

Ethnobotanical Survey of Medicinal Plants Used for the Treatment of Diarrheal Diseases in the Hauts-Bassins Region of Burkina Faso

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Abstract Diarrheal diseases are responsible for significant mortality worldwide. In many regions, local populations rely on traditional medicine, including medicinal plants, to manage these illnesses. This study aimed to identify the medicinal plants used by traditional healers in the Hauts-Bassins region of Burkina Faso for treating diarrheal diseases. An ethnobotanical survey was conducted from September 4 to 30, 2020, using a semi-structured questionnaire. Key indicators such as Family Importance Value (FIV), Relative Frequency of Citation (RFC), plant parts used, preparation methods, and routes of administration were assessed. A total of 51 traditional healers were interviewed, 90.20% of whom were male. Most participants were over 60 years of age, and 54.9% were from the village of Bala. Eighteen (18) plant species from eleven (11) botanical families were recorded, with the Annonaceae family being the most frequently cited (35.56%). The most commonly reported

species included *Annona senegalensis* Pers. (35.56%), *Euphorbia hirta* L. (11.11%), and *Erythrina senegalensis* DC (8.89%). Roots (44.44%) and trunk bark (20.00%) were the most frequently used plant parts. Decoction (57.78%) and maceration (42.22%) were the primary preparation methods, with oral administration being the most common. Species including *Opilia celtidifolia*, *Erythrina senegalensis*, *Entada africana*, *Acacia erythrocalyx*, and *Combretum nigricans* were reported as rare. This study contributes to the preservation of indigenous knowledge and provides a foundation for future pharmacological investigations into antidiarrheal medicinal plants.

Keywords Ethnobotanical Survey, Traditional Healers, Antidiarrheal Medicinal Plants, Hauts-Bassins Areas, Burkina Faso

1. Introduction

Diarrheal diseases continue to pose a serious global public health challenge, with an estimated 2.8 billion cases reported annually worldwide [1]. Each year, approximately 525,000 children under the age of five die from diarrhea-related complications [1].

In sub-Saharan countries, diarrhea not only constitutes a health concern but also hinders national economic development. It remains one of the most urgent healthcare challenges facing these regions [2]. In Burkina Faso, diarrheal diseases rank among the top ten reasons for medical consultation, with 981,603 cases documented [3]. In the Hauts-Bassins region alone, 138,272 cases were recorded in outpatient consultations at lower-tier health centers, while in 2023, hospitals in the region reported 1,481 hospitalizations and 36 deaths attributed to diarrhea [3].

Diarrheal illnesses are caused by a range of pathogens, including viruses, bacteria, and parasites primarily transmitted through water contaminated with fecal matter [1]. Enteric bacteria such as *Escherichia coli*, *Shigella*, *Salmonella*, *Campylobacter jejuni*, *Clostridium difficile*, and *Aeromonas hydrophila* are among the most common etiological agents [4,5].

Antibiotic therapy remains the standard treatment for bacterial diarrhea [1,4]. However, the emergence of multidrug-resistant strains has rendered many antibiotics ineffective [2,5]. In addition, high treatment costs limit access to conventional medicine for many populations in sub-Saharan Africa [6].

According to the World Health Organization, around 80% of the African population relies on traditional medicine and medicinal plants to manage common illnesses [7]. Numerous studies have confirmed the antibacterial and antidiarrheal properties of various medicinal plants [8,9].

The use of plants to treat a wide array of diseases is well documented in tropical West Africa [9-11]. Several authors have highlighted the antidiarrheal potential of plant species such as *Pterocarpus erinaceus*, *Diospyros mespiliformis*, and *Anacardium occidentale* [11-13]. In Burkina Faso, a previous study in the Niangoloko area identified *Pachycarpus lineolatus* as a species traditionally used to treat diarrhea [14].

Despite the widespread use of traditional remedies, scientific research on antidiarrheal medicinal plants in Burkina Faso remains limited, particularly in the Hauts-Bassins region. The objective of this study was to identify and document the plant species used by traditional healers in this region for the treatment of diarrheal diseases.

