ORIGINAL ARTICLE

Traditional knowledge of medicinal plants used to treat livestock in shared pasture communities in some areas of the semiarid region of Bahia, northeastern Brazil

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ABSTRACT

The present study aimed to identify the primary plant species used for treating livestock in the Lower-Mid São Francisco River region of Northeast Brazil. Conducted in rural areas of the state of Bahia, this study focused on traditional shared-pasture farming communities. Interviews with 42 livestock farmers were conducted to evaluate the medicinal use of plants in treating livestock diseases. The use value, citation frequency, relative citation frequency, frequency index, cultural importance index, and relative importance of plant species were calculated. A total of 45 plant species were cited, belonging to 19 families and 38 genera. *Mimosa tenuiflora* (Willd.) Poir. was the most cited species and had the highest relative importance value (0.750). *Spondias tuberosa* Arruda had the highest number of use reports (8) and frequency index (19). The stem was the most used part of the plant, followed by the leaves. This study demonstrated that the use of medicinal plants remains common in several communities in the semiarid region of Northeast Brazil, with plants serving diverse medicinal purposes and preparations in shared-pasture livestock farming.

Keywords:Medicinal plants, ethnoveterinary, ethnobotany, Caatinga biome, plants of Bahia.

INTRODUCTION

Traditional knowledge about medicinal plants and their properties has been transmitted through generations, built empirically through observations of nature and the animals that consume these plants. In this scenario, domestic animals play a pivotal role in human civilization. In addition to benefiting humans, these plants are also used as medicines for many domestic animals. Ethnoveterinary medicine is a field that protects animal health and treats illnesses, grounded in the traditional beliefs and indigenous knowledge of local communities (Khan et al. 2019; Rahman et al. 2023).

The reduction in the availability of medicinal plant species due to ecosystem changes caused by human activities leads not only to the loss of potential pharmaceuticals but also to the erosion of knowledge associated with these genetic resources, knowledge that has been historically accumulated and transmitted over generations (Volenzo and Odiyo 2020; Sousa et al. 2020a; Shinde 2024). Ethnobotanical and ethnopharmacological surveys play a fundamental role in retrieving traditional knowledge from rural and urban settings, highlighting its historical and cultural value, and confirming the indications for the use of medicinal plants (Soares et al. 2015). Additionally, the field of ethnoveterinary medicine studies folk practices involving the use of medicinal plants for treating or preventing diseases in animals (Teixeira et al. 2015; Amorim

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et al. 2018).

In Brazil, there are few studies in the field of ethnoveterinary medicine. Notable examples include research conducted in Paraná (Burei et al. 2022), the Eastern Amazon (Monteiro et al. 2011; Ritter et al. 2012), and Piauí (Castro et al. 2016). According to Sousa et al. (2020a), studies on the use of species with ethnomedicinal properties for veterinary medicine are scarce compared to the abundant information on plants used for human medicinal purposes. The authors emphasize the importance of preserving species in the Caatinga (semiarid) biome to ensure the continued availability of plant resources for folk medicine. Furthermore, they underscore the need for studies that address the knowledge and techniques employed with plants that have medicinal properties beneficial to livestock farmers for safeguarding their animals.

From this perspective, the present study aimed to determine the main plant species used to treat livestock animals in the sub-middle region of the São Francisco River, northeastern Brazil.

MATERIAL AND METHODS

Area and communities involved in study

This study was conducted in rural areas of the municipalities of Sobradinho, Casa Nova, and Juazeiro, located in the semiarid region of the state of Bahia in northeastern Brazil. A total of 23 locations were investigated, with one location per area (Figure 1). The municipalities have respective areas of approximately 1,355.97 km², 9,647.07 km², and 6,721.24 km². The municipality of Sobradinho (9°27'34'' S; 40°49'31'' W) is located 35 km southwest of the city of Juazeiro (9°24'42'' S; 40°29'55'' W). Casa Nova (9°24'29'' S; 41°9'29'' W) is situated 70 km from Juazeiro and is considered the largest city in the state by territorial area (IBGE, 2018).

The region belongs to the Caatinga ecosystem, with a vegetation consisting mostly of cacti, shrubs, small trees, and other plants adapted to the semiarid climate. According to the Köppen classification, the climate is classified as *BWh* (i.e., dry), with an annual rainfall lower than 500 mm and a mean temperature of 24.8 °C.

