Fabaceae and Bromeliaceae families (Veloso *et al*., 2002).

Community of Brito. The community of Brito is located at Queimadas city in the micro-region of Campina Grande, in Paraíba state, approximately 600 to 800 meters high, under crystalline geological structure, stony and shallow soils. The climate is Bsh type (semi-arid) characterized as hot and dry, with summer rains and low rainfall indices (annual average of 500 mm). The average temperature is 26° C and the relative humidity does not exceed 75%. The lack of water for long periods causes a slow development of the soil; hence they are stony and shallow (Carvalho *et al*., 2000).

The residents of Brito's community are typically people who survive of subsistence agriculture and livestock. People who were selected as key informants are retirees who work in agriculture and livestock only with additional income. In general, the community lives of the livestock (main economic activity) and subsistence farming (Carvalho *et al*., 2000).

Community of Lagoa Salgada. It is located at a confluence among three municipalities in Paraíba state: Montadas and Areial (micro-region of Esperança) and Pocinhos (micro-region of the western Curimataú). It is situated between 800 and 1000 meters high under crystalline geological structure, the soil is often shallow and stony with some sandy and sandy-clayey areas. The climate is Bsh type and the predominant vegetation is the Caatinga with some areas of typical vegetation of Agreste. Its special feature is the presence of headwaters of Mamanguape River, forming a watershed with the same name (www.paraiba.org.br accessed in 2007).

The economic structure of the residents is similar to Brito's community, however with few differences. The main activity is the agriculture; developed regardless of income obtained through retirements, pensions or social programs, and a great part of respondents do not take part of these programs. Through these cases, the area is quite devastated, remaining only a few hectares of native vegetation. A huge problem is due the lack of supervision by the environmental protection bodies and the lack of awareness of residents regarding environmental issues (Carvalho *et al.*, 2000).

Collection of ethnobotanical data. The ethnobotanical data were collected through semi-structured interviews (Albuquerque *et al.*, 2010), from September 2007 to February 2008, visiting 40 homes in Brito's community

and 48 in Lagoa Salgada. The interviews were conducted in the residence of each interviewee and when possible, in the remnant forest, according to Martin (1995).

The first visits were held in homes from the communities, which the older residents were called in order to select a first local specialist, which served as an initiator in the application of the "snowball" technique (Bailey, 1994; Albuquerque *et al*., 2010). It was identified 23 local specialists in Brito's community and 20 in Lagoa Salgada. From the interviews performed with experts, some were answered with an indication in loco of the mentioned species, featuring the technique of guided tour (Albuquerque *et al.*, 2010), on which occasion the botanical material was collected for identification and later tipping in Jayme Coêlho de Moraes' Herbarium, in the Agricultural Science Center of the Federal University of Paraíba State (UFPB).

The interviews were recorded and reproduced; the species were identified and related, listed by use type and grouped into use categories, adapted by Galeano (2000), Albuquerque & Andrade (2002a), Albuquerque & Andrade (2002b) and Fonseca-Kruel & Peixoto (2004) for this work.

Data analysis. For each species cited by local experts and the community in General, it was calculated the use value (VU) with the formula: $VU = \sum Ui/n$, described by Rossato *et al*. (1999), where Ui = number of uses mentioned by each informant, n = total number of informants.

The correlations between the use values estimated in the two samples of respondents were evaluated by the linear correlation coefficient of Pearson (Beiguelman, 1996).

Results

Community of Brito

Richness of uses and species of Caatinga. It was identified 41 species belonging to 39 genera and 19 families, distributed into seven use categories (Table 1 and 2). Some species stood out by presenting great use versatility, ranging from technological up to food uses, i.g. *Croton blanchetianus* Baill.

The use category that recorded the largest number of useful species was fuel with 26 species, followed by technology (14 spp.) and medicinal (13 spp.). The predominance of this category is due the heavy use of plants from this region for this purpose, besides the great diversity of useful species for energy purposes, mainly to meet the demand of domestic stoves.

