



Traditional knowledge and use of *Mimosa tenuiflora* (Wild.) Poir. (jurema-preta) in the semi-arid region from Northeastern Brazil

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Resumo

Este estudo teve como objetivo registrar as informações relativas ao conhecimento e uso de *Mimosa tenuiflora* (Wild.) Poir. em três comunidades rurais, nas cidades de Itaporanga, Lagoa e São Mamede (Paraíba, Brasil). Entrevistas semi-estruturadas foram realizadas com todos os chefes de família (homens / mulheres), nas comunidades de Pau D'Arco, Barroquinhas e Várzea Alegre. Foram realizadas entrevistas com foco na identificação e análise dos usos atuais e potenciais, para obter informações mais precisas sobre a relação dos informantes com *M. tenuiflora*. Os usos foram distribuídas em nove categorias. Nos comunidades de Pau D'Arco, município de Itaporanga, Barroquinhas em Lagoa e Várzea Alegre em São Mamede. Foram identificadas 43, 181 e 158 citações de uso, respectivamente. A separação do uso atual e potencial é importante para expressar a situação em termos de conservação de espécies que estão ameaçadas pelas multiplicidades de usos. O maior uso atual para *M. tenuiflora*, considerando todos os usos atribuídos nas três comunidades, foi para combustível e construção. Portanto, a investigação que incide sobre os usos de *M. tenuiflora* torna-se urgente, uma vez que deve valorizar estudos que busquem o resgate do conhecimento tradicional sobre a Caatinga como base epistemológica, como uma forma de registrar o maior número de utilidades para a espécie e implementar planos de gestão sustentável para cada comunidade local.

Palavras chave: etnobotânica; Caatinga; população tradicional.

Abstract

This study aimed to record information concerning the knowledge and use of *Mimosa tenuiflora* (Wild.) Poir. in three rural communities in the cities of Itaporanga, Lagoa and São Mamede (Paraíba, Brazil). Semi-structured interviews were conducted with all heads of families (men/women), in the communities of Pau D'Arco, Barroquinhas and Várzea Alegre. The interviews focused on the identification and analysis of the current and potential uses, to obtain more precise information about the relationship of the informants with *M. tenuiflora*. The uses were distributed into nine categories. In the communities of Pau D'Arco in Itaporanga town, Lagoa in Barroquinhas and São Mamede in Várzea Alegre, 43, 181 and 158 use citations were identified, respectively. The separation of current and potential use is important for expressing the situation in terms of the conservation of species that are threatened by the multiplicities of uses. The greatest current use for *M. tenuiflora*, considering all uses attributed in the three communities, was for fuel and construction. Therefore, research that focuses on the uses of *M. tenuiflora* (Wild.) Poir. becomes urgent, since it must value ideological studies that have the rescue of traditional knowledge about the Caatinga as their epistemological basis, as a way to fulfil the largest number of utility properties for the species and from the findings, implement plans for the sustainable management for each local community.

Keywords: ethnobotany; caatinga; traditional population.

Introduction

Traditional people who inhabit the semi-arid region of Northeastern Brazil have developed a multitude of adaptive functions for living in the areas of the Caatinga biome to survive the environmental adversities of this region, using techniques of use, observation, physiognomy, floristic composition and ecological relations with plants and animals, their survival tools, through their culture and cognitive knowledge (Albuquerque 1997, Chaves 2004, Mourão and Montenegro 2006, Abreu et al. 2010, Carvalho et al. 2012, Leite et al. 2012, Lucena et al. 2012a,b).

The flora of the Caatinga, according to Ferraz et al. (1998), is rich in the number of species from several botanical families, such as the Anacardiaceae, Apocynaceae, Bignoniaceae, Boraginaceae, Malvaceae, Cactaceae, Euphorbiaceae, Fabaceae,

Nyctaginaceae and Sapindaceae. The family with the greatest diversity is the Fabaceae, which contains many important species for the survival of traditional people from the semi-arid region in Northeastern Brazil, including *Mimosa tenuiflora*. (Wild.) Poir., popularly known as “jurema preta”. This species belongs to the subdivision Mimosoideae, which contains approximately 82 genera with 3,271 species, distributed throughout the world, in tropical, subtropical and temperate regions (Schrire et al. 2005). From these species, about 350 are endemic to Latin America, including the genus *Mimosa*.

According to Lewis (2006), the genus *Mimosa* contains 104 taxa distributed in the northeastern region of Brazil and more specifically in the Caatinga, the sympatric species *Mimosa ophthalmocentra* Mart. ex Benth. (jurema de imbirá) and *M. tenuiflora*. (jurema preta) are found, belonging to the section *Batocaulon* DC. and the *Leiocarpae*

Benth (Lewis 2006, Oliveira 2009, Queiroz 2009). According to Oliveira et al. (2009), *M. tenuiflora* is a shrubby tree between 5.0 and 7.0 m tall, that forms stems of over 1.5 m tall, with sparse, erect aculeus and also a stem that is acute or slightly tilted depending on the type of soil, with abundant reddish-brown branches. It has a cosmopolitan distribution in most northeastern States (Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe and Bahia), and prefers deep, highly fertile alkaline soils, but can occur in secondary formations of floodplains with a high moisture content.

