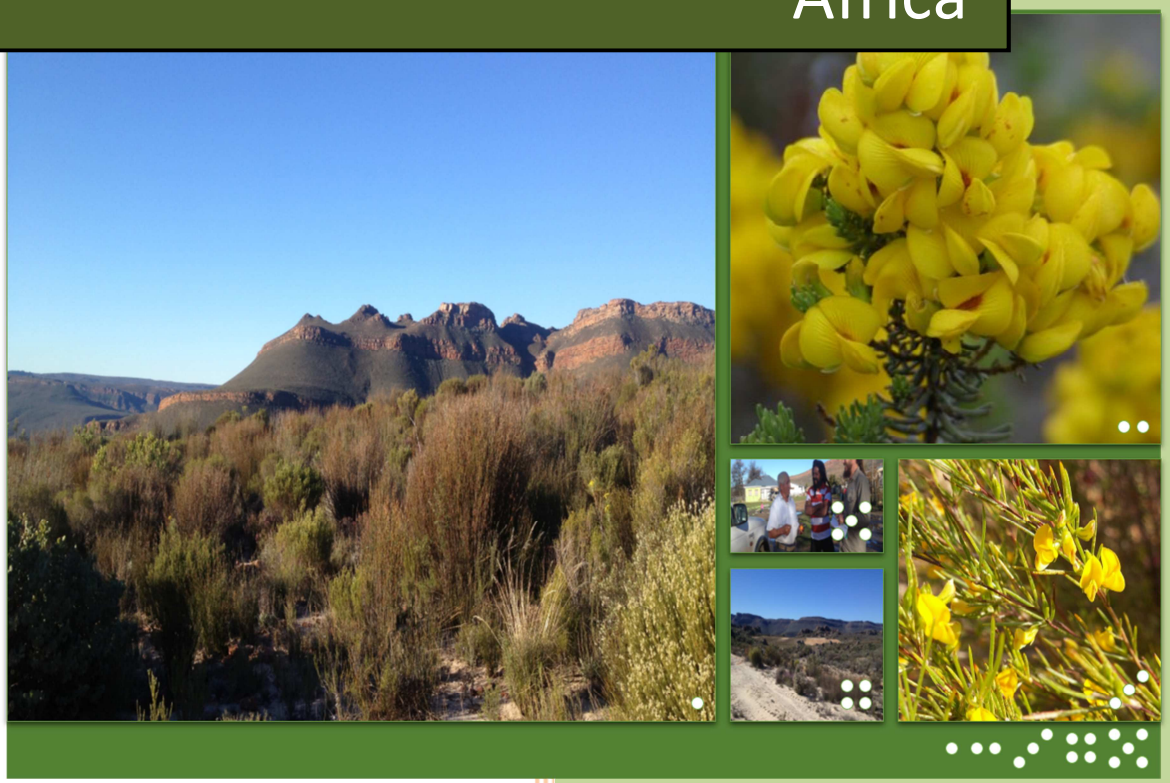
Traditional Knowledge Associated with Rooibos and honeybush Species in South Africa



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Traditional Knowledge Associated with Rooibos and honeybush Species in South Africa

Submitted by:

Siyanda Samahlubi Consulting

EXECUTIVE SUMMARY

South Africa has a rich cultural and biological heritage and diversity, with an expansive history of linking these through the traditional use of biological resources. Local traditional knowledge (TK) of the value and use of biological resources is unique to a culture or society and is passed from generation to generation through word of mouth and cultural rituals. This traditional knowledge is usually built by a group of people living in close contact with nature.

Traditional knowledge, particularly traditional ecological knowledge of an indigenous species, is an important component in the improvement of natural resource management in South Africa and can provide valuable information for the sustainable use and protection of ecosystems and species. This kind of knowledge is developed by local communities through adaptive experiences with natural resources.

In 1992 the Convention on Biological Diversity (CBD) provided an approach to ensuring equity in the exploration and exploitation of biological resources and regulating the benefits of bioprospecting. This approach, also called 'Access and Benefit Sharing' (ABS) set out in Article 1 of the CBD states that one of the fundamental objectives is the *fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.*

South Africa, being party to the CBD, regulates the exploration and exploitation of the countries rich biodiversity for commercial purposes through the National Environmental Management: Biodiversity Act (NEM: BA or 'Biodiversity Act') (Act No. 10 of 2004)[1] and the Bioprospecting, Access and Benefit Sharing (BABS) Regulation, 2008[2] (including amendments). South Africa's groundbreaking bioprospecting legislations and regulations are further supported by the ratification of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits arising from their Utilization (ABS), adopted in Japan in 2010.

The South African legislation and regulations and the international Nagoya Protocol have increased awareness of ABS and provide new opportunities for communities to benefit from their role as custodians of traditional knowledge of biological and genetic resources in South Africa.

In relation to this, The Department of Environmental Affairs has commissioned a study on the traditional knowledge associated with two key species in bioprospecting sector of South Africa, namely rooibos (*Aspalathus linearis*) and honeybush (*Cyclopia spp.*). The overall objectives of the study is to; (i) conduct an ethnobotanical study on the origin of traditional knowledge associated with rooibos and honeybush species, (ii) investigate and analyse information on the original distribution of the species in South Africa and link it with the existing

[1] South Africa (2004). National Environmental Management: Biodiversity Act, Act No. 10 of 2004. Government Printers, Pretoria.
[2] DEAT (2008). National Environmental Management: Biodiversity Act, 2004: Regulations On Bio-Prospecting, Access And Benefit-Sharing. No. R. 138 8 February 2008. . Government Printers, Pretoria.

associated traditional use by indigenous and local communities; (iii) investigate and reveal how the traditional knowledge associated with these species as an information source has provided valuable leads into the scientific and commercial environment; (iv) and to make recommendations on the existence and legitimate ownership of traditional knowledge associated with rooibos and honeybush species in South Africa

A systematic approach has been used to address the objectives of the study. This involves (i) an expansive review of current and historical literature on the traditional use and knowledge of uses of rooibos and honeybush, (ii) an ethnobotanical survey of the historical knowledge of use and current uses of the species in communities which fall within the range of the species or which the literature has indicated as having played a role in the traditional knowledge and uses of the species and (iii) semi-structured interviews with industries and academic institutions involved in the rooibos and honeybush bioprospecting value chains in the county.

In relation to Rooibos, community interviewees associated the knowledge of rooibos to the indigenous people (KhoiSan) and in turn, believe that the local people transferred this knowledge to the European settlers, particularly the Moravian Missionaries. Interviewees from the communities believe that the knowledge of rooibos originated directly from their region and that benefit-sharing for their traditional knowledge of the use and commercialisation of rooibos should be provided to them.

Academia, in certain instances, support community assertion that the traditional knowledge of the use of *Aspalathus* stems from the Khoi and San communities in the area of *Aspalathus* products, with academia making statements related to rooibos ***tea*** such as:

- *the Hottentots' use of this plant for beverage purposes was first reported by the botanist Carl Thunberg in 1772 (Thunberg, 1795-1796). Early settlers adopted the practice, lopping the bushes as needed, chopping the branches with axes, bruising with mallets, and letting them cure in heaps*[39].

However, industry interviews on the other hand show a strong perception that there is a weak link between local communities and the origin of TK for rooibos. Industry relies on the belief that there is no conclusive evidence that TK of rooibos rests with any particular community.

In relation to Honeybush, community interviewees state that the traditional knowledge of honeybush is closely linked to the Khoi-San ancestry of communities where these plants are naturally found. Communities have a strong sense of this knowledge belonging to those with a Khoi-San heritage and several stories pertaining to honeybush being traded amongst different groupings of people in the past are also recalled. Honeybush TK has similar issues to rooibos, with industry indicating that they are largely not aware of any particular community in which the TK can be attributed.

The Sustainability Report 2013 "Honeybush Tea Industry Development Project" Eastern Cape Report states that Latrobe (1815) mentioned that the most popular refreshment on greeting any visitor was tee-water and this was certainly not any other tea other than honeybush tea; a logical assumption that the knowledge of this indigenous tea came through interactions with the Khoi and San people, original custodians of the area[79]. Unfortunately, there are no published reports at that time of its use as a tea by the native populations (KhoiSan).

The fact that these species are endemic in areas where the species are in abundance, combined with the fact that the San and Khoikoi populations were resident in these areas for centuries before the arrival of the settlers and that the industry has evolved and expanded in these particular areas does largely support the communities *perception* that the TK for rooibos and honeybush rests with the communities who originate in these areas. There is no evidence that disputes that the Khoi and San as holders of TK for these species.

Acknowledgements

We would like to thank the following individuals and communities for the willingness to assist with this assignment and provide valuable information on traditional knowledge associated with rooibos and honeybush species:

Name	Institution/Organization
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Mr Gerhard Pretorius	CapeNature
Ms Lizette Joubert	Agricutlure Research Council/ representing South Africa Honeybush Council
Dr Christopher Cupido	South African National Biodiversity Institute
Mr Bulelani Mgodeli	South African National Biodiversity Institute
Mr Martin Bergh	Rooibos Ltd.
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Ms Lesle Jansen	Representing the National Khoisan Council
Ms Leana Synders	Representing the South African San Council

Area of communities which were included in study:

Communities
Bo-Kouga
Cederberg area
Genadendal
Greyton
Haarlem
Knysna
Paarl
Plettenberg Bay (Ericaville Farming trust)
Stellenbosch
Uniondale
San and Khoi Council
Wupperthal (Cederberg)
Eselbank (Cederberg)

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ACRONYMS

ABS	Access and Benefit Sharing
ASNAPP	Agribusiness in Sustainable Natural African Plant Products
CBD	Convention on Biological Diversity
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism (now DEA)
DST	Department of Science and Technology
DTI	Department of Trade and Industry
SAHTA	South African Honeybush Tea Association
SARC	South African Rooibos Council
TK	Traditional Knowledge

1 INTRODUCTION

South Africa has a rich cultural and biological heritage and diversity, with an expansive history of linking these through the traditional use of biological resources. Local traditional knowledge (TK) of the value and use of biological resources is unique to a culture or society and is passed from generation to generation through word of mouth and cultural rituals. This traditional knowledge is usually built by a group of people living in close contact with nature. The characteristics of this traditional knowledge are that the knowledge[3]:

• has been created over a long period of time, passed down from generation to generation;

• is constantly improved as new knowledge is integrated to the existing; and

• the creation and improvement of knowledge is a group effort.

The role of an individual in the traditional knowledge should not be underestimated, as individual efforts can also have a significant impact.

Traditional knowledge, particularly traditional ecological knowledge of an indigenous species, is an important component in the improvement of natural resource management in South Africa and can provide valuable information for the sustainable use and protection of ecosystems and species. This kind of knowledge is developed by local communities through adaptive experiences with natural resources[4].

Historically, communities had expressed concern over the lack of recognition of the contribution that indigenous knowledge had made in the commercialization and utilization of biological resources. This indigenous knowledge had been inadequately acknowledged, recognised or protected, yet it had contributed considerably to the identification and development of useful compounds and new products such as drugs, medicines, cosmetics, fragrances.

Hence, in 1992 the Convention on Biological Diversity (CBD) provided an approach to ensuring equity in the exploration and exploitation of biological resources and regulating the benefits of bioprospecting. This approach, also called 'Access and Benefit Sharing' (ABS) set out in Article 1 of the CBD states that one of the fundamental objectives is the *fair and equitable sharing of the benefits arising out of the utilization of genetic resources,*

[3] Lewis and Ramani (2007). Ethics and practice in ethnobiology: analysis of the international cooperative biodiversity group project in Peru. In: Biodiversity and the Law: Intellectual Property, Biotechnology and Traditional Knowledge. McManis C.R (ed). Earthscan, London.

[4] Hanazaki N., Firme Herbst D., Simionato Marques M. and Vandebroek I.(2013). Evidence of the shifting baseline syndrome in ethnobotanical research. Journal of Ethnobiology and Ethnomedicine 9 (75): 1-11

including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding[5].

South Africa, being party to the CBD, regulates the exploration and exploitation of the countries rich biodiversity for commercial purposes through the National Environmental Management: Biodiversity Act (NEM: BA or 'Biodiversity Act') (Act No. 10 of 2004)[6] and the Bioprospecting, Access and Benefit Sharing (BABS) Regulation, 2008[7] (including amendments). The Act and BABS Regulation have the purpose of managing the use of indigenous biological or genetic resources in a sustainable, equitable and fair manner by the sharing of benefits arising from these resources[7]. The Act includes two stakeholder categories 1) those individuals and communities who give access to the biological resources and 2) indigenous individuals and communities whose traditional knowledge or use of biological and genetic resources has contributed to, or may contribute to bioprospecting[7]. Stakeholders enter into a benefit-sharing agreement (BSA) and those giving access to resources enter into a material transfer agreement (MTA).

