CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

Seventeenth meeting of the Conference of the Parties
Johannesburg (South Africa), 24 September – 5 October 2016

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

South Africa is proposing the inclusion of *Siphonochilus aethiopicus*[*] on Appendix II in accordance with Article II 2 (a) of the Convention and based on criteria A and B in Annex 2 a of Resolution Conf. 9.24 (Rev. CoP16). Despite the fact that *Siphonochilus aethiopicus* has a wide distribution from tropical Africa to southern Africa, it is under threat from trade in several southern African countries and is Critically Endangered (CR A4acd) in South Africa and Endangered (EN A1d) in Swaziland. Listing the *S. aethiopicus* populations of South Africa, Swaziland, Mozambique and Zimbabwe on CITES Appendix II would help regulate the herbal medicines trade into South Africa through cross-border trade from Swaziland, Mozambique and Zimbabwe, which is having a negative impact on the species in the southern African region. As a species whose populations have declined significantly in South Africa and Swaziland due to international trade, *S. aethiopicus* meets the criteria for an Appendix II listing in accordance with Article II 2 (a). Both criteria A and B in Annex 2 a of Resolution Conf. 9.24 (Rev. CoP16) are satisfied.

B. Proponent

Republic of South Africa

C. Supporting statement

1. Taxonomy

1.1 Class: Angiospermae

1.2 Order: Zingiberales

1.3 Family: Zingiberaceae

1.4 Genus, species or subspecies, including author and year: *Siphonochilus aethiopicus* (Schweinf.) B.L. Burtt (1982) (The Plant List, Version 1.1, 2013)

1.5 Scientific synonyms: *Cienkowskiella aethiopica* (Schweinf.) Y.K. Kam (1980) and *Cienkowskiella evae* (Brig.) Y.K. Kam (1980), *Kaempferia aethiopica* (Schweinf.) Benth., *Kaempferia dewevrei* De Wild. & T. Durand (1900), *Kaempferia ethelae* J.M.Wood (1898), *Kaempferia evae* Brig. and *Kaempferia zambeziana* Gagnep. and *Siphonochilus natalensis* (Schltr. & K. Schum.) J.M.Wood & Franks (1911) (The Plant List, Version 1.1, 2013).

1.6 Common names: English: Natal ginger, wild ginger
French:
Spanish:

[*] Only the populations of Mozambique, South Africa, Swaziland and Zimbabwe.

2. Overview

Siphonochilus aethiopicus is currently considered to be Critically Endangered (CR A4acd) in South Africa (Lötter, et al., 2006) and Endangered (EN A1d) in Swaziland (Dlamini & Dlamini, 2002). The species is extinct over much of its former South African range (including the subpopulations in KwaZulu-Natal) and the Extent of Occurrence (EOO) has declined by more than 90% over the last 100 years (Lötter, et al., 2006). The conservation status of wild populations of this species in South Africa is of particular concern, as this species is one of the top ten most popular traditional medicines in the traditional medicine trade. *Siphonochilus aethiopicus* rhizomes are widely used to treat coughs, colds and hysteria, as well as a protective charm against lightning (Hutchings, et al., 1996). Due to its scarcity in South Africa, cross-border trade in this species from Mozambique, Swaziland and Zimbabwe to supply demand in South Africa is increasing, and is evident in informal sector marketplaces in Johannesburg. This is accompanied by rising prices for *S. aethiopicus* rhizomes in South Africa coupled to high levels of poverty in these neighbouring countries. Cross-border trade from KwaZulu-Natal (South Africa) to Lesotho was noted over a century ago (Wood & Franks, 1911), with J Medley Wood reporting in 1915 that S*. aethiopicus* was almost locally extinct in KwaZulu-Natal province in South Africa. Despite the long history of trade, the volume of *S. aethiopicus* traded is difficult to quantify, as this is almost entirely an informal sector "hidden economy". It is due to the increased cross-border trade from Mozambique, Swaziland and Zimbabwe, that a CITES Appendix II listing of geographically separate populations is recommended. Because the trade with South Africa extends further into tropical Africa, it is also important to consider that differentiation of *S. aethiopicus* from other *Siphonochilus* species such as *S. kirkii* can be difficult due to the flower polymorphy and variability of the rhizome shape.

3. Species characteristics

Siphonochilus aethiopicus is a long-lived geophyte in seasonally dry woodlands with a perennial rhizome and annual above ground parts that die off during the dry season. Re-sprouting each spring, plants can grow to 60cm high. The spectacular flowers are borne at ground level and are short lived, very occasionally producing small fruits close to ground level (Figure 2).

3.1 Distribution

Siphonochilus aethiopicus is widespread across seasonally dry woodlands in tropical and sub-tropical Africa. The range States in which it is recorded are Angola, Benin, Cameroon, Cote d'Ivoire, Ethiopia, Gambia, Ghana, Kenya, Malawi, Mali, Mozambique, Niger, Nigeria, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe (Figure 1A) (USDA, ARS, National Genetic Resources Program, n.d.). The western most range is in Senegal across to Ethiopia, then southwards through miombo woodlands in east and south-central Africa to *Pterocarpus angolensis* woodlands in the province of Mpumalanga, South Africa. In South Africa, the species occurs sporadically from the Letaba catchment in the Limpopo Lowveld to Swaziland, and is extinct in KwaZulu-Natal (Lötter, et al., 2006) (Figure 1A).

