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Fabaceae medicinal flora with therapeutic potential in Savanna areas in the Chapada do Araripe, Northeastern Brazil

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ABSTRACT

Fabaceae is one of the largest families of ethnopharmacological importance. From this botanical group, important chemical constituents that act in the treatment and/or healing of various bodily systems arise. The objective of this study was to evaluate the most versatile Fabaceae species and the agreement of use among the informants, in the Chapada do Araripe Savanna. The research included five rural communities located in the municipalities of Nova Olinda, Crato, Barbalha, Moreilândia and Exu, covering the states of Ceará and Pernambuco. We conducted semi-structured interviews with 126 informants, adopting the snowball technique and using a standardized form. The relative importance and the Informant Consensus Factor were analyzed for the selection of species with therapeutic potential. Twenty-six medicinal species, distributed across 22 genera, were associated with seventy therapeutic purposes. As for the habitat of the species, the arboreal habitat predominated (76.92%). In relation to the plant parts, the bark (28.57%) and stem inner bark (26.53%) were the most used structures. Among the species, four showed great versatility in relation to their uses, with relative importance ($\overline{RI} > 1$), these being: *Copaifera langsdorffii* Desf. (1.70), *Stryphnodendron rotundifolium* Mart. (1.52), *Bowdichia virgiloides* Kunth (1.10) and *Amburana cearenses* (Allemand) A. C. Sm. (1.02). These species had eight to thirty curative properties and ranged from five to twelve body systems. The therapeutic indications cited were grouped into sixteen categories of body systems, of which Sensory System Disorders and Mental and Behavioral Diseases presented maximum values for the Informant Consensus Factor. For the Sexual Impotence category there was no agreement, whereas for the remaining systems the Informant Consensus Factor ranged from 0.33 to 0.91. The study evidences that the information of use and/or knowledge are shared among the people within the community, proving the great importance of Fabaceae in the use of medicinal plants.

Introduction

The Brazilian flora is considered to be one of the richest in the planet and accounts for roughly 20% of the world's plant biodiversity (Amaral et al., 2015; Garcez et al., 2016). All this richness is distributed among differentiated biomes, within them is the Cerrado, which has a great phyto-physiognomic heterogeneity. The predominant species in this biome offer great potential for bioactive compounds, which demonstrates the importance of the Cerrado for studies with medicinal plants (Guarim Neto and Morais, 2003).

The traditional communities that live along the Savanna distribution areas have the opportunity to explore a range of their medicinal flora resources (Cunha and Bortolotto, 2011), where selection and use depend on the symptoms, species availability and cultural and educational aspects (Amorozo, 2002). This local knowledge has been of great value for supporting phytochemical and pharmacological investigations in the discovery of new drugs.

Among the most abundant families of the Brazilian Cerrado medicinal flora is the Fabaceae family with roughly 1263 species, distributed in approximately 138 genera (Flora do Brazil, 2018). This botanical group is one of the most evaluated groups, both from a chemical and a pharmacological point of view (Wink, 2013; Neves et al., 2017). Important chemical components are derived from this family such as flavonoids, alkaloids, coumarins, among

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other metabolites (Wink, 2013), which treat and/or cure various body systems.

In the Northeastern Cerrado area, Fabaceae has been identified as the most diversified family in the majority of studies involving medicinal plants (Oliveira Júnior and Conceição, 2010; Ribeiro et al., 2014a; Silva et al., 2015; Vieira et al., 2015; Macêdo et al., 2016). The species from this family stand out for their medicinal properties, being used by the local traditional communities as herbal medicines for the treatment of various diseases. Studies of this nature have contributed to the discovery of promising active principles for the development of new drugs since the Cerrado harbors high biodiversity and endemism rates. Therefore, considering the importance of Fabaceae family within the savanna medicinal flora, this study had as its purpose to evaluate the versatility of the used species and the knowledge and/or use agreement by the interviewees, highlighting the promising species for bioprospecting and those which require further studies to validate their therapeutic applicability.

Materials and methods

Study area

The research was carried out in disjoint areas of the Savanna in the Chapada do Araripe, in rural communities located in the municipalities of Nova Olinda (Serra do Zabelê), Crato (Barreiro Grande), Barbalha (Betânia), Moreilândia (Catolé) and Exu (Matozinho, Estância, Serra do Zé Gomes and Mangueiras), in the state of Ceará and Pernambuco (Fig. 1).

The Chapada do Araripe is located on the border of the states of Ceará, Piauí and Pernambuco, with its greatest extent covering the state of Ceará. It presents a tabular surface preserved at an altitude ranging from 800 to 1000 m, whose vegetation types are diverse, comprising the following phytophysiognomies: humid forests, Caatinga, Savanna and Carrasco, with the Savanna being the dominant vegetation (Bezerra, 2004).

The soils that make up the Chapada do Araripe are represented by very deep, Yellow Latossol and Redish-Yellow Latossol classes (MMA, 2003) weathered in all their depth. These soils are well drained, heavily leached and occur in flat reliefs. The predominant climate is warm tropical with an annual average rainfall of approximately 760 mm, with an annual average temperature of 24–26 °C (Bezerra, 2004).

The studied communities present on the Chapada do Araripe are composed of 174 families and depend on a single health center, except for Barreiro Grande and Serra do Zabelê, whose residents receive medical assistance through a health agent who follows up at the residences.

Ethnobotanical survey

The ethnobotanical study was conducted in the period from 2012 to 2014, through semi-structured interviews based on standardized forms (Martin, 1995). We interviewed 126 principal informants or local experts, ranging in age from 22 to 100 years, selected using the snowball technique (Albuquerque et al., 2010). The information about the knowledge of the besiegers regarding the medicinal species was allowed after the reading, permission and signing of the free and informed consent term. The study was submitted to the Ethics and Research Committee of the Regional University of Cariri and approved with legal numbers 251.829/2013 (Barreiro Grande, Betânia and Catolé), 251.677 (Serra do Zabelê) and 873.654 (Matozinho, Estância, Serra do Zé Gomes and Mangueiras).

The therapeutic indication of each species were grouped in sixteen categories of body systems based on the international classification of diseases and related health problems (ICD-10) proposed by the World Health Organization (WHO, 2010): Non-Defined Disorders or Pain (NDDP), Disease of the Endocrine Glands, Nutrition and Metabolism (DEGNM), Infectious and Parasitic Diseases (IPD), Mental and Behavioral Disorders (MBD), Diseases of Blood and Hematopoietic Organs (DBHO), Diseases of the Musculoskeletal System and Connective Tissue (DMSCT), Injuries, Poisonings and Other Consequences of External Causes (IPOCEC), Neoplasms (N), Disorder of the Digestive System (DDS), Disorder of the Genitourinary System (DGS), Respiratory System Disorder (RSD), Disorders of the Visual Sensory System – eyes (DVSS-E), Diseases of the Circulatory System (DCS), Diseases of the Skin and Subcutaneous Cellular Tissue (DSSCT), Diseases of the Nervous System (DNS), Sexual impotence (SI).

