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Survey of Medicinal Plants Used in Treating Livestock among the Fulani People of Mararaba - Mubi, Adamawa State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors YSC and ATA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author BPM managed the analyses of the study. Author JJO managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim: The study was undertaken to document some medicinal plants used in treating livestock among the Fulani people of Marraba-Mubi.
Place and Duration of Study: Plant samples were collected from Mararaba-Mubi, November 2015-February 2016.
Methodology: All the plant samples collected were dried at room temperature and milled to a coarse powder. Aqueous extraction of the samples was carried out at room temperature. These extracts were phytochemically screened qualitatively for the presence of alkaloid, tannins, flavonoids, saponins, terpenoids and Phenols using standard procedures.

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Results: A total of 25 species of plants belonging to 18 families were collected in which Fabaceae represented 20.0% (5 species), Meliaceae, Malvaceae and Alliaceae 8.0% (2 species/family) respectively. The plant parts mostly used were the leaves 66.67% and the least being the roots 7.41%. The qualitative phytochemical screening of active constituent of the plants revealed the presence of alkaloids, tannins, flavonoids, saponin, glycosides, terpenoids and phenols. The survey also reveals that some plants have multiple medicinal uses, while some were being used to cure only one disease. The major threats in the study area were found to be agricultural activities, cutting down of trees for fuel and natural factors.

Conclusion: Mararaba Mubi is relatively rich in medicinal plant knowledge and practice. Therefore, conservation of medicinal plants, documentation and promotion of indigenous knowledge by encouraging research activities is required in the study area.

Keywords: Mararaba; phytochemicals; Fabaceae; plant parts.

1. INTRODUCTION

According to World Health Organization, a medicinal plant is any plant which, one or more of its organs, contains substances that can be used for therapeutic purposes, or which are precursors for chemo-pharmaceutical semi-synthesis. Such a plant will have its parts including leaves, roots, rhizomes, stems, barks, flowers, fruits, grains or seeds, employed in the control or treatment of a disease condition and therefore contains chemical components that are medically active.

Herdsmen in non- industrialized nations of the world still use medicinal plants for the treatment of live stock diseases due to the belief that herbal remedies are more efficacious. In developing countries, veterinary health services are still poor or are obtainable in urban centres. The threat exists as high cost or scarcity of drugs may grow beyond the reach of rural livestock rearers. In Nigeria, for example, the highest proportion of livestock remains in the care of traditional herdsmen among whom ethnoveterinary healthcare forms a major part of disease management [1].

Numerous home remedies utilized in the treatment and relief of pains, external injuries such as burns, abscesses and wounds and for the treatment of ecto and endo-parasites, respiratory infection and enteritis contain most indigenous plants [2]. However, information on ethnoveterinary medicine has not been well documented [3]. And there is a danger that this knowledge will soon be lost as traditional social patterns are increasingly disturbed by globalization, environmental degradation, agricultural expansion, cultivation of marginal lands and urbanization [4,5]. Traditional knowledge of medicinal plants and their use by indigenous cultures are useful for conservation of plants and thus there is imperative need to document and preserve the indigenous knowledge in written form for the next generation. Even though traditional knowledge of medicinal plants is very crucial to treat different diseases, there is no such study conducted in Marraraba Mubi. This study, therefore, aimed to document some medicinal plants used in treating livestock among Fulani people of Marraraba-Mubi and has the following objectives: to identify the plant parts used for livestock disease condition, and to carry out phytochemical screening of the plants used in ethnoveterinary in the study area.

2. MATERIALS AND METHODS

2.1 Study Area

This research work was focused on Fulani people dwelling in Mararaba Mubi, Hong L. G. A. Adamawa State. Mararaba Mubi is a small town in Hildi district in the Local Government Area. It is located in North Eastern Nigeria between Lat 10.16° N 13°16'E / 10.267°N 13.267° E. The town is dominated by different tribes and languages such as Kilba, Marghi, and Fulanis. The main economic activities are farming, rearing and petty trading. It is about 15 kilometres from Mubi town, Nigeria.

