



## Medicinal plants used by the Bapedi traditional healers to treat diarrhoea in the Limpopo Province, South Africa

S.S. Semanya, A. Maroyi\*

Department of Biodiversity, University of Limpopo, Private Bag X1106, Sovenga 0727, South Africa

### ARTICLE INFO

#### Article history:

Received 27 April 2012

Received in revised form

15 August 2012

Accepted 18 September 2012

Available online 28 September 2012

#### Keywords:

Bapedi traditional healers

Diarrhoea

Ethnobotanical survey

Limpopo Province

South Africa

### ABSTRACT

**Ethnopharmacological relevance:** This paper provides ethnobotanical information on medicinal plants used to treat diarrhoea in the Limpopo Province, South Africa. Documentation of this nature usually provides the basis for selecting medicinal plants for future phytochemical and pharmaceutical studies aimed at developing new, effective and affordable plant-derived diarrhoea remedies.

**Aim of the study:** To record and document medicinal plants used by the Bapedi traditional healers to treat diarrhoea in the Limpopo Province, South Africa.

**Materials and methods:** In order to record and document medicinal plants used by the Bapedi traditional healers to treat diarrhoea, 51 healers from 17 municipalities covering Capricorn, Sekhukhune and Waterberg districts in the Limpopo Province, South Africa were interviewed between January and July 2011. Data collected included the names of plants, plant part(s) used, methods of herbal preparation, administration, dosage and duration of treatments. Voucher specimens of the plants used by the Bapedi traditional healers to treat diarrhoea were collected, identified and deposited as future reference material at the Larry-Leach Herbarium (UNIN), University of Limpopo.

**Results:** A total of 20 plant species representing 16 families and 20 genera were found to be commonly used by the Bapedi traditional healers to treat and manage diarrhoea in the Limpopo Province, South Africa. The largest proportion of the medicinal plants belonged to the families Anacardiaceae, Asteraceae, Fabaceae and Malvaceae (10% each). The most frequently used species were *Punica granatum* (39.2%), *Grewia bicolor* (33.3%), *Dombeya rotundifolia* (21.6%), *Commiphora marlothii* (19.6%) and *Acacia senegal* (13.7%). The roots were the most commonly used plant part (50%), followed by leaves (20%), bark (15%), fruits (10%), pericarp, seed, tuber and whole plants (5% each). Mono therapies based on preparations made from a single plant species were the most dominant (90%). All medicinal preparations were taken orally for 1 week or until diarrhoea subsided. The therapeutic claims of the medicinal plants documented in this study are well supported by literature, with 70% of the species having anti-diarrhoeal properties or are used as diarrhoea remedies both in South Africa and also in other countries.

**Conclusion:** This study reveals that local communities in the Limpopo Province, South Africa still depend on traditional medicines for basic healthcare; and the use of traditional medicines is still an integral part of their socio-cultural life.

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### 1. Introduction

Diarrhoea is defined as the passing per day of three or more loose or watery stools that can take the shape of a container (Keusch et al., 2006). Diarrhoea is regarded worldwide as one of the major causes of death (Farthing, 2000). The major causative agents of diarrhoea in human beings include various enteropathogens like *Escherichia coli*, *Salmonella typhi*, *Shigella flexneri* and *Staphylococcus aureus* (Anne and Geboes, 2002). Human beings,

particularly those in developing countries are exposed to these potentially harmful infectious organisms. The major burden of infection is due to food-borne infections caused by *Salmonella*, *Campylobacter jejuni* and *Escherichia coli* and water-borne infections particularly as a result of contamination of domestic water supplies with the cysts of *Giardia intestinalis* and *Cryptosporidium parvum* (Mathabe et al., 2006). According to De Wet et al. (2010), an estimated 88% of diarrhoeal-related deaths are caused by inadequate sanitation and poor hygiene. The main cause of death from diarrhoea is dehydration, which results from the loss of electrolytes in diarrhoeal stools.

