

# *Bowiea volubilis* Harv. ex Hook.f. subsp. *volubilis*: A therapeutic plant species used by the traditional healers in the Soutpansberg Region, Vhembe Biosphere Reserve, Limpopo Province, South Africa

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## Abstract

Traditional healers in South Africa have been using *Bowiea volubilis* as herbal medicine against assorted diseases since time memorial. This study was aimed at documenting therapeutic uses of *B. volubilis* by the traditional healers in the Soutpansberg Region, Vhembe Biosphere Reserve, Limpopo Province, South Africa. Data about medicinal uses of *B. volubilis* were gathered via interviews with 133 traditional healers, using semi-structured questionnaires. Five therapeutic uses associated with *B. volubilis* were recorded, including being utilized as herbal medicine for rash and skin smoothening (FL=24.8%), anthelmintics in infants (FL=23.3%), liver infections (FL=18.8%), pelvic pains in women (FL=17.3%) and jaundice in infants (FL=15.8%). Among the recorded therapeutic uses, three of them were reported for the first time in this study. The results of this study, calls for further investigations focusing on phytochemical and pharmacological properties of the plant species. There is a need to domesticate *B. volubilis* in home gardens as a conservation strategy since the species is sought after as herbal medicine and threatened with extinction.

**Keywords:** *Bowiea volubilis*, Soutpansberg Region, therapeutic uses, threatened plant species, Traditional healers, Vhembe Biosphere Reserve

## INTRODUCTION

*Bowiea volubilis* Harv. ex Hook.f. subsp. *volubilis* is a deciduous climber and bulb plant species belonging to family Hyacinthaceae [1]. This plant species is considered to be an unusual succulent species with climbing inflorescences adapted to trap light and photosynthesize without aerial leaves [2]. It has a bright-green fleshy stem and its bulb can reach a diameter of 150 mm in growth and the diameter of its flowers range from 16 to 24 mm, while the fruits can reach 25 mm [3]. In the southern African region, *B. volubilis* is distributed in South Africa, Mozambique, Zimbabwe, Zambia, Angola, Uganda and Tanzania [2–4]. In South Africa, the distributional range of the plant species stretches from Eastern Cape, Kwazulu-Natal, Mpumalanga, Gauteng to Limpopo Provinces [4]. Traditionally, plant species are considered integral for human wellbeing [5]. Indigenous knowledge about therapeutic uses of plant species against assorted ailments have existed since time immemorial [6–7]. Regardless of the available modern therapeutic means worldwide, more than 80% of global population, particularly in rural areas heavily rely upon herbal medicines for their well-being [8–9]. It is evident that more than 4 000 plant species in southern Africa are being utilized as herbal medicines for assorted diseases [10] which includes the utilization of both threatened and non threatened plant species [11]. Raimondo *et al.* [4], has assessed the conservation status of *B. volubilis* using IUCN Red List Categories and Criteria version 3.1 and categorized the species as Vulnerable (VUA2ad) [12].

It is evident that many bulb plant species, including *B. volubilis* are on the verge of extinction risk due to numerous threats, including over-harvesting as herbal medicine, habitat destruction, human settlement and agricultural expansion [13–14]. Many species under the family Hyacinthaceae including *B. volubilis* are being utilized as herbal medicines and ornamentals [1], and they are also listed as threatened plants [4,11]. In various parts of South Africa, *B. volubilis* is known by its numerous vernacular names [15–16], including being called Nyalakhobvu or Khobvumutovu in Tshivenda language in the Soutpansberg, Vhembe Biosphere Reserve, Limpopo Province. Sati [17], articulated that medicinally used plant species including *B. volubilis* plays an integral role in the growth of subsistence economy for local people, whereas, Louw *et al.* [18] portrayed the history of using herbal medicines in traditional health care systems as the continuing heritage [19]. Therefore, South African traditional healers have been using *B. volubilis* as herbal medicine against miscellaneous diseases since time immemorial [15,20,21].

Jäger and van Staden [22], portray the use of herbal medicine in South African traditional health systems as an equal and important segment of national primary health care, whereas, Hannweg *et al.* [23] illustrated *B. volubilis* as an essential herbal medicine within South African traditional health care system. The literature studies showed *B. volubilis* as one of the top five frequently utilized therapeutic plant species countrywide [24–25]. However, there is no record of published data about the therapeutic uses of the plant species in the Soutpansberg

area of the Vhembe Biosphere Reserve and the entire Limpopo Province at large [26]. The current study aimed at documenting the therapeutic uses of *B. volubilis* by the traditional healers in the Soutpansberg area of the Vhembe Biosphere Reserve, Limpopo Province, South Africa. The results of this study could potentially be envisaged as a baseline towards drug synthesis.