South Africa's groundbreaking bioprospecting legislations and regulations were further supported by the ratification of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits arising from their Utilization (the Nagoya Protocol on ABS), adopted in Japan in 2010. The Nagoya Protocol is an international, legally binding framework which promotes transparent and effective implementation of the ABS concept at the regional, national and local level.

The South African legislation and regulations and the international Nagoya Protocol have increased awareness of ABS and provide new opportunities for communities to benefit from their role as custodians of traditional knowledge of biological and genetic resources in South Africa.

1.1 Background to this study

The Department of Environmental Affairs commissioned this study on the traditional knowledge associated with two key species in the bioprospecting sector of South Africa, namely rooibos (*Aspalathus linearis*) and honeybush (*Cyclopia spp.*). Understanding the traditional knowledge holders of these two species is a key milestone towards achieving national imperatives as set out in the NEM: BA[6] and the Nagoya Protocol on ABS. The overall objectives of the study were to:

- Conduct an ethnobotanical study on the origin of traditional knowledge associated with rooibos and honeybush species;

[5] CBD (undated). [Online]. Available: http://www.cbd.int/convention/articles/?a=cbd-01
[6] South Africa (2004). National Environmental Management: Biodiversity Act, Act No. 10 of 2004. Government Printers, Pretoria.
[7] DEAT (2008). National Environmental Management: Biodiversity Act, 2004: Regulations On Bio-Prospecting, Access And Benefit-Sharing. No. R. 138 8 February 2008. . Government Printers, Pretoria.

- Investigate and analyse information on the original distribution of the species in South Africa and link it with the existing associated traditional use by indigenous and local communities;
- Investigate and reveal how the traditional knowledge associated with these species as an information source has provided valuable leads into the scientific and commercial environment; and
- To make recommendations on the existence and legitimate ownership of traditional knowledge associated with rooibos and honeybush species in South Africa

To address the above objectives the study conducted:

1. an expansive review of current and historical literature on the traditional use and knowledge of uses of rooibos and honeybush
2. an ethnobotanical survey of the historical knowledge of use and current uses of the species in communities which fall within the range of the species or which the literature indicated as having played a role in the traditional knowledge and uses of the species.
3. Semi-structured interviews (see Appendix 1) with industries and academic institutions involved in the rooibos and honeybush bioprospecting value chains in the county.

The ethnobotanical survey of communities was conducted through the application of a semi-structured questionnaire (see Appendix 2) with communities in the following areas:

Provinces	Communities
Western Cape	Bo-Kouga Cederberg area Genadendal Greyton Haarlem Knysna Paarl Plettenberg Bay (Ericaville Farming trust) Stellenbosch Uniondale San and Khoi Council Wupperthal (Cederberg) Eselbank (Cederberg)

Stakeholders in the Eastern Cape honeybush sector could not identify a specific community within their province which could be included in the honeybush TK study. Both the literature and stakeholders referred to the two communities which are situated on the boundary of the Western and Easter Cape province, namely the Haarlem and Ericaville communities. Since it is clear that traditional knowledge of biological and genetic resources is not bounded by current provincial boundaries, the study assumes that these two communities could be representative of TK of honeybush in both provinces.

Details of the data capture and analysis are provided in Appendix 3.

1.2 Structure of the report

This report has the key purpose of communicating the results of the study of *Traditional Knowledge Associated with Rooibos and honeybush Species in South Africa* and to provide recommendations on the existence and legitimate ownership of traditional knowledge associated with these species in South Africa.

The report is comprised of the following sections:

- Section 1: Introduction and background to the study;
- Section 2: Overview of the history of the San and the Khoi and links to the species under review
- Section 3: Botanical aspects of rooibos and honeybush
- Section 4: Traditional and commercial use and knowledge of rooibos
- Section 5: Traditional and commercial use and knowledge of honeybush
- Section 6: Conclusions and recommendations of TK holders of the species

1.3 Key terminology

1.3.1 Traditional Knowledge

Traditional Knowledge or "TK" according to the World Intellectual Property Organisation (WIPO) (2001) *refers to tradition-based literary, artistic or scientific works; performances; inventions; scientific discoveries; designs; marks, names and symbols; undisclosed information; and all other tradition-based innovations and creations resulting from intellectual activity in the industrial, scientific, literary or artistic fields*[8].

"Tradition-based" in the above definition of TK, refers to *knowledge systems, creations, innovations and cultural expressions which: have generally been transmitted from generation to generation; are generally regarded as pertaining to a particular people or its territory; and, are constantly evolving in response to a changing environment*[8].

Simply, the WIPO (2001) describes Traditional Knowledge as[8]:

- knowledge, know how, skills, innovations or practices;
- that are passed between generations;
- in a traditional context; and

[8] World Intellectual Property Organisation (WIPO) (2001). Intellectual property needs and expectations of traditional knowledge holders. WIPO Report on Fact-Finding Missions on Intellectual Property and Traditional Knowledge (1998-1999). WIPO, Geneva.

- that form part of the traditional lifestyle of indigenous and local communities who act as their guardian or custodian.

The WIPO also uses the term "traditional knowledge holder" to refer to all persons who create, originate, develop and practice traditional knowledge in a traditional setting and context. Indigenous communities, peoples and nations are traditional knowledge holders, but not all traditional knowledge holders are indigenous.

The Draft Protection of Traditional Knowledge Bill[9], recently published for public comment, has been introduced as a pioneering approach to the protection of indigenous works in South Africa. This Bill has defined traditional knowledge *a traditional work, a traditional design and a traditional mark.* According to the same Draft Bill[9]:

"traditional work" means -	*a literary, musical or artistic work as defined in Section 1 of the Copyright Act, which evolved in, or originated from, a traditional community, and in respect of which no individual maker is known.*
"traditional design" means -	*Any design applied to any article, whether for the pattern or the shape or the configuration thereof, or for any two or more of those purposes, and by whatever means it is applied, having features which appeal to and are judged solely by the eye, irrespective of the aesthetic quality, which evolved in or originated from, a traditional community, and in respect of which no individual marker is known.*
"traditional mark", means –	*(a) a certificate trade mark as described in section 42(1) of the Trade Marks Act;* *(b) a collective mark as described in section 43(1) of the Trade Marks Acts;* *(c) a trade mark as defined in section 2 of the Trade Marks Act;* *which evolved in, or originated from, a traditional community*

Comparing the above WIPRO definition of traditional knowledge, which can be applied directly to TK of biological and genetic resource in South Africa, the current definition of TK in the Draft Bill may need to be strengthened to be able to directly address TK of biological and genetic resource.

The NEM: BA (10/2004): Draft amendment regulations on bio-prospecting access and benefit-sharing does seem to address this problem by introducing a definition of **traditional use and knowledge** to the suite of South Africa environmental legislation. This definition, which directly addresses TK of biological and genetic resources in the country, is outlined as *the customary utilisation or knowledge of indigenous biological resources by an indigenous community, in accordance with written or unwritten rules, usages, customs or practices traditional observed, accepted and recognised by them, and includes discoveries about the relevant indigenous biological resource by the community[10].*

[9] James, W.G (2013). Invitation for public comment on Draft Protection of Traditional Knowledge Bill. Government Gazette No. 36354, General Notice 376 of 2013. Government Printers, Pretoria.

[10] South Africa (2013). NEM:BA (10/2004): Draft amendment regulations on bio-prospecting access and benefit-sharing. Government Gazette 37331. Government Printers, Pretoria.

1.3.2 Indigenous Knowledge

According to the World Intellectual Property Organisation (2001), **Indigenous knowledge** on the other hand, is understood in two different ways. Firstly, it can be used to describe knowledge held and used by communities, peoples and nations that are "indigenous". The Intellectual Property Law Amendment Bill (2011) of South Africa defined indigenous cultural knowledge as *any form, tangible or intangible, or a combination thereof, in which traditional culture and knowledge are embodied, passed on between generations, and tangible or intangible forms of creativity of indigenous communities, including, but not limited to—*

a) phonetic or verbal expressions, such as stories, epics, legends, poetry, riddles and other narratives, words, signs, names or symbols;
b) musical or sound expressions, such as songs, rhythms, or instrumental music, the sounds which are the expression of rituals;
c) expressions by action, such as dances, plays, ceremonies, rituals, expressions of spirituality or religion, sports, traditional games, puppet performances, and other performances, whether fixed or unfixed; or
d) tangible expressions, such as material expressions of art, handicrafts, architecture, or tangible spiritual forms, or expressions of sacred places.

In this sense, "indigenous knowledge" would be the traditional knowledge of indigenous people, making indigenous knowledge part of the traditional knowledge category. However, traditional knowledge is not necessarily indigenous. That is to say, indigenous knowledge is traditional knowledge, but not all traditional knowledge is indigenous (see Figure 1).

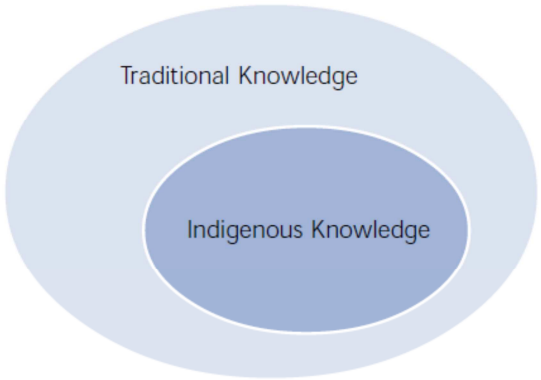


Figure 1: Relationship between traditional knowledge and indigenous knowledge (taken from WIPO, 2001)

"Indigenous knowledge" is also used to refer to knowledge that is itself "indigenous". Dictionaries define "indigenous" as: "originating or occurring naturally (in a country, region etc.); native; innate (to); inherent (in); and

"(Esp. of flora and fauna) produced naturally in a region; belonging naturally (to soil etc.)". In this sense, the terms "traditional knowledge" and "indigenous knowledge" may be interchangeable.

The protection of indigenous knowledge is a matter of importance to the South Africa government. As a result, the Department of Trade and Industry developed a policy framework for the protection of indigenous traditional knowledge through *Indigenous Knowledge Systems (IKS) Policy* (adopted in November 2004) and the *Policy Framework for the Protection of Indigenous Traditional Knowledge through the Intellectual Property System and the Intellectual Property Laws Amendment Bill, 2008*[11]. The Policy indicates that it uses the *words "traditional knowledge" and "indigenous knowledge" interchangeably, but the two expressions have different meanings nationally and internationally*.

The NEM:BA (10/2004): Draft amendment regulations on bio-prospecting access and benefit-sharing introduction a definition of **indigenous use and knowledge** to the suite of South Africa environmental legislation, defining it as *knowledge of, discoveries about or the traditional use of indigenous biological resources, if that knowledge, discoveries or use has initiated or will contribute to or form part of a proposed bioprospecting to which an application for a permit relates* [10].

1.3.3 Indigenous community

The description of the concept of an i**ndigenous community** according to the Intellectual Property Law Amendment Bill (2011) of South Africa means *any recognizable community of people originated in or historically settled in a geographic area or areas located within the borders of the Republic, as such borders existed at the date of commencement of the Intellectual Property Laws Amendment Act, 2011, characterized by social, cultural and economic conditions which distinguish them from other sections of the national community, and who identify themselves and are recognized by other groups as a distinct collective*[12].

The Draft Protection of Traditional Knowledge Bill provides a definition for a **traditional community** as *a natural, indigenous and monogenous grouping of people that have a common language and customs, which exists in the Republic within an organised structure, and is generally recognised as having a separate and individual character*[9].

[11] DTi (2008). Policy Framework for the Protection of Indigenous Traditional Knowledge through the Intellectual Property System and the Intellectual Property Laws Amendment Bill, 2008. Government Gazette No. 31026 . Government Printers, Pretoria.
[12] DTi (2011). Intellectual Property Law Amendment Bill (2011) of South Africa. Government Printers, Pretoria.