Another conspicuous use category was the medicinal one, mainly

represented by the shrubby-arboreal, followed by the herbaceous ones. According to the informants such species are used for various purposes, since the human medical treatment till veterinary use. The current use of medicinal species is widespread in the community, but people do not drop the use of chemically-synthesized allopathic medicinal products when needed, and available by health agents and medical stations.

The species used in rural constructions, technology and food were also well represented and locally recognized. Such use is mainly due the economic activities in the communities, where prevail the subsistence agriculture and livestock. In order to get such practices is needed some tools, which are used with handles and appliances produced by plants of the region, characterizing the use of technology, such as hoe and axe handles. The uses of plants for human consumption and domestic constructions were little expressive.

Use value of Caatinga species. Seven species were highlighted regarding the use value, getting values greater than or equal to 1, being them: *Croton blanchetianus* Baill (marmeleiro), *Prosopis julifora* DC. (algaroba), *Mimosa tenuiflora* (Willd.) Poir. (jurema preta), *Opuntia ficus-indica* Mill.

Table 1: Use Categories organized from citations of use mentioned by the population of the communities of Brito and Queimadas, Paraíba (Northeastern Brazil) **i.ch** = Key -informants. **com**. = community in general.

Use Category	Uses mentioned by respondents	Number of cited species (i.ch.)	Number of cited species (with.)
Food	Human food	3	3
Domestic construction	Pug domestic Construction, door, door and window; plank wood ; beams; rafters; slats; wall sticks	3	3
Rural constructions	Gates; gatepost and fence stakes; fences	11	12
Fuel	Firewood and coal	22	25
Fodder	Food for farm animals	7	7
Medicinal	Infections in general; snake bite; rheumatic pain; digestive problems; respiratory disorder; urological disorder; back pain; stroke; child-birth disorder; cosmetics; abortive; cow milk production.	15	13
Tecnologia	Tool handles; gun handles; trough; bottle cap; stand; wooden spoon; pestle and oxcart	8	9

(cactus forage), *Aspidosperma pyrifolium* Mart. (pereiro), *Myracrodruon urundeuva* Allemão (aroeira do sertão) and *Sideroxylon obtusifolium* (Roem. & Schult.) T.D. Penn. (quixabeira) (Table 2). The expressiveness of these species may be associated to their utility, their peculiar qualities, resistance to drought and local availability, like *A. pyrifolium* and *M. tenuiflora*. However, it does not happen to *O. ficus-indica*, which stood out and was widely appreciated, even without having great diversity of use, due its use by all residents, as fodder for livestock, besides being a cultivated and exotic species.

Plants whose use value was low, as *Leucaena leucocephala* (LAM.), *Ruta graveolens* L. and *Plectranthus* sp. are used by few people, and do not occur in abundance in the area, mainly for being an exotic species and for being herbaceous plants that do not survive in dry environments, except *L. leucocephala* which presents shrubby size (Table 2). For this reason, the use of these species rarely occurs. The remaining ones which showed low use value, however being woody plants, probably was because their disuse in people's daily life or by being forgotten by the respondents, as happened to *Ziziphus joazeiro* Mart. and *C. lepthophloeos*.

The species which had average values between 0.4 and 0.8 are plants which have reasonable use and usually, according to the respondents, are required when the preferred species is hard to access, like *Eucholirium spectabile* L., *Cereus jamacaru* DC. and *Agave sisalana* L., mainly, in the drought season, serving as food for cattle forage. Similarly occurs with *Erythrina velutina* Willd., *Euphorbia tirucali* Boiss. and *Cereus squamosus* Guerk., being used for fuel and rural construction, especially to build fences.

The use values correlated between the general community and the key informants about each species are similar, showing that there is great similarity of uses and preferences by plants. The occurring changes in the values are due the community in general to present more use categories per each plant than the key informants. On the other hand, some species described above had their use referred only by these informants, like *Talisia esculenta* (Radlk.) and *Swartzia psilonema* (Harms).

