

Short communication

## *Hydnora abyssinica*: Ethnobotanical evidence for its occurrence in southern Mozambique

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### Abstract

*Hydnora* spp. are rarely collected root holoparasites due to the subterranean nature of the rhizomes and seasonal emergence of the flowers. Results from a recent study in South African traditional medicine markets positively identified *Hydnora abyssinica* A.Br. rhizomes in trade and indicated that there was a high probability of the species also occurring in southern Mozambique. An ethnobotanical study was thus conducted in two markets in Maputo, and the presence of *H. abyssinica* at the stalls of traditional medicine sellers is a new record for the species' occurrence in Mozambique. Most of the rhizomes were cited as being harvested in the districts of Boane and Manhica, and further research is required to verify the harvesters' accounts of its distribution.

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### 1. Introduction

*Hydnora* spp. are subterranean root holoparasites that are rarely collected by botanists because of their cryptic nature and the seasonal emergence of the flowers (Tennakoon et al., 2007). There is some taxonomic uncertainty in the genus and there are currently five species recognised (Tennakoon et al., 2007). The plant body is a root-like rhizome with extremely reduced vegetative features, a dark brown periderm and fleshy red/pink interior (Tennakoon et al., 2007) (Fig. 1). The rhizomes of *Hydnora* spp. and the tubers of *Sarcophyte sanguinea* Sparrm. subsp. *sanguinea*, called *uMavumbuka* in Zulu and Xhosa, are used and traded for traditional medicine (TM) in South Africa (Botha et al., 2001; Cunningham, 1988; Dold and Cocks, 2003; Williams et al., 2001, 2007, 2011; Williams, 2004, 2007; Wojtasik, 2009). The plants are reportedly used to treat diarrhoea, piles, acne, menstrual problems, stomach cramps and to stop bleeding (Dold and Cocks, 2003; Hutchings et al.,

1996; Musselman and Visser, 1989). The high tannin concentration in the *Hydnora* spp. rhizomes imparts a strong astringency and bitterness, and this may be the reason for its efficacy in treating intestinal ailments (Dold and Cocks, 2003; Musselman, 1984; Musselman and Visser, 1989).

Ethnobotanical studies have shown that insight can sometimes be gained into the occurrence of small and unusual species through the knowledge of local communities living adjacent to the plants, thereby providing information to supplement herbarium records (Cunningham, 2001). Until recently, *Hydnora africana* Thunb. was presumed to be the only *Hydnora* species occurring in eastern South Africa available to traditional healers. However, *Hydnora* rhizomes observed in the Faraday TM market (Johannesburg) that bore a slight, but not exact, resemblance to *H. africana* were identified as *Hydnora abyssinica* A.Br. by L.J. Musselman, an expert in parasitic flora (pers. comm., 2007). *Hydnora abyssinica* rhizomes are cylindrical in cross-section with a random arrangement of warty outgrowths or 'bumps'. In contrast, *H. africana* rhizomes are angular in cross-section with a regular arrangement of bumps on the ridges of the 5–6merous rhizome. The prevalence of *H. abyssinica* in TM markets in eastern South Africa and

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Fig. 1. *Hydnora abyssinica* ('mavumbule') rhizomes bought from Xipamanine market, Maputo (Falcão s.n. J).

observations of it in a market in Liwonde, Malawi in 2005 were noteworthy, since these regions were not known to be part of its geographic range.

*Hydnora abyssinica* is a widespread species and was believed to range diagonally across parts of sub-Saharan Africa from northern Namibia to Ethiopia, Somalia and the Arabian peninsula (Musselman and Visser, 1989). Re-examination of herbarium specimens by Pieter Winter at the National Herbarium, Pretoria (PRE) in 2004, however, established that *H. abyssinica* also occurs in South Africa in the Northern Cape, Limpopo and Gauteng, and in Swaziland (Fig. 2) (Muller 4395; Galpin 1032; van der Byl 4310; Lemmer 3072; von Wissel 15073; Williamson 22463; Marloth 1142). Further evidence of the species' occurrence in South Africa in Mpumalanga and KwaZulu-Natal was subsequently found from specimens lodged at the Skukuza Herbarium, Kruger

National Park (KNP) [van der Schyff 3464; Zambatis 2006; Anon. s.n. in KNP 1234 (KNP!)] and the KwaZulu-Natal Herbarium, Durban (NH) (Ward 1761). The specimen at NH was collected in the Tembe Elephant Park in 1986 and was determined to be *H. abyssinica* by E.M Wojtasik in 2009. Synonymy is common in *H. abyssinica* A.Br. (= *H. johannis* Becc. = *H. solmsiana* Dinter), and there are 10–11 recognised synonyms (Musselman, 1997; Musselman and Visser, 1989).