2. Material and Methods

2.1. Study Area

This study was conducted in the department of Satiri (villages of Tiarako, Sokourani, and Bala) and in the peri-urban zones of Bobo-Dioulasso (Nasso and Bana), located in the Hauts-Bassins region of western Burkina Faso (Figure 1). Geographically, the region lies between 11°02'N latitude and 4°21'W longitude. It comprises three provinces Houet, Tuy, and Kénédougou, and spans a total area of 25,479 km² representing approximately 9.4% of the national territory. The population of the region is estimated at 2,046,973 inhabitants [15,16].

The climate is tropical, characterized by two main seasons: a rainy season that lasts from May to October or November, and a dry season extending from November or December to April. Annual rainfall varies between 800 and 1,200 mm, with average temperatures ranging from 24 °C to 30 °C. The region includes 16 classified forests and is predominantly covered by savannah-type vegetation, comprising both wooded and grassy savannahs [14].

Climate and rainfall (runoff and well outcrops) may favor diarrheal diseases in the surveyed localities.

2.2. Data Collection

Fieldwork was conducted from September 4 to 30, 2020, using a semi-structured questionnaire administered during face-to-face interviews. The interviews were carried out in local languages, specifically Dioula and Mooré. The survey focused on the following key areas: socio-demographic characteristics of the healers, knowledge of diarrheal disease symptoms, parts of medicinal plants used, preparation techniques and administration routes.

2.3. Identification of Plants

Traditional healers were asked to provide physical samples of the medicinal plants they use for treating diarrhea. These plant specimens were identified and authenticated by Dr. Hermann Yempabou Ouoba, a botanist at Nazi BONI University.

2.4. Data Analysis

Quantitative data were entered and analyzed using Microsoft Excel 2013. The analysis included calculations of percentages, means, and standard deviations, as well as the creation of visual figures.

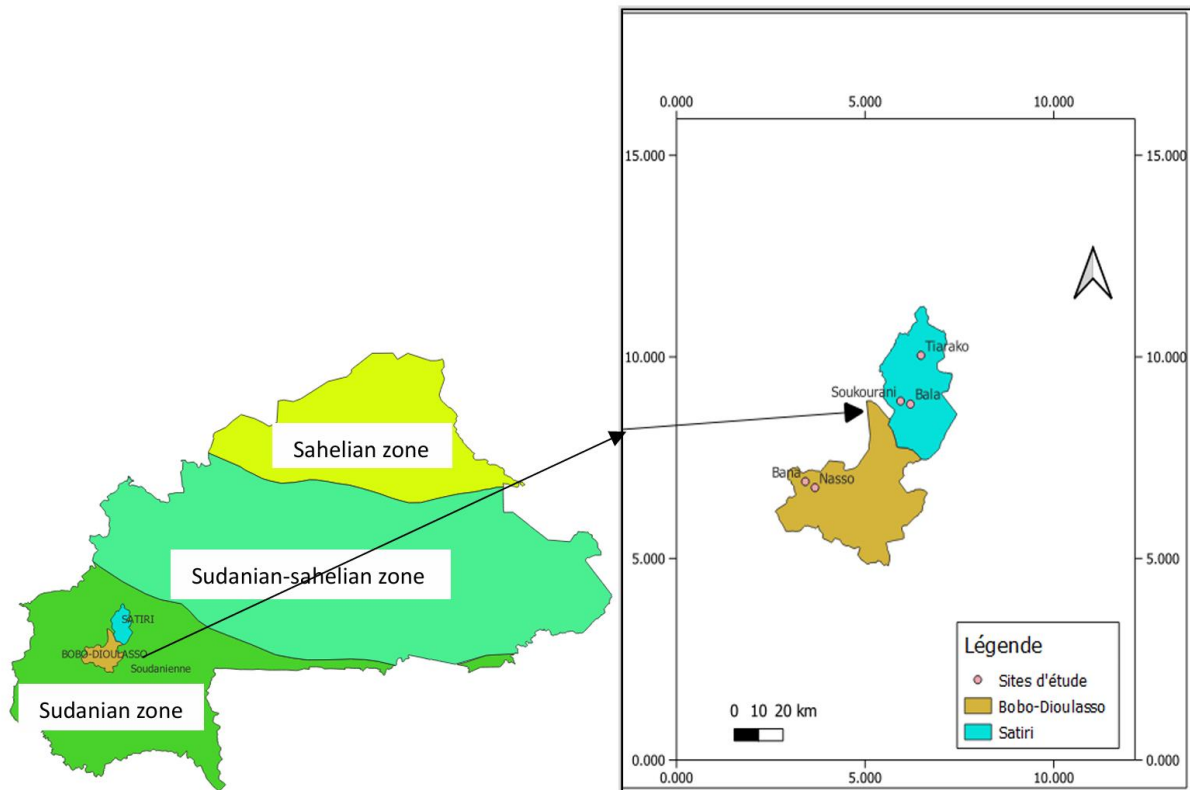


Figure 1. Location of the study area

2.4.1. Relative Frequency of Plant Citation (RFC)

The Relative Frequency of Citation (RFC) was calculated to evaluate the popularity of each plant species. The formula used was [17]:

$$RFC = \frac{FC}{N}$$

FC is the number of citations for the plant considered, and N is the total number of respondents.

2.4.2. Family Importance Value (FIV)

The Family Importance Value (FIV) was computed to assess the significance of each botanical family. The formula applied was [18]:

$$FIV = \frac{FC \text{ (Family)}}{N}$$

FC is the number of citations considered for the family, and N is the total number of respondents.

3. Results

3.1. Socio-Demographic Profile of Traditional Healers

A total of 51 traditional healers were interviewed in the Hauts-Bassins region. Table 1 presents their socio-demographic profiles. The respondents were between 34 and 90 years of age, with an average age of

55.12 years. Most participants were male (90.20%) and belonged primarily to the Bobo ethnic group (76%), followed by the Mossi, Dioula, Dafing, and Sambla groups (each representing 6%). The occurrence of the Bobo ethnic group is due to the fact that most of the localities surveyed are Bobo villages.

In terms of age distribution, 33.33% of respondents were between 60 and 90 years old, followed by 29.41% between 40 and 50 years, and 25.49% between 50 and 60 years. Regarding literacy, 76.47% of the healers were literate (able to read and write), while 23.53% were not. A significant proportion (35.29%) had between 20 and 30 years of experience in traditional healing practices.

3.2. Level of Knowledge of Diarrhea Manifestations

All participants were able to identify signs and symptoms associated with diarrhea. The most frequently cited manifestations included watery stools, mucus or blood in the stool, fever, and abdominal pain (Figure 2). These symptoms were commonly used by healers to diagnose diarrheal diseases.

3.3. Family Importance Value of Medicinal Plant Used (FIV)

Eleven botanical families were reported in the treatment of diarrheal diseases (Figure 3). The Annonaceae family was the most frequently cited (35.56%), followed by

Fabaceae (17.78%), Euphorbiaceae (11.11%), and Combretaceae (8.89%). These families were considered important due to their repeated mention across multiple

respondents. The plant family allows subsequent investigation of species with the same effects within the same family.

Table 1. Socio-demographic characteristics of traditional healers

Variable	Number	Frequency (%)
Sex		
Male	46	90.20
Female	5	9.8
Age groups		
[30-40]	6	11.76
[40-50]	15	29.41
[50-60]	13	25.49
[60-90]	17	33.33
Ethnic groups		
Mossi	3	6
Bobo	39	76
Dafing	3	6
Dioula	3	6
Sambla	3	6
Educational level (year)		
Literate (be able to read and write)	39	76.47
Not literate (not being able to read and write)	12	23.53
Experience		
<10	4	7.84
[10-20]	14	27.45
[20-30]	18	35.29
[30-40]	8	15.69
[40-50]	2	3.92
[50-80]	5	9.80