Myracroduon urundeuva and *A. colubrina* presented high use value, mainly because their medicinal use is strongly aggregated to local culture; however, other use categories for these species were little mentioned. *M. tenuiflora* . Although getting high use value and be cited by most of the respondents, does not have wide range of uses, being used only in rural constructions and as fuel. *Tabebuia sp*. and *Schinopsis brasiliensis* Engl. had great appreciation and diversity of use; however their uses tend to decrease over time due their scarcity in the areas of local vegetation and because the prohibition of their use by IBAMA through Law n° 9.605/98.

A material fact is the case of *Prosopis juliflora* DC, a plant considered as invasive in the Caatinga, however getting a high use value, and being considered as versatile plant. Although introduced quite recently, it has obtained a lot of acceptance by the community for its great presence and its arboreal habit in the region, which enables its use in rural constructions.

Most of the plants with medicinal use did not provide other ways of use. However, when is considered only those with shrubby or arboreal size, the scenario changes, because they presented greater availability than the herbaceous sized, like *M. urundeuva*, *A. colubrina* and *S. obtusifolium*. This situation may be explained by the hypothesis of climatic seasonality and optimal foraging, since in the areas dominated by Caatinga vegetation, the only medicinal resource available all over the year is the bark.

According to the information of respondents, the use of these plants by the community is under sustainable basis, since the use of these resources occurs sporadically, both in the use of the entire plant and the use of wood for charcoal, firewood and technological utilities, as well as in the use of their parts (bark, leaves, flowers, roots, etc) for non-timber purposes. Plants which have a few use varieties (one or two uses) are those that occur sparsely in the region, or those ranging from medium and small, and their use occur occasionally, like *Malva silvestris* L. and *A. cearensis*. Thus, checking out if the use values are directly proportional to their categories. This same situation is found in plants with high use values, which by their preference and size are used in many categories and consequently have got their greater versatility, as *C. blanchetianus* and *Geoffroea spinosa* Jacq, both with five categories.

However, there are exceptions such as *O. ficus-indica*, *Pilocereus gounellei* and *M. tenuiflora* which, although present little diversity of use, are well required by the residents who have large amount in local vegetation and farms, and also because economic issues, being them used for animal feeding.

Community of Lagoa Salgada

Categories of Caatinga species. he use categories which fit the useful species cited by the informants of Lagoa Salgada community were the same ones recorded in the community of Brito, being: food, power, rural and domestic construction, fuel, forage, medicinal and technology (Table 1 and 3). As well as in the community of Brito, in Lagoa Salgada species with few citations were those used as fodder and in domestic construction.

In this community there was an expressive knowledge by informants regarding the potential use of species, however such uses are not being effective, due the absence of individuals in the local vegetation, mainly regarding the species for medicinal purposes.

Table 2: Species mentioned by key-informants and informants of the general community, their use values within and their respective use categories described by the residents of the community of Brito, Queimadas, Paraíba (Northeastern Brazil). A: nutrition; B: domestic constructions; C: rural constructions; D: fuel; E: fodder; F: medicinal; G: mobile technologies.