2 THE SAN, KHOIKHOI, ROOIBOS AND HONEYBUSH

2.1 History of the San and Khoi in the Western and Eastern Cape

The Cape Floristic Region of South Africa is widely recognised as the most biodiverse biome in the country, with an estimated 9030 vascular plant species (68.7% endemic) packed into this small 90,000km^2 area of the country[13]. Donaldson and Scott estimate that there are 533 medicinal plant species located in this region[14]. The region is also the traditional home of the Khoikhoi or Khoekhoe (Hottentot) herders and San (Bushman) hunter–gatherers, collectively referred to as the Khoi-San[15]. The San, according to literature, were in Southern Africa at least 120 000 years ago while Khoikhoi arrived in the Western Cape about 2 000 years ago[16].46

Despite the rich endemism and the cultural uniqueness of the region information on the traditional practices, particularly related to the traditional use of biological and genetic resource of the Cape Floristic Region by the Khoikhoi and San people, is limited and scattered in the literature[15].

The San people are regarded as the longest continuous inhabitants of a single area and are believed to be the progenitors of the rest of humankind. They are also believed to be the oldest human inhabitants of South Africa. Historic evidence shows that the San ranged from the central-eastern reaches of the continent, to the far northeastern and southern most areas of Africa (Figure 2).

[13] Goldblatt P. and Manning J.C. (2002). Plant Diversity of the Cape Region of Southern Africa. *ANN. MISSOURI BOT. GARD*. 89: 281–302.

[14] Donaldson J.S. and Scott G. (1994) in Philander L.E.A., Makunga N.P. and Platten S.J. (2011). Local Medicinal Plant Knowledge in South Africa Preserved by Apartheid. *Hum Ecol*, 39:203–216

[15] Van Wyk B.-E. (2008). A review of Khoi-San and Cape Dutch medical ethnobotany. *Journal of Ethnopharmacology* 119: 331–341

[16] Mountain A. (2003). The First Peoples of the Cape. David Philip, Cape Town.

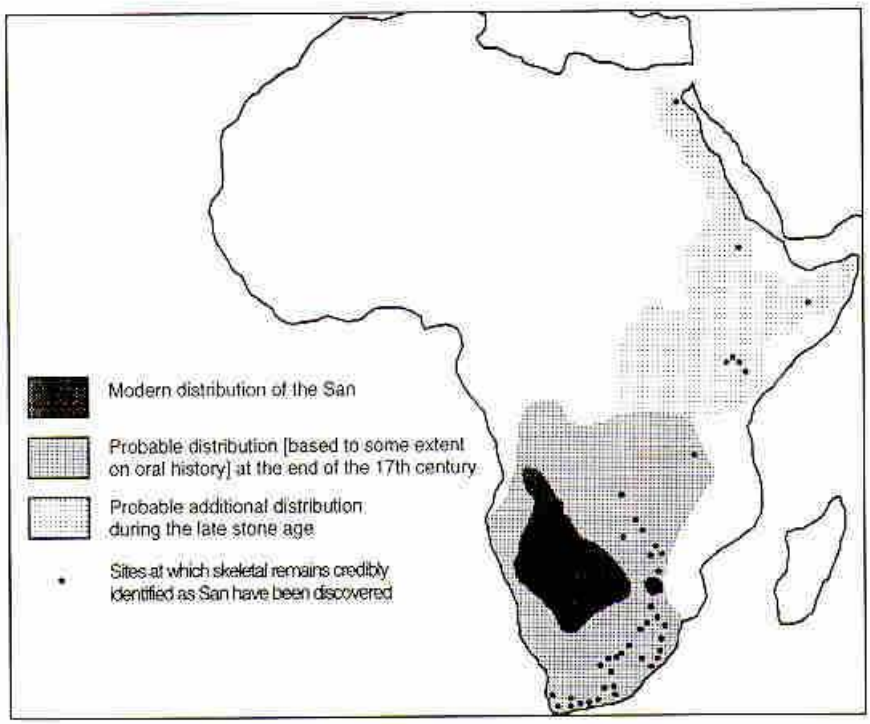


Figure 2: Area probably occupied by Khoisanids in Africa round 10 kya at the end of the seventeenth century, and now [17]

The San life-style was a semi-nomadic hunter-gathering one, with family groups of 20-30 individuals living and travelling together[18]. Groups would meet and join other groups from time to time to form larger clans. The San lifestyle was per-dominantly a survival one, with daily activities centred around hunting of animals and gathering of plants for food[18]. Families would travel to find the best food sources, as well as sources of liquid sustenance in the form of watermelon and water from sip-wells, springs and natural pans[18].

In the late 17th century the areas covered by the Cape Floristic Region became inhabited by settlers from Europe, chiefly of Dutch, German and French descent. This group of people became collectively known as the Cape Dutch and later as Cape Afrikaners[15]. At the time the San occupied an area from the Central Africa to the Cape in South Africa (Figure 2), consisting of a population of 300 000 individuals[19]. Arrival of the settlers resulted in the practice of apportion land to private owners for farming, which placed significant limitation on the areas where the San could hunt and collect food and water. At the same time, the population of the San was significantly reduced due to thousands of San, according to Chennells et al., being *systematically exterminated*

[17] Taken from Cavalli-Sforza et al. (1994) [Online]. Availble: http://www.unc.edu/~nielsen/soci111/m10/soci111m10.htm

[18] Wynberg R. and Chennells R. (2009). Green Diamonds of the South: An overview of the San-*Hoodia* Case. In: Indigenous Peoples, Consent and Benefit Sharing. Lessons from the San-Hoodia Case. (Eds) Wynberg R., Schroeder D. and Chennells R. Springer Science+Business Media.

[19] Lee, R.B. (1976) in Chennells R., Haraseb V. and Ngakaeaja M. (2009). Speaking for the San: Challenges for Representative Institutions. In: Indigenous Peoples, Consent and Benefit Sharing. Lessons from the San-Hoodia Case. (Eds) Wynberg R., Schroeder D. and Chennells R. Springer Science+Business Media.

by hunting parties[20]. By the end of the 18th century, the San culture and society had been devastated, with the population being marginalised, scattered across national borders and speaking at least 7 different language[18].

As Figure 2 above shows, the modern distribution of the San people is significantly smaller, found largely in the Northern Cape of South Africa, Namibia and Botswana.

The institutional structure which currently represents the San population in South Africa is shown in Figure 3. The South African San Council is constituted of three representatives from each of the three San communities in South Africa, namely the ≠Khomani, the !Xun and the Khwe. Each of these communities is linguistically and culturally distinct[20].

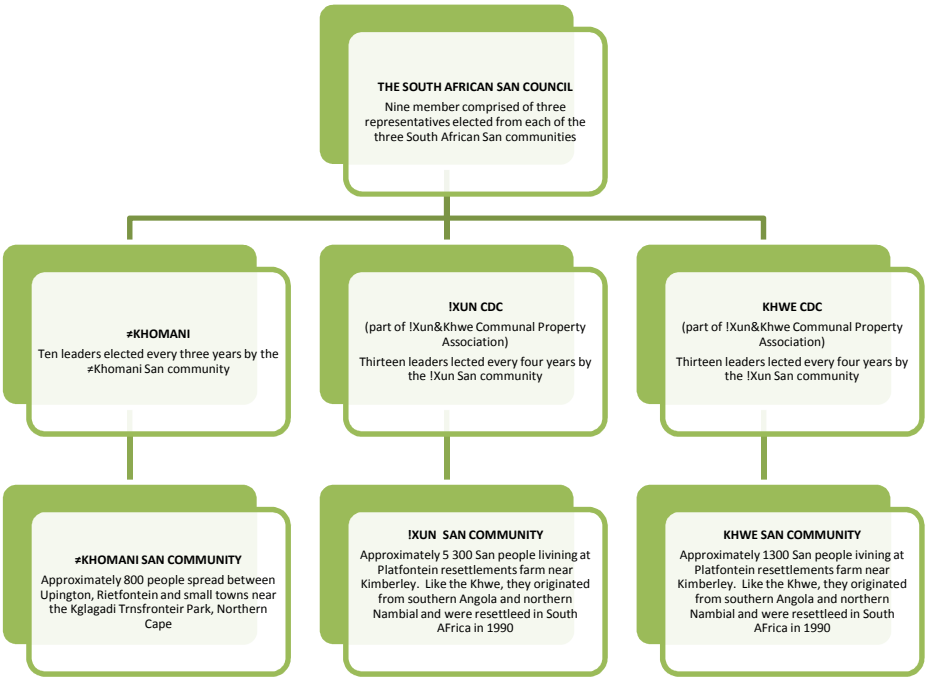


Figure 3: Structure of the San leadership institution in South Africa (taken from [20])

The Khoikhoi people, previously referred to as Hottentots, were traditional pastoralist. The distinct origin of the Khoi is debated, but Khoikhoi are believed to have originated in the northern and eastern regions of what is now Botswana[21] (Figure 4a). The Khoikhoi are believed to be the first pastoralists to make their way into what is now South Africa, entering the country through two distinct routes (Figure 4b), namely traveling west, skirting the Kalahari to the west coast and then down towards the Cape, and traveling south-east out into the Highveld and then southwards to the south coast.

[20] Chennells R., Haraseb V. and Ngakaeaja M. (2009). Speaking for the San: Challenges for Representative Institutions. In: Indigenous Peoples, Consent and Benefit Sharing. Lessons from the San-Hoodia Case. (Eds) Wynberg R., Schroeder D. and Chennells R. Springer Science+Business Media.

[21] Boddy-Evans A. (undated). Pre-Colonial cultures in South Africa. The San and Khoikhoi. [Online]. Available: http://africanhistory.about.com/library/weekly/aa-SAColonists1.htm

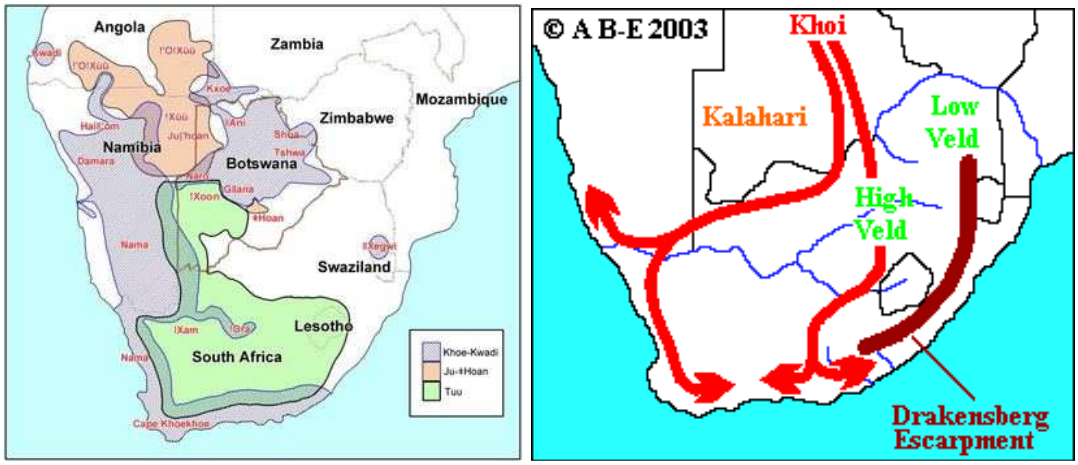


Figure 4: (a) Historical distribution of major Khoisan linguistic groups in southern Africa (taken from[22]) and (b) Model for the origins of the Khoikhoi approx. 1800–2000 years before present (taken from[21])

Literature indicated that the Khoikhoi are likely to have developed their pastoral culture approximately 2000 years ago as a result of their contact with other pastoralist tribes in Africa.

There was some intermarriage between migratory Khoi groups living in the Western Cape area of the country and the San family groups. The two population groups however, remained culturally distinct as the Khoikhoi continued to graze livestock and the San subsisted on hunting-gathering. Over time, some Khoi abandoned pastoralism and adopted the hunter-gatherer economy of the San, probably due to a drying climate.

At the time of the arrival of European settlers to southern Africa (mid-seventeenth century) the Khoi populations were located around the Cape of Good Hope and inland from the south-western and western coasts of the country. The Khoikhoi population experienced similar loss as the San with the arrival of these settlers, including loss of pastoral grazing land to private farmers and the extermination of the population through conflict with the new settlers.

Today the Khoikhoi are mainly grouped under what would be the Nama, Koranna, Griqua and Cape Khoi groupings. Current estimates are that the population of Khoikhoi, in South Africa and Namibia, is well below 20 000 individuals.