Floristic survey

The medicinal species that were in a reproductive stage and that were available in the community were collected with the help of informants and/or the owners who identified the plants by their vernacular names. The plant material collected was stored and handled in accordance with conventional herbarium techniques (Mori et al., 1989). The identification of the species occurred through a specialized bibliography, compared with botanical material identified and sent to specialists. The testimonial material was incorporated into the Herbarium Caririense Dárdano de Andrade-Lima collection (HCDAL), of the Reginal University of Cariri and the Herbarium Sergio Tavares (HST), of the Federal Rural University of Pernambuco. The Angiosperm Phylogeny Group III classification system was adopted (APG, 2009). For the review of the scientific names of the species, the database of the Missouri Botanical Garden (Mobot, 2014) and the list of Brazilian flora species were consulted (Flora do Brasil, 2018). The authorization for the collection of botanical material was provided by the Biodiversity Information and Authorization System (SISBIO) of the Brazilian Institute of Environment and Renewable Resources (IBAMA), registered under number 32679-1.

Data analysis

Versatility and agreement of the use of species of Fabaceae

The versatility of the medicinal species belonging to the Fabaceae family was evaluated by the Relative Importance (RI) quantitative method, according to the methodology proposed by Bennett and Prance (2000), which shows the importance of the species based on the number of properties that it acquired by the interviewees, with "2" being the maximal value obtained by a species. The following formula was used to obtain the data: RI = NBS + NP. The two factors are calculated by the following formulas: NBS = NBSS/NBSVS and NP = NPS/NPVS, where NBS is the number of bodily systems, determined by a species (NBSS), divided by the total number of bodily systems treated by the most versatile species (NBSVS); NP corresponds to the number of properties attributed to a determined species (NPS), divided by the total number of properties attributed to the most versatile species (NPVS) (Almeida and Albuquerque, 2002).

The average relative importance of the species was obtained by the sum of the RI values of each species, whose value was divided by the number of communities that the species was mentioned. The data was calculated using Microsoft Excel.

In order to evaluate the agreement of use on the medicinal species the Informants Consensus Factor (ICF) was calculated (Totter and Logan, 1986), whose analysis aims to identify the body systems that have a greater knowledge and/or use consensus. The ICF values range from 0 to 1 and are calculated according to the following formula: (ICF = (nur – na)/(nur – 1)), where (nur) is the

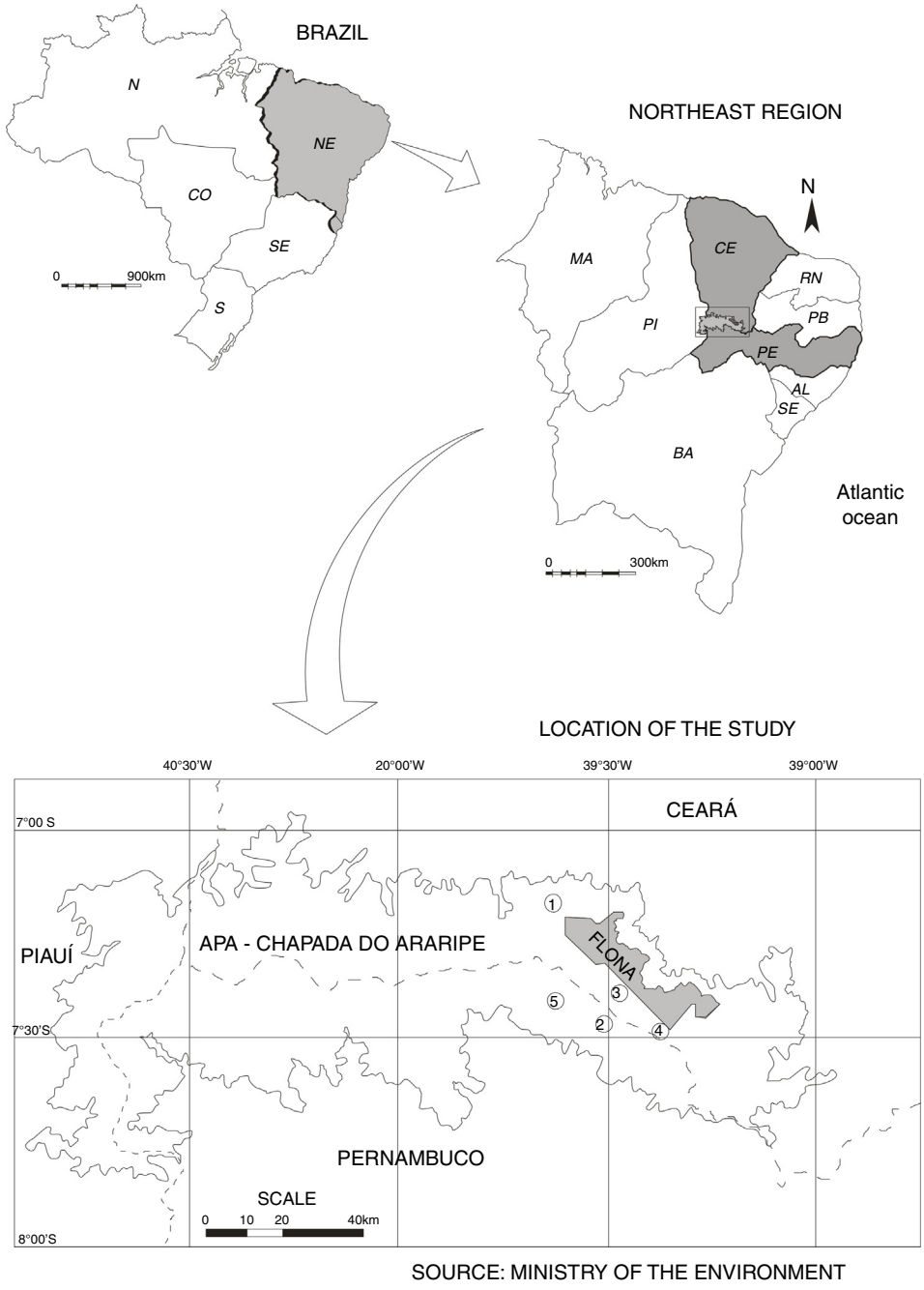

Fig. 1. Geographic in the communities of Serra do Zabelê (1), Catolé (2), Barreiro Grande (3), Betânia (4), Matozinho, Estância, Serra do Zé Gomes and Mangueiras (5).

number of citations of uses in each category and (na) is the number of species indicated in each category.

Results and discussion

Survey of medicinal species

Twenty-six medicinal species represented by the Fabaceae family were listed, which were distributed across 22 genera (Table 1). The number registered is within the variation range observed in other ethnobotanical studies conducted in the Savanna woodland areas of Brazil, which report a considerable species richness for the Fabaceae medicinal flora, whose number ranges from 10 to 79 (Amorozo, 2002; Guarim Neto and Morais, 2003; Vila-Verde et al., 2003; Botrel et al., 2006; Pereira et al., 2007; Moreira and Guarim-Neto, 2009; Pereira et al., 2012; Silva et al., 2015). The accentuated medicinal use of this family is possibly associated with the wide distribution of its species in the Savanna woodland domain, occurring in all its phytophysiognomies, where its innumerable phytotherapeutic activities are determinants for its intensified use (Bruneton, 2001; Saraiva et al., 2015). The diversity of its species, as well as the quantity and distribution of its individuals in the environment, raises the usage likelihood by human populations that use the resources of their flora (Guarim Neto and Morais, 2003; Pinto et al., 2013).