Mimosa tenuiflora shows great potential as a regenerative plant of eroded land, because apart from being a good indicator of progressive secondary succession, it is an opportunistic species and is mostly connected with areas occupied by man that are in the process of desertification. In addition, it shows a great extent and tolerance to different physico-chemical soil attributes; its tendency throughout the ecologic process is to reduce its sectional density (Araújo Filho and Carvalho 2001, Lorenzi 2002, Lorenzi and Matos 2002). Pereira Filho et al. (2005) reports that *M. tenuiflora* is well-known by farmers in semi-arid regions of Brazil, due to its multiple uses, which are important, for example, for raising animals, through its use as fodder, as well as providing food and shelter for many native bird nests. Faria (1984) outlines the timber potential of this species, emphasising its use as fuel (wood and coal), due to its high calorific content, which is appreciated by traditional populations as a wood of "hot fire".

An ethnobotanical study conducted by (Albuquerque and Andrade 2002a) confirms the findings (Faria 1984), that *M. tenuiflora* is used by northeastern populations for making fences (stakes) because of the quality of its wood, and also in charcoal and firewood production. Several other ethnobotanical studies have recorded these and other uses (Chaves 2004, Albuquerque and Lucena 2005, Oliveira et al. 2006, Lucena et al. 2008, Ramos et al. 2008, Carvalho et al. 2012, Leite et al. 2012, Lucena et al. 2012a, Ramos and Albuquerque 2012).

The wood of *M. tenuiflora* is very resistant and has a high energy value, and is widely used for firewood and charcoal (Pereira Filho et al. 2005, Silva et al. 2011), and it also has a high value in the production of stakes for construction (Pereira Filho et al. 2005, Silva et al. 2011) and a wide use as fodder (Sampaio and Salcedo 1993, Sampaio et al. 1998, Pereira Filho et al. 2005, Bakke et al. 2007) and for medicinal purposes, for example in the treatment of inflammations and infections (Albuquerque and Chiappeta 1994).

In folk medicine, the stem bark is used in the treatment of various illnesses and diseases, such as burns and external and internal inflammations, probably due to its high tannin level, which is believed to possess anti-microbial activity (Albuquerque 2006, Albuquerque and Hanazaki 2006, Mota and Albuquerque 2006, Siqueira et al. 2012).

Studies carried out in Mexico have evaluated the antimicrobial properties of the stem of *M. tenuiflora* and have demonstrated a wide inhibitory action of ethanolic and aqueous extracts against gram-positive bacteria, gram-negative bacteria and dermatophyte fungi (Lozoya et al. 1989). Data from (Golçalves et al. 2005) obtained from the laboratory testing of extracts from *M. tenuiflora* stems, confirmed their pharmacological properties and showed an exceptional antimicrobial activity of the hydro-alcoholic extract against the bacteria *Escherichia coli*, *Streptococcus pyogenes*, *Proteus mirabilis*, *Shigella sonnei*, *Staphylococcus aureus*, *Staphylococcus spp.* (Santos et al. 2005, Santos et al. 2012). Many studies have also addressed nutritional features of *M. tenuiflora*, as well as its pharmacological properties.

Recognising the great importance and the potential utility of *M. tenuiflora* in the semi-arid region of Brazil, this study aimed to record and analyse the knowledge of traditional people concerning this species and the uses assigned to it in three rural communities in Depressão Sertaneja in Paraíba state, Northeastern Brazil, more specifically in the communities of Itaporanga, São Mamede and Lagoas.

Material and Methods

The local and regional context of work

The study was carried out in the rural communities of Várzea Alegre located in São Mamede; in Barroquinhas located in Lagoa; and Pau D'Arco in Itaporanga, all in Paraíba state, Northeastern Brazil (Figure 1). These areas were chosen as they belong to the semi-arid region of Paraíba state and are characterised by the predominance of the Caatinga vegetation type, formed basically by arborescent plants with a predominance of species such as Quince (*Croton blanchetianus* Baill.), mandacará (*Cereus jamacaru* DC.) catingueira (*Poincianella pyramidalis* Tul.), pereiro (*Aspidosperma pyrifolium* Mart.) and facheiro (*Pilosocereus pachycladus*).

São Mamede – Várzea Alegre

The community of São Mamede is located in the Mesoregion of Borborema in the northeastern region of Paraíba state, at an altitude of approximately 263 m, at 55°06'37"S and 37°05'45"W. It is approximately 278 km from the State capital João Pessoa, and accessible via the highway BR-230 in the east-west direction. São Mamede is bordered by Ipueira - RN and Várzea - PB (north), Várzea and Santa Luzia - PB (east), Areia de Baraúnas - PB, Passagem - PB, Quixaba - PB (south), Patos - PB, São José de Espinharas - PB (to the west). It has a population of 7,548 inhabitants; 1,819 in the countryside and 5,729 in the urban area, in a territorial area of 530,725 km² (IBGE 2012).