## MATERIALS AND METHOD

### Description of the study place

The current study was conducted in 34 villages in Makhado and Thulamela Local Municipalities in the Soutpansberg area of the Vhembe Biosphere Reserve, Limpopo Province, South Africa (Fig. 1). The study place was located within the coordinates ranging from 22°42'11.005" to 23°0'3.650" south latitudes and 30°11'23.333" to 30°11'58.747" east longitudes. Both sites were predominantly occupied by the Vhavanḁa ethnic group who speaks Tshivenḁa as their native language. The study sites are classified as savanna biome and its vegetation cover is classified as bushveld [27] and Soutpansberg Mountain Bushveld with some small patches of afromantane forest [28]. Climatically the region is characterized by mild-dry winter (stretching from May to September) and warm-wet summer (stretches from October to April), with the annual mean rainfall ranging from 300 mm (winter) to 820 mm (summer) [29–30].

### Data gathering and analysis

Data about the therapeutic uses of *B. volubilis* by the traditional healers was garnered in May 2018 until April 2019. An ethical clearance certificate (Reference no. MAR031SRAM01) was granted by the University of Fort Hare, prior to the commencement of data collection. The objective of this study was explained to all the traditional healers of various age groups using their own local language (Tshivenḁa) and subsequently all those who were willing to participate signed an informed consent form (Fig. 2). A total of 133 traditional healers specializing in various categories of herbal healing, including child health care healers, wound and general healers (Fig. 2), were arbitrarily selected with the aid of the local traditional leaders who knows them better. To increase the certainty, participation tenacity and allowance of smooth flow of ideas during the interviews, all traditional healers were visited in their homestead and interviewed individually with the aid of semi-structured questionnaires. To validate the accuracy the given information, the same questions were administered to all the traditional healers. Accumulated data were stored in a Microsoft Office 2010, spreadsheet program and then descriptive statistical analysis was performed using components such as the frequency of occurrence and fidelity level percentage (FL %). The FLs (%) was determined using formula ( $FL\% = N_p/N \times 100$ ), cited by Umair *et al.* [31] and Al-Qur'an [32], whereby  $N_p$ , embodied a number of traditional healers who cited certain therapeutic use, whereas  $N$ , donates total number of traditional healers who cited all the therapeutic usage of *B. volubilis* within the study sites. Therefore, since all traditional healers have cited the

therapeutic uses of *B. volubilis*, then  $N$ , was equivalent to 133.

### Plant specimen collection and identification

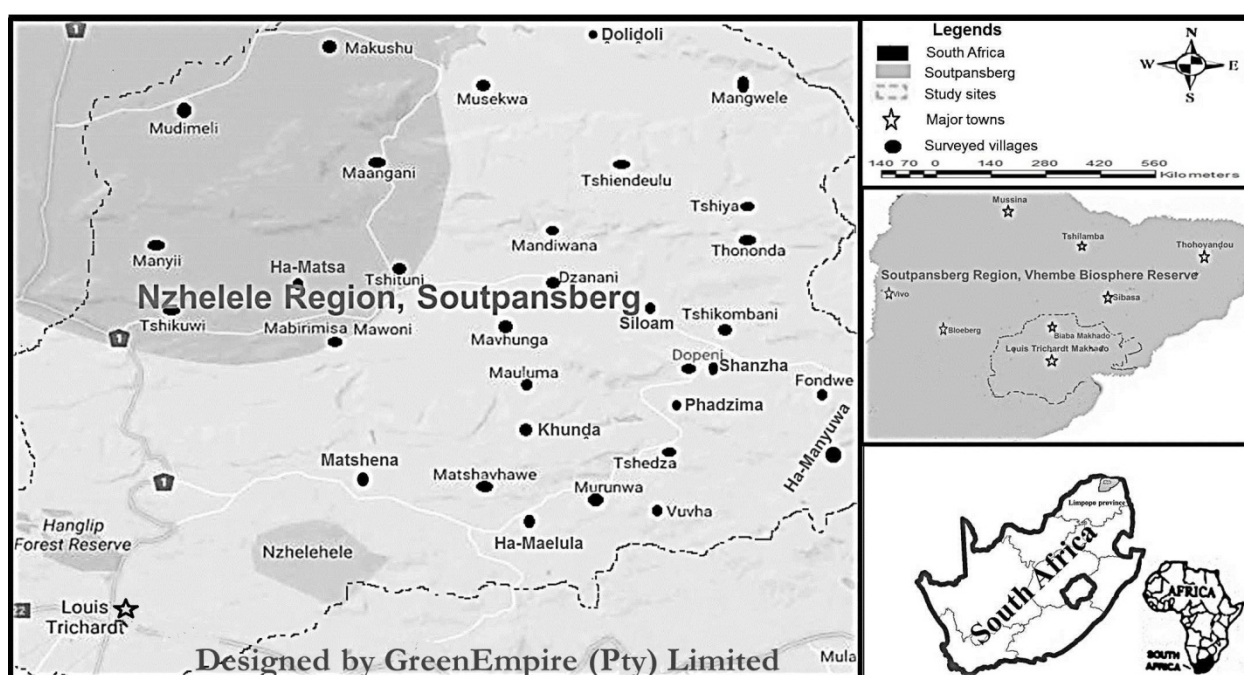
A specimen collection permit (Reference no. ZA/LP/92932) was licensed by the Limpopo Provincial Department of Economic Development, Environment and Tourism. Accumulated data were supplemented by field visit-inspection together with all the traditional healers, for the purpose of plant identification and specimen collection purpose. Firstly, traditional healers identified the target plant species using its vernacular name and then the specimen was collected, prepared (pressed or dried), assigned the voucher number (RAMLJ 015) and deposited in Botany Herbarium of the University of Venda for further examination by taxonomists.