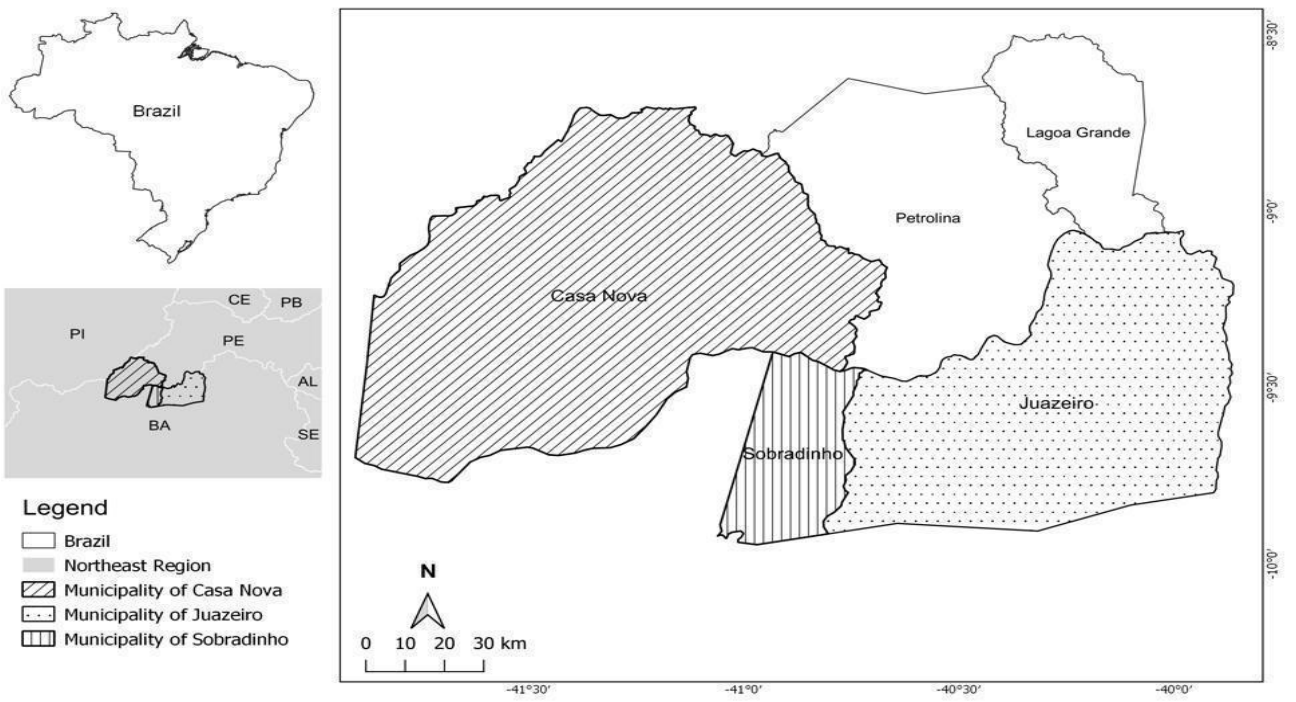

Figure 1. Geographic location of municipalities with traditional *fundo de pasto* communities.

Traditional *fundo de pasto* (shared-pasture farming) communities are characterized by the communal use of land and natural resources. Fences are practically non-existent, and animals are raised freely, identified by ear tags that denote their family ownership. Given the scarcity of water in the semiarid region of Northeast Brazil, the absence of fences between rural properties facilitates animals' access to water and forage (Marques 2016). Traditional *fundo de pasto* communities have been nationally recognized as culturally distinct groups who self-identify as such. These groups possess unique forms of social organization and occupy and utilize territories and natural resources as essential conditions for their cultural, social, religious, ancestral, and economic reproduction, using knowledge, innovation, and practices generated and transmitted through tradition (Brasil 2016).

Ethnobotanical survey of medicinal plants

This study was registered in the National System of Genetic Heritage Management and Associated Traditional Knowledge (process number: AD38B20). Data were collected through dialogues and interviews, adhering to the methodology outlined by Albuquerque and Lucena (2004). Questionnaires were administered to rural residents who raised livestock, including goats, sheep, cattle, pigs, and poultry, to survey plant species and their medicinal uses for animal treatment. The data collection period spanned from January 2017 to July 2018. A total of forty-two individuals participated in the study, representing communities in the municipality of Sobradinho (Algodões Velho, Canaã, Santa Maria, Lagoa Grande, Tataui I, II, III, and IV), Juazeiro (Cano and Saquinho), and Casa Nova (Cacimbas, Sítio Lagoa de Baixo, Atoleiro, Melancia de Baixo, Junco, Tanque Novo, Capim Grosso, Simplício, Riacho Grande, Leite II, Lagoinha, and Queimadas).

Individuals associated with rural unions in each city were invited to participate in the study and share their experiences with the plants on their properties, as well as traditional and family knowledge on the use and preparation of folk remedies derived from local flora. Native species were classified into different vegetal strata (trees, bushes, herbs, and vines) found within forest fragments on the properties visited. An ethno-directed approach was adopted, emphasizing the indications of the participants in specific contexts of plant use and highlighting local knowledge and practices related to the treatments developed (Albuquerque and Hanazaki 2006).

This study received approval from the Human Research Ethics Committee of the *Sertão Pernambucano* Federal Institute (CAAE 62166616.5.0000.8052). Each interviewee signed an informed consent statement agreeing to participate in the study.

Identification and preservation of plant specimens

Samples of the mentioned species were collected in this ethnobotanical study and deposited at the *Sertão Nordestino* Reference Herbarium. Only plant materials with enough stem, leaves, and flowers/fruits were deposited. Species identification was conducted by Vinicius Messas Cotarelli and Duílio Paulino de Souza using analytical keys, morphological comparisons with vouchers deposited in the herbarium, and the Flora of Brazil 2020 website.

Quantitative data analysis

The following indices were used for the quantitative analysis: relative citation frequency (RCF), use value (UV), frequency index (FI), and relative importance (RI).

Relative citation frequency (RCF)

The RCF was calculated according to the method described by Tardio and Santayana (2008): the number of informants who mentioned a useful species (citation frequency [CF]) divided by the total number of informants in the study (N):

$$RCF = CF/N$$

The RCF ranged from 0 to 1, with zero corresponding to when no one mentioned a plant as being useful, and one corresponding to when all informants reported the plants as useful, respectively.

Use value (UV)

The UV was calculated using the following formula (Gazzaneo et al. 2005):

$$UV = \Sigma Ui/N$$

where Ui is the number of uses mentioned by each informant for a given species and N is the total number of informants. This index highlights the relative importance of locally known plants.

Relative importance (RI)

The RI of the plant species cited by the informants was calculated as follows (Kadir et al. 2012):

$$RI = PP + AC$$

where PP is the number of medicinal properties attributed to a species (specific diseases reported) divided by the maximum number of properties attributed to the species with the most resources (species with the largest

number of properties), and AC is the number of use categories (conditions treated by a certain species) divided the maximum number of use categories (conditions treated by the most versatile species). According to Oliveira et al. (2010), the highest RI value is 2, indicating the most versatile species with the largest number of medicinal properties.

Frequency index (FI)

According to Mahwasane et al. (2013), FI is the numeric expression of the citation frequency percentage for a single species by informants. The following equation was used to calculate this index (Madikizela et al. 2012):

FI = CF = N x 100

The CF is the number of informants who mentioned the use of the plant species, whereas N is the total number of informants. The value of FI is high when many informants mention a particular plant, and low when few informants mention it.