3.2 Habitat

In Tanzania and Mozambique *S. aethiopicus* is found in miombo woodland, while in the northern provinces of South Africa *S. aethiopicus* occurs mainly in Lowveld Sour Bushveld, Tall Open or Closed Woodland with some populations in the transition zone between Acocks' Sour Lowveld Bushveld and Lowveld veld types. Across West Africa, *S. aethiopicus* occurs in Sudano-Sahalian woodlands, where it has a clumped distribution, occurring under tall deciduous trees in seasonally moist sites. In Ethiopia and Kenya, this species prefers deciduous woodland, wooded grassland and bushland.

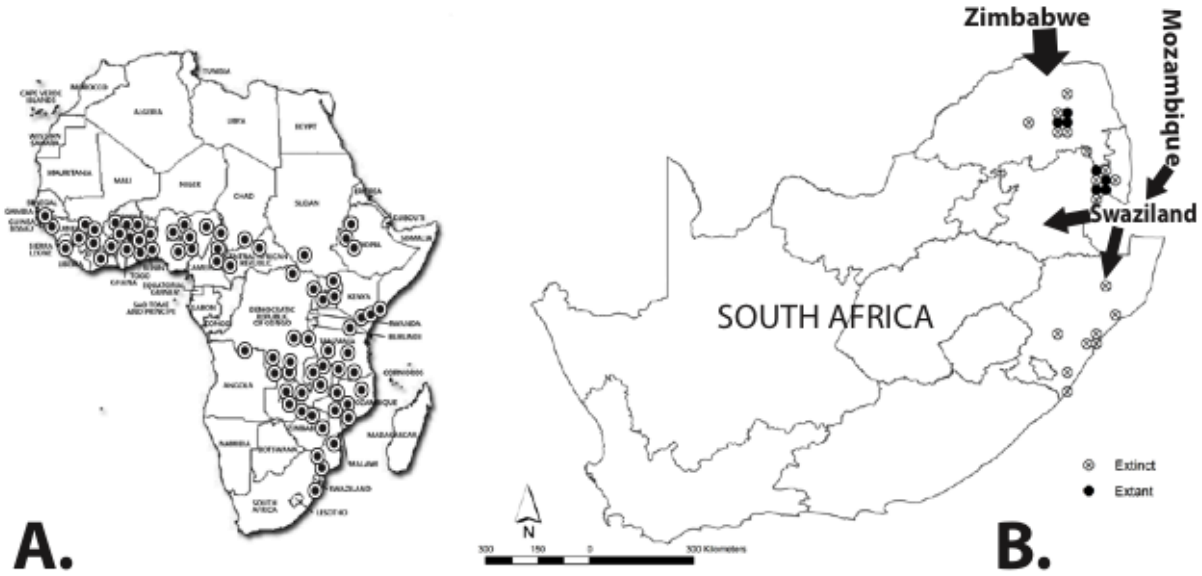

Figure 1. A. The distribution of *Siphonochilus aethiopicus* across Africa (redrawn from the African Plant Database (CJB/SANBI, n.d.)) and B. Localities in South Africa where the species is now locally extinct and remaining remnant (extant) populations (redrawn from Williams and Crouch (unpublished), N. Crouch, pers. comm., 2015) to show the current direction of cross-border trade, including trade directly from Mozambique to South Africa and from Mozambique via Swaziland to South Africa.