## RESULTS AND DISCUSSION

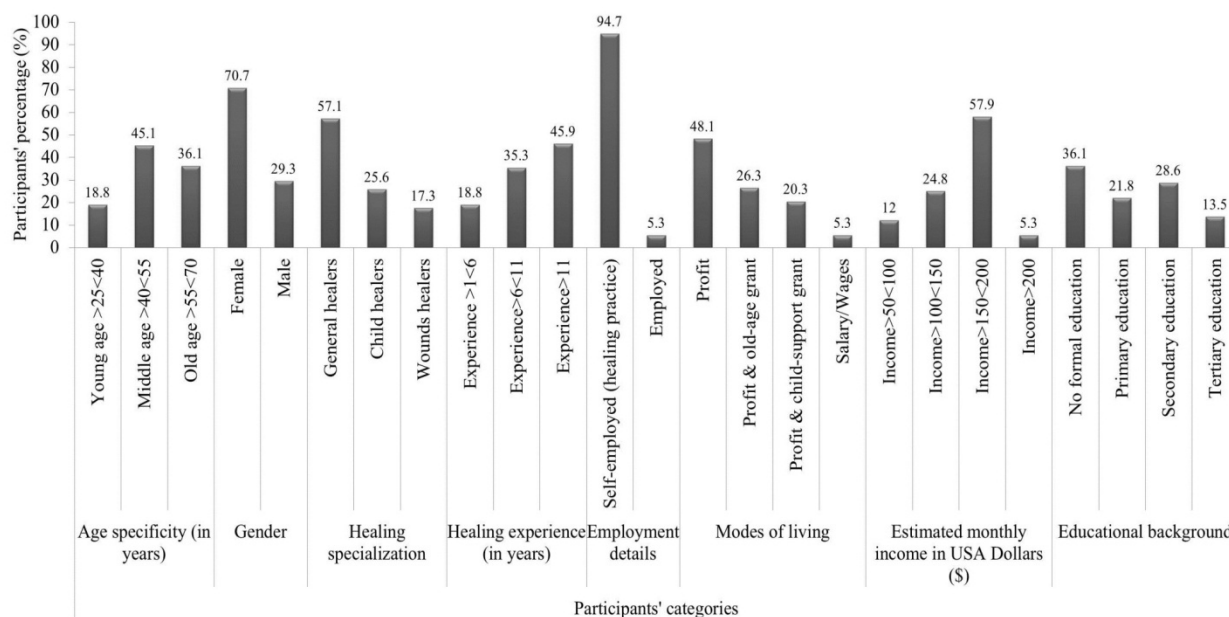
The results showed that *B. volubilis* is being utilized by local traditional healers as herbal medicine against assorted diseases (Table 1). More than 80% of traditional healers within the study sites seemed to mix *B. volubilis* with other herbal remedies while using decoction as a major preparation method (Table 1). This was to intensify its therapeutic efficacy against miscellaneous diseases (personal communication), whereas decoction is considered to be the simplest method in traditional therapeutic preparation [33]. Ugulu [34], argued that mixed medicinal plant species could provide the most effective therapeutic treatment against target disease. This was also endorsed by other scholars worldwide [35–37]. The total of five therapeutic uses associated with *B. volubilis* were recorded in the current study and their fidelity level (FL) ranged from 15.8 to 24.8%. The recorded therapeutic uses of the plant species includes being utilized as herbal medicine for rash and skin smoothening (FL=24.8%), anthelmintics in infants (FL=23.3%), liver infections (FL=18.8%), pelvic pains in women (FL=17.3%) and jaundice in infants (FL=15.8%) (Table 1). The recurring therapeutic use of *B. volubilis* by traditional healers against assorted diseases delineates high potential of bioactive compounds it may possess, wealth of pharmacological knowledge among healers and dynamism within the traditional therapeutic means. This was supported by other scholars in the field [38–40]. According to Louw *et al.* [18], plant species under family Hyacinthaceae including *B. volubilis* contains large amount of bioactive compounds to be used against assorted diseases. The current study lack phytochemical validations. Tengö *et al.* [41], argued that indigenous therapeutic knowledge requires no validations since it has already been validated through its developmental stages long time ago, whereas, Jamila and Mostafa [42], stated that herbal therapeutic efficacy should not be doubted, but pharmacological evaluated for precisions. Furthermore, therapeutic use of *B. volubilis* against multiple diseases also demonstrates its high level demand within study sites. Therefore, this study argued that the continuous unsustainable harvest of *B. volubilis* for any purpose within the region could potentially derive its population towards the verge of extinction risk.