RESULTS

Demographic characteristics of informants

Of the individuals interviewed, 15 participants were women (35.7%) and 27 were men (64.3%), with ages ranging from 36 to 94 years. A total of 97.6% of the 42 informants reported engaging in livestock farming, while 11 (26.2%) practiced rainfed agriculture in combination with livestock farming. The length of residence on their properties varied from two to 73 years. Additionally, 20 participants were retired (47.6%), and only 19% were illiterate (Table 1).

Table 1. Demographic characterization of the informants (N = 42).

Demographic characteristics	Number of individuals	Percentage (%)
Age group		
36 – 44	3	7.1
45 – 54	13	30.9
55 – 64	7	16.6
65 – 74	11	26.2
75 – 84	5	11.9
85 – 94	3	7.1
Gender		
Female	15	35.7
Male	27	64.3
Schooling		
Literate	34	80.9
Illiterate	8	19.0

Plants recorded

During the study, samples of 45 plant species used for medicinal purposes in animals were collected. These species belong to 19 families and 38 genera (Table 2). The Fabaceae family was the most represented, with 11 species, followed by Lamiaceae with five species, and Anacardiaceae and Euphorbiaceae with four species each. Other families were represented by only one or two species with ethnoveterinary uses.

Table 2. Medicinal plants used for treatment of illnesses in livestock animals, in rural communities of Sobradinho, Casa Nova, and Juazeiro, state of Bahia, Brazil.

Taxon/Record id[a]	Common name	Origin[b]	Part used	Use categories	CF and RU	% CF	RCF	UV	FI	RI
Acanthaceae										
Ruellia paniculata L.	Melosa/ amargosa	Native	Leaves and flowers	Wounds in general	1/1	2.4	0.023	0.023	2.3	0.080
Amaranthaceae										
Dysphania ambrosioides (L.) Mosyakin & Clemants (4608)	Mastruz	Naturalized	Leaves and bark	antihelminthic, cases of placental retention and healing agent	2/3	4.8	0.047	0.071	7.1	0.223
Anacardiaceae *Myracrodruon urundeuva* (M. Allemão) Engl (4646)	Aroeira	Native	Bark	Cough, healing agent, cases of placental retention and wounds in general	1/4	26.2	0.261	0.095	9.5	0.446

Continua...

TABLE 2. *Continuação*

Taxon/Record id[a]	Common name	Origin[b]	Part used	Use categories	CF and RU	% CF	RCF	UV	FI	RI
Anacardium occidentale L. (4620)	Cajueiro	Native	Bark	Use for the treatment of diabetes	4/1	9.5	0.095	0.023	2.3	0.133
Spondias tuberosa Arruda	Umbuzeiro	Native	Bark	Influenza, bronchopneumonia, diarrhea, healing agent, bleeding, cases of placental retention, infections in general and abdominal pain	13/8	30.9	0.309	0.190	19	0.732
Apterokarpos gardneri (Engl.) Rizzini	Aroeira mole	Native	Bark	Anti-inflammatory	2/2	4.8	0.047	0.047	4.7	0.160
Schinopsis brasiliensis var. *glabra* Engl.	Baraúna	Native	Bark	Anti-inflammatory	1/1	2.4	0.023	0.023	2.3	0.080
Apocynaceae										
Allamanda blanchetii A.DC.	Sete pataca	Native	Bark	Anti-inflammatory	2/1	4.8	0.047	0.023	2.3	0.098
Asphodelaceae										
Aloe vera (L.) Burm.f. (4622)	Babosa	Exotic	Gel	antihelminthic, healing agent, cases of placental retention and infections in general	14/4	33.3	0.333	0.095	9.5	0.500
Burseraceae										
Commiphora leptophloeos (Mart.) J.B.Gillett (4618)	Umburana de cambão/ boi	Native	Bark	Diarrhea, abdominal pain, healing agent and anti-inflammatory	21/4	50	0.5	0.095	9.5	0.652
Celastraceae										
Maytenus rigida Mart. (4631)	Pau de colher	Native	Bark	Anti-inflammatory	2/1	4.8	0.047	0.023	2.3	0.098
Convolvulaceae										
Operculina macrocarpa (L.). Urb. (4629)	Batata-de-purga	Native	Fruit and tuber	antihelminthic and bronchopneumonia	4/2	9.5	0.095	0.047	4.7	0.196
Cucurbitaceae										
Apodanthera pedisecta (Ness & Mart.) Cogn.	Batata de teiú	Native	Fruit	Scabies	3/1	7.1	0.071	0.023	2.3	0.116
Momordica charantia L.	Melão são caetano	Naturalized	Fruit	Repellent, bronchopneumonia and infections in general	3/3	7.1	0.071	0.071	7.1	0.241

Continua...

TABLE 2. *Continuação*

Taxon/Record id[a]	Common name	Origin[b]	Part used	Use categories	CF and RU	% CF	RCF	UV	FI	RI
Luffa operculata (L.) Cogn.	Paulistinha	Native	Fruit	Bronchopneumonia	1/1	2.4	0.023	0.023	2.3	0.080
Euphorbiaceae										
Cnidoscolus quercifolius Pohl (4611)	Favela	Native	Bark	Healing agent, repellent, abdominal pain, infection and wounds in general	17/5	40.5	0.404	0.119	11.9	0.616
Croton echioides Baill. (4621)	Quebra faca	Native	Bark	Diarrhea, cases of placental retention and bronchopneumonia	6/3	14.3	0.142	0.071	7.1	0.294
Jatropha cf. mollíssima (Pohl) Baill. (4617)	Pinhão brabo	Native	Leave, flowers and sap	Poisoning and keratoconjunctivitis	10/2	23.8	0.238	0.047	4.7	0.303
Croton sonderianus Müll. Arg. (4625)	Marmeleiro	Native	Leaves and bark	Respiratory problems and diarrhea	6/2	14.3	0.142	0.047	4.7	0.232
Fabaceae *Poincianella microphylla* (Mart. ex G. Don) L.P.Queiroz (4627)	Catingueira	Native	Flowers and bark	Anti-inflammatory, diarrhea, urinary infection, abdominal pain and bloating	10/5	23.8	0.238	0.119	11.9	0.75
Libidibia ferrea var. *leiostachya* (Mart. ex Tul.) L.P. Queiroz (4637)	Pau-ferro	Native	Leaves, bark scraping and pod	Infections in genera, urinary infection healing agent, anti-inflammatory, cases of placental retention	8/5	19	0.190	0.119	11.9	0.455
Bauhinia cheilantha (Bong.) Steud.	Mororó	Native	Leaves	Bronchopneumonia	1/1	2.4	0.023	0.023	2.3	0.080
Caesalpinia pyramidalis Tul. (4610)	Pau de rato	Exotic	Bark	Placental retention, abdominal pain and diarrhea	2/3	4.8	0.047	0.071	7.1	0.223
Senna martiana (Benth) H.S. Irwin & Barneby (4641)	Canafístula	Native	Leaves and flowers	Bloating, abdominal pain, urinary infection, anti-inflammatory, antihelminthic and treatment of scabies	7/6	16.7	0.166	0.142	14.2	0.5
Tamarindus indica L. (4619)	Tamarindo	Native	Bark and fruit	Infections in general and laxative	1/2	2.4	0.023	0.047	4.7	0.142
Amburana cearensis (Allemão) A.C.Sm.	Umburana de cheiro	Native	Seeds	Anorexia, indigestion and abdominal pain	6/3	14.3	0.142	0.071	7.1	0.294