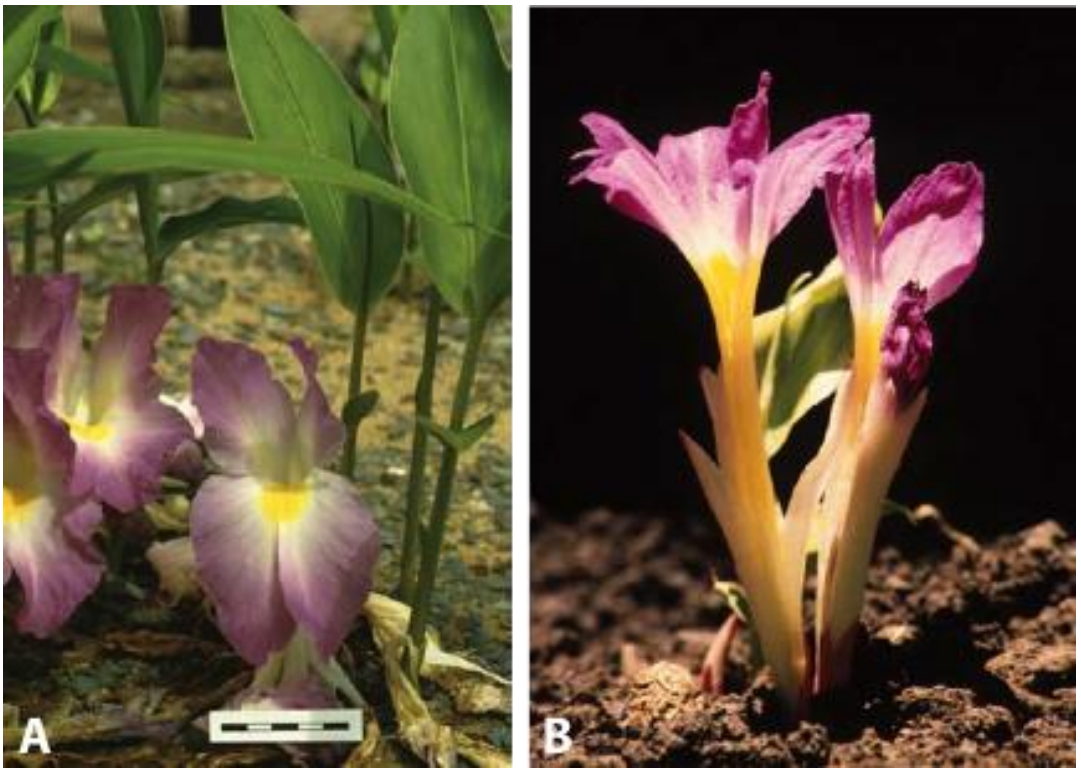

Figure 2. *Siphonochilus aethiopicus*, showing the two flower types. A. The large hermaphroditic (bisexual) flowers and characteristic ginger-like leaves. B. Much smaller female flowers. Photos: A.B. Cunningham.

3.3 Biological characteristics

Siphonochilus aethiopicus is a long-lived geophyte in seasonally dry woodlands with a perennial rhizome and annual above ground parts that die off during the dry season. Edwards et al. (2004) have confirmed the early observation of Wood and Franks (1911) that *S. aethiopicus* can be polygamous (producing both female and hermaphroditic flowers on the same rhizome) (Edwards, et al., 2004; Wood & Franks, 1911), although earlier studies had not been able to confirm this early observation (Burtt, 1982; Gordon-Gray, et al., 1989). Although up to 25 flowers are sequentially

produced over summer (Crouch, et al., 2000), most reproduction is vegetative rather than from seed, as flowering often fails (Onderstall, 1978; Burtt, 1982) and viable seed production is rare (Nichols, 1989).

3.4 Morphological characteristics

Siphonochilus aethiopicus is the only member of this genus that produces both unisexual and bisexual flowers on the same plant (Smith, 1998). It is also the only *Siphonochilus* species occurring in South Africa. Due to the flower polymorphy and variability of the rhizome shape, professional taxonomic advice may be required to distinguish *S. aethiopicus* from other *Siphonochilus* species (such as *S. kirkii*) as the trade with South Africa extends further into tropical Africa.

3.5 Role of the species in its ecosystem

Siphonochilus aethiopicus may be a larval food-plant of some insect species, but this is unlikely to be a species-specific situation. Elephants are known to dig up *S. aethiopicus* rhizomes, reportedly travelling a long distance to get the aromatic rhizomes. Based on the observation that all three *S. aethiopicus* populations in Kruger National Park, South Africa grow beneath marula (*Sclerocarya birrea* subsp. *caffra*) trees whose fruits are favoured by elephant, Crouch et al. (2000) have asked whether elephant may be dispersers of *S. aethiopicus* rhizomes (Crouch, et al., 2000).

4. Status and trends

Siphonochilus aethiopicus is currently considered to be Critically Endangered (CR A4acd) in South Africa (Lötter, et al., 2006) and Endangered (EN A1d) in Swaziland (Dlamini & Dlamini, 2002), but the status of this species in other range States is unknown. The drop in availability of *S. aethiopicus* was reflected in a study of the Gauteng medicinal plant markets: in 1995 20% of the Witwatersrand traditional medicine shops sold the species; by 2001 only 8% of the traders at the Faraday market sold the species. The estimated number of bags (50 kg) bought by 189 shops in 1995 was 20; in 2001 only one 50 kg bag was bought by 164 traders (Williams, et al., 2000). Since then, sporadic mass quantities of *S. aethiopicus* rhizomes from Zimbabwe have been seen arriving in the Faraday medicinal plant market (Williams, V., pers. comm., 2015), and an increase in the trade in *S. aethiopicus* has been recorded, with 12% of the Faraday traders currently (January 2015) selling the species. According to an inventory of 25 *muthi* shops conducted by the Gauteng Department of Agriculture and Rural Development (GDARD), 44% of the 25 surveyed *muthi* shops sell *S. aethiopicus* in large quantities. Although sold at a high price, the plant is popular amongst buyers and, according to traders the plants are sourced from outside South Africa.

In a 1994 survey of traders at *muthi* shops, the main harvesting localities reported were in Limpopo province [Tzaneen, Pietersburg (now Polokwane), and Shangaan areas of Giyani], Bushbuckridge (Mpumalanga province), KwaZulu-Natal (via Warwick), and Swaziland. Availability was reported as ‘scarce’ by 3 (of 12) traders, ‘very scarce’ by 3, ‘very, very, very scarce’ by 1 trader, and ‘scarcest plant of all’ by 1 trader, and not disclosed by 4 traders (Williams, V., pers. comm., 2015).

4.1 Habitat trends

The only quantitative data for *S. aethiopicus* habitat trends are from South Africa. For the province of Mpumalanga, satellite images show that only 54% of the Lowveld Sour Bushveld is still considered to be in a natural state, with 4% of it degraded and 42% of it wholly transformed (Crouch, et al., 2000). The commercial plantation forestry has had a major impact on the Lowveld Sour Bushveld. By 1995, 33.4% of this veld type was under timber plantations (mainly *Eucalyptus* and *Pinus*) and there has been further expansion since then. Mining activity in *S. aethiopicus* habitat may also be a driver of habitat loss. As a result, *S. aethiopicus* habitat has also been reduced. Nevertheless, Crouch et al. (2000) considered that “the influence of habitat destruction on the conservation status of wild ginger is relatively small compared to the threat of ongoing harvesting for the *muthi* trade” (Crouch, et al., 2000).