The climate according to the Köppen climate classification is BSh type: semi-arid hot, with a mean annual rainfall of about 400 mm (Peel et al. 2007). The community's economy is based upon agriculture with cattle, goats and poultry breeding (Sousa et al. 2011).

The rural community of Várzea Alegre is located approximately 6 km from the urban centre of São Mamede. The local economy is based on agriculture, especially dairy cattle, also with extensive goat and poultry breeding. In agriculture, corn and beans predominate and are produced only by upland agriculture (agriculture where

production occurs only during the rainy season) and it is mostly used for family subsistence (Sousa et al. 2011).

Lagoa – Barroquinha

The settlement of Lagoa is located in the Sertão mesoregion in the northeastern region of Brazil at 06°34'15"S and 37°54'57"W, covering a land area of 177,901 km² and is bordered by the settlements of Bom Sucesso, Jericó, Mato Grosso (north), Pombal (to the south), Paulista (to the east) and Santa Cruz (west). The community is approximately 394 km far from the State capital João Pessoa and is accessible via the highways BR-325 and BR-230.

From its 4,681 inhabitants, 2,304 are men and 2,377 are women. Among the members of the rural community of Lagoa, Barroquinha has a BSh hot semiarid climate according to Köppen (climate from the hot steppes with low latitude and altitude), the predominant vegetation is typically semi-arid, the mean temperature is 27°C (Peel et al. 2007). The economy of the settlement is characterised by farming activities within small agricultural areas in the countryside, where there are sheep, goats and cattle breeding as well as the family crops of beans, maize, tobacco and cotton (Lucena et al. 2012c).

Amongst the communities that form the rural area of Lagoa, Barroquinhas is important, together with the communities of Jatobá, Timbaúba and Jutubarana, because of its influence on the economy of the Lagoa. The community of Barroquinha is characterised by the presence of farming activities within small agricultural areas, with crops of corn, beans, tobacco and cotton as well as sheep, goats and cattle breeding (Lucena et al. 2012c).

Itaporanga – Pau D'Arco

The town of Itaporanga is located in the Sertão mesoregion in the northeastern region of Brazil, with a land area of 468 km², at 7°18'14"S and 38°09'00"W, with an altitude of 191 m (IBGE 2012). The access from João Pessoa is via the BR-230 and BR-361 in an east-west direction, and it lies approximately 430 km from the capital

(Ministério de Minas e Energia 2005). It borders the towns of Aguiar and Igaracy (north), Boa Ventura, Diamante and Pedra Branca (south), São José Caiana (east), Piancó and Santana dos Garrotes (west) (Leite et al. 2012).

The climate according to the Köppen climate classification is BSh type: semi-arid hot, with a mean annual rainfall of about 400 mm (Peel et al. 2007).

Itaporanga has a population of 23,192 inhabitants, including 11,389 men and 11,803 women. It has a hot semi-arid climate with a short rainy season (IBGE 2012). The community of Pau D'Arco is 8

km from the urban centre and has a football field, a Catholic chapel, a disabled school, seven private dams and an artesian well that was built through a governmental action to meet the water needs of the residents (Leite et al. 2012). The Pau D'Arco community is located approximately 8 km from the urban centre of Itaporanga and consists of eight inhabited residences. Due the scarcity of rainfall in the region. Some residents work as day labourers in local farms and in other neighboring communities. Many work in the city and some women work as teachers in the city school.