Continua...

TABLE 2. *Continuação*

Taxon/Record id[a]	Common name	Origin[b]	Part used	Use categories	CF and RU	% CF	RCF	UV	FI	RI
Anadenanthera colubrina var. cebil (Vell.) Brenan (4632)	Angico	Native	Bark	Cough, wounds in general, diarrhea, treatment of fractures, stimulant, healing agent and anemia	11/7	26.2	0.261	0.166	16.6	0.633
Hymenaea martiana Hayne (4623)	Jatobá	Native	Bark	Energy stimulant	2/1	4.8	0.047	0.023	2.3	0.098
Mimosa arenosa (Willd.) Poir.	Calumbi	Native	Leaves	Healing agent and cough	3/2	7.1	0.071	0.047	4.7	0.178
Mimosa tenuiflora (Willd.) Poir. (4651)	Jurema preta	Native	Bark	Cough, healing agent and wounds in general	28/4	66.7	0.666	0.095	0.75	9.5
Lamiaceae										
Mesosphaerum suaveolens (L.) Kuntze (4643)	Samba caita	Native	Leaves	Anti-inflammatory	1/1	2.4	0.023	0.023	2.3	0.080
Plectranthus amboinicus (Lour.) Spreng. (4615)	Malvão	Native	Leaves	Respiratory problems	1/1	2.4	0.023	0.023	2.3	0.080
Plectranthus ornatus Codd	Boldo	Naturalized	Leaves	Indigestion	2/1	4.8	0.047	0.023	2.3	0.098
Malvaceae *Gossypium hirsutum* L. (4635)	Algodão crioulo	Naturalized	Leaves and seeds	Infections in general, cases of placental retention and anti-thermal	7/3	16.7	0.166	0.071	7.1	0.312
Pseudobombax simplicifolium A. Robyns (4634)	Umburuçú	Native	Bark	Respiratory problems, infections in general, anti-inflammatory and wounds in general	6/4	14.3	0.142	0.095	9.5	0357
Sida cordifolia L.	Malva babenta	Native	Leaves	Anti-inflammatory and treatment of myiasis	3/2	7.1	0.071	0.047	4.7	0.178
Melastomataceae										
Miconia albicans (Sw.) Steud	Canela de velho	Native	Leaves	Abdominal pain	1/1	2.4	0.023	0.023	2.3	0.080
Nyctaginaceae										
Guapira graciliflora (Mart. ex Schmidt) Lundell (4647)	Pau piranha	Native	Leaves	Anti-inflammatory	1/1	2.4	0.023	0.023	2.3	0.080
Olacaceae										
Ximenia americana L.	Ameixinha	Native	Bark	Anti-inflammatory and healing agent	4/2	9.5	0.095	0.047	4.7	0.196

Continua...

TABLE 2. *Continuação*

Taxon/Record id[a]	Common name	Origin[b]	Part used	Use categories	CF and RU	% CF	RCF	UV	FI	RI
Rhamnaceae *Zizyphus joazeiro* Mart.	Juazeiro	Native	Leaves	Healing agent, abdominal pain and cough	5/3	11.9	0.119	0.071	7.1	0.276
Rutaceae										
Zanthoxylum L. (4616)	Limoeiro	Native	Fruit	Keratoconjunctivitis and cough	5/2	11.9	0.119	0.047	4.7	0.214
Sapindaceae										
Cardiospermum var. corindum L. (4636)	Xique-xique	Native	Bark and flowers	Poisoning	1/1	2.4	0.023	0.023	2.3	0.080
Turneraceae										
Turnera subulata Sm. (4642)	Flor amarela	Native	Flowers	Analgesic	1/1	2.4	0.023	0.023	2.3	0.080
Verbenaceae										
Lippia alba (*Mill.*) N.E.Br.ex Britton & P.Wilson. (4633)	Erva cidreira	Native	Leaves	Abdominal pain	2/1	4.8	0.047	0.023	2.3	0.098
Lippia origanoides Kunuth (4612)	Alecrim/ alecrim do campo	Native	Leaves and bark	Respiratory problems, infections in general and repellent	3/3	7.1	0.071	0.047	4.7	0241

Plants without record id are not deposited at Sertão Nordestino Reference Herbarium; **b**. According to Flora of Brazil 2020 website. **CF**- citation frequency; **RU** – reports of use; **RCF** – relative citation frequency; **UV** – use value; **FI** – frequency index; **RI** –relative importance.

The seven following species were among the most cited by the informants: *M. tenuiflora* (“jurema preta”), followed by *C. leptophloeos* (“umburana de cambão”), *C. quercifolius* (“favela”), *A. vera* (“babosa”), *S. tuberosa* (“umbuzeiro”), *A. colubrina* var. cebil (“angico”), and *M. urundeuva* (“Aroeira”), the latter two of which had the same number of mentions (11/42). These species are widely used for the treatment of different conditions, e.g., respiratory problems, inflammation, infection, and wounds in general (Table 2).