2.2 History of the Khoi-San and *Aspalathus spp.*

The interactions between the Khoi-San and early Cape Dutch settlers in the relatively isolated areas of the Cape Floristic Region resulted in a distinct but poorly studied healing culture, referred to as Khoi-San or Cape Dutch medicine. Van Wyk (2008) indicates that three main categories of healers can be distinguished in the Cape Floristic Region, namely the diviner or *!gai aup* who treats serious ailments, the herbalist or *bossiedokter* who

[22] Gerlach L. and Berthold F. (2011). The sociolinguistic situation of ǂHoan, a moribund 'Khoisan' language of Botswana [Online]. Available: https://www.afrikanistik-aegyptologie-online.de/archiv/2011/3164

treats minor and chronic ailments and the poison or snake doctor, who specializes in the treatment of snake bites[15]. Diviners, who are often female, can still be encountered in remote regions of the Kalahari[15].

Despite the literature recognising this medicinal contribution of the Khoi-San to the culture of healing in the Western Cape, van Wyk (2008) indicates that *as pointed out by Liengme (1983) and Van Wyk (2002), the ethnobotany of the Khoikhoi people is poorly recorded. There are numerous publications on the San (Bushman) of the Kalahari (Tobias, 1960, 1975) but the emphasis has been on plants used for food and water (Story, 1958, 1964), utility items (Tanaka, 1978) or hunting poisons (Neuwinger, 1994, 1996). Medicinal plants and their uses have remained poorly known despite recent books by Von Koenen (1996, 2001) and Van Wyk and Gericke (2000), both of which contain summaries of available information from Namibia and Botswana*[15]*.*

Despite the lack of historical literature on the use of rooibos species by the Khoi-San communities in the Western Cape, van Wyk (2008) does indicate that both *Aspalathus cordata* (skekeltee) and *Aspalathus linearis* (rooibostee, bossietee) is listed in the literature up to 1932 as traditionally used as a general health tea (*A. linearis*), for asthma and as a diuretic (*A. cordata*)[15]. Van Wyk (2008) lists the sources of this information as Peppe (1847; 1850; 1857) (*A. cordata*) and Marloth (1925) (*A. linearis*)[15].

Peppe (1847; 1850; 1857) gives a list of indigenous Cape Plants used as remedies in this country, arranged according to the natural system of De Candolle. Although not linking the use of *Aspalathus spp.* directly to the KhoiSan, he does indicate *Borbonia cordata. Lin*[23]. (currently *Aspalathus cordata* (L.) R. Dahlgren*); Borbonia ruscifolia*[24] and *Borbonia parviflora*[25](*Aspalathus crenata* (L.) R.Dahlgren) are *common on the Lion's head and on Table Mountain, and use under the significant name of Stekelthee, apparently with good effect on Asthma and Hydrothorax. It is commonly given as a decoction, which acts as a gentle diuretic.*

Similarly, Marloth (1917) in his book on the *Dictionary of The Common Names of Plants* indicates, under the definition of tea, that *many indigenous herbs or shrublets are employed as tea for daily consumption or medicinal purposes. None of them, with the exception of Gatfia, contain any alkaloid. In most cases the reason for the use appears to be some aromatic substance, e.g. Helichrysum, Leyssera, Psoralea, etc.*[26]*.* One of the teas which he lists in the book is Rooibos, where he indicates that:

Rooi 'bos—Rooi—Naald— or Koopmans *— Borbonia pinifolia* (accepted name *Aspalathus linearis* (L.) R. Dahlgren)*; a small shrublet of the Olifants river and Cedar mountains. The twigs and leaves are cut up and fermented like the Cyclopia. A pleasant beverage, especially in hot weather, free from tannin and stimulating ingredients. In most cases the reason for the use appears to be some aromatic substance, e.g. Helichrysum, Leyssera, Psoralea*[26]*.*

[23] Pappe L. (1847). A List South African Indigenous Plants Used as Remedies by the Colonists of the Cape of Good Hope. O.I. Pike, Cape Town.
[24] Pappe L. (1850). Florae Capensis Medicae Prodromus. A.S. Robertson, Cape Town.
[25] Pappe L. (1857). Florae Capensis Medicae Prodromus, 2nd ed. W. Britain Press, Cape Town.
[26] Marloth R. (1917). The Flora of South Africa Darter, 4 vols. Cape Town and William Wesley, London.

Again, no direct mention is made of the KhoiSan by Marloth but the book does indicate use of indigenous species as a tea, as early as 1917, mentioning a 'Hottentots' tea made of *Helichrysum serpyllifoum*[26]. Peppe (1850) also makes the link between *Helichrysum serpyllifolium*. Less., which *is much liked by the coloured people, who infuse it as tea*[24].

LeClercq et al. indicate that they too were unable to make a direct link in the literature between the KhoiSan and rooibos, indicating that *San people were probably the first to discover and use rooibos, though no reference exists in the 18th and 19th centuries' literature*[27]. This research does however indicate that there is a strong probability that the first users of rooibos were the San people.

Literature indicates that the Wupperthal area represents the cultural point-of-origin for rooibos[28]. Wupperthal is a small town in the Cederberg mountains in the Western Cape province, founded in 1830 by two German missionaries of the Rhenish Missionary Society (RMS) (Figure 5). The two missionaries settled among the seven Khoikhoi families which were based in the valley at the time of their arrival. Although missionary work began there as early as 1830, the Rhenish Mission Station first acquired, through purchase, the farm Riedmond (later renamed Wupperthal) in 1832 for the sum of 20 000 guilders[29].

The Wupperthal mission station currently includes 30 properties amounting to 35 200 hectares in extent[29]. The majority of these properties were acquired through purchase. Twenty-eight of the thirty properties of Wupperthal were transferred, in the form of a donation, from the RMS to the Evangeliese Broederkerk (Western Cape).

A Wupperthal land claim has been lodged with the Commission for the Restitution of land Rights.

[27] LeClercq M., Bienabe E. and Caron P (undated). The case of the South African Rooibos: Biodiversity conservation as a collective consensus. [Online]. Available:

[28] Keahey J.A. (2013). Emerging markets, sustainable methods: political economy empowerment in South Africa's rooibos tea sector. Dissertation, Colorado State University Fort Collins, Colorado

[29] Strassberger E. (1969). The Rhenish Mission Society in South Africa 1830 – 1950, Struik, 1969 in A joint research project of the Surplus People Project and the Legal Resource Centre (2000). An Inventory and Description of the Historical Acquisition of Moravian Church Land. A Report Compiled for the Moravian Church of South Africa.

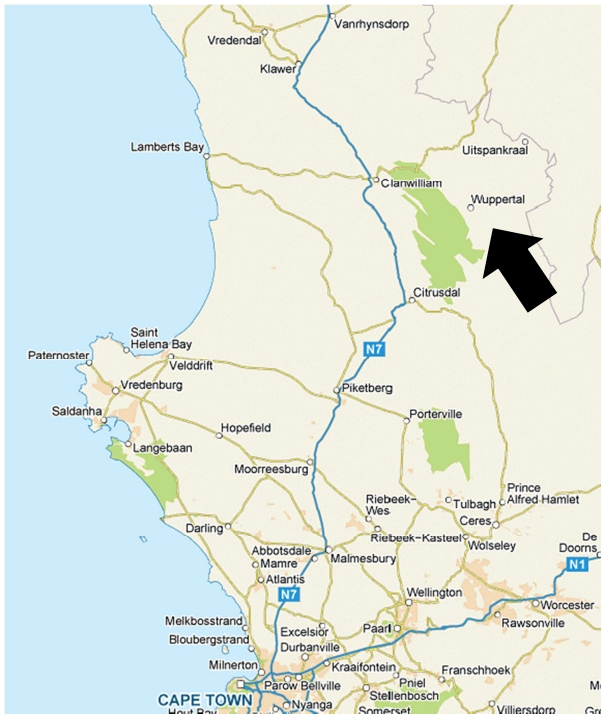


Figure 5: Map showing the position of Wupperthal in the Western Cape.

According to literature, residents historically harvested wild tea and as one informant stated, drank "veld tea for breakfast, lunch, and dinner"[28]. The preparation of the rooibos as a tea was time-consuming, with the plant chopping on a wooden block, sprinkled with water and allowed to rest under sticks overnight[28]. The following morning, the leaves were spread out to dry and then used to make the tea[Error! Bookmark not defined.]. According to Keahey, (2013) elder Wupperthal respondents did remember harvesting and preparing rooibos by hand for daily consumption, but the practice has largely disappeared in the community, as the purchasing of rooibos tea for retails stores has become easier and cheaper[28][Error! Bookmark not defined.].

2.3 History of the Khoi-San and *Cyclopia spp.*

The earliest references to honeybush in the literature is found in 1705 taxonomic script[30]. The Swedish botanist Carl Thunberg also recorded the use of the name 'honigtee' during his travels in the Cape in the 1770s[31].

Latrobe, travelling in the Langkloof in 1815 is reported to have been served 'tea-water' prepared from a local plant (believed to be honeybush). Latrobe does not however, link this 'tea-water' to any group, only indicating

[30] Kies P. (1951). Revision of the genus Cyclopia and notes on some other sources of bush tea. Bothalia 6: 161–176.

[31] Joubert E, Gelderblom W.C.A., Louw A. and de Beer D. (2008). South African herbal teas: Aspalathus linearis, *Cyclopia spp*. and *Athrixia phylicoides*–A review. *Journal of Ethnopharmacology* 119: 376–412.

that the tea was served at the house belonging to the mother of *our* host. Latrobe also mentions in his account of his travels that *we called on the friendly family at Wellgelegen, who treated us with tea-water*[32].

Joubert et al.[33] indicated that the first anatomical and chemical study of *C. genistoides* can be found in Greenish (1818)[34] in his account of Cape Tea, in which he notes that *Cyclopia genistoides* (Cape tea, "honig-thee) was used as a substitute for tea.

Bowie (1830), in his description of *C. genistoides*, indicates that *Cyclopia. Astringent; a decoction of this shrub is much used by the Colonists as a restorative. As ornamental shrubs, the genus rank high in the leguminous tribe, they are very hardy and of quick growth, and where guttered to remain, attain the height of 10 feet. In the years 1825 and 1820, one species resisted the severity of British winters, though fully exposed, (without covering) to the action of frost*[35].

Peppe (1847; 1850; 1857) followed with his list of indigenous Cape Plants used as remedies in this country. Although not linking the use of Cyclopia directly to the KhoiSan, he does mention *Cyclopia genistoides Vent.*, utilised as a tea. He highlights that this plant - *in the form of decoction, or infusion, this plant, which is not uncommon in moist places on the Cape Flats near Wynberg, is often made use for the purpose of promoting expectoration in old inveterate Catarrh, and even in Consumption. It is of a sweetish taste, but a little astringent, and is therefore considered as a restorative by many colonists. Its vernacular name is Honigthee.*

Marloth (1917) in his book on the Dictionary of The Common Names of Plants, under his description of bush tea indicates that there are *several kinds. The most frequently employed shrublet is Cyclopia vogelii (Honey —, Boer —from the mountains of Swellendam, etc. On the Cape Peninsula it is the narrow-leaved G. genistoides, and along the coast C. tenuifolia (Vlei tee). The fresh leaves are subjected to a kind of fermentation by keeping them in a tightly packed heap for some days. After this process of " sweating " they are dried in the sun. They contain several specific substances not known from other plants, viz., cyclopine and cyclopia-red, but no tannin*[26].

Similarly Marloth in this document indicates that *Bush tea is made from various shrublets that are used as tea by the natives and colonists (v. tea and tee), but the most generally employed kind is derived from species of the genus Cyclopia. The bulk of the common article is obtained from C. yogelii (Swellendam). Near Cape Town this is replaced by C. genistoides and in the Zwartebergen by C. latifolia. The tea is free from stimulating alkaloids, but contains cyclopine, etc*[26].

[32] Latrobe (1818). Journal visit to South Africa, 1815, AND 1816. Account of the missionary settlements United Brethren, The Cape Of Good Hope. L. B. Seeley, 169, Fleet Street and H. Ackerma, 101, Strand.

[33] Joubert E, Joubert M.E., Bester C., de Beer D. and de Lange J.H. (2011). Honeybush *(Cyclopia spp.*): From local cottage industry to global markets — The catalytic and supporting role of research. South African Journal of Botany 77: 887–907

[34] Greenish, H.G., 1881. Cape tea. The Pharmaceutical Journal and Transactions 11, 549‑551.

[35] Bowie J., (1830). Sketches of the botany of South Africa. South African Quarterly Journal I, 27–36.

Marloth also indicated that honeybush was praised by many colonists as being wholesome, valuing it as a stomachic that aids weak digestions without producing any serious stimulating effects on the heart[36].

Similar to rooibos, few of these texts make a direct link between honeybush and use by local Khoi-San communities.