There are three major diarrhoea syndromes which include acute watery diarrhoea, which results in varying degrees of dehydration; persistent diarrhoea, which lasts 14 days or longer,

Abbreviations: AIDS, acquired immunodeficiency syndrome; HIV, human immunodeficiency virus

\* Corresponding author. Tel.: +27 15 268 2933; fax: +27 15 268 2184.

E-mail address: [alfred.maroyi@ul.ac.za](mailto:alfred.maroyi@ul.ac.za) (A. Maroyi).

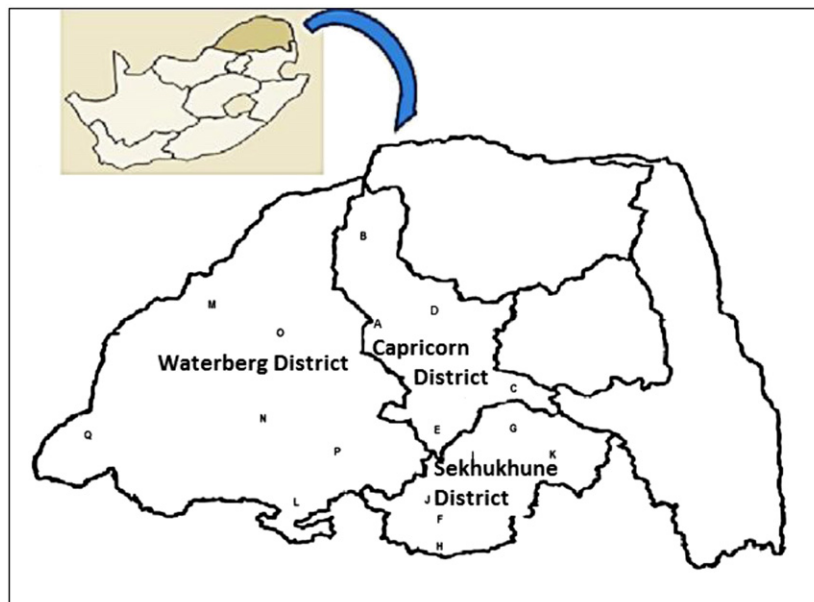


Fig. 1. Study area: Capricorn, Waterberg and Sekhukhune districts, Limpopo Province, South Africa. A to Q designates the involved municipalities.

manifested by malabsorption, nutrient losses, and wasting; and bloody diarrhoea, which is a sign of the intestinal damage caused by an infectious agent, drugs, poisons or acute inflammatory reactions (Keusch et al., 2006). Diarrhoea affects all age groups. But, in young children, it is the second most common cause of death in children under 5 years of age worldwide and is responsible for 2.4 million deaths each year (Forsberg et al., 2007). It is estimated that diarrhoeal disease is the primary cause of death in infants younger than 5 years, leading to about 160–200 deaths per day (Medical Research Council, 2012). About 43,000 South African adults die every year from diarrhoeal disease while the annual public and private health care costs as a result of diarrhoea are about \$4.3 million (Pegram et al., 1998). Diarrhoea is a major concern in all provinces of South Africa. In Limpopo Province as well as other poorer provinces such as Northern Cape in South Africa, diarrhoeal disease is the first cause of mortality after HIV/AIDS (Bradshaw et al., 2005).

Traditional medicines are an important source of drugs in rural areas. Traditional healers are deeply interwoven into the fabric of cultural and spiritual life of local communities where there are no health services (Clarke, 1998). In these areas, traditional medicines are important sources of anti-diarrhoeal drugs (Maikere-Faniyo et al., 1989; Mathabe et al., 2006). Traditional healers are the first health practitioners to be consulted in up to 80% of cases (especially in rural areas), and they are present in almost every community, which means that they are easily accessible in remote areas where there are no health services (Clarke, 1998). For most parts of South Africa, this rich indigenous knowledge on medicinal plants used to treat diarrhoea is not adequately documented, although there have been a few attempts to document such plants in the Eastern Cape Province (Appidi et al., 2008; Bisi-Johnson et al., 2010) and KwaZulu Natal Province (Lin et al., 2002; De Wet et al., 2008, 2010). Although occasional attention was paid to this subject by Mathabe et al. (2006) in the Limpopo Province, there is little information on medicinal plants used to treat diarrhoea by the Bapedi ethnic group, the largest (57%) in the Limpopo Province (Lodge, 2005). This investigation is part of a larger study (see Semanya et al., 2012) to document the ethnobotanical knowledge held by the Bapedi people. Therefore, the present study was aimed at documenting medicinal plants used by the Bapedi traditional healers to treat diarrhoea in the Limpopo Province, South Africa.