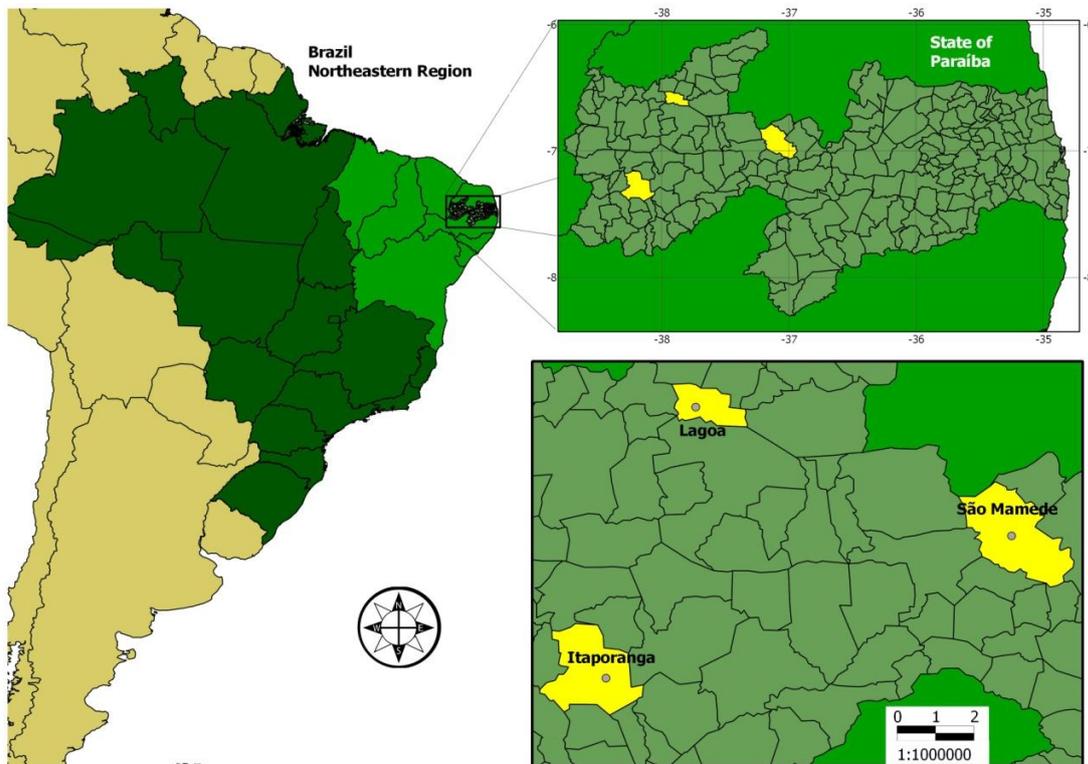


Figure 1: Location of the cities of Itaporanga, São Mamede and Lagoa in the State of Paraíba, Northeastern Brazil.

Phytosociological Inventory

To evaluate the local availability of species, the vegetation in the studied communities was sampled. For each survey, the standard procedure for studies in dry forests was used, consisting of the survey of one hectare of forest (Araújo and Ferraz 2010). The present study consisted of 100 plots (each 10 x 10 m): semi-permanent, 50 plots in each of two communities each in either an area locally considered as conserved (A1), i.e. showing little or no

removal of plant resources, or in an area locally considered as degraded (A2), where the plant resources are continually being used.

For each plot, all individuals that had a diameter at ground level (DNS) \geq 3 cm were recorded (Araújo and Ferraz 2010). The diameter of all studied individuals was measured at ground level and height was estimated using a standardised reference. Information was also obtained from informal conversations and open interviews with residents and the

main informants in each community, to identify the locations of collection of *M. tenuiflora*, as well as the forms of collection developed by them.

The phytosociological parameters adopted were basal area, importance value, relative density (number of individuals per area), relative dominance and relative frequency (Araújo and Ferraz 2010), where the relative frequency (FRt,%) was estimated based on FAt (the absolute frequency of the species concerned), regarding the total frequency (FT%), which represents the sum of all absolute frequencies. Relative dominance (DoRt,%) represented the percentage of DoA (absolute dominance of the species concerned), regarding the total dominance (DoT) (sum of the space occupied by DNS in relation to the area).

Ethnobotanical Inventory

For recording the information and collecting the ethnobotanical data, semi-structured interviews were conducted with each household (male or female). In total, 113 informants in three settlements were interviewed: 15 key informants in Itaporanga (eight men and seven women), 62 in Lagoa with (24 men and 38 women) and 36 in São Mamede (19 men and 17 women). The age of the informants varied between 25 and 56 years, 17 and 85 and 30 and 73, in Itaporanga, Lagoa and São Mamede, respectively.

A form was supplied in the interviews that asked specific questions about *M. tenuiflora*, aiming to elicit all its local usages, as well as the categories into which they might fit. The categories were determined according to those in the literature (Chaves 2004, Ferraz et al. 2006, Lucena et al. 2008, Carvalho et al. 2012, Leite et al. 2012, Lucena et al. 2012a,b) and were: fuel, construction, forage, magical-religious, medicinal, ornamental, and other technology.

The interviews aimed to identify and distinguish the current uses, which were those the person effectively uses, from potential uses, which were those known by the informants, but not used by them; however, a questionnaire commonly used in

literature makes no distinction between use and knowledge (Lucena et al. 2012a).

The information obtained was enriched and confirmed by the use of other investigative techniques such as direct observation and a guided tour (Albuquerque et al. 2010), which consisted of observing the informants' homes and walking through the forests of the communities with ten informants who were willing to cooperate in this stage of the research and to identify *M. tenuiflora*.

The collection of ethnobotanical data occurred from January to September 2011 via semi-structured forms (Albuquerque et al. 2010). When the form was provided, the importance of the study was explained to each informant, their participation was requested, as well as the signing of a Free Consent Term required by the National Health Council through the Committee of Ethics in Research (Resolution 196/96).

The botanical collections were carried out in each community and were identified and incorporated into the Herbarium Jaime Coelho de Moraes (EAN) of the Federal University of Paraíba in the Agricultural Science Center.

This study was approved by the Committee of Ethics in Research with Human Beings (CEP) of the Hospital Lauro Wanderley, Federal University of Paraíba, registered with protocol CEP/HULW No. 297/11.