2.2 Data Collection

An ethnoveterinary botanical survey was conducted to gather information on the traditional use of plants in livestock health care system using a semi-structured interview, observations and field guided walks [6] with the livestock owners, local and traditional healers who were willing to share their indigenous knowledge. Specimens of plants were collected including

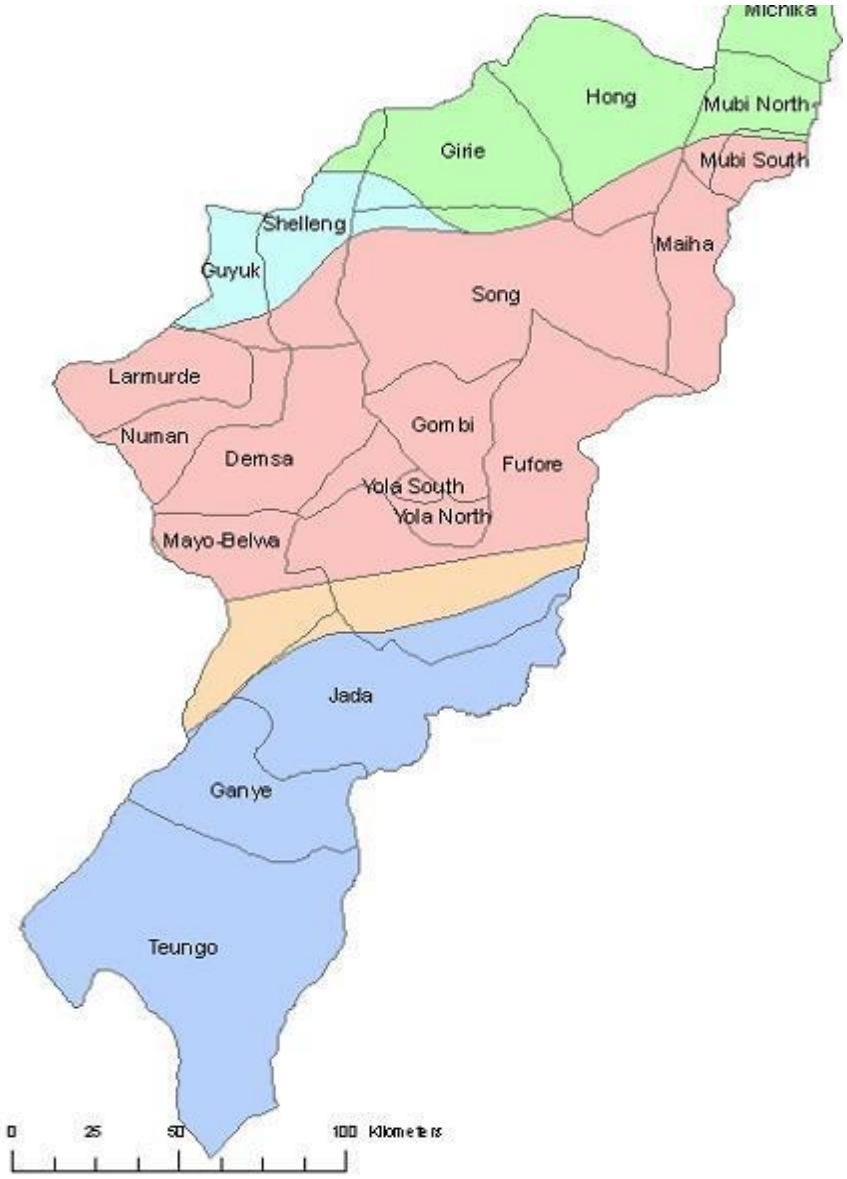
their vegetative and floral parts which were needed for taxonomic identification. During collection information regarding habitat, general description of the plant and geographical site of the collection were recorded. The local names of the plants and the corresponding disease conditions they can cure were obtained from the respondents. The samples were identified at the Ministry of Environment and Natural Conservation, Forestry Division, Mubi using a field key by Stanfield and Hopkins [7].

2.3 Preparation of Extracts

All the plant samples collected were dried at room temperature and milled to a coarse powder. The procedure for the phytochemical analysis was done based on standard procedures [8]. The aqueous extracts of the sample were prepared by soaking 15 g of the dried powdered sample in 100 ml distilled water for 24 hours in a beaker properly sealed with a polythene bag. The extracts were filtered using Whatman filter paper no 2. The extracts were dried at 40°C on a water bath. Dried extracts were collected and kept in sample bottles at ambient temperature.

2.4 Phytochemical Screening

Phytochemical screenings were performed using standard procedures [8].



Map 1. Local government areas of Adamawa state

2.4.1 Test for saponins

2 g of the powdered sample was boiled in 20 ml of distilled water in a water bath and then filtered. 10 ml of the filtrate was mixed with 5 ml of distilled water and shaken vigorously for stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously. The formation of emulsion indicated the presence of saponins [9].