Species	Common Name	Use Values (i.ch.)	Use Values (with.)	Use Category
Agavaceae				
Agave sisalana	Agave	0,58	0,54	D, E, G
Amarantaceae				
Gomphrena demissa Mart.	Quebra panela	0,47	0,50	E, G
Anacardiaceae				
Myracrodruon urundeuva Allemão	Aroeira	1,04	0,95	C, D, F
Spondias tuberosa Arruda	Umbuzeiro	0,83	0,85	A, D
Schinopsis brasiliensis Engl.	Braúna	0,91	0,97	C, D,
Apoynaceae				
Aspidosperma pyrifolium Mart.	Pereiro	1,13	1,07	C, D, G
Bignoniaceae				
Tabebuia aurea (Sila Manso)	Craibeira	0,70	0,61	C, D
Tabebuia sp.	Pau d'arco	0,70	0,85	C, D, F
Bromeliaceae				
Eucholirium spectabile L.	Macambira	0,45	0,59	E
Neoglaziovia variegata Mez	Caroá	0,85	0,91	E, G
Borraginaceae				
Cordia alliodora Chamm.	Frei Jorge	0,41	0,52	D, G
Guapira sp.	João mole	0,33	0,78	D, F, G
Burseraceae				
Commiphora leptophloeos (Mart.) J. B. Gillet.	Imburana	0,38	0,71	D, G
Cactaceae				
Cereus jamacaru DC.	Mandacaru	0,58	0,62	E
Cereus squamosus Guerk.	Facheiro	0,78	0,85	A, E
Opuntia ficus-indica Mill.	Palma	1,00	1,04	E
Pilosocereus gounellei (F.A.C.Weber) Byles & Rowley.	Xiquexique	0,83	0,85	B, E
Chenopodiaceae				
Chenopodium ambrosioides L.	Mastruz	0,41	0,95	F
Crassulaceae				
Kalanchoe brasiliensis Cambess.	Saião	0,12	0,47	F
Euphorbiaceae				
Croton blanchetianus Baill.	Marmeleiro	1,20	1,12	B, C, D, E, G
Euphorbia tirucali Boiss.	Avelós	0,60	0,71	C, D
Phyllanthus niruri L.	Quebra-pedra	0,41	0,78	F
Fabaceae				
Anadenanthera colubrina (Vell.) Brenan	Angico	1,00	0,97	C, D, F
Amburana cearensis (Allemão)	Cumaru	0,45	0,86	D, F
Bauhinia cheilantha (Bong.)	Mororó	0,50	0,78	D, G

Table 2 (cont.)

Species	Common Name	Use Values (i.ch.)	Use Values (with.)	Use Category
Erythrina velutina Willd.	Mulungu	0,50	0,71	D, G
Geoffroea spinosa Jacq.	Umarí	1,25	1,12	A, B, C, D, G
Leucena leucocephala (Lam.)	Leucena	0,20	0,47	E
Libidibia ferrea (Mart. *ex* Tul.) L.P.Queiroz	Jucá	0,70	0,60	A, D, F
Mimosa tenuiflora (Willd.) Poir.	Jurema preta	1,16	1,05	C, D
Poincianella pyramidalis Tul.	Catingueira	0,95	0,9	C, D
Prosopis julifora DC.	Algaroba	1,00	1,00	C, D, E
Senna martiana (Benth.) H.S.	Canafistula	0,58	0,59	C, D
Swartzia psilonema (Harms.)	Ubiratã	0,83	0,00	D, E
Lamiaceae				
Plectranthus sp.	Hortelã	0,20	0,19	F
Malvaceae				
Malva silvestris Linn.	Malva	0,20	0,20	G
Sida acuta Burm.	Relógio	0,16	0,16	G
Rhamnaceae				
Ziziphus joazeiro Mart.	Juá	0,45	0,42	A, D, F
Rutaceae				
Ruta graveolens L.	Arruda	0,16	0,11	F
Sapindaceae				
Talisia esculenta (Radlk.)	Pitomba	0,50	0,00	A, D
Sapotaceae				
Sideroxylon obtusifolium (Roem. & Schult.) T.D. Penn.	Quixaba	1,00	1,00	D, F, G

Table 3: Use categories arranged from the citations of use mentioned by the population of Lagoa Salgada community, municipalities of Montadas, Areial and Pocinhos, Paraíba (Northeastern Brazil). **i.ch** = key-informers. **com.** = community in general.

Use Category	Uses mentioned by respondents	Number of cited species (i.ch.)	Number of cited species (with.)
Food	Human food	3	1
Domestic construction	Pug domestic Construction, door, door and window; plank wood ; beams; rafters; slats; wall sticks	2	2
Rural constructions	Gates; gatepost and fence stakes; fences	9	8
Fuel	Firewood and coal	11	12
Fodder	Food for farm animals	4	6
Medicinal	Infections in general; snake bite; rheumatic pain; digestive problems; respiratory disorder; urological disorder; back pain; stroke; child-birth disorder; cosmetics; abortive; cow milk production.	5	5
Tecnologia	Tool handles; gun handles; trough; bottle cap; stand; wooden spoon; pestle and oxcart	3	4

There are 40 species, belonging to 38 genera and 24 families (Table 4). Those that stood out were: *Cereus squamosus* Guerk., *Prosopis julifora* DC., *Bowdichia virgilioides* Humb., *Agave sisalana* L. and *Lonchocarpus sericeus* Humb., besides other species already highlighted in the community of Brito (pereiro, catingueira, aroeira). These plants have many ways of use (Table 3), but being more used as fuel and food.