Table 1

Municipal districts and local municipalities included in this study.

Capricorn district	Sekhukhune district	Waterberg district
Aganang (A)	Elias Motsoaledi (F)	Bela-Bela (L)
Blouberg (B)	Fetakgomo (G)	Lephalale (M)
Lepelle-Nkumpi (C)	Groblerdsdal (H)	Modimolle (N)
Molemole (D)	Makhuduthamaga (I)	Mogalakwena (O)
Polokwane (E)	Marble Hall (J)	Mookgophong (P)
	Tubatse (K)	Thabazimbi (Q)

## 2. Materials and methods

### 2.1. Study area

The present study was carried out in 17 local municipalities (Fig. 1, Table 1), covering three of five districts (Capricorn, Sekhukhune and Waterberg) that constitute the Limpopo Province. The socio-economic status of the area is low, public health services are minimal, and many communities do not have access to treated drinking water. Only 14.2% of households in the area have rubbish removal once per week; 16.8% of households have access to flush or chemical toilets and 46.7% households have pit latrines without a ventilation pipe (Statistics South Africa, 2002). Consequently, diarrhoea is one of the common diseases in the study area (Bradshaw et al., 2003).

### 2.2. Data collection

A total of 51 Bapedi traditional healers were selected purposefully with the help of local administrators and elderly people from 17 municipalities within the three districts of the Limpopo Province (Fig. 1, Table 1). The selected traditional healers were professional practitioners who medicated the local people using local medicinal plants, animals and their products. Traditional healers' age range was from 22 to 79 years (median=63), and the majority were men 68.6% (Table 2). The sample population was not well-educated, with illiterate level of 90.2% (Table 2). A small proportion of traditional healers were educated up to secondary level (9.8%). Data on medicinal plants used by the Bapedi traditional healers to treat diarrhoea in the Limpopo Province were collected from January 2011 to July 2011. The interviews and discussions with the traditional

**Table 2**  
Demographic characteristics of the Bapedi traditional healers interviewed in the Limpopo Province, South Africa.

Age (years)	21–40	41–60	61–80	Total
Male	3	23	9	35
Female	9	2	5	16
<b>Education of traditional healers</b>				
			<b>Number</b>	<b>%</b>
Illiterate			46	90.2%
Educated up to primary level			4	7.8%
Educated up to secondary level			1	2.0%

healers were carried out in Sepedi, the local language. Before the start of interviews and any discussions on medicinal plants used to treat diarrhoea in the Limpopo Province, verbal informal consent was obtained from each individual traditional healer who participated in the study. The researchers also adhered to the ethical guidelines of the International Society of Ethnobiology (International Society of Ethnobiology, 2006). Information on plant names, the plant part(s) used, methods of herbal preparation, administration, dosage and duration of treatments were documented.

### 2.3. Plant collection and identification

Field trips were made to the sites where the Bapedi traditional healers collected medicinal plants they used to treat diarrhoea. Plants said to be used as remedies for diarrhoea during the interviews were identified by the traditional healers. Voucher specimens were collected during the field trips when encountered for the first time and again when they were flowering or fruiting, for easy identification. The voucher specimens were processed using standard taxonomic procedures (Bridson and Foreman, 1998; Victor et al., 2004). Each herbarium specimen included important parts such as leaves, stems, flowers and fruits whenever available. For small herbaceous plants, the whole plants were collected. These specimens were deposited for future reference at the Larry-Leach Herbarium (UNIN), University of Limpopo.