To verify the occurrence of *H. abyssinica* in South Africa, an ethnobotanical study was conducted in the Faraday and the Warwick (Durban) traditional medicine markets in 2009 (Wojtasik, 2009). The study confirmed that *H. abyssinica* was being sold, and that most of it was reportedly being harvested from the uMhlabuyalingana district in northern KwaZulu-Natal, close to the border with Swaziland and Mozambique (Fig. 2). Confirmation of the presence of *H. abyssinica* in TM markets in eastern southern South Africa (Williams et al., 2011), and one citation of it being harvested in Mozambique in 2001 (V.L. Williams, unpublished data), suggested that the probability of the species occurring in southern Mozambique was very high. If positive evidence of its occurrence in Mozambique could be obtained, then the known geographic range of *H. abyssinica* subpopulations would be further extended within southern Africa. Based on the preponderance of evidence that *H. abyssinica* probably occurs in Mozambique, a short study was conducted in two TM markets in Maputo in 2009 to investigate its presence, the extent of trade, and areas where harvesters were collecting the rhizomes.

## 2. Method

### 2.1. Study site

The survey sought to confirm the presence of *H. abyssinica* in TM markets in Maputo and hence the occurrence of the

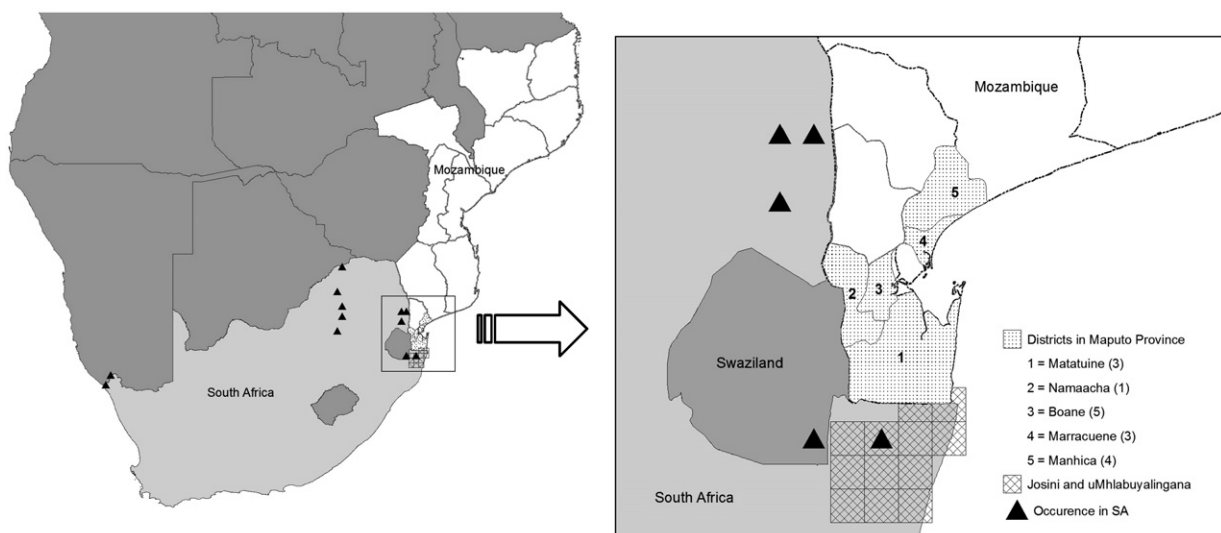


Fig. 2. Actual and probable areas of occurrence of *Hydnora abyssinica* in Mozambique and South Africa. The numbered districts in Maputo Province, Mozambique, were cited by Xipamanine traders as areas where *mavumbule* is harvested. Numbers in parentheses indicate the number of citations of a district as a harvesting area. The Josini and uMhlabuyalingana municipal districts in South Africa were cited by traders in Johannesburg and Durban as sources of *H. abyssinica* for the Faraday and Warwick traditional medicine markets respectively (Williams et al., 2011). The black triangles indicate areas in South Africa where *H. abyssinica* is confirmed to occur (herbarium specimens and plant sightings).

species in Mozambique. There are 3 markets for TM in Maputo located within a 7 km radius of the city centre. The two largest markets, Xipamanine and Xikalene, are on the outskirts of the city near major roads and have approximately 175 and 17 medicinal plant vendors respectively (Krog et al., 2006). The markets are organised according to the type of products sold, and the stalls (called ‘banca’) of the medicinal plant traders are clustered in the same part of the market.

## 2.2. Survey

A sample of *H. abyssinica* rhizomes bought in the Faraday market, Johannesburg, was shown to traders in Xipamanine in July 2009 to validate the presence of the species. A questionnaire, originally designed to capture information on the regional harvesting and trade of *uMavumbuka* in South Africa (Wojtasik, 2009), was adapted for the Maputo markets (Appendix 1). Seven traders each in Xipamanine and Xikalene were interviewed in August 2009. Included in the questionnaire was a diagram of a typical *H. abyssinica* flower with four fully patent perianth lobes, since this is one of the floral characteristics that distinguish it from *H. africana* (Williams et al., 2011). In order to identify potential host species, traders were asked if they knew the names of plants under which the rhizomes grew.