4.2 Population size

The total population size of *S. aethiopicus* is unknown. The species occurs over a large area (Figure 1A) and can be locally abundant in clumps in miombo woodland in Malawi and Mozambique (Cunningham, A.B, pers. obs., 1987, 2010). Consequently, we consider that *S. aethiopicus* would fit

into option C in the Rabinowitz matrix (Table 1). In South Africa, however, although populations of up to 4,000 plants have been recorded, less than 100 individuals occur at most remaining sites (60%) (Crouch, et al., 2000).

Table 1. The Rabinowitz matrix approach (Rabinowitz et al., 1986) can be applied at a variety of scales, from local through to a national or international scale, leading to a single choice out of 8 boxes (A-H) that is then ranked. In this report, we highlight the section of this matrix relevant to *S. aethiopicus* from the perspective of an **international** scale.

GEOGRAPHIC DISTRIBUTION		**LARGE**		**SMALL**	
HABITAT SPECIFICITY		**Wide**	**Narrow**	**Wide**	**Narrow**
POPULATION SIZE	**Large & dominant somewhere**	A. Locally abundant, several habitats over large geographic area	C. Locally abundant in a specific habitat over large geographic area	E. Locally abundant, several habitats over small geographic area	G. Locally abundant in a specific habitat over small geographic area
	Small & non-dominant	B. Constantly sparse in several habitats over a large geographic area	D. Constantly sparse in a specific habitat over a large geographic area	F. Constantly sparse in several habitats over a small geographic area	H. Constantly sparse in a specific habitat over a small geographic area

4.3 Population structure

No studies are known on the population structure of *S. aethiopicus*.

4.4 Population trends

There are serious grounds for concern about this species in southern Africa, with quantitative data on local extinctions and concerns about critically low populations of this species in southern Africa (Scott-Shaw, 1999). Based on 1993 and 1999 census data, only 5,214 plants were known from wild populations. Over a four-year period, a provincial conservation agency in South Africa (the Mpumalanga Parks and Tourism Agency) recorded a 64% decline in *S. aethiopicus* numbers (Crouch, et al., 2000) confirming field observations of botanists such as Onderstall (1978). Crouch et al. (2000) located a total of 39 historical localities, finding that the species still existed at 44% of these, while 7% had "unconfirmed status" and the species was considered to have become extinct at the remaining 49% (Crouch, et al., 2000). A further concern is that the majority of remnant *S. aethiopicus* populations in South Africa are not secure. Sixty-five percent of these remnant populations occur outside of formal conservation areas and in addition, three of the six populations that theoretically are "protected" are "still being heavily exploited". In the Venda speaking area of Limpopo province, South Africa, villagers considered that the plant was becoming so scarce that some people were traveling to Zimbabwe to harvest the plant from the wild (Masevhe, 2004).

In Swaziland, remnant wild populations are not secure in protected areas. For example, locations of *S. aethiopicus* populations in the small (18,000 ha) Malalotja Nature Reserve in north-west Swaziland are well known to local herbalists, who harvest the species in the reserve (Swaziland National Trust Commission).

Populations in southern Mozambique may also face local extinction, but healthy populations exist in northern Mozambique.

Little is known about population trends for *S. aethiopicus* in West Africa. Burkill (2000) reports that *S. aethiopicus* "appear in considerable quantity and may be mistaken for ground orchids". In contrast, Noudogbessi, et al., (2013) considered the species endangered in Benin.

4.5 Geographic trends

The main concerns about *S. aethiopicus* are at the southernmost extent of its range, particularly in South Africa (Figure 1B). Nearly 40 years ago, Compton (1976) considered that the traditional medicine trade had had a significant impact on wild *S. aethiopicus* populations in Swaziland (Compton, 1976).

5. Threats

Siphonochilus aethiopicus has not yet been assessed for the IUCN Red List (The IUCN Red List of Threatened Species. Version 2015.2, n.d.). *Siphonochilus aethiopicus* is currently considered to be Critically Endangered (CR A4acd) in South Africa (Lötter, et al., 2006) and Endangered (EN A1d) in Swaziland (Dlamini & Dlamini, 2002); *S. aethiopicus* has been reported to be an endangered species of Benin (Noudogbessi, et al., 2013). Although habitat loss is a factor, large-scale commercial exploitation of *S. aethiopicus* from wild populations to supply the herbal medicine trade in southern Africa is the most significant threat.

6. Utilization and trade

6.1 National utilization

Philander (2010) reports that *S. aethiopicus* is among 20 species found within the Rastafari bush doctors inventories (in the Western Cape) that were listed in the 2009 Red List of Southern African Plants. Philander also reports that *S. aethiopicus* ranks among the top ten most commonly traded medicinal plants in KwaZulu-Natal and Mpumalanga (Philander, 2010).

In July 2015, the e-commerce platform alibaba.com listed *S. aethiopicus* items offered by three supplier-exporters, two situated in South Africa (Afrinatural Holdings and Global Fusion Naturals). The website of Global Fusion Naturals provides license and registration numbers to sell protected flora (via Cape Nature) and consignment-specific CITES export permits. The Afrinatural Holdings website offers 'dry bulb' of *S. aethiopicus* harvested in November as well as extracts made from it. The third listed supplier, International Cosmetic Care, is situated in Sydney, Australia and offers extracts of South African origin *S. aethiopicus*.