### 2.4. Data analysis

The majority of the data collected in this study were qualitative and descriptive in nature, therefore, they were explained directly. Interview and discussion data obtained from the Bapedi traditional healers were coded and sorted into themes. Any inconsistencies and unique statements obtained from the healers were noted and given particular attention. Recurrent themes were uncovered in this study by a process of systematic content analysis. Different researchers have emphasized various aspects of content analysis, from its capacity to generate quantitative descriptions by analyzing word counts (Silverman, 1993) to its ability to help researchers draw inferences from a text by breaking that text into discrete units of manageable data that can then be meaningfully reorganized (Weber, 1990). Data on plant species, families, voucher numbers, habit, plant part(s) used, number of citations, preparation, administration and dosage were entered into excel worksheets. These data were presented using percentages, frequency, ranking and bar charts.

## 3. Results and discussion

### 3.1. Medicinal plant diversity

The Bapedi traditional healers in the Limpopo Province, South Africa, use 20 plant species belonging to 16 families to treat diarrhoea

(Table 3). Of these, 15 species (75%) are indigenous to the Limpopo Province, South Africa, while 5 species (25%) are exotic, cultivated in home gardens as food plants. The families Anacardiaceae, Asteraceae, Fabaceae and Malvaceae had the highest proportion (10% each) of medicinal plants used to treat diarrhoea. Other families were represented by one species each, as shown in Table 3. Anacardiaceae, Asteraceae, Fabaceae and Malvaceae families have the highest diversity of species used to treat diarrhoea probably because these are large families characterized by several species. Other studies done in the Eastern Cape Province of South Africa documented Anacardiaceae (Appidi et al., 2008) and Fabaceae (Appidi et al., 2008; Bisi-Johnson et al., 2010) as the most represented families in terms of utilized medicinal plants used to treat diarrhoea. In India, both Laloo and Hemalatha (2011) and Pragada et al. (2012) reported Asteraceae as the dominant family in the treatment of diarrhoea. Furthermore, other dominant families in these studies were Anacardiaceae (Laloo and Hemalatha, 2011), Fabaceae and Malvaceae (Pragada et al., 2012). *Triumffeta* spp. could not be identified to species level due to non-availability of flowers and fruits at the time of collection. The most frequently used medicinal plant species in the current study were *Punica granatum* (39.2%), *Grewia bicolor* (33.3%), *Dombeya rotundifolia* (21.6%), *Commiphora marlothii* (19.6%) and *Acacia senegal* (13.7%). Apart from *Commiphora marlothii*, all other widely used anti-diarrhoeal medicinal plants in the Limpopo Province are also used by different cultural groups throughout the world (Table 3). Basotho traditional healers in the Limpopo Province of South Africa also use *Punica granatum* to treat diarrhoea (Mathabe et al., 2006). Namsa et al. (2011) and Shanmugam et al. (2011) recently reported the use of this species in the treatment of diarrhoea in India. Studies by Prashanth et al. (2001), Mathabe et al. (2006) and Venkatrao et al. (2007) have confirmed the anti-bacterial activities of *Punica granatum*, rendering the species effectiveness against diarrhoea. Although no pharmacological support exists for *Grewia bicolor* as an anti-diarrhoeal; VhaVenda traditional healers in the Limpopo Province (Mabogo, 1990) and local communities in the Katima Mulilo region, Caprivi region of Namibia (Chinsebu and Hedimbi, 2010) use the species as a remedy for diarrhoea. These similarities in use of *Grewia bicolor* by the Bapedi traditional healers and communities from other ethnic groups make the documented therapeutic claims in this study credible. The same is true for *Dombeya rotundifolia*, which is documented as widely used in treating diarrhoea by South Africans (Elgorashi et al., 2003) and Indians (Khare, 2007).