## 3. Results and discussion

Known in Xitsonga/Xichangana as *mavumbule*, rhizomes resembling *Hydnora abyssinica* are sold in Mozambican TM markets (Fig. 1). Krog et al. (2006) recorded *mavumbule* at 11% of the *banca* in three Maputo TM markets during a 2006 survey; however, the rhizomes were never identified. The percentage of traders selling *mavumbule* in 2009 was not ascertained.

All of the traders interviewed in Maputo in 2009 bought *H. abyssinica* from suppliers and did not harvest the rhizomes themselves. The traders reported that suppliers usually harvested the rhizomes from the same districts they called ‘home’, and the Boane district (adjacent to the city of Maputo) was ‘home’ to most of the suppliers. Five districts in the Maputo Province were cited as sources of the rhizomes, especially Boane (Fig. 2). The southern-most district of Mozambique, Matutuine, adjacent to the uMhlabuyalingana district of KwaZulu-Natal, was also recorded as a harvesting source. Given that uMhlabuyalingana was cited as the primary source of rhizomes harvested for the South African markets (Williams et al., 2011), it was expected that the geographic range of *H. abyssinica* would extend through Matutuine.

None of the traders knew what the flowers of *mavumbule* looked like or the names of the plants under which it grew. However, some respondents had seen the rhizomes when collecting firewood and knew that it occurred near trees. Three people in Xikalene said that it grew in wetland areas near rivers, lakes and lagoons or near areas where there was an accumulation of water. Several South African traders had also mentioned that *H. abyssinica* could be found growing near

water, and host roots from *Acacia xanthophloea* Benth. (a species generally found in low-lying localities along rivers, swamps and pans), were attached to a large proportion of the rhizomes bought from the Faraday and Warwick markets (Williams et al., 2011). *Acacia xanthophloea* occurs in large parts of Mozambique; hence, it is possible that further research will reveal previously unrecorded *H. abyssinica* localities in *A. xanthophloea* habitat. The unidentified host roots attached to the *H. abyssinica* rhizome evident in Fig. 1 are currently undergoing DNA testing at the University of Johannesburg to try and identify the host.

The quantity of *H. abyssinica* rhizomes purchased monthly from harvesters varied. Most traders (54%) said they bought 1–2 bags (50 kg-size) per month; 15% bought <1 bag per month; 15% bought ≤3 bags per month; and 8% bought up to 4 and 6 bags per month each. Fifty kilogram-size bags of *H. abyssinica* were sold to traders in Xipamanine at a mean cost of 313±116 (s.d.) MZN (Metical) per bag, compared to 136±38 MT per bag at Xikalene market (approximately 76±29 and 34±10 ZAR respectively). Why traders in Xipamanine paid twice as much for rhizomes from harvesters than traders in Xikalene is unclear.

## 4. Conclusion

The knowledge of experienced resource users on the occurrence of plant subpopulations is an important tool for scientists wanting to investigate plant availability and distribution, especially for rare species. Few botanists have encountered *Hydnora* spp. and the genus is rarely present in herbarium collections; however, to traditional healers and harvesters of traditional medicine, the species is well known and not rare. Hence, communities using natural resources are often very aware of where to find plants that are important to their social and physical welfare. The ‘discovery’ of *Hydnora abyssinica* in Mozambique is a first time record of its occurrence in this country, and scientific authentication of this record through further research and the collection of specimens will further improve our understanding on the growth and distribution of the species.

## Appendix 1

The questionnaire designed for the survey of *Hydnora abyssinica* in TM markets Maputo. A version of this questionnaire was also used during the survey of the Faraday and Warwick traditional medicine markets in 2009 (Williams et al., 2011; Wojtasik, 2009). Subsequent to the study, the diagram in Question 9 was found to be ineffective for recognising *H. abyssinica* flowers since, under dry environmental conditions or when the flowers emerge, the perianth lobes of *H. abyssinica* often fail to separate fully, remain connivent, and thus the upright tepals resemble the flowers of *H. africana*.

(Questionnaire on the following page)

Date  Market  Questionnaire no.

1 Estimate total volume present at the stall (e.g. ½ sack)

2 Do you buy it or harvest it (mark with a ✓)  
 Buy it from someone  Sometimes both  Harvest it myself

(Follow the grey side if the trader harvests plants themselves)

3 Origin: where was it harvested? (e.g. town, area, province and/or country)

4 Describe the trader you buy it from. Where are they from?


5 How many bags do you get every month or every year?  
 Monthly  Or yearly  Monthly  Or yearly

6 How much does it cost to buy 1 bag? (MZN)  
 What size is the bag?

7 Do you know the name(s) of the plant(s) it grows under? (list the common names)

8 Can you tell me how you know where to find this plant? (e.g. do you see the flower or fruit or what do you see under the tree or bush? Does the soil crack? etc)

9 Does the flower look like this diagram below? (✓ tick the correct box) Or, does it look like something else – please draw the flower in the empty space provided or describe the flower

<input type="checkbox"/> 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Don't know what it looks like		Don't know what it looks like	

10 When you sell it to a customer, how much do they usually buy (volume & price, MZN)? (e.g. 1 handful, 1 bag etc)

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