2.4.2 Test for tannin

0.5 g of the dried powdered sample was boiled in 20ml of water in the test tube and then filtered. Few drops of 0.1% ferric chloride (FeCl) was added, brownish green or a black coloration in any of the samples was an indication of the presence of tannin [9].

2.4.3 Test for flavonoid

5 ml of dilute ammonia solution was added to a portion of aqueous filtrate of plant extract followed by addition of concentrated Sulphuric Acid (H_2SO_4). A yellow coloration that disappears on standing indicated the presence of flavonoids [8].

2.4.4 Test for alkaloids

1 ml of the aqueous plant extract was treated with a 2 ml picric acid solution. Formation of orange coloration indicated the presence of alkaloid in the plant sample tested [10].

2.4.5 Test for volatile oil

2.0 ml of extract solution was shaken with 0.1 ml dilute sodium hydroxide and a small quantity of dilute Hydrochloric Acid (HCl). Presence of volatile oil in any of the samples was identified by formation of a white precipitate [9].

2.4.6 Test for free anthraquinones

0.5 g of the extract was taken in a separate test tube and 10ml of chloroform added and shaken for 5 minutes. The extract was filtered and equal volume ammonia was added to the filtrate and shaken. A bright pink color in the upper aqueous layer was observed indicating the presence of free anthraquinone [8].

2.4.7 Test for terpenoids

5 ml of extract was mixed in 2 ml of Chloroform and 3 ml of concentrated Sulphuric acid (H_2SO_4) was carefully added to form a layer. A reddish brown coloration of the interface was formed to show positive results for the presence of terpenoids [8].

2.4.8 Test for glycosides

To 2 ml of the plant extract, 1 ml of glacial acetic acid was added and 5% Ferric Chloride. To these 3 drops of concentrated Sulphuric acid was added. Presence of greenish-blue color indicates the presence of glycosides [9].

2.4.9 Test for phenols

To 1 ml of the extract, 2 ml of distilled water followed by 5 drops of 10% Ferric Chloride was added. Formation of blue or green color indicated the presence of phenol [8].

3. RESULTS AND DISCUSSION

The information gathered from the study area reveals that twenty plant species belonging to 19 families were used in treating some disease conditions (Table 1). This result agreed with the findings of Akinyemi et al*.,* [11] who reported that almost all species of plants are used in treatment of one disease or the other. The most frequent family of plants used were Fabaceae (16.7%), Meliaceae (8.3%), Alliaceae (8.3%) and (4.2%) representing other families (Table 2). This is in accordance with the work of Saifa, [12] who reported that Meliaceae and Fabaceae constituted active substances used in treating livestock.

The survey also revealed that the leaves of the plants were the most used, constituting 66.7%, followed by the bark (14.2%), fruit (11.1%) and root 7.4% (Table 2; Fig.1). This agrees with the reports of Ayeni and Basiri[(13] and Giday et al. [5] who reported that the leaves were the most frequently used plant part by local inhabitants. It is feasible that leaves contain a reasonable amount of secondary metabolites that have the potential of targeting the disease-causing organisms or regulating defects in body cells or tissues. Majority of the claimed ethnoveterinary medicinal plants were collected from natural habitat (wild) without cultivation so that the remedies are under a big threat to their existence as long as the mass destruction of their habitats continues [5, 14].

Phytochemical screening was carried out on the samples collected and the screening revealed

the presence of the following metabolites saponins, tannins, flavonoids, phenols, glycosides, anthracenes, terpenes and alkaloids (Table 3).