The plants which have few use categories were, mostly, fruit or herbaceous, or are not found in the region, due the extinction in the place, like *Mimosa caesalpinefolia* L. (sabiá) which most of the time is acquired as stakes or firewood.

Table 4: Species mentioned by the key-informants and informants of the general community, their values of their respective use categories described by residents of the Lagoa Salgada, municipalities of Montadas, Areial, Pocinhos, Paraíba (Northeastern Brazil). A: nutrition; B: domestic constructions; C: rural constructions; D: fuel; E: fodder; F: medicinal; G: mobile technologies.

Species	Common Name	Use Values (i.ch.)	Use Values (with.)	Use Category
Agavaceae				
Agave sisalana	Agave	0,71	0,71	B, D, E, G
Anacardiaceae				
Anacardium occidentale L.	Cajueiro	0,89	0,82	B, D, E, G
Myracrodruon urundeuva Allemão	Aroeira	1,06	1,00	C, D, F
Anonnaceae				
Annona marcgravii Mart.	Araticum	0,17	0,48	A
Apoynaceae				
Aspidosperma pyrifolium Mart.	Pereiro	1,07	1,06	C, D, G
Asteraceae				
Bidens pilosa L.	Picão preto	0,91	0,82	E, F
Borraginaceae				
Cordia sp.	Louro	1,00	0,93	C, D, G
Guapira sp.	João mole	0,64	0,68	D, G
Eucholirium spectabile L.	Macambira	0,5	0,48	C,E
Burseraceae				
Commiphora leptophloeos (Mart.) J. B. Gillet.	Imburana	0,50	0,66	C,D
Capparaceae				
Cynophalla flexuosa (L.) J. Presl	Feijão bravo	0,28	0,51	D
Cactaceae				
Cereus squamosus Guerk.	Facheiro	0,80	0,60	B, C, D, E
Opuntia ficus-indica Mill.	Palma forrageira	1,02	1,02	A, E
Celastraceae				
Maytenus rigida Mart.	Bom nome	0,50	0,53	C, D, G

Table 4 (cont.)

Species	Common Name	Use Values (i.ch.)	Use Values (with.)	Use Category
Chenopodiaceae				
Chenopodium ambrosioides L.	Mastruz	1,00	0,95	F
Curcubitaceae				
Luffa operculata Cong.	Cabacinha	0,64	0,68	F
Euphorbiaceae				
Croton blanchetianus Baill.	Marmeleiro	1,06	1,00	B, C, D, E, G
Croton campestris A.St.-Hil	Velame	0,51	0,86	D
Euphorbia tirucali Boiss.	Avelós	0,78	0,75	C, D
Manihot glaziovia L.	Maniçoba	0,55	0,70	C
Jatropha curca L.	Pinhão verde	1,00	1,00	C, D
Fabaceae				
Amburana cearensis A.C. Smith	Cumarú	0,82	0,62	B, C, D, E, G
Bowdichia virgilioides Humb.	Sucupira	0,95	1,00	E
Lygodium volubile Sw.	Feijão de Lambu	0,33	0,33	C, D, G
Lonchocarpus sericeus Humb.	Piaca	0,67	0,73	C
Mimosa caesalpinefolia L	Sabiá	1,00	1,02	C, D
Mimosa tenuiflora (Willd.) Poir.	Jurema preta	1,07	1,02	C, D
Poincianella pyramidalis Tul.	Catingueira	0,95	0,89	C, D
Pithecellobium dumosum Benth.	Jurema branca	0,88	0,91	C, D, E
Prosopis julifora DC.	Algaroba			
Malvaceae				G
Malva silvestris Linn.	Malva preta	0,50	0,46	
Myrtaceae				A
Eugenia uvalha Camb.	Ubaia	0,53	0,82	
Poaceae				E
Cenchus echinatus L.	Carrapicho roseta	0,33	0,66	F
Cymbopogon citratus Stapf	Capim santo	0,88	0,88	
Rhamnaceae				F
Ziziphus joazeiro L.	Juazeiro			
Sapindaceae				A, D
Talisia esculenta (Radlk.)	Pitomba			
Sapotaceae				D, F
Sideroxylon obtusifolium (Roem. & Schult.) T.D. Penn.	Quixaba	0,82	0,68	B, D, E
Solanaceae				
Solanum paniculatum L.	Jurubeba	0,71	0,71	
Verbenaceae				F
Lantana camara L.	Camará	0,71	0,93	
Indeterminada				
Sambucus australis Cham. & Schltr.	Sabugueiro	0,71	0,64	
Indeterminate 1	Carrapicho cigano	0,40	0,44	