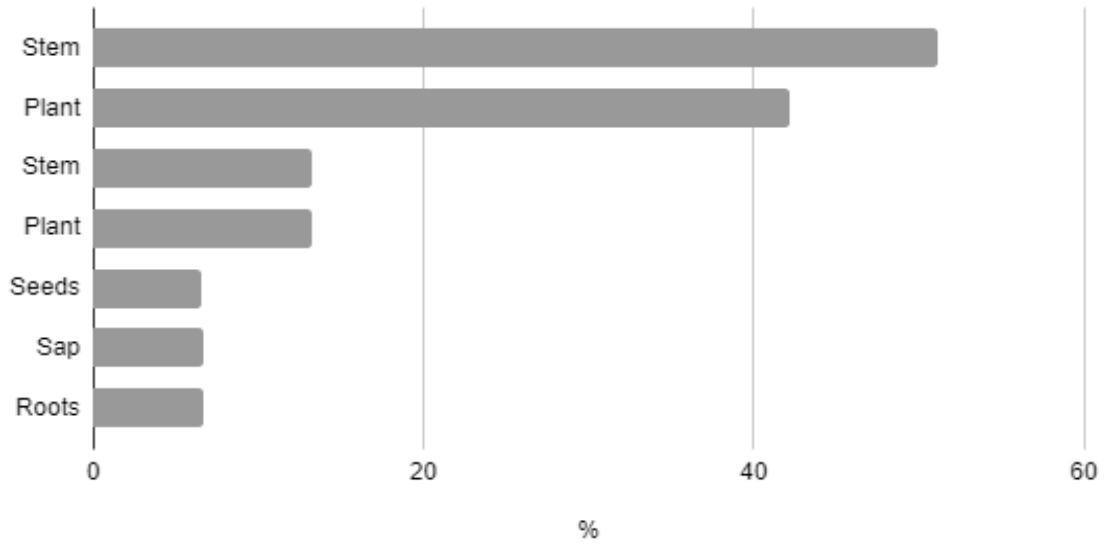

Figure 2. Plant parts used by the interviewed population from municipalities in the Brazilian states of Bahia (Casa Nova, Juazeiro and Sobradinho) to treat the livestock.

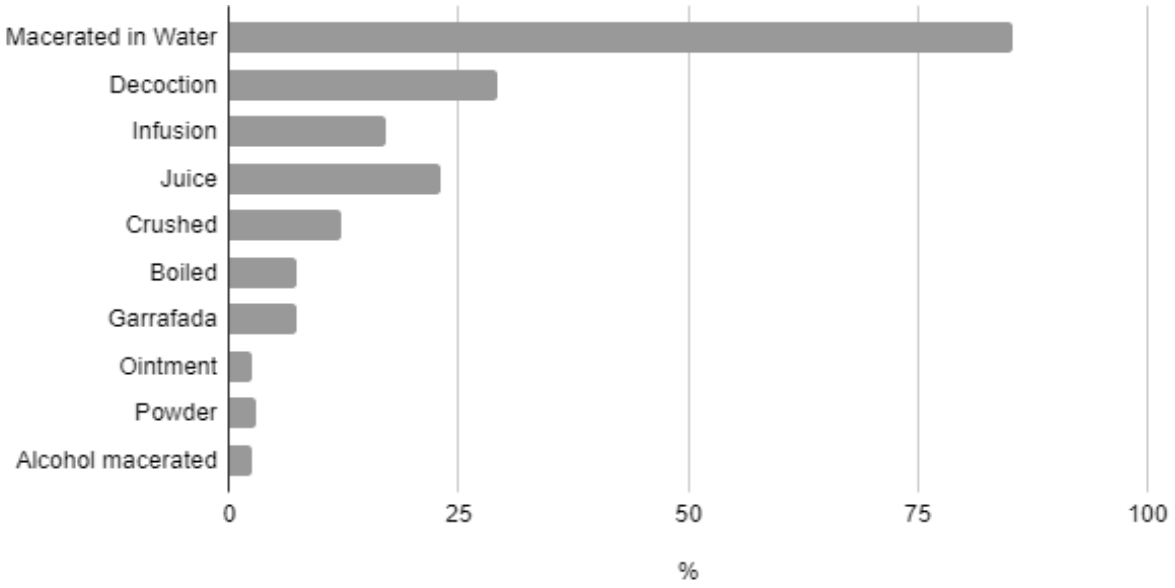

Figure 3. Mode of preparation of medicinal plants used by the interviewed population from municipalities in the Brazilian states of Bahia (Casa Nova-BA, Juazeiro and Sobradinho) for the treatment of livestock.

The plant parts most used to treat illnesses were the stem (51.1%), leaves (42.2%), flowers (13.3%), fruit (13.3%), seeds (6.6%), sap (6.7%), and roots (6.7%) (Figure 2).

The predominant plant part used for medicinal purposes was the stem. The availability of this portion, along with the leaves, throughout all seasons likely indicates its higher use value compared to other parts such as flowers, fruits, and seeds, which are often not available (Valeriano et al., 2020). The use of leaves also has a conservational benefit for the plant resource, as it does not impede plant development or affect the plant's reproductive system.

Plant preparation for application in animal treatment was diverse. The reports suggested that the most common type of preparation was maceration in water (85.3%), followed by decoction (29.2%), infusion (17%), juice (23%), crushing (12.2), boiling (7.3), bottled herbal preparations (7.3), ointment (2.4), powder (3%), and maceration in alcohol (2.4%) (Figure 3).

When asked about the source of their knowledge on the use of medicinal plants for treatment, 88% of respondents indicated they learned from family members, primarily parents, while 30.9% cited other sources such as neighbors or training courses. Additionally, 88% of the informants stated that their families continue to practice this form of therapy, whereas only 11.9% reported that their families no longer use these traditional methods.