**Table 1:** Therapeutic uses of *B. volubilis* by the traditional healers in the Soutpansberg Region, Vhembe Biosphere Reserve, Limpopo province, South Africa (Notes: n – Total number of participants).

Therapeutic uses	Preparation and recipe	Dosage and Administration	Parts	Fidelity level (%) (n=133)	Cited before
Rash and skin smoothening	Chopped fresh bulb is crushed and squeezed to produce the liquid extracts	Five to ten drops of liquid extract are applied on skin sore as body lotion twice per day for five days	Bulb	24.8	Yes [16,20,24]
Infant anthelmintic	Decoction of boiled and chopped pieces of fresh bulb and fresh root of <i>Athrixia phyllicoides</i> DC.	Two spoons of decoction are taken orally, three times per day for one month	Bulb	23.3	No
Liver infections	Decoction of boiled fresh parts (whole plant) together with fresh roots of <i>Momordica boivinii</i> Baill, <i>Momordica balsamina</i> L., <i>Momordica cardiospermoides</i> Klotzsch, <i>Momordica foetida</i> Schumach, <i>Momordica repens</i> Bremek.	Decoction on the cup is taken orally, three times per day for two months	Whole plant	18.8	No
Pelvic pains in women	Decoction of boiled and chopped fresh bulb and <i>Artabotrys monteiroae</i> Oliv., is mixed with maize meal to make soft porridge	Taken as soft porridge twice per day, for one week	Bulb	17.3	Yes [11,20]
Infant jaundice	Decoction of boiled fresh parts (whole plant) and fresh rhizome of <i>Rhus lancea</i> (L.f.) F.A. Barkely as well as <i>Kniphofia crassifolia</i> Barker	Decoction on the spoon is taken orally, three-times per days for two weeks	Whole plant	15.8	No



**Figure 1:** Locality map of the study sites



**Figure 2:** Participants' biographical details

## CONCLUSION

The present study has unveiled novel evidence about the therapeutic uses associated with the utilization of *Bowiea volubilis* in the Soutpansberg Region and the entire Limpopo province in particular. From the best of our knowledge, this was the first study to record the therapeutic uses of *B. volubilis* in the Soutpansberg Region and entire Limpopo Province. This study has recorded five therapeutic uses associated with *B. volubilis* within the study sites. Among the recorded therapeutic uses, three of them have never been published before elsewhere. *Bowiea volubilis* seemed to be an important herbal medicine for infant diseases, women's diseases, organ infections and tissue treatment. This study recommended phytochemical and pharmacological property investigations of the plant species. There is an earnest need to detail appropriate conservation strategies for local traditional healers to naturally growing scant therapeutic plant species including *B. volubilis* within the dwelling areas.

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