Use Value of the species in Lagoa Salgada. Plants that had greater use value were: *Bowdichia virgilioides* Humb., *C. blanchetianus*, *M. tenuiflora* and *Mimosa caesalpinefolia L.* by presenting arboreal and shrubby size and higher availability in the area, except *Mimosa caesalpinefolia* L., whose conditions were said earlier (Table 4).

Unlike the community of Brito, these plants do not show multiple uses, even though they are cited by many people. In the same way with *Cordia sp*. (louro) and *A. pyrifolium*, which are widely used for making handles for tools, due their wood be "linheira", as the farmers say, i.g., what favors their use. Plants that have less value were *Lonchocarpus sericeus* Humb. and *Lantana camara* L. which are enough useful in domestic construction, however were not very informed, perhaps for being forgotten, besides being eliminated from the rural property by hinder the agriculture practice.

Correlating data from the key informants and the general community, there is great similarity of uses, showing up, in the same way, that the community of Brito and in general the community of Lagoa Salgada present greater diversity of use, while the key informants have got greater medicinal knowledge, being a more specialized knowledge.

Correlation between the areas of study. Correlating the values found in the two areas of study, it was verified that their correlation is positive, because the plants presented by the residents from both studied communities have the same preferences, even if the described plants be different.

In this context, communities have different plant formations, as seen when examining the Sorensen index that both vegetal physiognomies are just like 33.7%. Showing that, every community has got a comprehensive guide of the plants very similar, changing only the vegetal species.

Discussion

The use of plants as food got reasonable values despite the livestock to be quite practiced in the region. The main reason is that useful plants in this activity are scarce and other herbaceous, scattered in the vegetation, which are consumed in livestock (usually in the extensive system) do not persist during the drought season. Such situation may be understood because the members of the analyzed communities use livestock for living, using traditional techniques. If the livestock was developed, the tendency is the percentage of these species to diminish with the introduction of forage plants from other ecosystems, as described by Lima & Pozzobon (2005) in studies in the Amazon region.

Even with this scenario found in the studied communities, other studies conducted in other cities in the semi-arid region (Albuquerque & Andrade, 2002a; Albuquerque & Andrade, 2002b; Ferraz *et al*., 2005, 2006; Lucena *et al*., 2008, 2012) show that rural populations have a great knowledge and huge list of plants with utilitarian potential for forage purposes, which may, at any time, be required for such purpose. In this context, a possible explanation for this difference in knowledge and use of forage species is the climate, since the rainfall indices and the rainy season in the semi-arid area is well varied, especially when observing communities located at the Borborema plateau with communities located at the Depressão Sertaneja region, like in Paraíba state.