The traditional uses of *S. aethiopicus* in South Africa are summarized by Hutchings *et al.* (1996) and Crouch et al. (2000), for example the rhizome is used for coughs and colds in Zulu medicine, for menstrual pain and as an anti-malarial in Swazi medicine, and veterinary use (for horses) by Zulu and Sotho, among other uses including as 'protective charms' (Hutchings, et al., 1996; Crouch, et al., 2000). According to Dold and Cocks (2002), *S. aethiopicus* was, at that time, the fourth most frequently sold plant species in Mpumalanga and ninth most frequently sold plant species in KwaZulu-Natal (Dold & Cocks, 2002). A study by Moeng and Potgieter (2011) found *S. aethiopicus* to be the second most frequently traded medicinal plant at *muthi* shops and by street vendors in the Limpopo province selling for up to ZAR 800.00/kg (Moeng & Potgieter, 2011). A survey of urban *muthi* markets conducted in 2015 by the South African National Biodiversity Institute (SANBI) on behalf of the CITES Scientific Authority of South Africa, indicated that the species is sold in the provinces of Gauteng, KwaZulu-Natal, Free State and Limpopo.

In East Africa, *S. aethiopcius* tubers are used as a spice. In Senegal, the roots are used to treat diarrhoea, for stomach infections and internal parasites, including schistosomiasis (Burkill, 2000).

According to Igoli and Obanu (2011, 2012), *S. aethiopicus* occurs in the middle belt region of Nigeria where roasted rhizomes are used as a spice by the Igede people of Benue State of Nigeria for flavouring cooked yams, which are a staple food crop (Igoli & Obanu, 2011; Igoli, et al., 2012). In traditional medicine of Benin, the aqueous decoction of the roots and rhizomes of *S. aethiopicus* is used for treating female infertility and endometriosis. In a study by Noudogbessi et al. (2012), samples were collected of organs (limbo, foliar sheaths and rhizomes) of wild growing *S. aethiopicus* from Manigri Village (Donga Department of western Benin) and from Savalou (Collines Department of Benin) (Noudogbessi, et al., 2012).

The bioprospecting group of the Council for Scientific and Industrial Research (CSIR) Biosciences has focused on the development of prescription drugs and herbal remedies based on South African traditional medicinal plants including *S. aethiopicus*. One of the leads being developed is BP4, a

novel herbal extract from *S. aethiopicus* for the treatment of asthma and allergies (Fouché, et al., 2008). Table 2 provides a list of 7 international patents involving *S. aethiopicus*, six submitted by South Africa's CSIR:

Table 2: Patents involving *Siphonochilus aethiopicus* listed in WIPO database

Pub. date	Applicant	Inventors	Title of patent
2013, Oct 10	Integral Bioceuticals (Pty) Ltd.	Nigel Gericke and Olga Gericke	Siphonochilone and related compounds and uses thereof
2011, Apr 19	CSIR	Ebrahim Wadiwala, Gerda Fouché et al.	Use of an extract of the plant species Siphonochilus aethiopicus, composition and use of a compound (for allergies and atopic syndrome)
2010, Jul 1	CSIR	Roelof Marthinus Horak	Preventative treatment and remission of allergic diseases
2009, May 13	CSIR	Roelof Marthinus Horak	Preventative treatment and remission of allergic diseases
2009, Mar 26	CSIR	Roelof Marthinus Horak	Preventative treatment and remission of allergic diseases
2008, Dec 31	CSIR	Roelof Marthinus Horak	Preventative treatment and remission of allergic diseases
2007, Oct 11	CSIR	Roelof Marthinus Horak	Preventative treatment and remission of allergic diseases

Source: World Intellectual Property Organization (WIPO). *Siphonochilus aethiopicus*. In: PATENTSCOPE database: https://patentscope.wipo.int/search/en/search.jsf

6.2 Legal trade

Over a 50 year period, the direction of trade reversed from being a cross-border trade from South Africa to neighbouring countries (South Africa to Lesotho in the early 1900's (Wood & Franks, 1911)) to an export from neighbouring range States (Swaziland, Mozambique, Zimbabwe) to South Africa. Twenty-five years ago, it was noted that some of the *S. aethiopicus* rhizomes in South African herbal medicine markets originated in Swaziland (Cunningham, 1988). Today, large quantities are being transported into South Africa from Zimbabwe and Mozambique and possibly into Swaziland from Mozambique as well.

There are insufficient data available to quantify the level of international trade. In the absence of a species-specific tariff code, obtaining data on legal export / import trade is difficult to impossible. If exported legally, it would be traded under a general tariff code, for example, both South Africa and Swaziland use HS Code 12119080 for "Other - Plants and parts of plants of a kind used primarily in pharmacy". The species is not yet included in the CITES Appendices, thus its exploitation is not subject to CITES regulations. Most data reviewed for this study tended to cite very old trade estimates (Mander, et al., 1997; Mander, 1998). More recent estimates of trade volume are crucial.