Of the 22 registered genera, *Amburana*, *Bowdichia*, *Hymenaea* and *Mimosa* presented two species each and the remaining eighteen (81.81%) genera were represented by a single species. The aforementioned genera are rich in chemical constituents (tannins,

Table 1
Medicinal species of the family Fabaceae indicated by the interviewees of the Catolé-PE, Barreiro Grande-CE, Betânia-CE, Serra do Zabelê-CE, Matozinho, Estância, Serra do Zé Gomes and Mangueiras-PE communities.

Family/scientific name and vernacular name	Habit	Therapeutic indication	Part Used	Communities	RI	$\overline{RI}$	HN
Fabaceae							
Acosmium glasycarpa Benth. (Pau pra-tudo)	Sh	Cough, herniated stomach	Sb	Barreiro Grande (Crato- CE)	1.00	0.62	Nc
		Rheumatism	Sb	Catolé (Moreilândia-PE)	0.30		Nc
		Stomach hernia, angina	Si	Betânia (Barbalha-CE)	0.55		Nc
Anadenanthera colubrina var. *cebil* (Griseb.) Altschul (Angico)	Tr	Intestinal infection, cough, influenza	Sb, Si	Serra do Zabelê (Nova Olinda- CE)	0.50	0.50	8329
Amburana cearensis (Allemão) A. C. Sm. (Imburana de cheiro)	Tr	Inflammation of the skin, throat inflammation, gynecological	Sb	Serra do Zabelê (Nova Olinda- CE)	0.80	1.02	3152
		inflammation, influenza, cough	Sb, Si	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	1.24		8702
		Measles, fever, influenza, menstrual regulation					
Amburana sp. (Imburana vermelha)	Tr	Inflammation	Sb, Ec	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.31	0.31	Nc
Bauhinia cheilantha (Bong.) Steud. (Mororó)	Tr	Diabetes, high blood pressure	Le	Serra do Zabelê (Nova Olinda- CE)	0.42	0.83	9266
		Bellyache, Kidney pain, diabetes,		Catolé (Moreilândia- PE)			
		anemia, Inflammation in the uterus	Le, Si, Ro		1.58		8414
		sore throat		Betânia (Barbalha- CE)			
			Le, Si, Ro		0.50		Nc
		Bellyache, Diarrhea with blood, heartburn					
Bowdichia sp. (Sucupira preta)	Tr	Rheumatism	Si	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.31	0.31	Nc
Bowdichia virgiloides Kunth (Sucupira)	Tr	Spine pain, rheumatism, aphrodisiac	Sb, Si	Serra do Zabelê (Nova Olinda- CE)	0.80	1.10	9268
		(sexual impotence), bone pain,					
		inflammation of the skin	Si	Barreiro Grande (Crato- CE)	2.00		8390
		Spine pain, osteoarthritis, Cough,					
		influenza, kidney pain, rheumatism	Sb, Ro	Catolé (Morelândia- PE)	1.30		8425
		Kidney pain, Spine pain, body ache,	Si, Sb	Betânia (Barbalha- CE)	0.66		8425
		bone pain, cancer					
			Si, Sb	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.73		10256
		Rheumatism, spine pain, bellyache					
		Inflammation, fever, spine pain					
Cajanus cajan (L.) Mill. (Andú)	Sh	Weakness and dizziness	Fr	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.42	0.42	Nc
Centrosema sp. (Alcançu)	Sh	Influenza, throat inflammation	Ro	Barreiro Grande (Crato- CE)	0.66	0.84	Nc
		Cough, influenza, expectorant,	Ro	Catolé (Moreilândia- PE)	0.80		8407
		bronchitis, asthma					
			Ro	Betânia (Barbalha- CE)	1.06		Nc
		Influenza, fever, cough asthma, bellyache					

Table 1 (*Continued*)

Family/scientific name and vernacular name	Habit	Therapeutic indication	Part Used	Communities	RI	$\overline{RI}$	HN
	Tr	Influenza, rheumatism, headache, pain, inflammation of the	Sb, Le, Re	Serra do Zabelê (Nova Olinda- CE)	2.00	1.70	9833
Copaifera langsdorffii Desf. (Pau d'óleo/Copaíba)		uterus, bone fracture, wounds, renal complications, gastritis, angina, knee	Si	Barreiro Grande (Crato- CE)	0.50		9442
		swelling, blows	Si, Sb	Catolé (Moreilândia- PE)	2.00		Nc
		Rheumatism	Le, Fr, Si	Betânia (Barbalha-CE)	2.00		7962
		Cough, healing, rheumatic pain, bellyache, fever, allergy, swelling, kidneys	Le, Sb, Si, Ro	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	2.00		10642
		Spine pain, rheumatism, indigestion, epilepsy, blood purifier, swelling in the belly, bellyache, pains in general, wounds					
		Cancer, general pain, inflammation, constipation, depression, nerves, stomach pain, gastritis, influenza					
Dimorphandra gardneriana Tull. (Faveira)	Tr	Cancer, pain, conjunctivitis, cough, healing, influenza	Fr	Serra do Zabelê (Nova Olinda- CE)	1.13	0.64	10564
			Se	Barreiro Grande (Crato- CE)	0.50		Nc
		Coração	Se	Catolé (Moreilândia- PE)	0.58		7941
		Anti-inflamatório, colírio	Se	Betânia (Barbalha- CE)	0.28		7941
		Coração	Fr, Sb	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.73		9769
		Pulmonary infection, wound, expectorante					
Dioclea grandiflora Mart. ex. Benth. (Mucunã)	L	Wound, inflammation of the skin	Sb, Se	Serra do Zabelê (Nova Olinda- CE)	0.42	0.42	9257
Enterolobium contortisiliquum (Vell.) morong. (Tamboril/Timbaúba)	Tr	Asthma, ulcer	Sb, Ro	Serra do Zabelê (Nova Olinda- CE)	0.42	0.38	9277
		Stomach Wound	Sb	Catolé (Moreilândia- PE)	0.30		Nc
				Matozinho, Estância, Serra do Zé	0.42		10516
		Inflammation of the vagina and urinary bladder	Ro	Gomes e Mangueiras (Exu- PE)			
Erythrina velutina Willd. (Mulungu)	Tr	Menopause, improving circulation	Si	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.62	0.62	Nc
Hymenaea courbaril L. (Jatobá)	Tr	Cough, constipation, expectorant, influenza, poisoning, blood problems	Si, Sb, Fr	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	1.47	0.85	9756
					0.83		7957
		Bronchitis, cough and influenza	Sb, Si, Sb	Barreiro Grande (Crato- CE)			
					1.00		7957
		Cough, influenza, anemia and wounds	Si, Sb	Catolé (Moreilândia- PE)			
					0.50		9997
		Cough, influenza, bronchitis	Si	Betânia (Barbalha- CE)			
					0.46		9837
		Cough, influenza, bronchitis, expectorant	Si	Serra do Zabelê (Nova Olinda- CE)			