A category which stood out in the communities of Brito (25 species) and Lagoa Salgada (22 species) was the fuel category, with a large number of species mentioned for that purpose. This highlight is expected in surveys conducted in the semi-arid regions because the social economic features of the rural population of the region, which have a low per capita income, which leads them to seek resources in areas of vegetation to meet their basic needs, which in this case is cooking their food in domestic and coal stoves. Many studies have recorded and analyzed the use of species of Caatinga for energy purposes, sometimes through ethnobotanical studies in a general aspect (Albuquerque & Andrade, 2002a; Albuquerque & Andrade, 2002b; Ferraz *et al*., 2005, 2006; Lucena *et al*., 2008, 2012), or through specific ethnobotanical studies about the species of potential fuel (Ramos *et al*., 2008; Ramos *et al*., 2008a). This positioning about the vegetation denotes the extractive nature of the inhabitants who live at the Caatinga area, thus, corroborating with the studies by Drummond (2000).

On the other hand, the uses in food were not significant, because, despite the respect of each respondent to those plants, food production occurs in certain period of the year and most of the respondents do not enjoy the fruits of native species. The same situation is seen in Ferraz *et al*. (2006). Besides, the habit of eating wild fruit became reduced as soon as the native flora disappeared and the consumption of exotic fruit grows. Unlike the results of Fonseca-Kruel & Peixoto (2004), in surveys conducted in Rio de Janeiro, where the wild fruits have great value to the community, but this difference may be related to the type of environment, since this study was carried out in humid forests. Although they are not consumed steadily, the knowledge about native plants of Caatinga which present food potential was recorded in ethnobotanical studies (Albuquerque & Andrade, 2002a; Albuquerque & Andrade, 2002b; Ferraz *et al*., 2005, 2006; Lucena *et al*., 2008, 2012).

An issue which may possibly explain this situation is the fact that many people from semi-arid regions associate the consumption of fruits of

native plants to poverty, since the past, where there were strong droughts in the Northeastern region, the rural population survived, in some regions, foraging on these plants, including cacti species. These issues about food taboos were observed in the study by Nascimento (2010) in a rural community of Pernambuco and another one in Paraíba state. Another explanation may also be given as a result of the improvement in the life quality of rural populations in obtaining a governmental aid, such as scholarship and family aid (Cavalcanti Filho, 2010), implying an improvement in the family income, which leads them to depend less of native species.

Regarding the rural constructions and technological uses, the values are significant, taking into consideration that the residents have a preference for certain species. It should also take into consideration the availability of plants for these uses, because it is required arboreal habit plants, which are scarce in study and some species are protected by the State supervisory bodies, like *S. brasiliensis* and *Tabebuia sp*. in this case, it was achieved a high number of use citations in these categories, but as mentioned before, such species are scarce, which denotes that this knowledge and use is only in the cognitive domain of these residents, without being effectively used in their everyday life, reinforcing the need that Lucena *et al*. (2012) pointed out about the distinction in ethnobotanical studies of what will be a citation of current use and a citation of potential use (such use which is known but not practiced). The importance of this distinction was already pointed out in literature (Lucena *et al*., 2007). The alternative found by local residents of the studied communities in the present study is the purchase of benefited wood. This same situation was found by Pedroso Júnior (2002). Thus, when the biota is used for a specific purpose, the variety becomes important, since some plants are better than others for a specific utility, here another note is required, in what will be a known species and preferred species, because there is a tendency of the informants to include a large list of species for a certain purpose, however, using a few in the practice (preferred).

Regarding the use in building, the plants of the Caatinga are constantly used for making fences (gatepost, stake or stick) and in technological uses, mainly related to the acquisition of tool handles, such as hoe handles, sickle, axe, among others (Lucena *et al*., 2007, 2008; Nascimento *et al*., 2009). This use, depending on the degree and dynamics, can submit many species to an extractive pressure that may take it to a critical level of local extinction, uses that deserve to be highlighted and a careful and deep analysis of recorded information.