Table 1. Botanicals collected based on family

S/N	Plant family name	Botanical names of plants	Parts used	Clinical condition	Number of Ethno-veterinary use	% Use
1.	Alliaceae (Amaryllidaceae)	*Allium cepa*	Leaf	Gastro-intestinal parasites		
		Allium sativum	Leaf	Streptothricosis	2	8.0%
2.	Annonaceae	*Annona senegalensis*	Bark, root	Snakebite, Wound	1	4.0%
3.	Arecaceae	*Elaeis guineensis*	Fruit	Poison	1	4.0%
4.	Asphodelaceae	*Aloe vera*	Leaf	Diarrhea	1	4.0%
5.	Asteraceae	*Vernonia amygdalina*	Leaf	Wound	1	4.0%
6.	Caricaceae	*Carica papaya*	Leaf	Parasitic gastro enteritis complex	1	4.0%
7.	Cucurbitaceae	*Cucumis melo*	Root	Snakebite	1	4.0%
8.	Fabaceae	*Tamarindus indica*	Leaf,	Stomach disorder		
		Parkia biglobosa	Fruit shell	Snake bite		
		Mucuna pruriens	Leaf	Snakebite		
		Senna siamea (Cassia siamea)	Leaf	Wound		
		Senna alata	Leaf	Skin infection	5	20.0%
9.	Lamiaceae	*Ocimum gratissum*	Leaf	Constipation	1	4.0%
10.	Malvaceae	*Adansonia digitata*	Leaf, fruit	Flies Feed		
		Waltheria indica	Leaf	Wound	2	8.0%
11	Meliaceae	*Khaya senegalensis*	Bark	Diarrhea		
		Azadirachta indica	Leaf	Wound	2	8.0%
12.	Moraceae	*Ficus platypoda*	Bark	Dullness	1	4.0%
13.	Moringaceae	*Moringa oleifera*	Leaf	Diarrhea	1	4.0%
14.	Myrataceae	*Psidium guajava*	Leaf	Diarrhea	1	4.0%
15.	Pedaliaceae	*Sesamum indicum*	Leaf	Peg complex	1	4.0%
16.	Rutaceae	*Citrus aurantiifolia*	Leaf	Tick fever	1	4.0%
17.	Sapotaceae	*Vitellaria paradoxa (Butyrospermum parkii)*	Bark	Parasitic gastro enteritis complex	1	4.0%
18.	Solanaceae	*Nicotiana tobacum*	Leaf	Black quarter	1	4.0%
	Total				25	100%

Table 2. Percentage of parts used in treating livestock

S/N	Plant part used	Ethnoveterinary usage	Percentage
1.	Bark	4	14.81%
2.	Leaf	18	66.67%
3.	Root	2	7.41%
4.	Fruit	3	11.11%
	Total	27	100%

Table 3. Phytochemical screening of the plant samples

Scientific name	Saponin	Alkaloid	Tannin	Phenol	Flavonoid	Glycoside	Terpenoid
Khaya senegalensis	+	+	+	+	+	-	+
Ocimum grattisum	+	+	-	+	-	+	-
Moringa oleifera	+	+	+	+	+	+	-
Tamarindus indica	+	+	+	+	+	+	-
Adansonia digitata	+	-	+	+	-	-	+
Allium cepa	+	+	-	+	+	+	-
Carica papaya	+	-	+	+	-	+	-
Ficus platyphilla	+	-	+	+	-	+	+
Parkia biglobosa	+	-	+	-	+	-	+
Cucumis melo	NS	NS	NS	NS	NS	NS	NS
Nicotiana tobacum	NS	NS	NS	NS	NS	NS	NS
Psidium guajava	+	+	+	+	-	+	+
Citrus aurantifolia	+	+	+	+	-	+	-
Mucuna puriens	NS	NS	NS	NS	NS	NS	NS
Cassia semea	+	+	+	+	+	+	+
Allium sativum	+	+	+	+	-	+	+
Waltheria indica	+	+	+	-	+	-	+
Eliaesis guinensis	NS	NS	NS	NS	NS	NS	NS
Butyrospermum paradoxum	+	-	+	+	-	+	-
Aloe vera	+	+	+	-	+	+	+
Azadiracta indica	+	+	+	+	+	-	+
Sesame indica	+	+	+	+	+	+	-
Anona senegalensis	NS	NS	NS	NS	NS	NS	NS
Senna alata	+	+	+	+	-	+	+
Vernonia amygdalina	+	+	+	+	+	+	+