The number of medicinal plant species used to treat diarrhoea in the Limpopo Province varied between districts. The highest number of plant species were cited in Sekhukhune district followed by Waterberg District (Table 3). From the 20 medicinal plants used by the Bapedi traditional healers to treat diarrhoea, 15 were used in the Sekhukhune district, 13 species in the Waterberg district, and 12 in the Capricorn district (Table 3). *Dombeya rotundifolia*, *Grewia bicolor*, *Osyris lanceolata*, and *Punica granatum* were used in all three districts. Species such as *Acacia senegal*, *Gymnosporia senegalensis*, *Solanum lycopersicum* and *Triumffeta* spp. were used exclusively by traditional healers residing in the Capricorn and Sekhukhune districts. While *Commiphora marlothii*, *Ozoroa sphaerocarpa*, *Pappea capensis* and *Sclerocarya birrea* were used by traditional healers in the Capricorn and Waterberg districts, and *Carissa edulis*, *Helichrysum caespititium*, *Psidium guajava* and *Ximania americana* were used by traditional healers in the Sekhukhune and Waterberg districts. The remaining species were used in a single district.

### 3.2. Literature based proof of Bapedi traditional healers' claims

Out of all the medicinal plants used by the Bapedi traditional healers to treat diarrhoea in the Limpopo Province, the uses of 14 species (70%) are supported by reports of similar uses elsewhere

**Table 3**  
Plant species used for the treatment of diarrhoea in Capricorn, Sekhukhune and Waterberg districts, Limpopo Province, South Africa. An asterisk (\*) indicates that the taxon is known or believed to be exotic to the Limpopo Province, South Africa.

Family, species name, voucher	Habit	Part(s) used	Method of preparation	No. of citations in districts			Reported diarrhoeal usage
				Capricorn	Sekhukhune	Waterberg	
<b>Anacardiaceae</b>							
<i>Sclerocarya birrea</i> (A.Rich.) Hochst. SS 1	Tree	Bark	A handful <sup>a</sup> of bark pounded and mixed with warm water. The infusion (250 ml <sup>b</sup> ) is administered thrice a day until diarrhoea subsides	1	–	1	(Chinsebu and Hedimbi, 2010; Elgorashi et al., 2003; De Wet et al., 2010; Gelfand et al., 1985; Mabogo, 1990; Mathabe et al., 2006; Oliver-Bever, 1994; Ribeiro et al., 2010; Runyoro et al., 2006)
<i>Ozoroa sphaerocarpa</i> R. and A.Fern. SS 30	Tree	Bark/ root	A handful of bark or roots cooked in water for 5–20 min. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	2	–	1	(Sibandze et al., 2010)
<b>Apocynaceae</b>							
<i>Carissa edulis</i> (Forssk.) Vahl SS 401	Shrub	Root	A handful of roots cooked in water for 10 min. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	–	1	1	(Maroyi, 2011)
<b>Asteraceae</b>							
<i>Dicoma anomala</i> Sond. SS 407	Herb	Tuber	One tuber is macerated in warm water for 24 h. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	–	1	–	(Becker et al., 2011; Gwaza et al., 2009; Setshogo and Mbereki, 2010)
<i>Helichrysum caespitium</i> Sond. SS 78	Herb	Whole plant	One whole plant cooked in water for 5–20 min. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	–	1	2	None found
<b>Burseraceae</b>							
<i>Commiphora marlothii</i> Engl. SS 403	Tree	Bark/ root	A handful of bark or roots pounded and mixed with warm water. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	3	–	7	None found
<b>Celastraceae</b>							
<i>Gymnosporia senegalensis</i> (Lam.) Exell SS 333	Shrub	Leaf	A handful of leaves cooked in water for 5–20 min. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	1	2	–	(Bandeira et al., 2001; Chabra et al., 1989; Chinemana et al., 1985; De Wet et al., 2010; Johns et al., 1995; Koné et al., 2004; Mathabe et al., 2006; Matu and van Staden 2003; Sanogo 2011)
<b>Dracaenaceae</b>							
<i>Sansevieria hyacinthoides</i> (L.) Druce SS 199	Herb	Leaf	A handful of leaves cooked in water for 5 min. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	–	3	–	(Mabogo, 1990; Takawira-Nyanya and Stedje, 2011; Van Wyk and Gericke, 2000)
<b>Fabaceae</b>							
<i>Acacia senegal</i> (L.) Willd. SS 102	Tree	Seed	A handful of seeds pounded and mixed with warm water. The infusion (250 ml) is administered thrice a day until diarrhoea subsides.	5	2	–	(Boer, 2002; Khare, 2007)
* <i>Vigna unguiculata</i> (L.) Walp. SS 400	Herb	Leaf	A handful of leaves cooked in water for 20 min. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	–	–	2	None found
<b>Lythraceae</b>							
* <i>Punica granatum</i> L. SS 73	Shrub	Root/ pericarp	A handful of roots or pericarp mixed with <i>Psidium guajava</i> roots and cooked in water for 5–25 min. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	8	5	7	(Mathabe et al., 2006; Namsa et al., 2011; Sathyavati et al., 1987; Shanmugam et al., 2011)
<b>Malvaceae</b>							
<i>Grewia bicolor</i> Juss. SS 22	Shrub	Root	A handful of roots cooked in water for 5–30 min. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	4	9	4	(Brink, 2008b; Chinsebu and Hedimbi, 2010; Mabogo, 1990; Maroyi, 2011)
<i>Triumffeta</i> spp. SS 64	Herb	Root	A handful of roots cooked in water for 5–20 min. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	1	1	–	None found
<b>Myrtaceae</b>							
* <i>Psidium guajava</i> L. SS 408	Tree	Root	A handful of roots mixed with <i>Punica granatum</i> roots or pericarp and cooked in water for 5 min. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	–	2	1	(Birdi et al., 2010; Bisi-Johnson et al., 2010; Chinsebu and Hedimbi, 2010; De Wet et al., 2010; Ghosh et al., 1993; Gutierrez et al., 2008; Hutchings et al., 1996; Lin et al., 2002; Lutterodt, 1989; Madikizela et al.,