Results

Phytosociological Inventory

When the parameters of the degraded area from the phytosociological survey were compared with those from the conserved area for the communities under study, *M. tenuiflora* showed a greater number of individuals in the degraded area in the community of São Mamede (individuals = 274) and in the preserved area in the community of Lagoa (47 individuals) (Table 1).

The highest relative density in the degraded area was in São Mamede (DeR = 11.85) and in the preserved area in Itaporanga (DeR = 2.28) and the highest relative frequency in the degraded area was

in São Mamede (FeR = 16.16) and in the preserved area in Itaporanga (FeR = 6.67).

The relative dominance in the degraded area was highest in São Mamede (DoR = 28.04) and in the preserved area it

was highest in Lagoa (DoR = 11.60), whereas the value of importance in the degraded area was highest in São Mamede (VI = 56.05) and for the degraded area was the highest in Lagoa (VI = 19.56) (Table 1).

Table 1. Phytosociological parameters of *Mimosa tenuiflora* Wild. Poir. (jurema preta), with a diameter at ground level ≥ 3 cm, in the rural communities of Várzea Alegre, Barroquinhas and Pau D'Arco, in the cities of São Mamede – PB, Lagoa – PB and Itaporanga – PB respectively. Parameters: N°Ind = number of individuals; DeR = relative density; FrR = relative frequency; DoR = relative dominance; VI = value of importance. A1: conserved area; A2: degraded area.

	N° Ind.		DeR.		FrR		DoR		VI	
	A1	A2	A1	A2	A1	A2	A1	A2	A1	A2
São Mamede	01	274	0.08	11.85	0.33	16.16	0.15	28.04	0.56	56.05
Lagoa	47	37	1.79	1.55	6.17	8.58	11.60	5.73	19.56	15.86
Itaporanga	42	42	2.28	2.08	6.67	5.75	4.37	3.62	13.32	11.46

Ethnobotanical Inventory

Mimosa tenuiflora was recognised and cited by residents of the rural communities of Pau D'Arco (Itaporanga), Barroquinhas (Lagoa) and Várzea Alegre (São Mamede) for several timber or non-timber uses.

In total, 382 citations for the use of *M. tenuiflora* were recorded: 43 in Pau D'Arco, 256 in Barroquinhas and 189 in

Várzea Alegre. In all communities, the categories which were most highlighted were fuel with 63% of the total citations in Pau D'Arco and 46% in Barroquinha. In Várzea Alegre, the construction category was the most highlighted with 31%.

The categories were divided into subcategories, for example, firewood and charcoal were included in the fuel category, and rafters and fence within the construction category (Tables 2, 3 and 4).

Table 2. Distribution of citations of use of *Mimosa tenuiflora* (Wild.) Poir. into categories and subcategories of use by residents of the Várzea Alegre rural community, São Mamede, State of Paraíba, Northeastern Brazil.

Categories	Number of citations	Use current	Use potential	Sub-category	Number of citations	Use current	Use potential
Fuel	56	47	9	Charcoal	28	25	3
				Firewood	28	22	6
Construction	58	50	8	Fafters	1		1
				Fence	55	49	6
				“Cural de faxina”	1	1	
				“Forquilha”	1		1
Forage	20	18	2				
Magical-religious	1	1					
Medicinal	24	16	8				
Ornamental	1	1					
Other	4	4		Bioindicator	1	1	
				Shadow	3	3	
				Cable tool	17	11	6
				Mobile	2	2	
Technology	22	13	9	Others	3		3

Table 3. Distribution of citations of use of *Mimosa tenuiflora* (Wild.) Poir. into categories and subcategories of use by residents of the Pau D'Arco rural community, Itaporanga, Paraíba State, Northeastern Brazil.

Categories	Number of citations	Use current	Use potential	Sub-category	Number of citations	Use current	Use potential
Fuel	27	22	5	Charcoal	13	10	3
				Firewood	14	12	2
Construction	12	11	1	Fafters	12	11	1
				Fence			
Forage	1		1				
Technology	3		3	shoulder yoke	3		3

Table 4. Distribution of citations of use of *Mimosa tenuiflora* (Wild.) Poir. into categories and subcategories of use by residents of Barroquinha rural community, Lagoa city, Paraíba State, Northeastern Brazil.

Categories	Number of citations	Use current	Use potential	Sub-category	Number of citations	Use current	Use potential
Fuel	119	59	60	Charcoal	52	16	36
				Firewood	57	41	16
				Firewood II	10	2	8
Construction	77	55	22	Fence	71	52	19
				“Forquilha”	6	3	3
Forage	6		6				
Medicinal	54	30	24				

Mimosa tenuiflora was recognised as versatile in use by informants and was classified as a species of timber and not timber utility. In all three communities timber use was more frequently cited than non-timber use, with values in the Pau D'Arco community of 97.67% of citations; 72.59% in Barroquinha and 69.84% in Várzea Alegre (Figure 2).