Key:+ = presence; - = Absent; NS= Not Screened

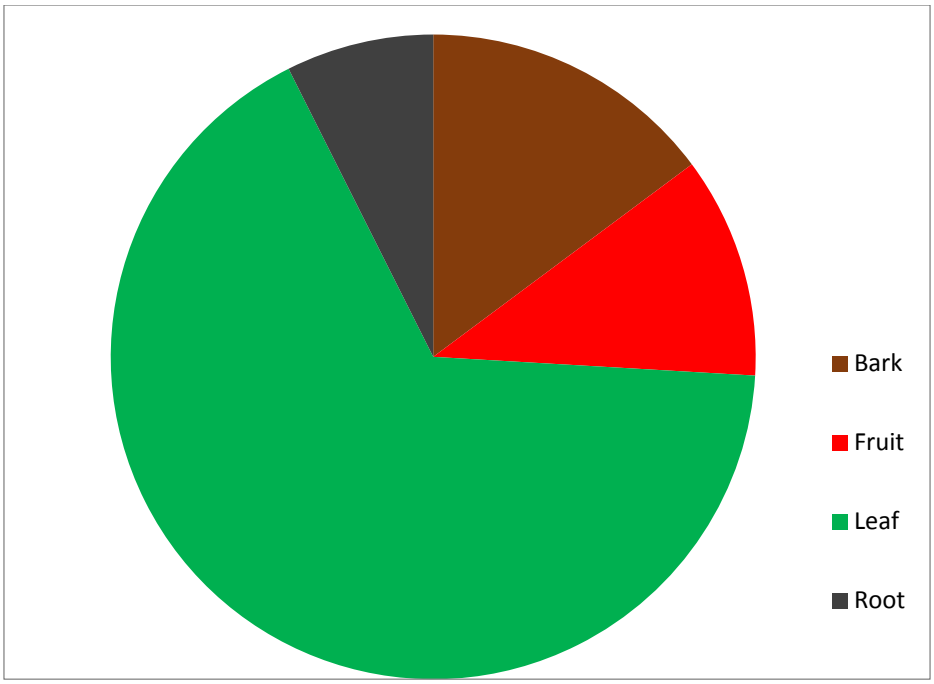


Fig. 1. Pictorial presentation of plant parts used

According to this research, *Khaya senegalensis, Moringa oleifera, Psidium guajava* and *Aloe vera,* were used for treating diarrhoea; while *Waltheria indica*, *Azadirachta indica, Anona senegalensis* and *Vernonia amygdalina* were used for wound treatment and snake bite is treated with *Parkia biglobosa*, *Cucumis melo, Mucuna puriens* and *Anona senegalensis*. *Ficus platyphilla* is used in the treatment of dullness or inactiveness; these findings are in agreement with the work reported by Attele et al. [15]. The fact that *Waltheria indica* has diverse use among Fulani in Mararaba Mubi to heal wounds and for other magical purposes also agreed with the work reported by Adjanohou et al*.* [16]. This study also discovered the use of oil palm (*Elaeis guienensis)* product for the treatment of poison if the livestock feed on infested crops/ plants.

The phytochemical screening of active constituent (secondary metabolites) of the plants revealed the presence of alkaloids, tannins, flavonoids, saponin, glycosides, terpenoids and phenols (Table 3). These secondary metabolites were known to show medicinal functions as well as exhibiting phytochemical activities as reported [8]. Saponins were present in all surveyed plants which showed that they may have an antibacterial activity or may increase the digestion rate of the livestock. Plants containing alkaloids are widely used as a local anesthetic; glycosides are either used as astringents, antiprotozoal or to reduce thyroxine and metabolism. Flavonoids play an important role in protecting biological systems against the harmful effect of oxidative processes on macromolecules, such as carbohydrates, proteins, lipids and DNA. Phenolics essentially represent a host of natural antioxidants, used as nutraceuticals. Tannin-rich medicinal plants are used as healing agents in a number of diseases. Terpenoid has antihelmintic activity. The presence of the phyto chemical compounds in plants further explains they are used as crude drugs for the treatment of snake bites, wound, PEG complex, diarrhoea and other physical disease conditions [17].

Despite the acknowledged importance of medicinal plants of ethnoveterinary use, the application of medicinal plants to livestock health problems is still generally poorly organized and regulated while most plants are being exploited with little or no regards to the future [18]. One of the problems facing the use of medicinal plants in the study area was that the vast majorities of medicinal plants grow in the wild and are under threat as a result of agricultural and anthropogenic interference. However few are domesticated with or without the knowledge of their efficacy for treating most common ailments and diseases in the area.

4. CONCLUSION

The study has been able to document medicinal plants and their ethnoveterinary knowledge and practices among the Fulanis' in Mararaba Mubi. It also revealed that the Fulanis still relied on plants for treating their livestock. Among the threats, agricultural expansion and overgrazing were found to be the main threats for the medicinal plants. Thus, priority for conservation of these medicinal plants and research is needed to determine safety, toxicity optimal dose and concentrations of preparations.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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