National demand in South Africa has a regional influence, particularly given poverty in neighbouring range States and the increasing prices paid for *S. aethiopicus* rhizomes. In the 1970s, prices paid for *S. aethiopicus* rhizomes in local herbal medicine markets nearly tripled (Cunningham, 1988) and have continued to increase since then. Over the past decade, there has been a shift in KwaZulu-Natal from wild harvested material to cultivated supplies of *S. aethiopicus* rhizomes, much of this grown locally or by farmers in the Eastern Cape. The demand for the species is also high in Johannesburg, and traders consider the species one of the scarcest plants to obtain (Williams, Balkwill, & Witkowski, Unravelling the commercial market for medicinal plants and plant parts on the Witwatersrand, South Africa, 2000); the prices paid are accordingly high, but the material appears to be mainly wild collected. Large quantities of wild harvested *S. aethiopicus* rhizomes are imported into South Africa from Zimbabwe, with smaller quantities from Swaziland and Mozambique.

6.3 Parts and derivatives in trade

In southern Africa, it is the cleaned, fresh, unprocessed *S. aethiopicus* rhizomes that are most traded, although some multi-species herbal preparations containing *S. aethiopicus* are also sold. In the Tzaneen area of South Africa, Crouch et al. (2000) found that only the larger rhizome section from the previous season's growth was harvested and that the remainder of the rootstock was discarded

(Crouch, et al., 2000). Based on research carried out by Coopoosamy et al. (2010), introducing preparations of the leaves could assist in reducing the use of the rhizomes only in traditional treatments which could contribute to a more sustainable use of *S. aethiopicus* (Coopoosamy, et al., 2010). Whether this suggested substitution of leaves instead of rhizomes is acceptable to traditional healers or not is a key question, though, and based on field experience, is unlikely to be widely accepted.

6.4 Illegal trade

In terms of South African legislation, current harvesting for the traditional medicines trade is illegal unless authorised by a permit. There is however concerns about the levels of national harvest and harvesters are being made aware about the requirement for permits to authorise the harvesting of the species. There are insufficient data available to quantify the level of illegal international trade.

In February 2002, the U.S. Food and Drug Administration (FDA) rejected a New Dietary Ingredient (NDI) submission for African Ginger (*S. aethiopicus*) made by the company Power Africa, Inc., on the basis that it was determined to be an unapproved new drug and, as such, prohibited from being introduced or delivered into interstate commerce (Food and Drug Administration, 2002).

6.5 Actual or potential trade impacts

Based on over a century of field observation, plus recent quantitative assessments of decline in *S. aethiopicus* populations in South Africa, there is little doubt that the cross-border trade in *S. aethiopicus* rhizomes from Swaziland and Zimbabwe to South Africa will contribute to continued population declines in both of those countries. In addition, localized and unsustainable depletion of *S. aethiopicus* populations may be occurring in southern Mozambique, also due to trade to South African traditional medicine markets. The extirpation of the species across its range in KwaZulu-Natal is attributed to harvesting for traditional medicine (local consumption and domestic trade in *muthi* markets), and the drastic declines in the remaining populations in the South African provinces of Limpopo and Mpumalanga are also attributed to harvesting for the traditional medicine trade. The demand for the species appears to be such that cultivated sources cannot supply the urban demand, hence plants are sourced from neighbouring countries – but the impact in these countries has not been fully assessed. One visit to a South African traditional medicine market in 2011 revealed thousands of plants harvested in Zimbabwe – which must have resulted in the extirpation (or near-extirpation) of that population at the harvesting source (Figure 3).

Figure 3: *Siphonochilus aethiopicus* tubers being dried at a traditional medicines market in Johannesburg, South Africa after they were off-loaded by a bulk trader from Zimbabwe. These tubers were wild harvested in Zimbabwe for “informal” export to South Africa. Photo: M. Raimondo.

7. Legal instruments

7.1 National

In South Africa, wild ginger is listed as an endangered species in the Threatened or Protected Species (TOPS) list published in the Government Gazette (23 February 2007) in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) as a species facing a 'high risk of extinction in the wild in the near future". Permits are therefore required for, among others, the harvesting, possession and trade in the species. In Swaziland, the Flora Protection Act lists *S. aethiopicus* as one of the specially protected flora (Minister for Agriculture and Cooperatives, 2000).

7.2 International

The Nagoya protocol is relevant, given that it has been ratified by many of the *S. aethiopicus* range States.

8. Species management

8.1 Management measures

Several "conservation through cultivation" initiatives have been implemented in South Africa, most notably through the Silverglen Nursery in KwaZulu-Natal. Commercial cultivation has been attempted on a small scale, as discussed in Section 8.3.2.

8.2 Population monitoring

The Mpumalanga Parks and Tourism Agency in South Africa has been monitoring the status of nine remnant *S. aethiopicus* populations, recording a 64% decline in numbers of individuals over the course of just four years. Based on 1993 and 1999 census data it is calculated that 5,214 plants are known to exist in the wild. In addition, the plant species database at the South African National Biodiversity Institute (SANBI) has enabled an assessment of changes in occurrence of this species largely due to the commercial herbal medicine trade.

8.3 Control measures

8.3.1 International

None at present.

8.3.2 Domestic

Please refer to 7.1

There are a number of initiatives in place to promote cultivation. For many years, Silverglen nursery, run through the eThekweni (Durban) municipality in KwaZulu-Natal, South Africa provided training and planting material of *S. aethiopicus* to traditional healers to encourage them to cultivate supplies (and take pressure off wild stocks). The impact of this admirable initiative is uncertain.