An analysis of the citations of current and potential uses in the studied communities, showed that current usage predominates (Figure 3).

In the fuel category, the community of Várzea Alegre recorded 56 citations of use; 28 for coal and 28 for firewood. The

community of Pau D'Arco recorded 27 citations of use, including 13 for coal and 14 for firewood, and the community of Barroquinhas recorded 119 uses; 52 citations for coal, 57 for firewood and 10 for wood. In the communities of Várzea Alegre and Pau D'Arco, the citations of current use outweighed those of potential use, in the subcategories wood and charcoal; however, in the community of Barroquinha, the citations of potential use outweighed those of current use, for the subcategories wood II and charcoal, however, the subcategory of firewood obtained more citations of current use than potential use (Tables 1, 2 and 3. Figure 4)

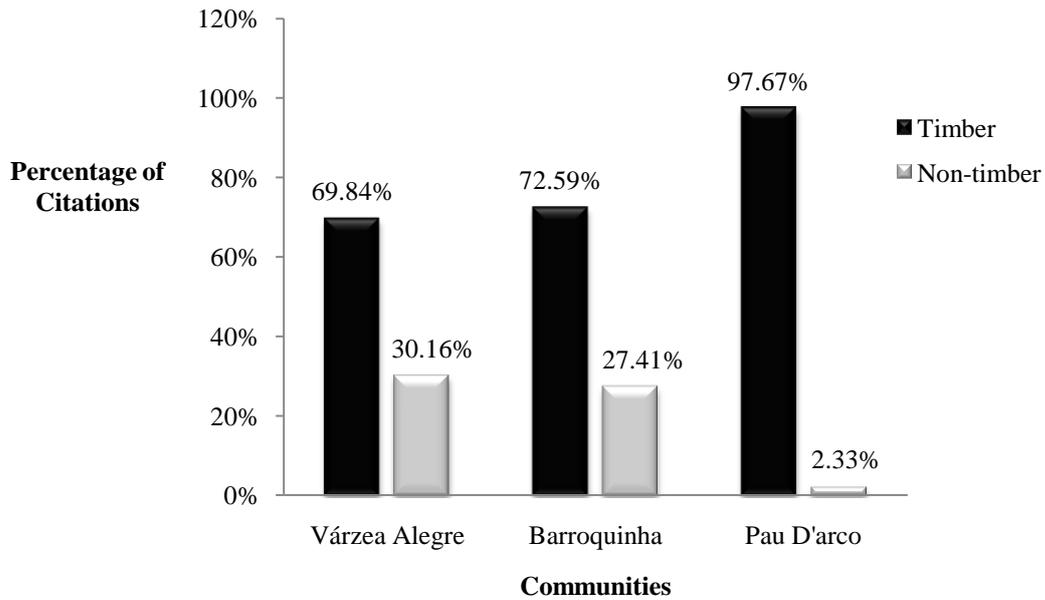


Figure 2. Representative graph of the timber and non-timber uses of *Mimosa tenuiflora* Wild. Poir. in the rural communities of Várzea Alegre, Barroquinhas and Pau D'Arco, in the cities of São Mamede, Lagoa and Itaporanga, respectively, Paraíba State, Northeastern Brazil.