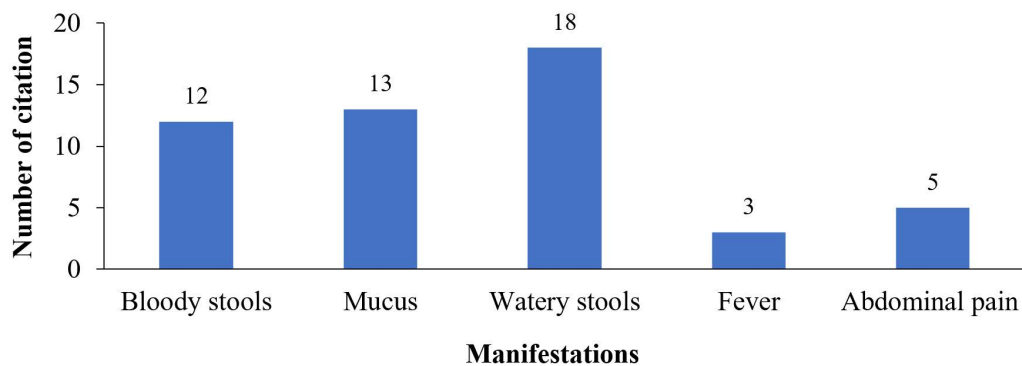


Figure 2. Level of knowledge on the manifestation of diarrhea

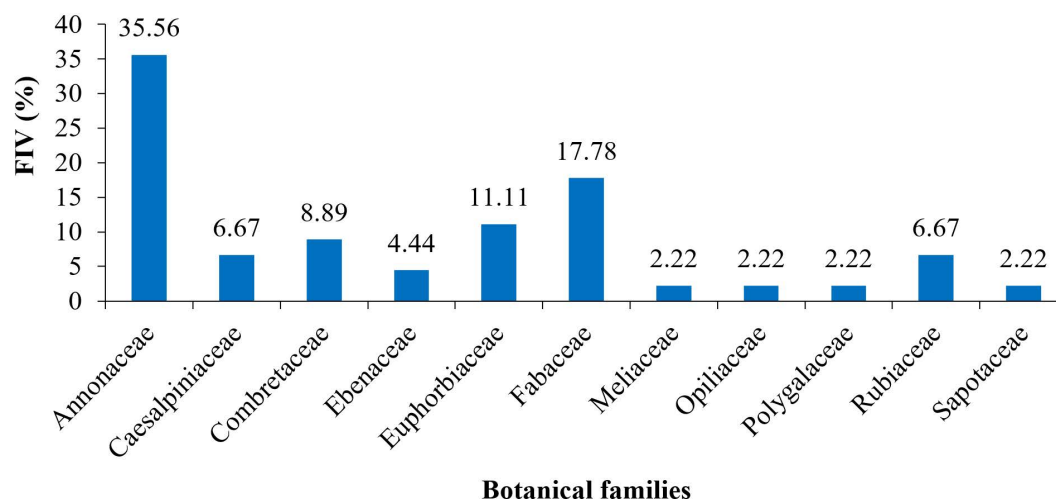


Figure 3. Family importance value (FIV) of medicinal plants used for treatment of diarrhea

3.4. Plant Parts Used

Various plant parts were cited for their therapeutic properties in the management of diarrhea (Figure 4). Roots were the most commonly used (44.44%), followed by trunk bark (20%) and the whole plant (17.78%). Leaves (13.33%) and fruits (4.44%) were mentioned less frequently.

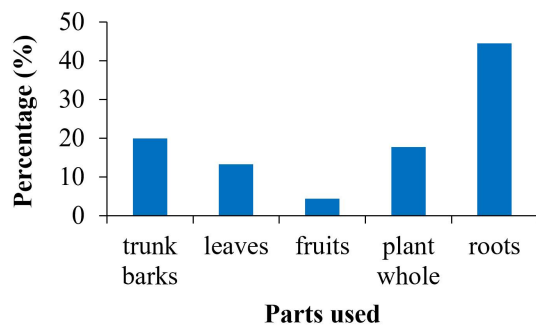


Figure 4. Parts of medicinal plants used

3.5. Preparation and Administration Methods

The most common preparation techniques were maceration (57.78%) and decoction (42.22%). In all cases, the remedies were administered orally, consistent with the internal nature of the illness being treated.

3.6. Medicinal Plants Used

Eighteen plant species used to treat diarrhea were identified and documented. Their local names, scientific names, botanical families, parts used, preparation methods, and other therapeutic applications are summarized in Table 2.

The most frequently cited species were *Annona senegalensis* Pers. (35.56%), *Euphorbia hirta* L. (11.11%), and *Erythrina senegalensis* DC (8.89%). These species were considered particularly effective and were commonly used across the surveyed communities.