[36] Mahomoodally M.F. (2013). Traditional Medicines in Africa: An Appraisal of Ten Potent African Medicinal Plants. Evidence-Based Complementary and Alternative Medicine, 2013.

3 BOTANICAL ASPECTS OF THE SPECIES

3.1 Aspalathus linearis

The Cape Floristic Region of South Africa is home to both the *Aspalathus spp* (rooibos) and *Cyclopia spp.* (honeybush).

The genus *Aspalathus* (Fabaceae, Tribe Crotalarieae) comprises more than 270 species[37]. The genus is endemic to South Africa, with the majority of the species occuring in the Cape Floristic Region of the country. Six species do however, extend to southern KwaZulu-Natal.

In 1963, a Swedish botanist Ralph Dahlgren renamed the *Aspalathus* species, which is traded both locally and internationally as rooibos tea, as *Aspalathus linearis*[38].

Aspalathus linearis is a straight, scattering shrub growing up to 2 metres in height and has reddish-brown branches which extend approximately 60 cm in length[39&40]. The shrub has green, needle-like leaves reaching 15-60 mm long and up to 1 mm in thickness.

The species can be found in deep, acidic, well-drained sandy soils[41]. *Aspalathus* is a legume which has the ecological role as a N2-fixer[39&42]. Nodules of nitrogen fixing bacteria are found on the roots, with bacteria in the nodules activity involved in nitrogen fixation[40].

Aspalathus linearis is characterised by the pea-shaped yellow flowers solidly grouped at the tips of branches[39] (see Figure 6). The yellow flowers appear in spring to early summer. The 1.5 cm long seedpod of the plant contains a single tiny, hard, yellow, kidney-shaped seed which is flung out when the pod splits open[39]. The plants regenerated by re-seeding or re-sprouting after fire[43].

[37] Joubert E. and de Beer, 2011). Rooibos (Aspalathus linearis) beyond the farm gate: From herbal tea to potential phytopharmaceutical. *South African Journal of Botany*, 77; 869–886

[38] Dahlgren R. (1988).Crotalarieae (Aspalathus). Flora of SouthernAfrica 16, 84–90.

[39] Morton J.F. (1983). Rooibos Tea, Aspalathus linearis, a Caffeineless, Low-Tannin Beverage Author(s): Economic Botany,37 (2): 164-173

[40] van Niekerk C. and Viljoen A. (2008). Indigenous South African Medicinal Plants. Part 11: Aspalathus linearis ('Rooibos'). *SA Pharmaceutical Journal Nov/Dec 2008.*

[41] Muofhe M.L., Dakora, F.D., 2000. Modification of rhizosphere pH by the symbiotic legume Aspalathus linearis growing in sandy acidic soil. *Australian Journal of Plant Physiology* 27, 1169–1173.

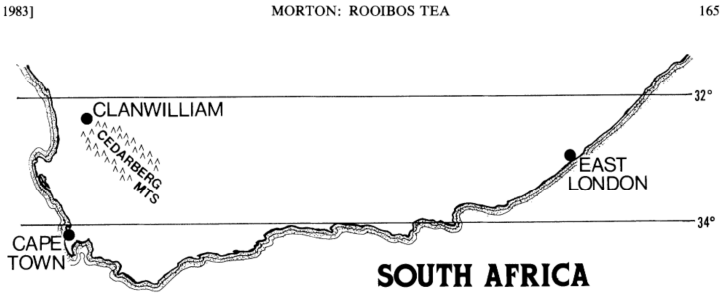
[42] Hawkins, H-J., Malgas, R. and Biénabe, E. (2011) Ecotypes of wild rooibos (Aspalathus linearis (Burm. F) Dahlg., Fabaceae) are ecologically distinct. [Online]. Available: http://www.experts.scival.com/stellenbosch/pubDetail.asp?t=pm&id=79955469784&n=Rhoda+Malgas&u_id=470

[43] Van der Bank M., Van der Bank F.H. and Van Wyk B.-E. (1999). Evolution of sprouting versus seeding in Aspalathus linearis. *Plant Systematics and Evolution* 219: 27–38.

(a)  (b) 

Figure 6: Pictures of *Aspalathus linearis* (a) plants and (b) flowers in South Africa[44]

A. linearis has a limited geographical range, from the western and south eastern parts of the Western Cape Province to the south-western part of the Northern Cape Province[45&38] (Figure 7). The areas are characterised by wet, cold winters and a hot, dry summer seasons.

(a) 

(b) 

[44] Taken from: http://commons.wikimedia.org/wiki/Aspalathus_linearis#mediaviewer/File:Rooibos_(Aspalathus_linearis).jpg

[45] Myers N., Mittermeier R.A., Mittermeier C.G., Da Fonseca G.A.B. and Kent J. (2000). Biodiversity hotspots for conservation priorities. *Nature* 403, 853–858.

(c)

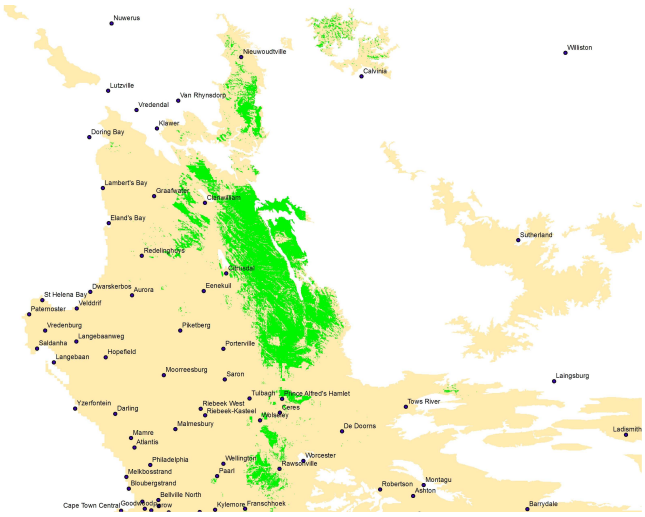


Figure 7: (a) Early map of the distribution of *Aspalathus linearis*[39]; (b) distribution of *Aspalathus linearis* based on Dahlgren [38&46] and (c) distribution of natural wild rooibos under current climate conditions[47]

Rooibos does not occur below 450m above sea level and flourishes only up to an altitude of about 900m. It is sensitive to frost and snow when very young, but mature plants are adapted to the cold winters and hot summers experience in the distribution area of the species[4831].

3.2 *Cyclopia spp.*

Honeybush (*Cyclopia* spp) is an indigenous plant to South Africa that is recognised for its pleasant taste and flavour as a tea.

The genus *Cyclopia* was first described taxonomically by Ventena in 1880, with at least three species having being described by 1925[31]. Currently, more than 24 species of *Cyclopia* have been identified in the fynbos region of South Africa, 23 of which have been described by Schutte (1997)[49]. However, only three of these species, namely *C. intermedia* ("bergtee"), *C. subternata* ("vleitee") and *C. genistoides* ("kustee") make up the commercial honeybush industry value chain in the country[50]. These species have different characteristics and are found in different climatic areas which require different management practices[50].

Cyclopia genistoides is a small, multi-branched woody shrub with a golden stem which grows to about a metre in height[51]. The leaves are arranged in 3 short, needle-like leaves on a very short stalk and flowers form a bold display of bright yellow flowers in the spring (Figure 8a)[51]. *C. intermedia* ("bergtee") and *C. subternata* ("vleitee")

[46] Taken from Malgas R.R., Potts A.J., Oettlé N.M., Koelle B., Todd S.W., Verboom G.A. and Hoffman M.T. (2010). Distribution, quantitative morphological variation and preliminary molecular analysis of different growth forms of wild rooibos (Aspalathus linearis) in the northern Cederberg and on the Bokkeveld Plateau. *South African Journal of Botany* , 76: 72–81

[47]Taken from the South Africa Risk & Vulnerability Atlas. [Online]. Available: http://rava.qsens.net/themes/agriculture_template/subsistence-agriculture-2/Current%20wild.jpg/view?searchterm=rooibos

[48]Joubert M. (undated). The history of rooibos. [Online]. Available: http://www.bosicetea.com/wp-content/uploads/2011/05/klipopmekaar.pdf

[49] Schutte A. L. (1997). Systematics of the genus Cyclopia Vent. (Fabaceae, Podalyrieae). *Edinburgh Journal of Botany*, 54: 125-170

[50] Hobson S. and Joubert M. (2011). Eastern Cape Honeybush Tea Project. Indsutry overview, assessment and proposed interventions. DEDEA, Eastern Cape.

[51] van der Walt, L. (2000). *Cyclopia genistoides* (L) R.Br. [Online]. Available: http://www.plantzafrica.com/frames/plantsfram.htm

have similar characteristics but *C. subternata* is a single stemmed reseeder, while *C. intermedia* is a multi-stemmed resprouter[52].

Honeybush plants have woody stems, and are easily recognised in the field, especially during the flowering season as they are covered with bright-yellow flowers with a sweet honey aroma. The species name *Cyclopia*, meaning 'round eye', refers to the intrusive base of the calyx, which contributes to the flower's unique appearance (Figure 8b).

The shape and size of the leaves vary within the species, but most are lean, needle-like to elongated leaves (see Figure 8 (a) & (b)).

(a)  (b) 

Figure 8: Image of *Cyclopia genistoides (*a) leaf and (b) flower[53]

Honeybush (*Cyclopia spp.*) grows periodically on the coastal plans and mountainous regions of the greater fynbos biome in the Eastern Cape Mountains (i.e. Tsitsikamma, Kouga, Baviaans, Langeberg and Swartberg) of South Africa, spreading down along the Langeberg and Swartberg mountains into the Western Cape and along the coast as far as Piketberg.

Figure 9 shows the distribution of the six Cyclopia *species* that have been studied in South Africa. The figures shows that *C. intermedia* ("bergtee") is the most expansive of the species, found in the interior of both the Western Cape and Eastern Cape provinces from the Worcester area to the Uitenhage area. *C. subternata* ("vleitee") however, is localised chiefly in the Eastern Cape Province, in the interior and coastal areas between Plettenberg Bay and Port Elizabeth. *C. genistoides* ("kustee") in Figure 9 is shown to be localised in the southern and western coastal regions of the Western Cape Province, extending from Bredasdrop to the Maimesbury regions of the province.

[52] van Wyk B-E., van Oudtshoorn B. and Gericke N. (2009) Medicinal Plant of South Africa. Biza Publication, Pretoria, South Africa.
[53] taken from http://www.sahta.co.za/photos/species-cyclopia-genistoides/category/4.html

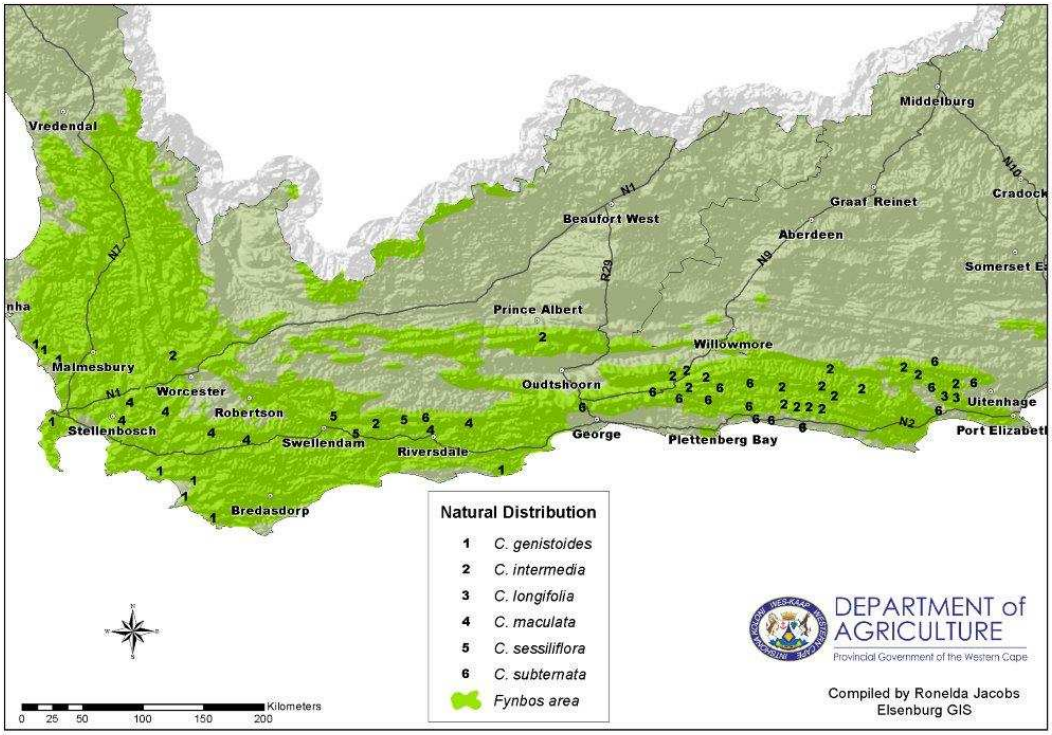


Figure 9: Natural distribution of six *Cyclopia spp*[54].