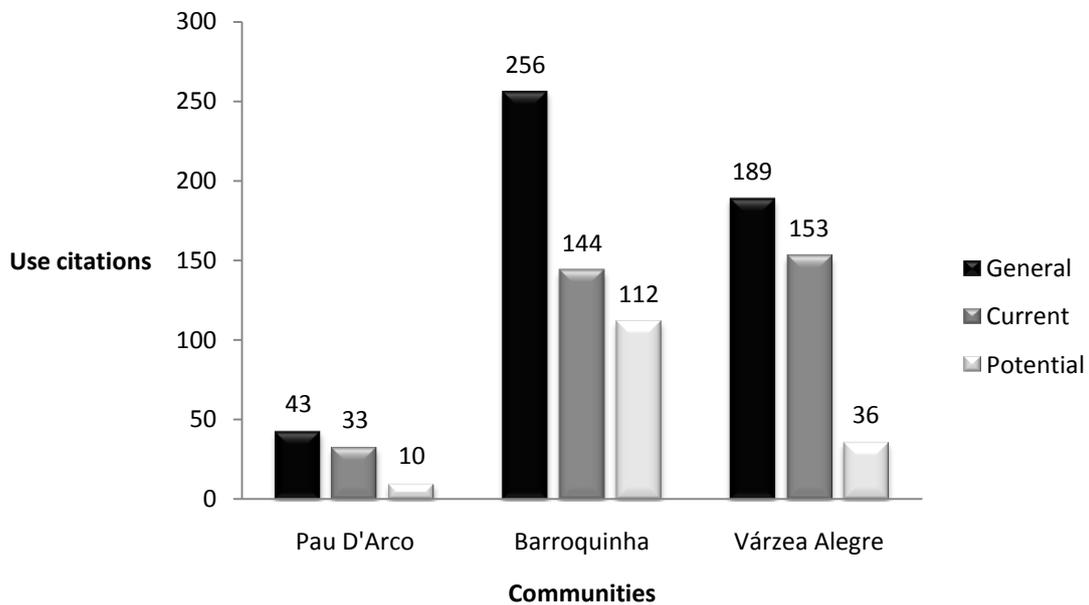


Figure 3. Citations of general, current and potential uses of *Mimosa tenuiflora* Wild. Poir. and the percentage of current and potential citations in the rural communities of Várzea Alegre, Barroquinhas and Pau D'Arco, in the settlements of São Mamede, Lagoa and Itaporanga, respectively, Paraíba State, Northeastern Brazil.



Figure 4: Record of the use of *Mimosa tenuiflora* Wild. Poir. as an energy source (wood) in Itaporanga, Paraíba State, Northeastern Brazil.

The building category was divided into four sub-categories (Rafter, fence, “Curral de faxina” {fence of fine cuttings} and “forquilha” {fork piece of wood that holds up the roof}). The Várzea Alegre community recorded 56 citations of use, including 55 for fences. In the Pau D’Arco community, 12 citations for fences were recorded and in the Barroquinha community, 71 out of 77 citations were for the fence subcategory. In all communities, the current uses were more frequent than the potential uses, including the subcategories, except for the subcategories rafter and “forquilha” in Várzea Alegre community, where the only citation was for a potential use and also in the Barroquinha community which recorded an equal number of potential and current citations for “forquilha” (Tables 1, 2 and 3).

For the fodder category, 20 citations were recorded in Várzea Alegre community, six for Barroquinha and there was no record in Pau D’Arco (Tables 1, 2 and 3).

The mystic uses were classified into the category magical-religious. In the Várzea Alegre community, there was a citation of a potential use which was not recorded in any of the categories for the Pau D’Arco and Barroquinha communities. This indicates that the species is not used

for mystical purposes, as the only citation considered as magical-religious was a potential one (Tables 1, 2 and 3).

In the medicinal category, 24 citations of uses were recorded in the Várzea Alegre community, 54 citations in the Barroquinha community and none for the Pau D’Arco community. In the medicinal category, the current uses were more frequent than the potential ones. (Tables 1, 2 and 3, Figure 5).

For the ornamental and other uses categories, there were citations only from the Várzea Alegre community. In the other uses category, four citations were recorded: one for bioindication and three for shade. For ornamental purposes, only one citation was recorded (Table 2, 3 and 4).

The technology category for the Várzea Alegre community produced 22 citations, including 17 citations for wooden handle (Table 2, 3 and 4).

The second category was construction, with a higher percentage of use citations among the communities of Pau D’Arco with 24%, Barroquinha with 28% and Várzea Alegre with 29%.

Mimosa tenuiflora was chosen for study due to its heavy use as timber. Further studies that evaluate the frequency and quantity of resources extracted from this species and the impact that use has on its population are necessary.



Figure 5: The use of *Mimosa tenuiflora* Wild. Poir for medicinal purposes in the city of Itaporanga, Paraíba State, Northeastern Brazil.

Discussion

According to ethnobotanical studies (Lima 1996, Chaves 2004, Maia 2004, Queiroz 2009, Carvalho et al. 2012, Leite et al. 2012, Lucena et al. 2012a,b), *M. tenuiflora* has multiple and varied uses in nine different utility categories. The data in this study corroborate what has been reported in the scientific literature, which has recognised a total of eight categories in the studied communities. Similar results were found in a study by Loiola et al. (2010), which recorded medicinal, technology, fuel, construction, fodder and other categories. Lucena et al. (2012a) also identified the categories of fodder, fuel, construction and medicinal. According to Loiola et al. (2010) that *M. tenuiflora* serves as an energy-generating source for traditional populations (wood and coal), the fuel category was the most frequent one for its use in its study. This was also the case

for the present study for the communities of Pau D'Arco and Barroquinha, where the fuel category gained greater prominence. However, in the Várzea Alegre community, the most frequent use category was construction, which was also the case in studies by Albuquerque and Andrade (2002a).

The present study records a new subdivision within the firewood category, where wood is used for the manufacture of bricks in brick yards of the region. The use for this subdivision was current and all citations mentioned were reported by men (this type of service or job in this community is probably only performed by men). Such citations within the fuel category were only observed in Lagoa.

In the present study, the categories with the highest percentage of citations were fuel, construction and technology. According to Albuquerque et al. (2009) and Ramos (2010), these three categories

correspond to the main domestic ethnobotanical uses developed as timber resources in the semi-arid region of Brazil. It was also observed that within the fuel category, the main use of *M. tenuiflora* is for cooking of food and as an energy supply for brick yards. For construction, the delimitation of properties (stakes, fence posts, rods) and for animal shelter ("Curral de faxina, rafters and "forquilha") were cited as uses, by Loiola et al. (2010) and in the community of São Miguel do Gostoso, Rio Grande do Norte, Brazil.