Regarding the origin of the species, the data showed that approximately 9% of the species reported during the interviews are naturalized species, 7% are exotic species, and 84% are native species.

DISCUSSION

These results demonstrate that the plants of the Caatinga ecosystem are widely used by families in the study region. Furthermore, they highlight the importance of preserving the Caatinga and orally transmitted popular knowledge.

The most frequently cited plant during the research was *Mimosa tenuiflora* (jurema preta), which is native to the Caatinga ecosystem. In this study, the medicinal use of this plant was identified for the treatment of cough, general infections, navel infections, and wounds. Studies with the crude extract of *M. tenuiflora* have demonstrated the presence of catechins, flavones, tannins, anthocyanins, anthocyanidins, xanthones, steroids, triterpenoids, saponins, and alkaloids (Borges et al. 2017). Although the results of this research are focused on the use of this plant in humans, tests have indicated its potential for treating animal diseases due to its antimicrobial action (Santana et al. 2008; Sousa et al. 2020b).

Commiphora leptophloeos (umburana-de-cambão) also had a high number of citations in this study. Despite its therapeutic value in folk medicine, there are still few scientific reports on the pharmacological activity and bioactive potential of *C. leptophloeos*. Silva et al. (2019) demonstrated its potential use in the treatment of mastitis in ruminants,

and Pereira et al. (2017) observed the presence of three phenolic compounds, identified by HPLC as gallic, chlorogenic, and protocatechuic acids.

The species *C. quercifolius* (favela), typical of the semiarid environment, was cited in the study for its therapeutic applications in animals. These included wound healing, infection treatment, and relief of abdominal pain, as well as use as an insecticide. Felix (2021) observed its nematicidal potential against gastrointestinal helminths in sheep. These results were associated with the presence of flavonoids, condensed tannins, saponins, alkaloids, and triterpenes.

S. tuberosa Arruda (umbuzeiro) and *A. colubrina* var. *cebil* (angico) were notable for their frequency indices, with values of 19 and 16.6, respectively, indicating a high number of usage reports for these species. *S. tuberosa* is considered a symbol of the biome and its fruit is highly valued by local communities, providing income for many families. Maceration of the bark in water was cited by 30.9% of informants, who reported its wound-healing activity in animals. Phenols, tannins, triterpenes, and quinones were detected in an ethanolic extract of the inner bark (Almeida et al. 2005). Although *S. tuberosa* has been extensively used in folk medicine, pharmacological studies on this species are scarce in the literature (Albuquerque et al. 2020).

A. colubrina var. *cebil* (angico) and *M. urundeuva* (aroeira) had the same proportion of citations (26.2%). *A. colubrina* was cited for the control of respiratory infections, wound treatment, and healing of the navel in newborn animals. According to Costa (2020), *A. colubrina* var. *cebil* is rich in phenolic compounds with significant antioxidant activity. *M. urundeuva* was cited for resolving cases of retained placenta in livestock (goats, sheep, and cows) and as a wound-healing agent. Plants with wound-healing activity typically contain high levels of tannins, flavonoids, proanthocyanidins, fatty acids, saponins, triterpenes, steroids, and alkaloids (Lorenzi and Matos 2008).

In the present study, several species were cited, such as *M. suaveolens* ("samba caeta"), *P. amboinicus* ("malvão"), *P. ornatus* ("boldo"), *P. simplicifolium* ("umburuçú"), and *G. hirsutum* ("algodão crioulo"). However, there are few ethnoveterinary studies that relate to the use of these plants. The interviewees cited *G. hirsutum* as capable of resolving various infections, cases of retained placenta, and as an antipyretic agent. The findings of Dey et al. (2020) support those of this research, as the authors also identified the use of this plant for reproductive disorders in animals in a region of India.

Among the exotic species highlighted in this study, *Aloe vera* stood out for its use in controlling gastrointestinal helminthiasis, wound healing, infections, and cases of retained placenta in animals. According to Freitas et al. (2014) and Chakrabarti et al. (2020), the anti-inflammatory and tissue healing activities of substances derived from *Aloe vera* have been demonstrated in both in vitro and in vivo tests. The study by Lima et al. (2012) indicates its use for controlling fever, helminths, and abdominal pain in domesticated animals in the rural area of Juru, in the state of Paraíba, Northeast Brazil. Additionally, studies in poultry health conducted by Ndlovu et al. (2023) demonstrated its use for controlling diarrhea.

R. paniculata (melosa/amargosa), *B. cheilantha* (mororó), and other plant species showed a low Use Value (UV). According to Chaudhary et al. (2006), low use values do not imply that the species are not important. However, such low values suggest a risk that traditional knowledge about these plants is not being transmitted between generations.

The species with the highest relative importance were *M. tenuiflora* (jurema preta), *S. tuberosa* (umbuzeiro), and *A. colubrina* var. *cebil* (angico), with values of 0.750, 0.732, and 0.633, respectively. These values indicate that these species have greater versatility and a higher number of medicinal properties in the present study. Additionally, it is evident that traditional knowledge about the use of these plants has not been lost over time.

CONCLUSIONS

The ethnoveterinary study conducted in traditional shared-pasture (*fundo de pasto*) farming communities in the state of Bahia, Brazil, demonstrated that the use of medicinal plants from the Caatinga biome for livestock is common in several communities. These plants are used for diverse therapeutic purposes and prepared in various ways. Treatments with medicinal plants are typically administered once or twice, with the objective of curing or resolving the problem achieved in most cases. Studies that recover this knowledge help ensure the preservation of folk knowledge and can contribute to the discovery of new medicinal agents from natural products.

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AUTHOR'S CONTRIBUTION

All authors contributed to the conception and design of the study. Material preparation, data collection and analysis: ALOB and AAN; draft of the manuscript: ALOB. All authors read and approved the final manuscript.

CONFLICT OF INTERESTS

The authors have no conflicts of interest to declare.