[54] Compiled by Ronelda Jacobs: DoA and supplied courtesy of DEA Eastern Cape

4 TRADITIONAL AND COMMERCIAL KNOWLEDGE AND USE OF ASPALATHUS SPECIES IN SOUTH AFRICA

4.1 Current and historic use of *Aspalathus linearis* based on interviews conducted with communities

The traditional use of rooibos is still a vibrant culture in South Africa. Rooibos has a highly localized natural distribution although it has found an international following as a tea and an ingredient in cosmeceuticals and dermaceutical products.

The communities interviewed in this study had resided in a region, on average, for 30 years and participants who were partaking in the rooibos and honeybush industries were, on average, 47 years old (Table 1). Just more than half of the interviewees were currently using rooibos in their households, with an additional group of interviewees indicating use of both rooibos and honeybush. Of note was the long history which the interviewees had with the area in which they lived, with the average length of time which an interviewee's family had been settled in an area being 7,57 generations. Assuming each generation is 25 years in length, the average length of time that interviewee's families have been settled in an area was 194 years. Some interviewee's families have been farming within the region since the 1700s. Interviewees which were not related to a household, but rather played a different role in the community (i.e. business owner) also had a relatively long history in an area, amounting on average to 29 years (which is a relatively long period for a business to be in an area).

Table 1: Demography of interviewees for both rooibos and honeybush consumption

Gender of interviewee (% of interviewee's)		Avg Age of Interviewee's (years)	Avg Length of Time Lived in the Community (years)	Users of the species (% of interviewee's)			Avg Number of Generations* in the Community (number)	
Male	Female			Rooibos	Honeybush	Both species	Interviewee= Family of Household	Interviewee= Business Owner
64	34	47	30	54.8	33.3	9.5	7.57	1.17

*Assumes one generation denotes 25 years in the community.

Current rooibos uses by interviewed communities are numerous, including use as tea for relaxation (as is generally accepted), to manage high blood pressure and for the treatment of stomach related ailments in both adults and children. It is said to be highly effective as a treatment for colic and used for treating nappy rash and a variety of skin disorders including eczema. A summary of the uses of rooibos is indicated in Table 2. It has varied internally and externally medicinal uses and for recreational purposes such as relaxation and stress relief. Medicinal uses which were identified included use in herbal mixtures or alone to assist with colic; hypertension and hypotension; chest ailments and diarrhoea. It is said to stimulate appetite, assist immune-boosting and is used for the blood circulation and kidney ailments. Rooibos is often administered with other herbs for treating

diabetes; eczema (internally and externally). It has found a place for the treatment of a variety of stomach ailments especially irritable bowel syndrome. Others are using it for oral health.

A high degree of the interviewees affirmed the region particularly, Eselbank, as a region with the best quality wild rooibos tea which is regarded as being 'strong' and highly effective medicinally.

Table 2: Current uses of rooibos as described by interviewees in the study

Medicinal Uses	Herbal mixtures:	Cosmetic and dermaceutical uses	Horticultural uses	Other uses:
• drink as tea; • relaxation and stress relief; • colic; • hypertension and hypotension; • chest ailments; • diarrhea; • immune-boosting; • blood circulation; • kidney ailments; • diabetes; • eczema (internally); • stomach ailments; • irritable bowl syndrome; • oral health	• Rooibos and Chamomile: - irritable bowl syndrome • Rooibos and Buchu:- cough and colds • Rooibos, Buchu and Wild garlic:- colds and flus	• skin disorders; • astrigent; • relieve puffy eyes; • soothing skin treatment; • Scalp treatments; • skin problems such as acne and pigmentation	• mulch; • fertilizer; • soil mix	• cooking; • jam making

*Some remedies are not included as the respondents were not willing to share the information; **Farming of cattle has resulted in the disappearance of some of the honeybush teas with location of plants being largely now in what are private farming lands.

Rooibos is also included in skin care products, used to treat such conditions as eczema and other types of dermatitis, assisting with dry skin and for treating minor skin wounds. The knowledge of the use of rooibos as a skincare product has been passed on from one generation to another.

Rooibos has found a place as a remedy that is used together with other medicinal herbs and as a carrier that assists in the consumption of polyherbal mixtures. Both traditional uses and new ways of using rooibos are popular in rural and urban centres. As a skin ailment, treatments include uses for acne and for soothing effects of an irritated skin and /or puffiness.

Rooibos is also being used for farming purposes and may be included in soil mixtures to assist with mulching and fertilization of the soil.

4.2 Traditional Knowledge of the Use of *Aspalathus linearis* by Interviewed Communities

The outcomes of interviews conducted in the Cederberg region, the natural habitat of rooibos, *Aspalathus spp.*, clearly showed a sense of pride and higher-level, in-depth traditional knowledge in terms of rooibos, when correlating this to their longstanding history in the Cederberg region (irrespective of genetic lineage).

Interviewees were emphatic indicating that there was little recognition of their knowledge pertaining to rooibos, which they believe originated in their community. There have been no benefit-sharing agreements which these particular communities, despite rooibos being perceived as 'big business' by interviewees. Communities within the rooibos natural habitat remain inherently poor and without adequate facilities.

Interviewees associated the knowledge of rooibos to the indigenous people (KhoiSan) and in turn, believe that the local people transferred this knowledge to the European settlers, particularly the Moravian Missionaries. Interviewees made statements such as: '*When the missionaries found the village in 1829, there were four KhoiSan families who lived in the village and introduced rooibos to them from the wild. We as the descendants of the KhoiSan taught the uses of rooibos to the Moravian missionaries*' (Barend Salome, personal communication). Interviewees thus linked the knowledge of rooibos to the Khoi-San communities that reside in the Cederberg region and indicated that the benefits of this knowledge should be linked to people that are living within the area where rooibos is endemically found.

Participants within the Wuppertal valley iterate the important role played by the Moravian Church in the globalization of rooibos through export of traditional knowledge related to its uses and introduction of the tea for consumption in Germany for instance. The Moravian Church continues to have a critical role in the rooibos industry and own much of the land which forms part of a cooperative amongst the local people of the valley.

Several interviewees from the Eselbank community believe that the knowledge of rooibos originated directly from their region and that benefit-sharing for their traditional knowledge of the use and commercialisation of rooibos should be provided to them. Interviewees indicated that the economic benefits never reach their community and they remain impoverished and socio-economically marginalised.

Figure 10 shows the interviewees responses to the question of where they gained their knowledge of rooibos. A large majority gained knowledge from their immediate family elders and from community elders.

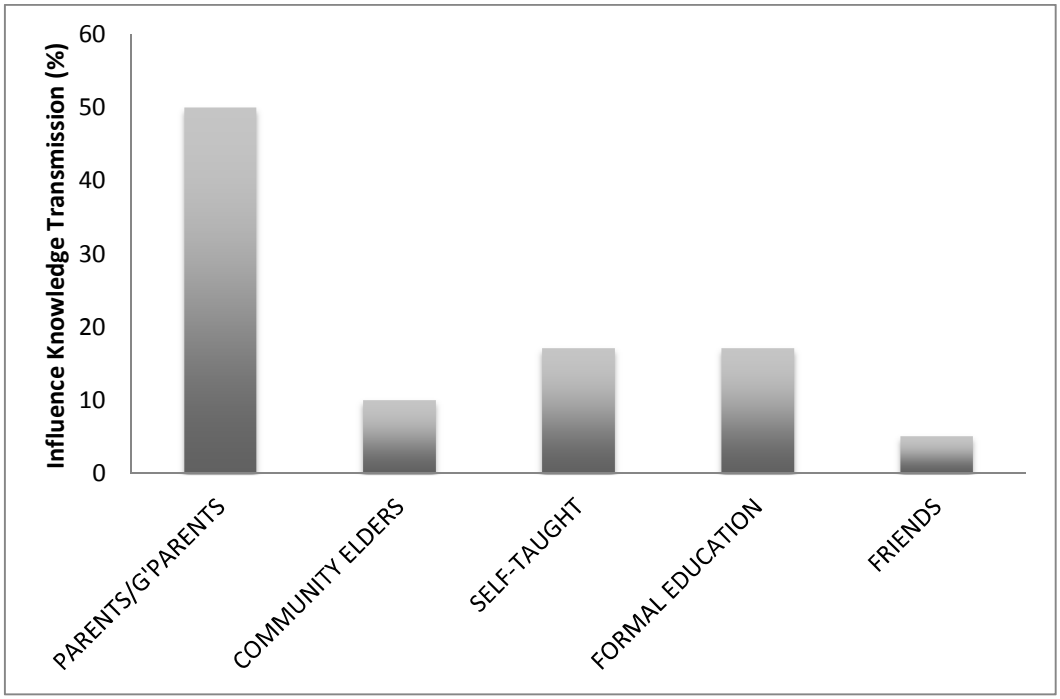


Figure 10: Source of transmission of TK related to rooibos in communities

All of the participants indicated that there is a need to continue to teach the younger generation on all aspects related to rooibos utilization and its domestication. There is a strong sense that by not protecting their TK and sharing it for future generations, this has led to the knowledge 'no longer being in their own hands but it is now in the hands of multinationals' and they feel very strongly about rooibos as it is not only drunk as a tea but is intimately linked to their heritage.

Interviewees emphasise that the current uses of rooibos are linked to ancient knowledge derived from their ancestors. The transgenerational link to transmission of TK linked to rooibos is evident. Communities acknowledge the various medicinal uses of rooibos (Table 2) as largely linked with the knowledge passed on through a maternal pattern with mother and grandmother being their source of knowledge irrespective of gender.

The depth of knowledge regarding rooibos is particularly rich in the Cederberg and in places where the plants are naturally found. For instance, rooibos may be administered when a liquor is generated from it and this is placed on a minor skin wound to facilitate its healing (Barend Salome, personal communication). This is valid as alcoholic extractions extract a wider range of chemicals which may possess antimicrobial activity.

Knowledge linked to the wild harvesting and also cultivation of rooibos is also associated with a parental route for transmission but grandfathers and fathers were identified as the person(s) that have taught on aspects related to wild collection through oral histories in the form of stories. Currently, sharing of knowledge with respect to cultivation at a community level is occurring and this represents horizontal pattern of TK transmission. Harvesting takes place after the plants have flowered and generated seeds indicating a concern for sustainability of wild

populations of rooibos. The knowledge on the processing of rooibos is evident in communities and this is generally associated with knowledge which has been passed on through female members of a family.

There are regional differences in terms of the use of rooibos in the various regions is shown in Figure 11. Although rooibos is used as a tea across the region, areas where rooibos is said to have originated seem to have a broader knowledge of the various uses of the species for other purposes (i.e. Cederberg and Granadal).