8.4 Artificial propagation

There is no record of *S. aethiopicus* cultivation in West Africa (Burkill, 2000). In terms of traditional medicine production in southern Africa, it is likely that the history of transplanting and small-scale cultivation of *S. aethiopicus* is longer than most people realize, as transplanting of this species is likely to have occurred as Bantu-speaking farmers moved southwards into KwaZulu-Natal, out of the natural range of this species. This was suggested by Williams (1996) with supplementary evidence from cultivating of *S. aethiopicus* (Edwards, et al., 2004; Williams, 1996). According to Street and Prinsloo (2013), "*S. aethiopicus* is easy to propagate and cultivate and successfully cultivated in the warm parts of South Africa" (Street & Prinsloo, 2013). Vegetative propagation is the preferred method as this is very efficient as few seeds are produced and are also difficult to find and use for propagation. Micro-propagation has been established although not widely used and still not incorporated on large scale for production of wild ginger. According to Street and Prinsloo (2013),

cultivation of wild ginger should be a financially viable operation in South Africa since there is always a demand (Street & Prinsloo, 2013). Commercial cultivation is taking place in the Eshowe and White River areas of South Africa, but marketing appears to be a real challenge. Crouch et al. (2005) report that cultivation of *S. aethiopicus* for its magical properties has served to conserve something of the remaining genetic diversity, albeit *ex situ* and that the amaXhosa in the Idutywa area of the Eastern Cape use the powdered roots to ward off evil spirits (Crouch, et al., 2005).

8.5 Habitat conservation

Although wild populations are not secure in some protected areas, such as Malolotja Nature Reserve (Swaziland), there is no doubt that large populations occur in conservation areas in miombo woodlands of Mozambique (Niassa National Reserve) and the 45,000 km^2 Selous Game Reserve (Tanzania).

8.6 Safeguards

Not applicable.

9. Information on similar species

In southern Africa, where there is a low diversity of other *Siphonochilus* species, *S. aethiopicus* rhizomes are fairly distinctive compared to other rhizomes sold in traditional medicine markets, but the possibility that *S. kirkii* is traded needs to be taken into account. If doubt exists, they can be cultivated to confirm identification from fertile material.

10. Consultations

The CITES Management Authority of South Africa, consulted range States for the species, including the range State affected by the proposal (Mozambique, Swaziland and Zimbabwe). Positive responses were received from Botswana, Ghana, Kenya, Mozambique, Malawi, Nigeria, Swaziland, Tanzania, Zambia as well as Zimbabwe, indicating that the proposed listing will assist in ensuring the international trade in the species remains sustainable. Kenya proposed the inclusion of all populations across the species range, but due to lack of data relating to international trade, the proposal is restricted to the populations of Mozambique, South Africa, Swaziland and Zimbabwe. The proposal was also discussed at a SADC Regional Workshop to prepare for the 17th Conference of Parties to CITES. No objections were received.

11. Additional remarks

None.

12. References

Burkill, H., 2000. *The Useful plants of West Tropical Africa, Vol. 5.* Kew: Royal Botanic Gardens.

Burtt, B., 1982. Cienkowskiella and Siphonochilus (Zingiberaceae). *Notes from the Royal Botanic Gardens Edinburgh,* 40(2), pp. 369-373.

CJB/SANBI, n.d. *African Plant Database. Version 3.4.0.* [Online] Available at: http://www.ville-ge.ch/musinfo/bd/cjb/africa/details.php?langue=an&id=20110 [Accessed 15 June 2015].

Compton, R. H., 1976. The flora of Swaziland. *Journal of South African Botany,* Volume Supplementary volume 11.

Coopoosamy, R., Naidoo, K., Buwa, L. & Mayekiso, B., 2010. Screening of Siphonochilus aethiopicus (Schweinf.) B. L. Burtt for antibacterial and antifungal properties. *Journal of Medicinal Plants Research,* 4(12), pp. 1228-1231.

Crouch, N., Lotter, M., Krynauw, S. & Pottas Bircher, C., 2000. Siphonochilus aethiopicus (Zingiberaceae), the prized Indungulu of the Zulu: an overview. *Herbertia,* 55(89), pp. 115-129.

Crouch, N., Lötter, M., Krynauw, S. & Pottas-Bircher, C., 2005. Siphonochilus aethiopicus. In: G. Nichols, Growing rare plants: a practical handbook on propagating the threatened plants of southern

Africa. In: G. Nichols, ed. *Southern African Botanical Diversity Network Report No. 36.* Pretoria: SABONET, pp. 149-152.

Cunningham, A., 1988. *An investigation of the herbal medicine trade in Natal/KwaZulu,* Pietermaritzburg: Institute of Natural Resources. University of Natal.

Dlamini, T. & Dlamini, G., 2002. Swaziland. In: J. Golding, ed. *Southern African Plant Red Data Lists. Report No. 14.* s.l.:Southern African Botanical Diversity Network, pp. 121-134.

Dold, A. & Cocks, M., 2002. The trade in medicinal plants in the Eastern Cape Province, South Africa. *South African Journal of Science,* Volume 98, pp. 589-597.

Edwards, T., Crouch, N. & Symmonds, R., 2004. Sexual expression in Siphonochilus aethiopicus: evolutionary nonsense?. *PlantLife,* Volume 31, pp. 27-29.

Food and Drug Administration, 2002. *Response to 75-Day Premarket Notification of New Dietary Ingredient: African Ginger [Siphonochilus aethiopicus (Schweinf.) B.L. Burtt],* Washington: Food and Drug Administration.