REFERENCES

Albuquerque UP, Hanazaki N (2006) As pesquisas etnodirigidas na descoberta de novos fármacos de interesse médico e farmacêutico: fragilidades e perspectivas. Rev Bras Farmacogn 16:678-689. https://doi.org/10.1590/S0102-695X2006000500015

Albuquerque UP, Lucena RFP (2004) Métodos e Técnicas na Pesquisa Etnobotânica. Recife:Livro Rápido/ NUPEEA. 19p.

Albuquerque UP, Brito AL, Nascimento ALB, Oliveira AFM, Quixabeira CMT, Dias DQ, Lira EC, Silva FS, Delmondes GA, Coutinho HDM, Barbosa MO, Landell MF, Alves RRN, Ferreira Júnior WS (2020) Medicinal plants and animals of an important seasonal dry forest in Brazil. Rev Ethnobio Conserv 9:1-53. https://doi.org/10.15451/ec2020-03-9.08-1-53

Almeida CFCBR, Lima e Silva TC, Amorim ELC, Maia MBS, Albuquerque UP (2005) Life strategy and chemical composition as predictors of the selection of medicinal plants from the Caatinga (Northeast Brazil). J Arid Environ 62(1):127–142. https://doi.org/10.1016/j.jaridenv.2004.09.020

Amorim WR, Sousa CD, Martins GN, Melo ES, Silva ICR, Corrêa PGN, Santos ARSS, Carvalho SMR, Pinheiro REE, Oliveira JMG (2018) Estudo etnoveterinário de plantas medicinais utilizadas em animais da microrregião do Alto Médio Gurguéia – Piauí. Rev PUBVET 12(10):1-5. https://doi.org/10.31533/pubvet.v12n10a183.1-5

Borges IV, Cavalcanti LS, Neto AF, Almeida JRGS, Rolim LA, Araújo ECC (2017) Identificação da fração antimicrobiana do extrato da *Mimosa tenuiflora*. Rev Comum Sci 8(1):155-164. https://doi.org/10.14295/cs.v8i1.1493

Brasil (2016) Decreto Nº 8.750 de 09 de maio de 2016. Conselho Nacional dos Povos e comunidades tradicionais. Available at: https://www.planalto.gov.br/ccivil_03/_ato2015-2018/2016/decreto/d8750.htm. Accessed on:18 july 2024.

Burei ST, Santana DAD, Lopez BB, Sotomaior CS, Acra LA, Weber SH, Ollhoff RD (2022) Ethnoveterinary knowledge and practice applied to domestic animals raised in the Ukraine colonization community of Palmital, Paraná State, Brazil. Rev Econ Bot 76:273-284. https://doi.org/10. 1007/s12231-022-09549-4

Castro KN, Wolschick D, Leite RRS, Andrade IM, Magalhães JA, Mayo SJ (2016) Ethnobotanical and ethnoveterinary study of medicinal plants used in the municipality of Bom Princípio do Piauí, Piauí Brazil. J Med Plants Res 10(23):318-330. https://doi.org/10.5897/JMPR2015.6038

Chakrabarti A, Sarkar PK, Yadav VK (2020) Use of ethno veterinary medicine viz *Aloe vera* gel and turmeric powder for maggot wound healing in crossbred (Tamworth x Deshi) pigs. J Entomol Zool Stud 8(4): 2216-2219.

Chaudhary MI, He Q, Cheng YY, Xião PG (2006) Ethnobotany of medicinal plants from Tian Mu Shan biosphere reserve, Zhejiang-Province, China. Rev Asian J Plant Scienc 5(4):646-653. https://doi.org/10.3923/ajps.2006.646.653

Costa OJ (2020) Atividade antioxidante e antidiabética de *Anadenanthera colubrina* (Vellozo) Brenan do cerrado tocantinense. 61p. Tese (Doutorado em Biodiversidade e Biotecnologia) – Universidade Federal do Tocantins, Programa de Pós-Graduação em Biodiversidade e Biotecnologia, Palmas, Brazil.

Dey S, Sarkar B, Paul S (2020) Ethno-veterinary practices for the management of reproductive disorders in dairy animals in rural Punjab. Rev Entomol Zool Stud 8:1595-1598.

Felix, RCS (2021) Potencial ecotoxicológico e atividade antihelmíntica *in vitro* de *Cnidoscolus quercifolius* Pohl (Euphorbiaceae) sobre nematoides gastrintestinais de ovinos. 57p. Dissertação (Mestre em Ambiente, Tecnologia e Sociedade) - Universidade Federal Rural do Semi-árido, Programa de Pós-Graduação em Ambiente, Tecnologia e Sociedade, Mossoró, Brazil.

Flora do Brasil (2020) Algas, fungos e plantas. Available at: http://floradobrasil.jbrj.gov.br/. Accessed on: 13 jul 2024.

Freitas VS, Rodrigues RAF, Gaspi FOG (2014) Propriedades farmacológicas da *Aloe vera* (L.) Burm. f. Rev Bras Plantas Med 16(2):299-307. https://doi.org/10.1590/S1516-05722014000200020

Gazzaneo LRS, Lucena RFP, Albuquerque UP (2005) Knowledge and use of medicinal plants by local specialists in a region of Atlantic Forest in the state of Pernambuco. Rev Ethnobiol Ethnomed 1(9):1-8. https://doi.org/10.1186/1746-4269-1-9

Instituto Brasileiro de Geografia e Estatística (2018) Cidades e Estados. Rev IBGE. Available at: https://www.ibge.gov.br/cidades-e-estados.html?view=municipio. Accessed on:13 oct 2020.

Kadir MF, Sayeed MSB, Mia MMK (2012). Ethnopharmacological survey of medicinal plants used by the indigenous and tribal people in Rangamati Bangladesh. J Ethnopharmacol 144(3):627–637. https://doi.org/10.1016/j.jep.2012.10.003

Khan K, Rahman IU, Calixto ES, Ali N, Ijaz F (2019) Ethnoveterinary therapeutic practices and conservation status of the medicinal flora of Chamla Valley, Khyber Pakhtunkhwa, Pakistan. Front Vet Sci 6:122. https://doi.org/10.3389/fvets.2019.00122

Lima RP, Palitot KM, Rego MAE (2012) Emprego de plantas medicinais em animais de companhia e de produção da zona rural do município de Juru-PB. Rev Biol Farm 8(1):85-92.