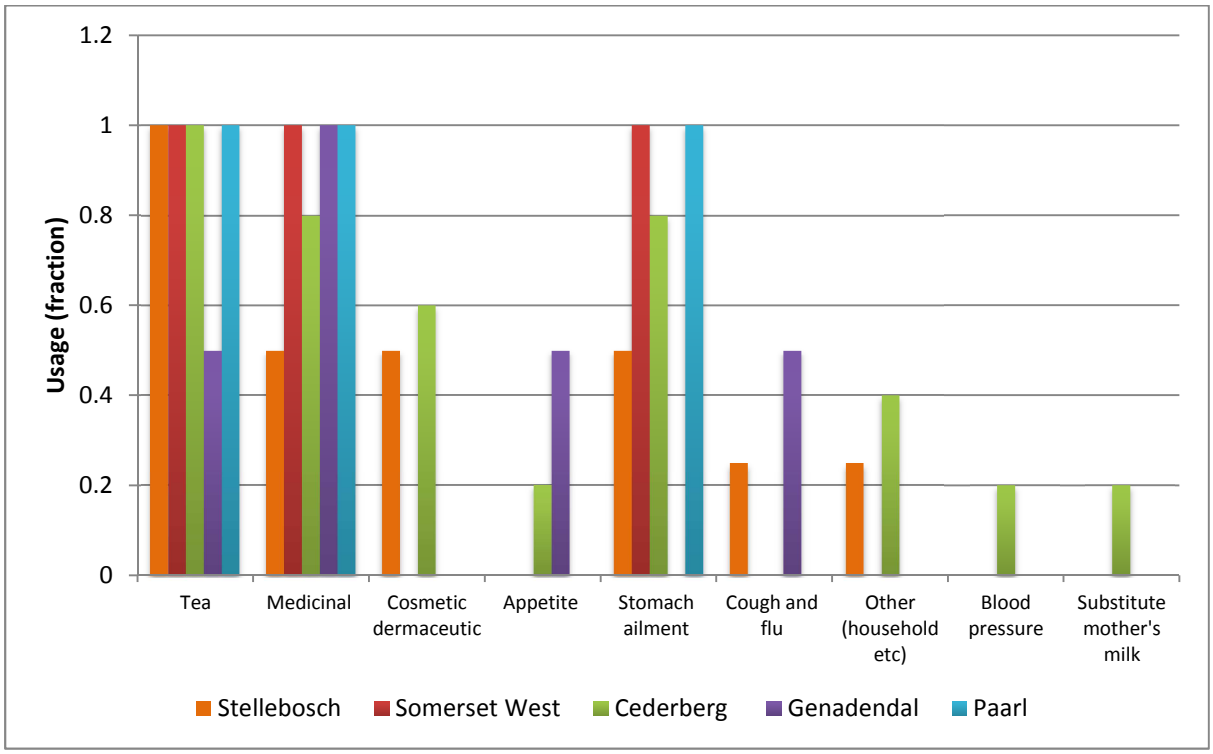


Figure 11: Differences related to current uses of rooibos in the various regions

The level of knowledge when compared to the number of generations that are linked to that area appears to have a negative relationship as the diversity of uses is limited in areas where the communities have been living there for extended periods of time (Figure 12). They have a more conservative approach to using rooibos, preferring to use rooibos as a single herbal medicinal product.

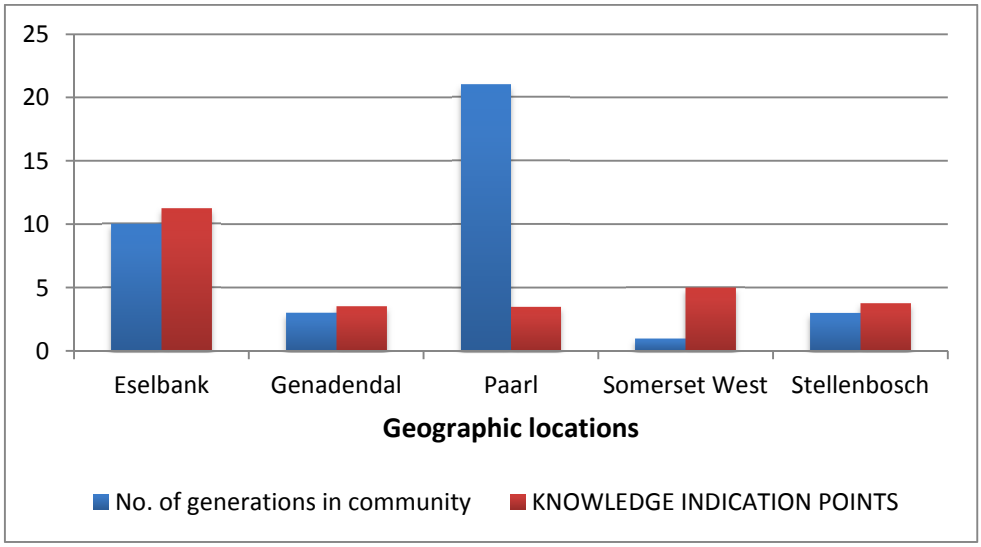


Figure 12: Comparison of the number of generations spent in a geographic region linked to rooibos versus the knowledge indicator score

In areas where rooibos is not naturally found but it is still used as a product, self-experimentation and formal education are routes which have been identified for gaining knowledge on its medicinal uses. This is usually in those areas which are linked to more urban centres where access to internet for instance is high. These areas are also engaging in using rooibos for a variety of different reasons; including as a mulch in agriculture.

In the Cederberg, the role of the *Ginsberg's in commercialisation of rooibos is acknowledged by communities but they express that it is their heritage which has been learnt from their forefathers*.

4.3 Traditional Knowledge of the Cultivation and Harvesting of *Aspalathus linearis*

At the community level wild harvesting dominated, with farming occurring on a minor scale. In areas such as Wupperthal, where rooibos is linked to a long standing history, only 7.14% of the rooibos is produced as a domesticated crop.

Wild harvesting practices and processing of rooibos was linked by interviewees to indigenous knowledge of the indigenous people. Wild harvesting takes place in January to February, as these were the best months for wild collection. Interviewees indicated that collection by hand was favoured as it allows for better regrowth and budding of plants. Plants were given a two year resting period between harvests.

Related to cultivation of rooibos, interviewees in the Cederberg indicated agricultural practises which correlate closely with published literature. Planting is conducted in August and September, with plants allowed to grow for three years before harvesting takes place. Cultivators who are farming on the Moravian church land in the area indicated that rooibos tea is largely susceptible to pests and fungi (see Box 1 for more details on the Moravian church history in The Cederberg). Yields are severely affected by these and they do not have the '*money to buy*

commercial organic fungicides and pesticides'. This then severely limits their capacity for high-scale cultivation. However, the community showed a high level of interest to be able to farm rooibos organically, with many participants indicating that they were eager to have greater participation along the entire rooibos commercialisation value chain.

Interviewees indicated that there are different varieties of rooibos which are better in terms of their fermentation. For instance, the 'langbeen-tee' should not be collected as it does not ferment that rapidly.

Box 1: History of the Moravial Church in the Cederberg[55]

The history of the Moravian Church in South Africa goes back to the founding of the first Protestant Church in Bohemia (now Czech Republic) as a breakaway from the Roman Catholic Church. In 1737 Georg Schmidt was sent to South Africa to convert the Khoi-Khoi. The government of the Dutch colony opposed his work. Because of his success in teaching the Khoi-Khoi and the baptism of five converts he was obliged to leave in 1744. During the fifty years after his departure the work was continued by the converts. In 1793 the mission enjoyed official recognition and a hopeful new beginning was made. The mission settlement flourished with people from different tribes joining. The work expanded tremendously in the Western and Eastern Cape. At a general synod at Herrnhut in 1868 it was decided to divide the work into two provinces, South Africa West & South Africa East.

The first missionary institution in the Cape Colony was established in 1737 at Genadendal, previously known as Baviaanskloof, by George Schmidt, a Moravian. The colonial government granted these lands on concession, as they did with Mamre (est. 1808), Enon (est.1818), Clarkson (est.1841) and others. The government however refused to grant mission authorities full and unconditional ownership to land that was "reserved" or "set aside" for mission purposes.

Broadly speaking a second epoch of the "missionary enterprise" commenced with the promulgation of the Cape Ordinance 50 of 1828, in terms of which the "Hottentots" were "liberated" within the Cape Colony, and the British Act 73 of 1833, which liberated slaves throughout the British Empire (Marais, 1957, 155). During this era, with increasing liberal and philanthropic pressures being exerted on the colonial government, mission stations were allowed, for the first time, to acquire and own land in their own name. It was during this era that the land at Elim was acquired (1824 onwards) and the first Rhenish institution, also a "purchase" institution, came into existence at Wupperthal in 1830. Land at Elim and Wupperthal was acquired during the second period through purchase as opposed to the grant acquisition of the former era.

The Moravian Church has been undergoing processes of tenure reform on its land since the 1980s. With the signing of the Genadendal Accord in 1996 the Church and the State committed themselves to work together regarding land reform and development on Moravian land. This commitment continues and the programme is being overseen by a Steering Committee involving various structures of the church, officials of the Department of Land Affairs and the Legal Resource Centre (LRC).

4.4 Commercialisation of *Aspalathus linearis*

Rooibos is one of the indigenous plants with a long history in South Africa. In 1772, Carl Thunberg, the Swedish botanist, first recorded rooibos tea as used as a health-beverage by the local people[39].

[55] taken from www.oikoumene.org

In the early 20th century, rooibos tea had no commercial value but today it is a well- known herbal tea, enjoyed in more than 37 countries with Germany, Netherlands, United Kingdom, Japan and the United States of America representing 86% of the export market in 2010[37]. Furthermore, it has been stated in a recent report by the Swiss Business Hub South Africa that '*rooibos appears to be headed towards becoming the second most commonly consumed beverage tea ingredient in the world after ordinary tea*'[56].

Seven ecotypes of *Aspalathus linearis* have been identified on the basis of flavonoids and tea colour[57]. Of particular interest is the commercially grown 'Nortier' form which is a shrub-type re-seeded and is thought to originate from the Pakhuis area of the northern Cederberg[42] . The cultivated Nortier type was selected from plantings by Dr. P le Frais Nortier and associates in the 1930s using seeds from the Pakhuis Mountains of the Cederberg, collected by himself and local Khoisan people[58&39]. The selection of the Nortier type was based on priorities at the time, such as growth rate, seed production and especially taste.

Rooibos tea is currently produced from cultivation of the crop on farms around the Greater Cederberg Biodiversity Corridor of the Western Cape Province of the country (Figure 13). In 2010, Kaiser Associates estimated that there were 350 to 550 rooibos farmers in South Africa, cultivating approximately 36 000 hectare of rooibos[59]. Most of these farmers, who also farm livestock and other crops, are suppliers to and shareholders of the Rooibos Ltd[60]. Approximately 150-160 of the farmers are small-scale previously disadvantaged farmers belonging to two co-operatives, namely Wupperthal (Western Cape) and Heiveld (Northern Cape). Only 10-15 of emerging farmers are shareholders in Rooibos Ltd[60].

[56] Anon (2007). South Africa Sector Report Food and Beverage Industry. Swiss Business Hub South Africa, Pretoria, South Africa.

[57] Van Heerden, F.R., Van Wyk, B.-E., Viljoen, A.M., Steenkamp, P.A., 2003. Phenolic variation in wild populations of Aspalathus linearis (rooibos). Biochemical Systematics and Ecology 31, 885–895.

[58] Cheney and Scholtz (1963) in Morton J.F. (1983). Rooibos Tea, Aspalathus linearis, a Caffeineless, Low-Tannin Beverage Author(s): Economic Botany,37 (2): 164-173.

[59] Street R.A. and Prinsloo G. (2013). Commercially important medicinal plants of South Africa: A review. *Journal of Chemistry*, 2013. Article ID 205048, 16 pages, http://dx.dot.org/10.1155/2013/205048

[60] Trade and Investment South Africa (2004). CSP Development for Rooibos Sector. Unpublished Report.

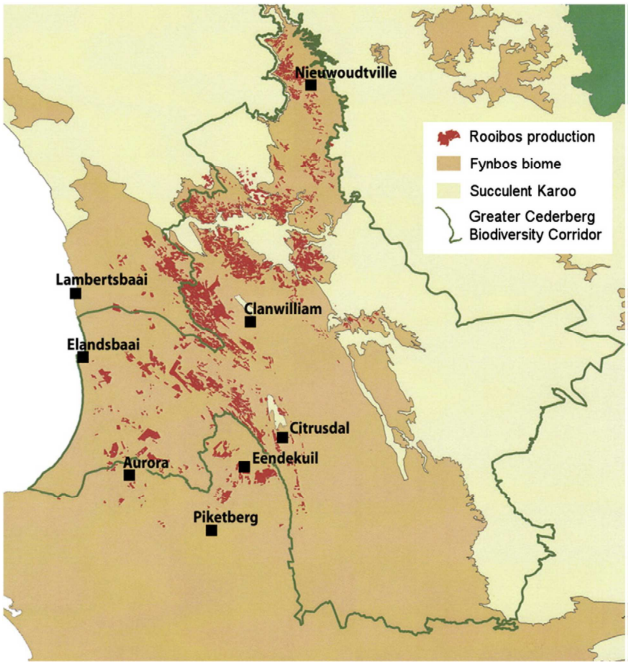


Figure 13: Production areas of *Aspalathus linearis* in and around the Greater Cederberg Biodiversity Corridor (taken from [37])

Cultivators of rooibos generally plant seeds in February and March and then transfer the seedlings to plantations which take 12-18 months before the shrubs are ready for harvesting. Young plants are topped to a height of 30 cm after 8 months to stimulate branching, with actual harvesting of a crop only occurring 3 years after planting[61]. *Aspalathus linearis* plants have a 5-year cycle and are harvested once each year, from December through April. Rooibos tea is harvested in an environmental sound manner. The harvesting is normally done in a conservational manner by only cutting the young branches and older branches left on the plant to promote plant growth.