Table 1 (*Continued*)

Family/scientific name and vernacular name	Habit	Therapeutic indication	Part Used	Communities	RI	$\overline{RI}$	HN
Hymenaea sp. (Jatobá roxo)	Tr	Severe influenza, tuberculosis, pneumonia	Sb	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.73	0.73	9997
Libidibia ferrea (Mart. ex. Tul.) L.P. Queiroz (Pau-ferro)	Tr	Blow, spine pain, cough, pains, influenza, inflammation of internal and external organs, bone pain, bone fracture	Sb, Se	Serra do Zabelê (Nova Olinda- CE)	1.25	0.99	9273
			Si	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.73		9450
		Hemorrhage, general inflammation, general pain					
Lochocarpus araripensis Benth. (Angelim)	Tr	Skin allergy	Fr	Serra do Zabelê (Nova Olinda- CE)	0.21	0.21	9244
Machaerim acutifolium Vogel (Coração de negro)	Tr	Pain, Inflammation of external and internal organs	Rt, Si	Serra do Zabelê (Nova Olinda- CE)	0.38	0.38	4368
Mimosa tenuiflora (Willd.) Poir. (Jurema preta)	Tr	Pain, inflammation of the external organs	Sb	Serra do Zabelê (Nova Olinda- CE) Catolé (Moreilândia- PE)	0.30	0.63	9251
		Inflammation in uterus, wound	Sb	Barreiro Grande (Crato- CE)	0.58		10156
		Healing, toothache	Sb		1.00		Nc
Mimosa sensitiva L. (Malissa)	He	Fever	Le	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.31	0.31	8675
Periandra mediterranea (Vell.) Taub. (Alcançu)	Tr	Lung infection, flu, tuberculosis, cough and expectorante	Ro	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.96	0.96	20003
Poincianella pyramidalis Tull. (Catingueira)	Tr	Cough	Fl	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.31	0.31	8667
		Cough, influenza	Fl	Serra do Zabelê (Nova Olinda- CE)	0.30		10559
Senna occidentalis (L.) Link (Mangirioba)	Tr	Stroke	Fr	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.31	0.94	8670
		Influenza, headache, cough, sinusitis, blood purifier	Ro, Se	Catolé (Moreilândia- PE)	1.13		8411
			Ro, Se	Betânia (Barbalha- CE)	0.66		8411
		Cough, influenza, blood purifier	Ro	Barreiro Grande (Crato- CE)	1.67		Nc
		Dor de cabeça, trombose, tosse e gripe					
Senegalia sp. (Angico)	Tr	Expectorant, influenza, leucemia	Si	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.73	0.73	10053
Stryphnodendron rotundifolium Mart. (Barbatimão)	Tr	Inflammation, vaginal infection	Si	Matozinho, Estância, Serra do Zé Gomes e Mangueiras (Exu- PE)	0.62	1.52	10536
		Wounds, bellyache, Healing, inflammation in general	Sb	Barreiro Grande (Crato- CE)	1.67		9263
			Sb	Betânia (Barbalha- CE)	1.89		8406
		Cancer, ulcer, injury, inflammation in the uterus, blood infection, gastritis, inflammation in the throat, wound Healing, gastritis, inflammation in the uterus, inflammation in general, furuncle, urinary infection, sore throat	Si, Sb	Catolé (Moreilândia- PE)	1.88		8406

Tr, Tree; Sh, Shrubby; He, Herbaceous; Cp, Climbing plants; L, Liana; Le, Leaf; Fr, Fruit; Re, Resin; Se, Seed; Sb, Stem bark; Si, Stem inner bark; Ro, Root; Rt, Root-tuber; $\overline{RI}$, Average Relative Importance; HN, Herbarium Number; Nc, Number of Collection in process by Herbarium; RI, Relative Importance; Fl, Flower.

flavonoids) with ample biological activity. *Mimosa* and *Amburana*, on the other hand, present several proven pharmacological activities (Box 1), especially reported for the species *Amburana cearensis* and *Mimosa tenuiflora*, such as: antimicrobial, antifungal, anti-inflammatory, antiplasmolytic, bronchodilator, antioxidant, hemolytic, antinociceptive and antimutagenic activity (Leal et al., 2000, 2006; Silva et al., 2013a).

The species indicated had an arboreal (20 species), shrubby (3), herbaceous (1), liana (1) and creeper habitats (1), with arboreal species prevailing (76.92%). Inferred ethnobotanical studies in Savanna woodland areas also point to Fabaceae as the dominant family in arboreal medicinal flora (Guarim Neto and Morais, 2003; Brotel et al., 2006; Pinto et al., 2013; Silva et al., 2015). Almeida et al. (2005) investigated the relationship between the habitats of species from various families and chemical compound classes (phenol, tannins, alkaloids, triterpenes and quinones) and found that trees exhibit a greater amount of these compounds when compared to herbaceous and shrubby species.

In relation to plant parts, the bark (28.57%) and stem weaves (26.53%) are the most commonly used structures. These results

Box 1: Medicinal species of the Fabaceae family and their biological activities.