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in the Hauts-Bassins Region of Burkina Faso

Table 2. Medicinal plants used by traditional healers

Local names (language)	Botanical families	Scientific names	RFC (%)	Availability	Parts used	Growth forms	Preparation	Other illnesses treated
Tougani sindji (Dioula)	Euphorbiaceae	<i>Euphorbia hirta</i> L.	11.11	Abundant	Plant whole	Herbs	Decoction, Maceration	
L'gré (Bobo)/ Mand éssounsoun (Dioula)/	Annonaceae	<i>Annona senegalensis</i> Pers.	35.56	Moderate	Trunk bark, Roots, leaves	Tree	Decoction, Maceration	Meningitis
Tchintchin (Bobo)	Opiliaceae	<i>Opilia celtidifolia</i> (Guill. & Perr.) Endl.ex Walp.	2.22	Rare	Roots	Tree	Maceration	
Aonga (Moor é)/ Sana yiri (Dioula)	Caesalpiniaceae	<i>Daniellia oliveri</i> (Rolfe) Hutch. & Dalziel	2.22	Moderate	Trunk bark	Tree	Maceration	pneumonia
Pinnin pinnin (Bobo)	Fabaceae	<i>Erythrina senegalensis</i> DC	8.89	Rare	Roots, Plant whole	Tree	Decoction	Urinary tract infections, Chest pain
Sankoro (Bobo)/ Triki yiri (Dioula)	Fabaceae	<i>Dicrostachys cinerea</i> (L.) Wight & Arn.	2.22	Abundant	Roots	Tree	Maceration	Wounds
Tinebom (Bobo)/ Guouiga (Moor é)	Rubiaceae	<i>Sarcocephalus latifolius</i> (Smith) E.A.Bruce	6.67	Moderate	Leaves, roots	Tree	Decoction, Maceration	Malaria
Sama n é (Dioula)	Fabaceae	<i>Entada africana</i> Guill. & Perr.	2.22	Rare	Trunk bark	Tree	Decoction	Cough
Kinakina (Bobo) Sidjan yiri (Dioula)	Caesalpiniaceae	<i>Cassia sieberiana</i> DC	4.44	Abundant	Roots	Tree	Maceration	Candidiasis, Fever
Song (Bobo)/ Zamen è (Dioula)	Fabaceae	<i>Acacia erythrocalyx</i> Brenan	2.22	Rare	Trunk bark	Tree	Maceration	Stomach aches
Sissarnon (Bobo)	Polygalaceae	<i>Securidaca longipedunculata</i> Fres.	2.22	Moderate	Leaves	Tree	Decoction	Candidiasis

Table 2 continued

Gnondefou (Dioula) / Guirdga (moor é) / Tchintchin (Bobo)	Combretaceae	<i>Pteleopsis suberosa</i> Engl. & Diels	4.44	Abundant	Trunk bark, roots	Tree	Maceration, Decoction	Wounds, Skin edema, Malaria, Wounds
Tienfourou (Bobo)	Combretaceae	<i>Combretum nigricans</i> Lepr. ex Guill. & Perr.	2.22	Rare	Roots	Tree	Decoction	Malaria
Touh (Bobo)/ Djalan yiri (Dioula)	Meliaceae	<i>Khaya senegalensis</i> (Desv.) A. Juss.	2.22	Abundant	Trunk bark	Tree	Maceration	Urinary tract infections, Malaria, Candidiasis
Kandga (Moor é)	Sapotaceae	<i>Vitellaria paradoxa</i> C.F. Gaertn.	2.22	Moderate	Leaves	Tree	Maceration	
Konon (Bobo)/ Ganka (Moor é)/ Sounsoun fin (Dioula)	Ebenaceae	<i>Diospyros mespiliformis</i> Hochst. ex A. DC.	4.44	Moderate	Fruits, trunk bark	Tree	Maceration	Meningitis, Urinary tract infections
W ðon(Dioula)/Kondr é(Moor é)	Combretaceae	<i>Terminalia laxiflora</i> Engl. & Diels	2.22	Moderate	Trunk bark	Tree	Decoction	Wounds
Koungu è(Dioula) Finfin (Bobo)	Combretaceae	<i>Guiera senegalensis</i> J.F. Gmel.	2.22	Abundant	Leaves	Tree	Decoction	Stomach aches, Absence of menses

4. Discussion

4.1. Socio-Demographic Profile

The dominance of male healers (90.2%) may reflect socio-cultural norms where traditional knowledge is predominantly passed down from father to son. In many rural communities, women are primarily responsible for domestic tasks, limiting their participation in traditional healing practices. Furthermore, certain traditions may restrict the transmission of medicinal knowledge to daughters due to marital migration, which could risk disclosing family secrets to other households. These observations are consistent with similar findings in other ethnobotanical studies [19-22].