One of the main uses of the plants of the Caatinga is the medicinal use. Such use is motivated by empirical medical knowledge which is going

through generations combined with social economic conditions, using the plants usually as tea (infusion or decoction). This use pattern also verified in Melo *et al*. (1998), Coutinho *et al*. (2002) and Tosti & Colli (2007) regarding *Chenopodium ambrosioides* L. and *Phyllanthus niruri* L. Confirms the data also found in Monteles & Pinheiro (2007) in studies carried out in Maranhão state. The use of medicinal plants in the Caatinga and their parts used, follows a peculiar dynamics of this environment, mainly, following the influence of climate, which in the case of the Caatinga, using bark as an available resource during the entire year, and in short periods the other parts, this situation explains the heavy use of bark for medicinal purposes in this region. The medicinal potential of the Caatinga species were recorded in several ethnobotanical studies, since inventories up to hypothesis tests, denoting the importance of traditional medicinal repertoire, which is going through profound changes and even the loss of knowledge due the advance of globalization in rural areas, and the arrival of medical assistance, assistance of rural health agents and other welfare activities, as well as the arrival of electric power, which radically change the daily life of rural populations.

Some plants found in Lagoa Salgada community were represented not only in the use of wood, as seen in Trovão *et al.* (2004) as well as forage. Also were relevant those ones used as a medicinal product, where most of the plants and their methods of use are correlated to works by Albuquerque & Almeida (2002), Coutinho *et al.* (2002), Fonseca-Kruel & Peixoto (2004) and Rosa *et al.* (2005) mainly regarding *Anacardium occidentale* L. and *S.obtusifolium* . This explains why much of medicinal plants are herbaceous sized and those which present arboreal habit are respected, and they are hardly used for other purposes. This occurs because people preserve the shrubs and trees with medicinal properties, because residents have this perception that the vegetal resources are running out and if you do not preserve them, they may come to an end, a fact confirmed in the data by Albuquerque & Andrade (2002a).

Many plants of arboreal habit are also used for healing diseases, both in humans and animals as tea, tinctures and syrups. However, the knowledge about these plants occurs among older people, this way, the knowledge that these individuals have are being lost, supporting the data found by Albuquerque & Andrade (2002a). The different ways of use are seen in works by Monteiro *et al.* (1998) and Silva & Justino (1998) about medicinal plants and in studies by Silva & Justino (1998) in communities of Pernambuco.

In both communities, according to the informants' information, the extraction of Caatinga products occurs in a sustainable manner, because the forest resources are scarce each day, either by climatic conditions or high degradation suffered to establish the agriculture and livestock, typical

inhabitants of semi-arid climate, as reports Diegues & Arruda (2001). However, studies about the floristic composition, diversity and structure of plant fragments, remnants of the areas from these communities are quite few, or non-existent as in Lagoa Salgada community. For this reason, this information cannot be confirmed. Through this, phytossociological studies are suggested in these areas to assess the availability of these species in the areas of local vegetation and their real local situation, as well as trying to detect in the vegetation areas the extraction signals.

Other social and economic change which occurred in the studied communities, and somehow changed their relationship with the plant resources, was the insertion into government assistance social programs, as well as the increase of people who have retired. Besides, the residents awareness avoid deforestation in places where still remains the native vegetation, either by themselves or by preventing others, proving thus the results by Albuquerque & Andrade (2002b).

The most valued plant species in the communities of Brito and Lagoa Salgada were *Croton blanchetianus* Baill., *Pilocereus gounellei*, *Mimosa tenuiflora* (Willd.) Poir. and *Prosopis julifora* DC. The Caatinga vegetation in the studied areas is widely used mainly for energy and medicinal purposes. The families of plants which stood out in both use categories and use value were Fabaceae, Euphorbiaceae and Cactaceae, all of them with more than three described species. Regarding the habit, the most valued are families of arboreal and shrubby strata.

The use value of described species is directly proportional to their occurrence in the area. Uses in constructions and technologies require species with peculiar features. The replanting aiming the conservation of native species in communities is non-existent, being the extraction characteristic in the communities, revealing a devastation action.

The use categories of plants are directly proportionate to their habits. Plants of medicinal use and arboreal habit are more susceptible to the reduction of occurrence in places of study, due the unbridled extraction by residents.

The biological conservation in the studied areas is strongly influenced by social economic conditions, i.e., the pressure on the environment is exercised by the survival conditions.

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