Family/species	Main chemical constituents/chemical classes	Biological activity
Fabaceae *Amburana cearenses*	Amburosídios (Canuto and Silveira, 2006), Protocatecuic acid, coumarins, flavonoids and phenolic glycosides (Canuto et al., 2010).	Antibacterial and antifungal (Bravo and Sauvain, 1999), Control in the production of antibodies (Marinho et al., 2004), anti-inflammatory, analgesic, antispasmodic and bronchodilator (Leal et al., 2006; Almeida et al., 2010).
Anadenanthera colubrina	Phenolic compounds, tannins and flavonoids (Monteiro et al., 2005; Monteiro et al., 2006).	Antioxidant (Desmarchelier et al., 1999).
Bauhinia cheilantha	Flavonoids, terpenoids, steroids, triterpenes, tannins and quinones (Silva and Cechinel-Filho, 2002).	Hypoglycemic (Almeida et al., 2006)
Bowdichia virgiloides	Tannins, flavonoids and alkaloids (Leite et al., 2014).	Anti-inflammatory (Barros et al., 2010), antimalarial and antioxidant (Deharo et al., 2001; Thomazzi et al., 2010).
Cajanus cajan	Flavonoids (Paul et al., 2003).	Abortive and teratogenic action (Lemonica and Alvarenga, 1994), larvicide (Paul et al., 2003; Zu et al., 2006).
Copaifera langsdorffii	Caorenoic acid diterpenes (Lima et al., 2008).	Antitumoral (Oshaki et al., 1994), gastroprotector (Paiva et al., 1998), anti-inflammatory and cytotoxic (Paiva et al., 2003; Paiva et al., 2004), diuretic (Paiva et al., 2003), antioxidant (Paiva et al., 2004), antinociceptive (Gomes et al., 2007), antimicrobial (Martins et al., 2010), healing (Martins et al., 2010) and antineoplastic (Senedese et al., 2013).
Dioclea grandiflora	Diocleína, dioclenol and dioflorina (Almeida et al., 2000).	Vasorelaxant (Lemos, 1999), analgesic, antinoceptive, antimicrobial (Silva et al., 2010).
Dimorphandra gardneriana	Flavanoids, rutin, quercetin and isoquercitrin (Landim et al., 2013).	Visco-surgic ophthalmic (Pires et al., 2010).
Enterolobium contortisiliquum	Bismedesidic triterpenic saponins (Mimaki et al., 2003, 2004).	Abortive (Bonel-Raposo et al., 2008).
Erythrina velutina	Alkaloids and flavonoids, isoflavones, pterocarps, flavanones and isoflavanones (Chacha et al., 2005).	Anti-bacterial (Pillay et al., 2001; Virtuoso et al., 2005), antinociceptive, anticonvulsive (Vasconcelos et al., 2007), anti-inflammatory (Vasconcelos et al., 2011).
Family/species	Main chemical constituents/chemical classes	Biological activity
Hymenaea courbaril	Triterpenes, diterpenes, flavonoids and phenolic compounds (Sales et al., 2014).	Antimicrobial (Gonçalves and Alves Filho, 2005), anti-inflammatory and antioxidant (Jayaprakasam et al., 2007).
Libidibia ferrea	Tannins (Dias et al., 2013).	Antiulcerogenic (Bacchi and Sertie, 1994), Chemopreventive cancer (Nakamura et al., 2002), antimicrobial (Sampaio et al., 2009), analgesic and anti-inflammatory (Lima et al., 2012b; Dias et al., 2013),
Lochocarpus araripensis	Flavonoids, flavones, flavans, flavanones and aurones. (Lima et al., 2014).	Attenuation of allergic inflammation (Vasconcelos et al., 2008), Cytotoxic activity (Lima et al., 2014).
Mimosa tenuiflora	Tannins (Camargo-Ricalde, 2000), Flavonoids, alkaloids, chalcones, steroids, terpenes and phenoxychomones, saponins and triterpenes (Souza et al., 2008).	Hallucinogenic (Schultes, 1994), anti-inflammatory (Tellez and Guitard, 1990) antiplasmolytic and hemolytic (Meckes-Lozoya et al., 1990), antimicrobial (Bezerra et al., 2009), Antifungal and antimutagenic (Silva et al., 2013b).
Periandra mediterranea	Saponins and polysaccharides glucans (Pereira et al., 2000).	Increased immune response (Santos et al., 1997), anti-inflammatory (Pereira et al., 2000).
Poincianella pyramidalis	Tannins, flavonoids and saponins (Bahia et al., 2005).	Anti-inflammatory (Santos et al., 2011), Radioprotector (Santos et al., 2013), Antinociceptive (Santana et al., 2012) and in the treatment of gastric ulcers (Ribeiro et al., 2013).
Senna occidentalis	Tannins (Lombarbo et al., 2009).	Antimicrobial, antiviral, antitumor (Lombardo et al., 2009).
Stryphnodendron rotundifolium	Tannins, flavonoids and alkaloids (Costa et al., 2012).	Inflammatory processes (Lima et al., 1998), wound healing (Lopes et al., 2005), antifungal (Ishida et al., 2006), anti-ulcer (Rodrigues et al., 2008), infections (Souza et al., 2009), leukorrhea and other gynecological problems (Oliveira et al., 2011) and antimicrobial (Oliveira et al., 2011).

were consistent with those observed in ethnobotanical surveys conducted in the Brazilian Savanna woodland, where the use of the bark of these legumes stands out from the other parts (Pinto et al., 2013; Ribeiro et al., 2014a; Silva et al., 2015; Macêdo et al., 2015). The accentuated use of the shells from this family is a frequent practice among semiarid populations to treat different therapies (Ribeiro et al., 2014a). This means that their preponderant use makes these species more vulnerable, and may lead to the reduction of populations in the Savanna woodland of the region, since there is no control over their collection. Lima et al. (2011) and Pinto et al. (2013) stress that the use of resources that affect the survival of the plant may compromise the conservation of the species.

Versatility of medicinal species

Of the 26 species reported, four presented great versatility in relation to their uses, exhibiting a high Relative Importance Mean (Table 1) ($\overline{RI} > 1$), with the following standing out: *Copaifera langsdorffii* (1.70), *Stryphnodendron rotundifolium* (1.52), *Bowdichia virgiloides* (1.10) and *Amburana cearensis* (1.02). The mentioned species presented from eight to thirty healing properties, ranging from five to twelve body systems, and being mentioned by informants from two to five communities. On the other hand, ten species had a low RI average (0.21–0.5), with little versatility within the communities. The remaining species (12) had a mean RI ranging from 0.62 to 0.99. From the pharmacological point of view, RI is considered a relevant criterion in the selection of plants for detailed studies of their biological activities (Albuquerque et al., 2007; Carneiro and Santos, 2014).

Among the species mentioned above, *Copaifera langsdorffii* obtained the highest number of medicinal uses (30) and encompassed twelve body systems, being mentioned in all the communities, standing out as the most versatile species (IR = 2) in four locations of the five analyzed. This result shows a strong knowledge among the informants in the selection of this species for the treatment of different diseases. In studies that address the versatility of species from the Savanna woodland pharmacopeia, *C. langsdorffii* is among the most outstanding medicinal species, presenting with great Relative Importance (RI = 1.08; 1.81; 1.85; 2.00) (Carneiro and Santos, 2014; Ribeiro et al., 2014a; Macêdo et al., 2015, 2016). This species also obtained the largest number (6) of plant parts used (Cc, Ec, Fo, Re, Fr, Ra), standing out from among the other species.

Among the *C. langsdorffii* therapeutic properties, the following stand out: rheumatism, gastric problems and general pains, as the most common indications. Several pharmacological studies validate the therapeutic applicability of this species. The oil extracted from its trees harbors a source rich in active compounds (kaurenoic and copalic acid), presenting gastroprotective activities (Paiva et al., 1998), antimicrobial (Martis et al., 2010), antineoplastic (Senedese et al., 2013), diuretic and anti-inflammatory (Paiva et al., 2003), antioxidant (Paiva et al., 2004), antinociceptive (Gomes et al., 2007). Studies also reveal, through extracts obtained from the bark of the tree trunk, the presence of betulinic acid and its important antitumoral action (Oshaki et al., 1994).