Most healers were aged 60 and above, and (35.29%) had between 20 and 30 years of experience. This correlation between age and experience confirms that knowledge of medicinal plants is largely acquired through observation, practice, and intergenerational transmission. The high concentration of healers in Bala (54.90%) may be attributed to the presence of well-organized healer associations, which foster the preservation and practice of traditional medicine within the community. The concept of the healer's associations is to share their knowledge of diseases and plants and to receive training.

4.2. Knowledge of Diarrheal Symptoms

All respondents demonstrated the ability to recognize symptoms of diarrheal diseases, including watery stools, mucus, blood, fever, and abdominal pain. These signs correspond with clinical descriptions provided by the WHO and suggest a high level of empirical diagnostic accuracy among traditional practitioners. As some studies suggest, diarrhea caused by antibiotic-resistant bacteria is a growing concern, which reinforces the relevance of local treatment approaches [2,3].

4.3. Importance of Botanical Families

The most frequently cited plant families were Annonaceae, Fabaceae, Euphorbiaceae, and Combretaceae. During a study on traditional diarrhea treatment, the same botanical families were discovered [10,11,13]. These findings align with previous studies conducted in West Africa, including Burkina Faso, Niger, Benin, and Côte d'Ivoire, where the same families were identified in the treatment of diarrhea, urinary infections, and other microbial diseases [10,11,23,24]. The diversity of cited families reflects the rich biodiversity of the region and the broad botanical knowledge of local healers. Although they did not focus solely on diarrheal diseases, in the Hauts-Bassins region, plants used to treat diarrheal diseases were identified [14, 20].

4.4. Use of Specific Species and Plant Parts

The most prominent species *Annona senegalensis*, *Euphorbia hirta* and *Erythrina senegalensis*, have been reported in the literature for their antimicrobial and antidiarrheal properties [9,25]. The preference for roots and bark is often based on the belief that these parts contain higher concentrations of active compounds. However, unsustainable harvesting of these organs may threaten plant survival. Several authors recommend shifting focus to renewable plant parts, such as leaves, to support conservation without compromising efficacy [8,22,25,26].

4.5. Preparation and Administration Methods

The remedies were prepared primarily by maceration and decoction, with water or alcohol used as solvents. Decoction was slightly more common, likely due to its efficiency in extracting bioactive compounds while neutralizing toxic elements [21,22,24]. These liquid preparations are compatible with oral administration, which remains the most common route used by traditional practitioners. The predominance of single-species formulations (monospecific use) may help avoid potential interactions and demonstrates the practitioners' confidence in the specific pharmacological value of each plant.

4.6. Availability and Conservation of Medicinal Plants

Several species including *Opilia celtidifolia*, *Erythrina senegalensis*, *Entada africana*, *Acacia erythrocalyx*, and *Combretum nigricans* were reported as rare. This scarcity may be due to overharvesting, land degradation, and anthropogenic pressures such as bushfires and deforestation [14,21]. The continued exploitation of roots and trunk bark further accelerates this decline. To mitigate these risks, promoting the use of abundant and less vulnerable species such as *Euphorbia hirta*, is a sustainable alternative that could preserve biodiversity while maintaining therapeutic efficacy.

In this study we did not take into account the types of diarrheal diseases treated, nor the medicinal plants used for each type of diarrhea. Further studies will take this into account.

5. Conclusions

This study aimed to identify and document medicinal plant species traditionally used by healers in the Hauts-Bassins region of Burkina Faso to treat diarrheal diseases. The ethnobotanical survey revealed 18 plant species belonging to 11 botanical families, with roots and trunk bark being the most commonly used parts. Decoction and maceration were the main methods of preparation, and oral intake was the preferred route of administration.

However, some of the identified plant species are becoming increasingly rare, mainly due to overharvesting and environmental degradation. Conservation efforts are therefore essential to ensure the sustainable use of these valuable resources. Promoting the use of more abundant species or less vulnerable plant parts, such as leaves, could be a practical alternative to preserve biodiversity without compromising therapeutic outcomes.

This research highlights the rich traditional knowledge held by local healers and provides a foundation for future scientific exploration. It also contributes to national and international databases on medicinal plants and may support the development of improved treatments for diarrheal diseases.

The next step will be to evaluate the antibacterial activity of these plants against resistant bacteria causing diarrhea.

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