Fouché, G., Moodley, N. & Maharaj, H., 2008. *Ten years of bioprospecting activities at the CSIR: BP4 as a model,* Pretoria: CSIR.

Gordon-Gray, K., Cunningham, A. & Nichols, G., 1989. Siphonochilus aethiopicus (Zingiberaceae). Observations on floral and reproductive biology. *South African Journal of Botany,* 55(3), pp. 281-287.

Hutchings, A., Scott, G. & Cunningham, A., 1996. *Zulu medicinal plants: an inventory.* Pietermaritzburg: University of Natal Press.

Igoli, N. & Obanu, Z., 2011. The volatile components of wild ginger (Siphonochilus aethiopicus (Schweinf) B.l Burtt). *African Journal of Food Science,* 5(9), pp. 541-549.

Igoli, N., Obanu, Z., Grayc, A. & Clements, C., 2012. Bioactive diterpenes and sesquiterpenes from the rhizomes of wild ginger (Siphonochilus aethiopicus (Schweinf) B.L Burtt). *African Journal of Traditional, Complementary and Alternative medicines,* 9(1), p. 88-93.

Lötter, M., Burrows, J. & von Staden, L., 2006. *Siphonochilus aethiopicus (Schweinf.) B.L.Burtt..* [Online] Available at: http://redlist.sanbi.org/species.php?species=2061-1 [Accessed 1 June 2015].

Mander, J., Quinn, N. & Mander, M., 1997. *Trade in Wildlife Medicinals in South Africa,* s.l.: TRAFFIC East/Southern Africa.

Mander, M., 1998. *Marketing of indigenous medicinal plants in South Africa: A case study in Kwazulu-Natal,* Rome: Food and Agriculture Organization of the United Nations.

Masevhe, M., 2004. *Mulching, Plant Population Density and Indigenous Knowledge of Wild Ginger (Siphonochilus aethiopicus).* s.l.:University of Pretoria.

Minister for Agriculture and Cooperatives, 2000. *The Flora Protection Act, Schedule A, Especially protected flora (Endangered).* Mbabane: s.n.

Moeng, E. & Potgieter, M., 2011. The trade of medicinal plants by muthi shops and street vendors in the Limpopo Province, South Africa. *Journal of Medicinal Plants Research,* 5(4), pp. 558-564.

Nichols, G., 1989. Some notes on the cultivation of Natal ginger (Siphonochilus aethiopicus).. *Veld and Flora,* 75(3), pp. 92-93.

Noudogbessi, J. et al., 2013. Chemical study of extracts of Siphonochilus aethiopicus (Schweinf.) BL Burtt (Zingiberaceae) from Benin. *Asian Journal of Chemistry,* 25(15), pp. 8489-8492.

Noudogbessi, J. Y. H. A. G. et al., 2012. Physical characteristics and chemical compositions of the essential oils extracted from different parts of Siphonochilus aethiopicus (Schweinf.) B. L. Burtt (Zingiberaceae) harvested in Benin. *Journal of Chemical and Pharmaceutical Research,* 4(11), pp. 4845-4851.

Onderstall, J., 1978. Kaempferia aethiopica – wild ginger. *Veld and Flora,* 64(2), pp. 43-44.

Philander, L., 2010. *An emergent ethnomedicine: Rastafari bush doctors in the Western Cape, South Africa.* s.l.:The University of Arizona.

Scott-Shaw, C. R., 1999. *Rare and threatened plants of KwaZulu-Natal and neighbouring regions. ,* Pietermaritzburg: KwaZulu-Natal Nature Conservation Service.

Smith, R., 1998. FSA contributions 11: Zingiberaceae. *Bothalia,* 28(1), pp. 35-39.

Street, R. & Prinsloo, G., 2013. Commercially Important Medicinal Plants of South Africa: A Review. *Journal of Chemistry,* Issue Article ID 205048, pp. 1-16.

Swaziland National Trust Commission, n.d. *Swaziland's Flora Database.* [Online] Available at: http://www.sntc.org.sz/flora/speciesinfo.asp?spid=661 [Accessed 15 Januar 2015].

The IUCN Red List of Threatened Species. Version 2015.2, n.d. *Siphonochilus aethiopicus (Schweinf.) B.L.Burtt.* [Online] Available at: www.iucnredlist.org [Accessed 3 September 2015].

The Plant List, Version 1.1, 2013. *Siphonochilus aethiopicus (Schweinf.) B.L.Burtt.* [Online] Available at: http://www.theplantlist.org/tpl1.1/record/kew-265942 [Accessed 1 June 2015].

Webb, C. d. B. & Wright, J. B., 1976. *The James Stuart Archive.* Pietermaritzburg: University of Natal Press and Killie Campbell Africana Library.

Williams, V., 1996. The Witwatersrand muthi trade. *Veld and Flora,* Volume 82, pp. 12-14.

Williams, V., Balkwill, K. & Witkowski, E., 2000. Unravelling the commercial market for medicinal plants and plant parts on the Witwatersrand, South Africa. *Economic Botany,* 54(3), pp. 310-327.

Wood, J. & Franks, M., 1911. Kaempferia natalensis. Schltr. and Schum. *The Naturalist. The Journal of the Natal Scientific Society,* 1(3), pp. 112-115.

Wood, J. M., 1898. New or noteworthy plants. Kaempferia ethelae. *The Gardeners' Chronicle,* 3(23), pp. 94-95.