Stryphnodendron rotundifolium (1.52), presented fourteen therapeutic properties inserted in seven body systems and was reported in four locations. Its most common uses among informants are: general inflammation, respiratory and gastrointestinal disorders, gynecological inflammation, healing and for the treatment of injuries, using the bark and stem bark. Neoplasia, ulcer and blood infection were mentioned only by one community (Betânia, Barbalha, CE). In the study by Souza et al. (2014), in Carrasco area located in the Araripe National Forest, this species presented eight medicinal properties and was also indicated for the treatment of cancer, inflammation and cauterization, exhibiting a RI equal to 1.75, being considered versatile within the community. It is already known, from phytochemical and pharmacological studies, that *S. rotundifolium* presents great therapeutic potential for sheltering tannins, flavonoids and alkaloids in its bark (Costa et al., 2012), which act in the healing of wounds (Lopes et al., 2005), in inflammatory processes (Lima et al., 1998) and in gynecological problems (Oliveira et al., 2012), thus confirming its traditional use.

Bowdichia virgiloides was mentioned in all the studied communities and presented fourteen therapeutic properties, with diseases of the musculoskeletal system and connective tissue (pains in the spine and rheumatism) the most frequent indications. Among the other attributed properties, the following stand out: respiratory diseases (cough and flu), neoplasia and gastrointestinal problems, referred to, respectively, by the communities of Barreiro Grande, Catolé and Betânia. The species was also reported with an aphrodisiac property (sexual impotence) in only one locality (Serra do Zabelê, Nova Olinda, CE). These results demonstrate a variability in therapeutic indications among communities, which according to Albuquerque and Andrade (2002) and Souza et al. (2014) the availability of resources and the effective need of the population influence traditional botanical knowledge.

The aforementioned species stood out as the most versatile in the Barreiro Grande locality (RI = 2) (Table 1), for which it presented the greatest number of properties and the second largest number of body systems attributed, corresponding to six uses (spine pain, osteoarthritis, cough, flu, kidney pain and rheumatism), linked to three body systems (Osteomuscular System and Connective Tissue Diseases, Respiratory System Disorder and Genitourinary System Disorder). For the other localities, it is noted that this quantitative index decreases (0.80–0.73), confirming that the local knowledge on the healing properties of the species diverges among the informants. In ethnobotanical surveys conducted by Carneiro and Santos (2014) and Macêdo et al. (2015) in disjoint and nuclear Savanna areas, *B. virgiloides* was among the ten medicinal species with high versatility, presenting an RI = 1.71; 1.08, respectively. Whereas in the study of Vieira et al. (2015), in the community of São Benedito, in the state of Maranhão, this species was cited with one of the smallest RI (0.19), being used for the treatment of only two medicinal properties, neoplasia and lower limbs pains. Some chemical compounds (flavonoids, tannins) isolated from the *Bowdichia virgiloides* stem bark have already been investigated pharmacologically, with their anti-inflammatory (Barros et al., 2010), antimalarial and antioxidant potential (Deharo et al., 2001; Thomazzi et al., 2010) being proven.

Amburana cearensis, which is usually among the species with the greatest relative importance in ethnobotanical research in the Caatinga (RI = 1.08; 1.09; 1.91) (Albuquerque et al., 2006; Cartaxo et al., 2010; Paulino et al., 2011), was also presented as versatile in this study ($\overline{RI} = 1.02$). The species was indicated for the treatment of up to eight curative properties, included in five body systems and was cited by the informants in two communities. Flu was the most common respiratory disease. Other therapeutic indications (skin inflammation, measles, fever, throat inflammation, cough and gynecological problems) differ in the localities. This species presents with great popularity in folk medicine of the Brazilian northeast (Albuquerque et al., 2007), being widely used for respiratory diseases, as verified in studies by Cartaxo et al. (2010) and Silva et al. (2015a,b). The efficacy of its popular use is confirmed by pharmacological studies from the hydroalcoholic extract of the stem bark and some of its chemical constituents, which demonstrated analgesic, bronchodilator and anti-inflammatory activities (Canuto et al., 2010).

The species that presented a $\overline{RI}$ ranging from 0.62 to 0.99 were: *Ascomium glasycarpa* (0.62), *Bauhinia cheilantha* (0.83), *Centrosema* sp. (0.84), *Dimorphandra gardneiriana* (0.64), *Erythrina velutina* (0.62), *Himenaea courbaril* (0.85), *Himenaea* sp. (0.73), *Libidibia*

ferrea (0.99), *Mimosa tenuiflora* (0.63), *Periandra mediterranea* (0.96), *Senna occidentalis* (0.94) and *Senegalia* sp. (0.73). Among the species mentioned, only *H. courbaril* and *D. gardneiriana* were cited among the informants of all the communities studied. Both species presented nine to twelve properties, respectively, with respiratory diseases (flu, cough, bronchitis and expectorant) and cardiovascular diseases the most reported indications. The other species were referred to in one to four communities. Some of these species stand out in ethnobotanical studies of medicinal purposes carried out in the Savanna woodland (Franco and Barros, 2006; Moreira and Guarim Neto, 2009; Lima et al., 2012a; Carneiro and Santos, 2014; Silva et al., 2015) and also in Caatinga areas (Almeida and Albuquerque, 2002; Silva and Albuquerque, 2005; Cartaxo et al., 2010; Ribeiro et al., 2014b). The influence of the Caatinga vegetation in the pharmacopeia of the studied communities is justified because it is a disjoint Cerrado area, occurring as an enclave within the north-eastern semiarid (Ribeiro et al., 2014a).

Species such as *Bowdichia* sp. (0.31), *Lochocarpus araripensis* (0.21), *Amburana* sp. (0.31) and *Mimosa sensitiva* (0.31) presented only one utility each, being indicated, respectively, for treatment of rheumatism, skin allergy, inflammation and fever. Although these species encompass lower values of Relative Importance, they should not be considered of lower pharmacological potential, as emphasized by Albuquerque et al. (2006) and Ribeiro et al. (2014a) that the versatility of species may vary according to the local knowledge where they are widespread. Among the mentioned species, it is noticed that there are few reports on the popular use attributed to *Lochocarpus araripensis*, however, important activities have already been demonstrated for some of their isolated compounds, such as the attenuation of allergic inflammation (Vasconcelos et al., 2008), through flavones present in its roots, thus confirming its traditional use reported in this study by the besieger of the Serra do Zabelê community.

It is observed from the scientific point of view that, among the most versatile species recorded in this research, *Copaifera langsdorffii*, *Amburana cearensis* and *Stryphnodendron rotundifolium* are already well known, with much of their therapeutic applications validated. However, *Bowdichia virgiloides* for presenting few records confirming its medicinal properties, especially for anticancer action, still requires more in-depth phytochemical and pharmacological studies that may prove the efficacy of its active principles. It is noteworthy that the species mentioned above was mentioned in all communities for the treatment of various body systems, representing a promising target for bioprospecting.

Informant's consensus factor for therapeutic purpose

The medicinal species of the Fabaceae family were indicated for 70 therapeutic purposes grouped in 16 body systems (Table 2). The categories that presented maximum values for Informants Consensus (ICF) were: Mental and Behavioral Disorders (MBD) and Sensory System Disorder SSD (Eyes), both presenting an ICF equal to 1. The other categories included values that ranged from 0.33 to 0.91, and for the Sexual Impotence (SI) category, there was no consensus among the informants.