Lorenzi HF, MATOS FJA (2008) Plantas medicinais do Brasil, nativas e exóticas. 2 ed. São Paulo: Plantarum. 576p.

Madikizela B, Ndhlala AR, Finnie JF, Van Staden J (2012) Ethnopharmacological study of plants from Pondo land used against diarrhoea. J Ethnopharmacol 141(1):61–71. https://doi.org/10.1016/j.jep.2012.01.053

Mahwasane ST, Middleton L, Boaduo N (2013) An ethnobotanical survey ofindigenous knowledge on medicinal plants used by the traditional healers of Lwamondo area, Limpopo province, South Africa. S Afr J Bot 88:69–75.https://doi.org/10.1016/j.sajb.2013.05.004

Marques LS (2016) As comunidades de fundo de pasto e o processo de formação de terras de uso comum no semiárido brasileiro. Rev Soc Natur 28(3):347–359. https://doi.org/10.1590/1982-451320160302

Monteiro MVB, Bevilaqua CML, Palha MDC, Braga RR, Schwanke K, Rodrigues ST, Lameira OA (2011) Ethnoveterinary knowledge of the inhabitants of Marajó Island, eastern Amazonia, Brazil. Acta Amazon 41(2):233-242. https://doi.org/10.1590/S0044-59672011000200007

Ndlovu W, Mudimeli NR, Mwale M, Ndou TM, Obadire OS, Francis J (2023) Ethnoveterinary practices for indigenous poultry health management by smallholder farmers. Herbs Spices-New Adv 1-17. https://doi.org/10.5772/intechopen.108912

Oliveira ES, Torres DF, Brooks SE, Alves RNN (2010) The medicinal animal markets in the metropolitan region of Natal City, north eastern Brazil. J Ethnopharmacol 13(1): 54–60. https://doi.org/10.1016/j.jep.2010.04.010

Pereira JS, Pereira APC, Jandú JJB, Paz JA, Crovella S, Correia MTS, Silva JA (2017) *Commiphora leptophloeos* phytochemical and antimicrobial characterization. Frontiers Microbiol 8(52):1-10. https://doi.org/10.3389/fmicb.2017.00052

Rahman IU, Ijaz F and Bussmann RW (2023) Editorial: Ethnoveterinary practices in livestock: Animal production, healthcare, and livelihood development. Frontiers Veter Sci 9:1-2. https://doi.org/10.3389/fvets.2022.1086311

Ritter RA, Monteiro MVB, Monteiro FOB, Rodrigues ST, Soares ML, Silva JCR, Palha MDC, Biondi GF, Rahal SC, Tourinho MM (2012) Ethnoveterinary knowledge and practices at Colares island, Pará state, eastern Amazon, Brazil. J Ethnopharmacol 144(2):346-352. https://doi.org/10.1016/j.jep.2012.09.018

Santana AF, Lima MC, Cruz GAM, Nascimento TVC, Araújo ECS (2008) Avaliação da ação cicatrizante da Jurema Preta (*Mimosa tenuiflora* Willd.) nas lesões causadas por pododermatite em ovinos. PUBVET 2 (36):1-11.

Shinde SS, Narwade KB, Kharat VV, Swami SG, Raut SD (2024) Ethnoveterinary medicinal plants for treatment of animal ailments by traditional healers in Nanded District (MS), India. Afr J Biol Sci 6(9): 5542-5557. https://doi.org/ 10.48047/AFJBS.6.9.2024.5542-5557

Silva IF, Guimarães AL, Amorim VS, Silva TMG, Peixoto RM, Nunes XP, Silva TMS, Costa MM (2019) Antimicrobial activity of ethanolic extracts from *Commiphora leptophloeos* (mart.) JB Gillett against *Staphylococcus* spp. isolated from cases of mastitis in ruminants. Ciênc Anim Bras 20:1-14 https://doi.org/10.1590/1089-6891v20e-57228

Soares FP, Fraga AF, Neves JPO, Romero NR, Bandeira MAM (2015) Estudo etnofarmacológico e etnobotânico de *Himatanthus drasticus* (Mart.) Plumel (janaguba). Rev Bras Plantas Med 17(4):900-908. https://doi.org/10.1590/1983-084X/14_086

Sousa VFO, Bandeira AS, Ribeiro MDS, Santos JJF, Santos GL, Silva RA, Maracajá PB, Costa JE (2020) Use of herbal medicines in curing animal diseases in the Paraibano Semiarid. Res, Soc Devel 9(7):1-15. https://doi.org/10.33448/rsd-v9i7.4040

Sousa MM, Araujo RMP, Liborio RC, Araujo BN, Lima MS, Gouveia GV, Costa MM, Peixoto RM (2020) Antimicrobial potential of jurema preta and umburana, native species of the Caatinga biome on *Staphylococcus* isolates from mastitis cases in small ruminants. Semina Ciênc Agrar 41(5):2231-2244. https://doi.org/10.5433/1679-0359.2020v41n5Supl1p2231

Tardio J, Santayana MP (2008) Cultural importance indices: a comparative analysis based on the useful wild plants of southern Cantabria (Northern Spain). Econ Bot 62:24–39. https://doi.org/10.1007/s12231-007-9004-5

Teixeira VHS, Fernandes NCF, Corrêa FC, Oliveira DMC (2015) Plantas medicinais na etnoveterinária no Brasil - Artigo de revisão. Anclivepa 42:926-930.

Valeriano FR, Savani FR, Silva MRV, Baracho IPS, Santos MSC, Braga JA (2020) Use of medicinal plants in the Quilombola do Veloso community, belonging to the municipality of Pitangui – MG. Braz J Devel 6:100701-100718. https://doi.org/10.34117/bjdv6n12-529

Volenzo T, Odiyo J (2020) Integrating endemic medicinal plants into the global value chains: the ecological degradation challenges and opportunities. Heliyon 6:1-11. https://doi.org/10.1016/j.heliyon.2020.e04970