Table 3 (continued)

Family, species name, voucher	Habit	Part(s) used	Method of preparation	No. of citations in districts			Reported diarrhoeal usage
				Capricorn	Sekhukhune	Waterberg	
<b>Olacaceae</b>							2012; Ramalivhana et al., 2010; Tona et al., 1999; Van Wyk et al., 2009)
<i>Ximenia americana</i> L. SS 460	Shrub	Root	A handful of roots cooked in water for 5 min. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	–	1	3	(Burkill, 1997; Gronhaug et al., 2008; Koné et al., 2004; Mabogo, 1990; Tran Le et al., 2012)
<b>Poaceae</b>							(Balamurugan et al., 2009)
* <i>Saccharum officinarum</i> L. SS 404	Herb	Leaf	A handful of leaves cooked in water for 20 min. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	–	1	–	
<b>Santalaceae</b>							None found
<i>Osyris lanceolata</i> Hochst. and Steud. ex A.DC. SS 61	Shrub	Root	A handful of roots cooked in water for 5 min or pounded with warm water. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	1	3	1	
<b>Sapindaceae</b>							(Kokwaro, 1976; Maundu et al., 2005)
<i>Pappea capensis</i> Eckl. and Zeyh. SS 114	Tree	Fruit	One fruit taken as raw, thrice a day until diarrhoea subsides	1	–	2	
<b>Solanaceae</b>							None found
* <i>Solanum lycopersicum</i> L. SS 490	Herb	Fruit	About 10–20 ml fruit juice taken orally, thrice a day until diarrhoea subsides	2	1	–	
<b>Sterculiaceae</b>							(Brink, 2008a; Elgorashi et al., 2003; Khare, 2007)
<i>Dombeya rotundifolia</i> (Hochst.) Planch. SS 301	Tree	Root	A handful of roots cooked in water for 5–20 min. The infusion (250 ml) is administered thrice a day until diarrhoea subsides	7	1	3	

<sup>a</sup> The average mass of a handful of bark was 35 g; bark and roots used together was 38 g; leaves was 29 g; roots was 40 g; roots and pericarp used together was 41 g; seeds was 40 g; and whole plant was 32 g.