Mental and Behavioral Disorders (MBD) and Sensory System Disorder SSD (olh), which reached high consensus (ICF = 1), encompassed a total of ten citations of uses. In the MBD category, the use of a single species (*Copaifera langsdorffii*) with seven indications of use for the purposes of depression and nerves. For diseases related to the sensory system, one species (*Dimorphandra gardneriana*) was also indicated for conjunctivitis and eye drops, which together obtained only three citations of uses. According to Chaves and Barros (2012), high ICF values show a uniformity of knowledge among the informants in the selection of a species for signs and symptoms of a certain category of disease. Analogous results were observed in studies carried out in the Brazilian northeast, where the category of MBD also presented with expressive values of agreement of use (Ribeiro et al., 2014b; Saraiva et al., 2015; Macêdo et al., 2016). The sensory system is referred to as having low consensus values (Cartaxo et al., 2010; Oliveira et al., 2010; Chaves and Barros, 2012), with no agreement between the informants in the selection of species used for this category, in contrast to the one observed in the present study.

Respiratory System Disorders (ICF = 0.91) included the highest number of citations (187), corresponding to 35.96% of the total reported uses. This category also obtained the highest number of species (18), corresponding to 19.78% of the total mentioned. These species were indicated to treat influenza, cough, bronchitis, throat inflammation, asthma, pneumonia, lung infection, sinusitis and expectorant.

Among the diseases reported, influenza included the largest number of citations (82), with the species *Hymenaea courbaril* and *Periandra mediterranea* being the most cited (55) for this purpose. The high number of species indicated for this category is probably associated with the prevalence of diseases related to the respiratory system, which according to Macêdo et al. (2015) are manifested as a response to the long periods of drought, the Savanna fires, as well as the low relative humidity. This category is also among the most cited in central Brazil, as well as in the northeastern semi-arid region of the Caatinga (Almeida and Albuquerque, 2002; Silva and Proença, 2008; Moreira and Guarim Neto, 2009; Chaves and Barros, 2012; Santos et al., 2012; Araujo and Lemos, 2015).

Injuries and Poisons and Other Causes of External Consequences (IPOCEC) and Disease of the Endocrine Glands, Nutrition and Metabolism (DEGNM) also obtained a high agreement of uses, presenting similar ICF values among themselves (0.90). IPOCEC reached a total of 59 citations of uses conveyed to the use of seven species. *Stryphnodendron rotundifolium* was the most reported for healing properties and wounds, which together comprised 40 citations, corresponding to 13.47% of the total citations (502). EGDNM (5), obtained three uses, for the treatment of diabetes (5), weakness (2) and dizziness (4), where only the species *Bauhinia cleilantha* and *Cajanus cajan* were indicated for these purposes. Pharmacological analyzes of *Bauhinia cleilantha* demonstrate its hypoglycemic action (Almeida et al., 2006), validating its popular use for the treatment of diabetes. As for *Cajanus cajan*, studies show its abortive and teratogenic action, which demonstrates the toxic effect of this species (Lemonica and Alvarenga, 1994).

The categories of Non-Defined Disorders or Pain (NDDP) and Diseases of the Musculoskeletal System and Connective Tissue (DMSCT) also included equal ICF values (0.87). NDDP was the second category with the highest number of citations (77), covering 11 species (12.09%), among which, *Copaifera langsdorffii* stands out among the informants' knowledge for the treatment of general pain, whose therapeutic purpose was the most cited (28). For the DMSCT category the use of five species was reported, with emphasis on *C. langsdorffii* and *Bowdichia virgiloides* which have the highest number of reported citations for treating rheumatism and spinal pain, which together totaled 24 citations. Pharmacological studies reveal the anti-inflammatory action of these species (Paiva et al., 2004; Barros et al., 2010), thus justifying its use.

For the category of Neoplasia, the use of five species, with eight citations for *Copaifera langsdorffii*, was indicated for the treatment of cancer in general. Phytochemical and pharmacological analyses performed by Oshaki et al. (1994) revealed the presence of betulinic acid and its important antitumor action, evidencing its wide popular use within this category.

With only five citations of uses, the category Diseases of the Nervous System (DNS) comprised two species (*Copaifera langsdorffii* and *Senna occidentalis*) and presented a concordance index of

Table 2
Factor of informant consensus based on citings of use of medicinal species by informants in the communities of Serra do Zabelê, CE, Catolé, PE, Barreiro Grande, CE, Betânia, CE, Matozinho, Estância, Serra de Zé Gomes and Mangueiras, PE, Chapada do Araripe, Brazil.

Body system categories/therapeutic purposes/quotations	Number of uses reported	Number and species of plants	ICF
MBD: Depression (4), nerves (3).	7	1 – *Copaifera langsdorffii*	1.00
SSD (Eyes): Conjunctivitis (2), eye drops.	3	1 – *Dimorphandra gardneriana*	1.00
RSD: Influenza (82), Cough, (58), expectorant, (26), Inflammation in the throat (6), bronchitis (6), asthma (3), lung infection (4), pneumonia, sinusitis.	187	18 – *Acosmium glasycarpa, Anadenanthera colubrina, Amburana cearenses, Bauhinia cheilantha, Bowdichia virgiloides, Centrosema* sp., *Copaifera langsdorffii, Dimorphandra gardneriana, Enterolobium contortisiliquum, Hymenaea courbaril, Hymenaea* sp., *Libidibia ferrea, Mimosa sensitiva, Periandra mediterranea, Poincianella pyramidalis, Senna occidentalis, Senegalia* sp., *Stryphnodendron rotundifolium.*	0.91
DEGNM: Diabetes (5), weakness (2), dizziness (4).	11	2- *Bauhinia cheilantha, Cajanus cajan.*	0.90
IPOCEC: Injury (23), healing (17), strokes (5), fractures (3), intoxication (4), wounds (7).	59	7- *Copaifera langsdorffii, Dimorphandra gardneriana, Dioclea grandiflora, Hymenaea courbaril, Libidibia férrea, Mimosa tenuiflora, Stryphnodendron rotundifolium.*	0.90
DMSCT: Rheumatism (12), spine pain (14), bone pain (3), arthrosis, knee swelling (2).	32	5- *Acosmium glasycarpa, Bowdichia* sp., *Bowdichia virgiloides, Copaifera langsdorffii, Libidibia ferrea*	0.87
NDDP: General pain (28), general inflammation (26), fever (10), inflammation external (5), inflammation internal (4), anti-inflammatory, allergy (2), swelling.	77	11- *Amburana cearenses, Amburana* sp., *Bowdichia virgiloides, Copaifera langsdorffii, Dimorphandra gardneriana, Libidibia férrea, Machaerim acutifolium, Mimosa tenuiflora, Mimosa sensitiva, Stryphnodendron rotundifolium, Centrosema* sp.	0.87
DGS: Gynecological inflammation (29), kidney problems (5), menopause (2), menstrual cycle (4).	40	8- *Amburana cearenses, Bauhinia cheilantha, Bowdichia virgiloides, Copaifera langsdorffii, Enterolobium contortisiliquum, Mimosa tenuiflora, Stryphnodendron rotundifolium, Erythrina velutina.*	0.82
DDS: Stomach pain (12), gastritis (9), gastric ulcer (5), herniated stomach, constipation (5), indigestion (4), belly swelling, wound stomach, bloody diarrhea, toothache.	40	9- *Acosmium glasycarpa, Bauhinia cheilantha, Bowdichia virgiloides, Centrosema* sp., *Copaifera langsdorffii, Enterolobium contortisiliquum, Hymenaea courbaril, Mimosa tenuiflora, Stryphnodendron rotundifolium.*	0.79
N: Cancer (15), leukemia (3).	18	5- *Bowdichia virgiloides, Copaifera langsdorffii, Dimorphandra gardneriana, Stryphnodendron rotundifolium, Senegalia* sp.	0.76
DNS: Headache (4), epilepsy.	5	2- *Copaifera langsdorffii, Senna occidentalis.*	0.75
IPD: Tuberculosis (7), measles, intestinal infection.	9	4- *Amburana cearenses, Hymenaea* sp., *Periandra mediterranea, Anadenanthera colubrina.*	0.63
DCS: Circulation (2), stroke (3), thrombosis (2), high blood pressure (2), bleeding (5), heart, angina.	16	7- *Acosmium glasycarpa, Dimorphandra gardneriana, Bauhinia cheilantha, Copaifera langsdorffii, Senna occidentalis, Erythrina velutina, Libidibia ferrea.*	0.60
DBHO: Blood purifier (4), anemia (2), problemas no sangue (2).	8	5- *Copaifera langsdorffii, Hymenaea courbaril, Stryphnodendron rotundifolium, Bauhinia cheilantha, Senna occidentalis.*	0.43
DSSCT: Skin inflammation (5), skin allergy, furuncle.	7	5- *Stryphnodendron rotundifolium, Lochocarpus araripensis, Dioclea grandiflora, Amburana cearenses, Bowdichia virgiloides.*	0.33
SI: Aphrodisiac (sexual impotence)	1	1- *Bowdichia virgiloides.*	0,00