In the technology category, Loiola et al. (2010) points out that there are elements that suffer some manipulation, but are not used for territorial delimitation, such as *M. tenuiflora* that also serve other purposes such as for tool handles (cables of the "chibanca" {tool used to dig the soil}, hoe, sickle, axe) stools and chairs, confirming findings of Loiola et al. (2010) and Lucena et al. (2012a). The technology category was also cited in the communities of Várzea Alegre and Pau D'Arco, as well as in the study by Loiola et al. (2010). *Mimosa tenuiflora* also has a forage potential and is used by animals in the field. Use citations for forage in the communities of Várzea Alegre and Barroquinha, as well as a record of the forage use of this species exist in studies by Loiola et al. (2010) and Lucena et al. (2012a,b), however, there was no record of such a use in the Pau D'Arco community.

This study also recorded other uses for *M. tenuiflora*, where it was cited as a rainfall indicator, shade for farmed animals and it was used to "wash" underwear.

Other uses were cited only in Várzea Alegre community, which were also recorded by Loiola et al. (2010), in legume research. Citations in the magical-religious and ornamentation categories, only occurred in the Várzea Alegre community.

This study recorded both the current and potential uses of *M. tenuiflora* suggested by Lucena et al. (2012a) and recorded a large number of citations of current usages for the species by local communities. The species is heavily used as timber, indicating that the species is systematically being removed from the environment and without removal

Many indigenous groups from the semi-arid region of Pernambuco State consider *M. tenuiflora* a sacred plant and the species is held in deep respect (Albuquerque and Andrade 2002b). Although the medicinal category was not recorded in the Pau D'Arco community, Várzea Alegre and Barroquinha Dimples ranked third, in terms of the number of use citations. Citations of the medicinal use of *M. tenuiflora* are found in studies of Albuquerque and Andrade (2002a), Loiola et al. (2010) and Lucena et al. (2012a,b).

For the medicinal category, the bark received the largest percentage of citations (60%). This has also been reported by Rivera-Arce et al. (2007) in Mexico and Bezerra et al. (2008) in the city of Patos, Northeastern Brazil. These authors have shown that *M. tenuiflora* was used by 90% of respondents to treat external injuries, gastric ulcers, internal inflammations and female problems such as amenorrhea, dysmenorrhoea and endometritis. The most-used plant part by informants in these studies was the bark, corroborating the findings in this study. The most-used plant parts by the informants were the core and the leaf, which correspond to the inner bark (20%) and the flower (20%), which were also used in the healing of wounds. These were used both for the treatment of the informants as well as for their animals. The species was also used to treat pests and hemostasis, by vets.

The pharmacological properties of *M. tenuiflora* are ascribed to the presence of compounds known as hydrolysable tannins and condensed ethanolic extracts which are present mainly in the bark of the stem, and in the core and leaves (Jiang et al. 1991, Albuquerque and Lucena 2005, Albuquerque 2006, Albuquerque and Hanazaki 2006, Mota and Albuquerque 2006, Paes et al. 2006, Siqueira et al. 2012). management, the local availability of the species might be in jeopardy.

A difference in the cognitive domain between man/woman for some categories was recorded, such as, for example, the fuel category. This has been well documented in several studies in ethnobotany (Phillips and Gentry 1993, Amorozo 1996, Caniogo and Siebert 1998, Albuquerque 2009, Lucena et al. 2012a),

and has not only been observed between men and women, but is also dependent on the age group. In these studies, the largest numbers of citations came from males. However, in this study, most of the citations for Lagoa and São Mamede came from a single female in Itaporanga. These uses are mostly current and for the activities already mentioned in the literature as being performed by men.

According to Silva (1997) and Caniago and Siebert (1998), the most important plants are those that usually provide continuous and varied products. For Lucena et al. (2012a), most plants used by local populations are those that are easiest to find and be incorporated by traditional people into their daily routines. The data in this study confirm that *M. tenuiflora* is a very important species for the communities of Pau D'Arco, Barroquinha and Várzea Alegre, because it demonstrates a high versatility and can thus provide varied products continuously throughout the year to the local population. This fact can only be observed due the particular ecology of the species and also because it is available in all areas used by the local populations surveyed.

Conclusion

In this study, *Mimosa tenuiflora* shows great potential for timber use. There is an urgent need for studies that focus on the uses of this species. These studies must have the traditional knowledge about the Caatinga ecosystem as their epistemological basis, as a way to maintain the largest possible number of utility properties, which have been reported via surveys carried out in partnerships with traditional communities in Northeastern Brazil.

The unification of use categories for such species reveals a dynamic of uses and private consumption patterns for the species, which are dependent on the frequency and quantity of resources extracted from the species according to the local culture.

The use categories have impacts on the ecology of species and their populations. Thus, it is necessary to implement appropriate management plans to be used in species conservation.

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