<sup>b</sup> Traditional healers usually prescribe a cup (250 ml) for adults, taking 75–90 ml three times a day. Children are given a third of this quantity about 80 ml, taking 25–30 ml three times a day.

or proven biological activity in literature (Table 3). The therapeutic claims of the following plant species are well supported in literature: *Acacia senegal*, *Carissa edulis*, *Dicoma anomala*, *Dombeya rotundifolia*, *Grewia bicolor*, *Gymnosporia senegalensis*, *Ozoroa sphaerocarpa*, *Pappea capensis*, *Psidium guajava*, *Punica granatum*, *Sansevieria hyacinthoides*, *Saccharum officinarum*, *Sclerocarya birrea* and *Ximenia americana* (Table 3). To the best of our knowledge, *Commiphora marlothii*, *Helichrysum caespititium*, *Osyris lanceolata*, *Solanum lycopersicum* and *Vigna unguiculata* are recorded for the first time as medicinal plants used to treat and manage diarrhoea.

### 3.3. Growth forms, plant part(s) used and method of application

Analysis of the growth forms of the medicinal plants used by the Bapedi traditional healers to treat diarrhoea revealed that herbs and trees constituted the largest number or proportion of growth forms with 35% each, followed by shrubs with 30% (Table 3). The plant parts mostly used by the Bapedi traditional healers to prepare anti-diarrhoeal remedies were the roots (50%), followed by leaves (20%), bark (15%), fruits (10%), pericarp, seed, tuber and whole plants (5% each) (Fig. 2). The use of whole plant as a remedy for diarrhoea was administered for herbaceous plant species. Results of the current study correlate strongly with those of Mathabe et al. (2006) who noted the dominance of roots and bark in the herbal preparation for diarrhoea remedies prepared by

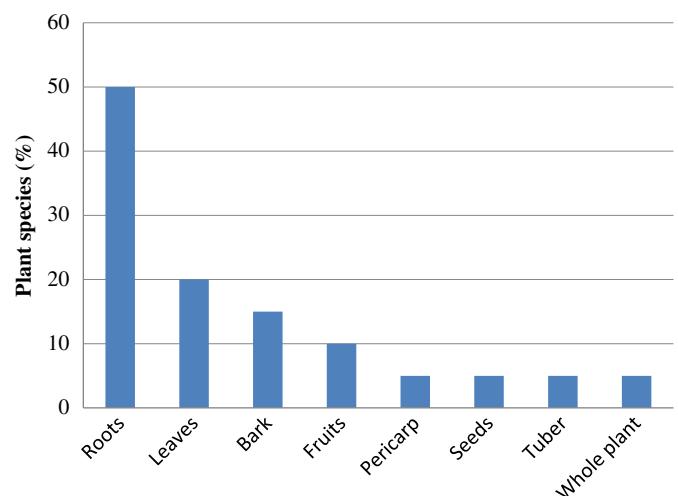


Fig. 2. Plant parts used by the Bapedi traditional healers to treat and manage diarrhoea in the Limpopo Province, South Africa.

the northern Sotho ethnic group in the Limpopo Province, South Africa. Appidi et al. (2008) noted that Xhosa traditional healers in Eastern Cape Province, South Africa, preferred roots followed by bark and leaves. In Kwazulu-Natal Province of South Africa,



De wet et al. (2010) found that lay people used bark followed by leaves. In a similar study in India, Shanmugam et al. (2011) recorded wide use of leaves and roots in the herbal preparations for diarrhoea remedies. Interviews with the Bapedi traditional healers revealed that they believed roots to be more effective for anti-diarrhoeal herbal preparations than other plant parts. Studies from other research, have shown that the roots and other underground parts have high concentrations of bioactive compounds (Kunwar et al., 2006). However, harvesting of whole plants and roots of herbaceous plants for medicinal purposes is not sustainable, as it threatens the survival of the same plants used to treat diarrhoea in the Limpopo Province.