ICF, Informant Consensus Factor. NDDP, Non-Defined Disorders or Pain; DEGNM, Disease of the Endocrine Glands, Nutrition and Metabolism; IPD, Infectious and Parasitic Diseases; MBD, Mental and Behavioral Disorders; DBHO, Diseases of Blood and Hematopoietic Organs; DMSCT, Diseases of the Musculoskeletal System and Connective Tissue; IPOCEC, Injuries, Poisonings and Other Consequences of External Causes; N, Neoplasias; DDS, Disorder of the Digestive System; DGS, Disorder of the Genitourinary System; DNS, Diseases of the Nervous System; RSD, Respiratory System Disorder; Sensory System Disorder (Eyes); DCS, Diseases of the Circulatory System; DSSCT, Diseases of the Skin and Subcutaneous Cellular Tissue; SI, Sexual Impotence.

0.75. The referred treatments were for headaches (4) and epilepsy. It is observed that the use of medicinal plants conveyed to this body system is scarcely mentioned, as verified in the studies of Montelos and Pinheir (2007), Oliveira et al. (2010) and Chaves and Barros (2012).

Ten therapeutic properties were grouped for Digestive System Disorder (DDS) with the use of nine species. The most frequent diseases were stomach pain, gastritis, gastric ulcer, constipation and indigestion, related to 35 citations of use. The most reported property among the informants was belly ache (12), with *Copaifera langsdorffii* being the most used species for this purpose. In research carried out in different communities in Brazil, it is observed that the diseases originating from this system are well reported, covering a large amount of medicinal species (Cartaxo et al., 2010; Oliveira et al., 2010; Costa and Mayworm, 2011; Cunha and Bortolotto, 2011; Alves and Povh, 2013; Araujo and Lemos, 2015).

Among the most frequent affections of the genitourinary system are gynecological inflammations and renal problems, where the use of eight species, including *Enterolobium contortisiliquum* and *Stryphnodendron rotundifolium*, was reported among the species with the highest number of reports within this category. Bonel-Raposo et al. (2008) have described, in their study on toxicity, divergent results to those mentioned in this study for the medicinal use of *E. contortisiliquum*, evidencing their abortive potential.

Infectious and Parasitic Diseases (IPD) and Diseases of the Circulatory System (DCS) presented ICF ranging from 0.60 to 0.63. Tuberculosis was the most frequently reported disease (7) within the category of IPD, where the use of four species prevailed, of which, *Periandra mediterranea* stands out as the most indicated species for this purpose. DCS obtained 16 citations of uses, mainly for hemorrhagic properties. *Libidibia ferrea* was the most cited species (5) within the category.

Diseases of Blood and Hematopoietic Organs (DBHO) and Diseases of the Skin and Subcutaneous Cellular Tissue (DSSCT) presented low values of agreement of use, with ICF ranging from 0.43 to 0.33, respectively. These systems encompassed six therapeutic purposes and fifteen citations of uses, where the use of five species in each system was predominant, with *Stryphnodendron rotundifolium* being mentioned in both categories. Inferred studies in the central Brazilian region and in the north-eastern semi-arid region reveal that these body systems are among those with the least consensus, encompassing ICF values ranging from 0.25 to 0.57 (Santos et al., 2012; Chaves and Barros, 2012; Alves and Povh, 2013).

With only one citation of reported use for the aphrodisiac property and with only one species indicated for this purpose, the category of Sexual Impotence did not present a consensus among the informants, which suggests that the besiegers do not share the same knowledge or do not agree on the use of this species within this body system, according to Cartaxo et al. (2010).

Of the species mentioned for the different body system categories, it is observed that *Copaifera langsdorffii* stands out as the most indicated species for most body systems.

Conclusions

Fabaceae presented an expressive amount of medicinal species used for the treatment of different conditions, proving the great importance of the family to the communities in the use of medicinal plants.

B. virgiloides, *D. gardneriana*, *C. langsdorffii* and *H. courbaril* were cited in all localities, showing a wide knowledge or use in the Savanna of Chapada do Araripe.

Because they presented a great number of therapeutic indications, *S. rotundifolium, A. cearensis, B. virgiloides* and *C. langsdorffii* reached great versatility, acting in varied body systems.

There was consensus among informants in most body systems, which shows that there is a well-defined selection criteria for medicinal plants and/or that usage and/or knowledge information is shared among the people within the community.

Considering, in this research, the large number of promising species for the discovery of bioactive substances, belonging to the Fabaceae family, an increase in ethnobotanical studies in this region, with the purpose of supporting biochemical and pharmacological research that prove the biological activities of species that require further study is recommended.

Ethical disclosures

Protection of human and animal subjects. The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

Authors' contributions

All the authors contributed fundamentally to this study. MJFM is responsible for the manuscript written by the literature review of the pharmacological activities of the species, together with the MMAS, guidance. In addition, MMAS and DAR participated in the increase of information to or manuscript. DAR, DGM, MES were responsible for the accomplishment of interviews and MOS, JGFM, BVA, MNSL participated in the collection of botanical material.

Conflicts of interest

The authors declare no conflicts of interest

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