Mono therapies based on preparations made from a single plant species were the most dominant (90%) and only 10% of diarrhoea remedies were prepared from a combination of two species. This included boiling of *Psidium guajava* and *Punica granatum* roots. Similarly, Laloo and Hemalatha (2011) reported the combination of these species in the herbal remedies for diarrhoea prepared by tribals of Meghalaya, northeast India. However, there is a difference in the utilized plant parts as Meghalaya tribals used a combination of the *Punica granatum* pericarp and leaves of *Psidium guajava*; whereas the Bapedi traditional healers used roots of the two species. The use of multiple therapies in traditional medicine based on combining plants has recently been shown to increase the efficacy of the herbal medicine (Zonyane et al., 2012). According to Bussmann and Sharon (2006), the use of more than one plant species to prepare a remedy for ailments is attributed to the additive or synergistic effects that they could have during ailment treatment. However, it seems the traditional healers in the Limpopo Province hardly use this practice in the treatment of diarrhoea. Only one traditional healer used multiple therapies in the current study, and also in the study carried out by Mathabe et al. (2006) which focused on the northern Sotho ethnic group of the Limpopo Province, South Africa.

The use of the following medicinal plant species (55%) as mono therapies for treating and managing diarrhoea in South Africa and other countries is well documented: *Acacia senegal* (Boer, 2002; Khare, 2007), *Carissa edulis* (Maroyi, 2011), *Dicoma anomala* (Becker et al., 2011; Gwaza et al., 2009; Setshogo and Mberekhi, 2010), *Dombeya rotundifolia* (Brink, 2008a; Elgorashi et al., 2003; Khare, 2007), *Grewia bicolor* (Brink, 2008b; Chinsemu and Hedimbi, 2010; Mabogo, 1990; Maroyi, 2011), *Gymnosporia senegalensis* (Bandeira et al., 2001; Chabra et al., 1989; Chinemana et al., 1985; De Wet et al., 2010; Johns et al., 1995; Koné et al., 2004; Mathabe et al., 2006; Matu and van Staden, 2003; Sanogo, 2011), *Pappea capensis* (Kokwaro, 1976; Maundu et al., 2005), *Saccharum officinarum* (Balamurugan et al., 2009), *Sansevieria hyacinthoides* (Mabogo, 1990; Takawira-Nyanya and Stedje, 2011; Van Wyk and Gericke, 2000), *Sclerocarya birrea* (Chinsemu and Hedimbi, 2010; De Wet et al., 2010; Elgorashi et al., 2003; Gelfand et al., 1985; Mabogo, 1990; Mathabe et al., 2006; Oliver-Bever, 1994; Ribeiro et al., 2010; Runyoro et al., 2006) and *Ximenia americana* (Burkill, 1997; Gronhaug et al., 2008; Koné et al., 2004; Mabogo, 1990; Tran Le et al., 2012).

The methods of herbal preparation of diarrhoea remedies varied considerably from one traditional healer to the other. Plant remedies were often utilized in the form of extracts (75%) and powder (20%). Plant parts were rarely prepared by decoction, either by maceration or squeezing (10%), and eaten raw (5%). These appear to be the common methods for anti-diarrhoeal remedy preparations in South Africa as the same herbal preparations were reported in Eastern Cape (Bisi-Johnson et al., 2010) and KwaZulu Natal (De Wet et al., 2010) provinces. All herbal preparations were taken orally. The Xhosa traditional healers in South Africa also prescribed all their diarrhoea herbal medicines orally (Appidi et al., 2008). However, Zulu people also prescribed

diarrhoeal remedies either anally or rectally. All diarrhoea herbal medicines in this study were taken for a week or until diarrhoea subsided (Table 3).

#### 4. Conclusion

This study reveals that local communities in Limpopo Province, South Africa still depend on traditional medicines for basic healthcare; and the use of traditional medicines is still an integral part of their socio-cultural life. The therapeutic claims of 70% of the species used by the Bapedi traditional healers to treat and manage diarrhoea are supported by reports of similar uses in other countries. This study therefore, offers additional support for continued use of the documented plants as essential traditional medicines that are important for basic healthcare of the local communities. The information gained from this study might give important leads for future development of medicinal plant derived drugs. However, more detailed phytochemical and pharmaceutical scientific studies are needed to evaluate the efficacy and safety of the medicinal plants used to prepare diarrhoea remedies.

#### Acknowledgements

The authors are grateful to the traditional healers in the Capricorn, Sekhukhune and Waterberg Districts of the Limpopo Province, South Africa for sharing their knowledge on herbal medicine. Two anonymous reviewers are thanked for their constructive comments.

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