Traditional or conventional harvested rooibos stems and leaves are 'fermented' to develop its characteristic red-brown leaf and infusion colour, and pleasant, slightly sweet flavour[37]. Although modernised, the processing steps employed today are still based on the traditional method. Cut shoots are transported to a process yard where it is finely chopped and bruised to release the chemicals which characterise the colour and flavour of rooibos tea[62]. Following production, and prior to marketing, the rooibos value chain has four main processes, namely:

- First level processing – includes the process of changing the wet unfermented tea into red brown tea. Processing of the harvested material, through fermenting and drying, results in a 3:1 loss of weight, with an average dry yield per hectare being about 300 kg.

[61] Kaiser Associates Economic Development Practice (2010). Rooibos and Honeybush market development programme framework. Revised final report. Western Cape Department of Economic Development and Tourism.

[62] Govender M. (2007). ***Aspalathus linearis*** (Burm.f.) R.Dahlgren. [Online]. Available: http://www.plantzafrica.com/frames/plantsfram.htm

- Second level processing – second level processing follows at a processing plant and includes pasteurisation, sieving and dust extraction.
- Third level processing – in-house packing and retail contract packing
- Value-adding manufacturing – instant teas, nutraceutical extracts, ice teas, cosmetics, etc.

According to Kaiser Associate (2010), in 2010 four manufacturing companies specialised in the different types of extracts that can be produced from rooibos, Afriplex, Afrinutrals, Brenn-O-Kem and Rooibos Ltd[61]. Afriplex is the largest manufacture of rooibos extract, producing 20 to 30 tonnes of extract per year. Afrinaturals and Brenn-O-Kem trade in smaller quantities of extracts, while Rooibos Ltd is the only company to have an extract facility dedicated to rooibos extract[61].

According to the Kaiser Associate (2010) report, secondary processing of *Aspalathus linearis* in South Africa is dominated by eight large processors responsible for an estimated 90% of the market - Rooibos Limited, Khoisan Tea, Coetzee & Coetzee, Cape Natural Tea Products (CNTP), King's Products, Red T Company, Big Five Rooibos Company, and Maskam Redbush[61]. Rooibos Ltd, the market leader in this value chain, is retaining the largest share of both the local and international markets (90% and 60% respectively) [61].

4.4.1 Commercialisation of Aspalathus linearis as a Tea

According to Tiedtke and Marks (2002)[63] rooibos tea is caffeine-free, low in tannins (about half that of black tea[5]) and rich in minerals and flavonoids, which are known to be antioxidants.

The rooibos tea industry has seen a number of milestones and developments since the early years of production. Some of these are outlined in the section below (taken from various sources but based largely on the history of rooibos provided by the South African Rooibos Council).

Early years: Although literature is limited on the traditional use of rooibos, it is believed that more than 300 years ago, the indigenous Khoi-Khoi tribe of the Cederberg and Elephants river valley region of the Western Cape discovered that the leaves of the rooibos plant can be used as a tasty, aromatic tea[40]. Apart from the use as a beverage, literature indicates the Khoi-San also traditionally used the rooibos beverage with medicinal and therapeutic properties to sooth digestive disorders, reduce nervous tension and promote sound sleep[15&64].

[63] Tiedtke D. and Marks O. (2002). Rooibos – The New "White Tea" for Hair And Skin Care. Cosmetochem International Ltd., Sennweidstrasse 44/46, CH-6312, Steinhausen/Zug, Switzerland

[64] Small E. and Catling P. M. (2009) Blossoming Treasures of Biodiversity. *Biodiversity*, 10:2-3, 113-119, DOI: 10.1080/14888386.2009.9712853

The rooibos plants were traditionally wild harvested using an axe, bruising the leaves with a hammer and allowing the leaves to ferment and dry in the sun[65]. Cuttings were placed in boiling water, allowed to simmer throughout the day, with more water being added when necessary[31].

1772: Carl Thunberg, a botanist from Europe who visited the Cape in 1772, first reported this use of the rooibos plant as a tea[39]. Early settlers adopted the practice of utilising rooibos as a tea, lopping the bushes as needed[39].

Early 20th century: In the early 20th Century, Dr Le Fras Nortier stated the first research studies on rooibos for its medical value and agricultural potential, recognising the ease of cultivating the plants[65].

1904: In 1904 a Russian immigrant to South Africa, Benjamin Ginsberg, recognised the potential of this unique "mountain tea" when he met Khoi-San people in the Clanwilliam region of the Western Cape[39]. He started trading in rooibos that he had bought from the Khoi-San communities, selling the product to European settlers who arrived at the Cape[66;67&37].

The Ginsberg family has been involved in the European tea industry for many generations, and thus became the first exporters of rooibos from South Africa[65]. Ginsberg domesticated the rooibos plant on a small scale and founded B. Ginsberg (Pty.) Ltd., of Cape Town.

1930s: The growing of rooibos as a commercial product was stimulated by the work of Dr P. le Fras Nortier on the Klein Kliphuis farm at Clanwilliam. The first plantations were established by friends of Nortier, Oloff Bergh and William Riordan[39]. Local people were paid to collect *Aspalathus linearis* seeds for planting. Interestingly, literature shows that local women always collected and submitted the most seeds. When she was asked how they achieved this they indicated that she had followed a black ant carrying a seed to its hill where a large cache of rooibos seeds could be found. Based on this insight, ant hills became the focus of seed collection with some of these hills yielding as many as 25,000 seeds[68&39].

1932: Marloth published an account of medicinal uses of South African plants, with several original anecdotes of these uses. Watt and Breyer-Brandwijk listed rooibos as a South Africa medicinal plant, without giving any detailed specification of its medicinal use[31].

1947: Due to shortage of the available Oriental tea during the 2nd World War, demand for rooibos tea grew. Despite growing rooibos exports, Ralph Holt Cheney, in 1947, still considered rooibos tea to be insignificant to mention in his report "The biology and economics of the beverage industry" [39].

[65] South African Rooibos Council (undated). [Online]. Available: http://www.sarooibos.org.za/research
[66] Cant M. and Machado R. (1999). Marketing success stories. New York: Oxford University Press.
[67] Carter L. (2005). South Africa. Rooibos tea. TED case studies No. 777.
[68] Heard and Faull (1970) in Morton J.F. (1983). Rooibos Tea, Aspalathus linearis, a Caffeineless, Low-Tannin Beverage Author(s): Economic Botany,37 (2): 164-173

1948: Literature indicates that the rooibos tea market collapsed after the World War II, largely due to the scarcity of high-grade seed leading to the marketing of inferior grades of the tea[39]. This decline resulted in rooibos producers establishing the Clanwilliam Tea Cooperative.

1954: The Clanwilliam Tea Cooperative requested the Minister of Agriculture to appoint a Rooibos Tea Control Board to regulate rooibos marketing, stabilise prices, and improve and standardise quality.

1963: The growing interest in the rooibos industry culminated in Cheney and Elizabeth Scholtz recognising the value of the tea by including a review of rooibos botany, culture, harvesting and marketing in an article entitled "Rooibos tea, a South African contribution to world beverages"[39].

1968: Rooibos tea remained and still remains first and foremost a South African beverage. Mrs Anneque Theron, a South African mother from Pretoria, who was struggling with a colic infant was the first to place the spotlight on health benefits of rooibos. Her approximately 1-yr-old infant was allergic to milk, suffering from stomach cramps, vomiting and restlessness, and was only able to tolerate a soybean formula[39&31]. Mrs Theron added some hot rooibos tea from her teapot to her child's bottle to hasten the warming process. The additions to the bottle (according to literature) resulted in the child relaxing. Mrs Theron continued to give the child rooibos in the bottle, resulting in her gaining 2 kg in weight in the next 10 days and her digestive trouble vanishing[39]. She published a book on her findings called "Babas, Allergiee en Rooiboste" and went on to launch a full range of health and skin care products with rooibos as the basic ingredient[69&39]. Ms Theron was the first to produce value-added products into the market utilising rooibos in her extensive cosmetic care range containing rooibos extract[70].

1984: Rooibos made headlines in Japan as an anti-ageing product.

1993: The Rooibos Tea Control Board was converted into the fully privatised company Rooibos Limited.

1994: A legal battle ensued between American and South Africa rooibos producers related to the opportunistic trade marking of the term 'rooibos' in the USA. South African producers set out to reclaim the right to use the generic term in marketing[37]. As a result of this legal wrangle, South Africa has developed a Geographic Indication (GI) for rooibos[71]. A GI is a geographic location specific label which is reserved for products which stem from a specific area (other examples are Champagne and Tequila)[72]. A GI for the rooibos is largely a

[69] Rooibos Tea Control Board (1982) in Morton J.F. (1983). Rooibos Tea, Aspalathus linearis, a Caffeineless, Low-Tannin Beverage Author(s): Economic Botany,37 (2): 164-173.

[70] Joubert E. and Schulz H. (2006). Production and quality aspects of rooibos tea and related products. A review. *Journal of Applied Botany and Food Quality*, 80: 138 - 144

[71] Gerz A. and Bienabe, E. (2006). Rooibos tea, South Africa: The challenge of an export boom. In: Van de Kop, P., Sautier, D., Gerz, A. (Eds.), Origin-Based Products. Lessons for Pro-Poor Market Development, Royal Tropical Institute (KIT), Amsterdam, Netherlands, pp. 53–63.

[72] Grazioli A. (2002). The Protection of Geographical Indications. [Online]. Available: http://www.iprsonline.org/ictsd/docs/GrazioliBridgesYear6N1January2002.pdf

defensive measure to prevent cultivation outside South Africa and to protect intellectual property rights. A GI certification attaches strict quality criteria to geographic cultivation of rooibos[37].

1995: Green Rooibos was developed in 1995 by the Agricultural Research Council (Infruitec) in South Africa. Green rooibos with higher antioxidant levels is used as a tea and for preparation of extracts for the food, cosmetic and functional beverage markets. The higher levels of flavonoids (antioxidants) in green rooibos, combined with its caffeine-free status contribute to its popularity in tea blends and cosmetic products[63&37].

2006: A new rooibos innovation in the form of an espresso, the first tea espresso in the world, was introduced to coffee shops and retail outlets.

Recent developments: Wild rooibos re-gained distinction in the rooibos market in recent years, with small-scale producers in the Cederberg (Wupperthal) and Southern Bokkeveld (Heiveld) supplying wild harvested rooibos under organic and fair-trade certification[73&74]. Communities involved in the wild rooibos industry are largely previously marginalised farming communities, comprising mostly Afrikaans speaking people from the original Khoi-San groups of the Cape region[75]. Literature estimates that this wild rooibos comprises only 2–5% of the annual production of rooibos tea annually[37].

4.4.2 Commercialisation of Aspalathus linearis as the Bioprospecting Industry

The history of bioprospecting with *Aspalathus* is largely undocumented. It is only the recent use of *Aspalathus* in various products that has been researched and documented.

Aspalathus linearis is not only traded as a tea, but also has interlinking value-added properties into products such as creams, bath products and soaps, fruit and vegetable juices cosmetics, in slimming products, as a flavouring agent in baking, cooking and cocktails and even as a treatment for infants who are prone to colic and those suffering from allergic skin conditions, such as eczema and nappy rash[39&76]. Value-added *Aspalathus linearis* products include extracts, instant powders and flavourings, with extracts being intermediate products used in industrial food ingredients (e.g. flavourants); in cosmetics and natural health products. There are three different types of extracts that can be produced from rooibos[61]:

1) Spray-dried powder extract which is used predominantly in beverages and functional foods;
2) Freeze-dried extract predominantly used in cosmetics and supplements; and

[73] Nel et al., 2007 in Joubert E. and de Beer, 2011). Rooibos (Aspalathus linearis) beyond the farm gate: From herbal tea to potential phytopharmaceutical. *South African Journal of Botany*, 77; 869–886

[74] Malgas R.R., Potts A.J., Oettlé N.M., Koelle B., Todd S.W., Verboom G.A. and Hoffman M.T. (2010). Distribution, quantitative morphological variation and preliminary molecular analysis of different growth forms of wild rooibos (Aspalathus linearis) in the northern Cederberg and on the Bokkeveld Plateau. South African Journal of Botany , 76: 72–81.

[75] Rampedi I. and Olivier J. (2008). The development path of rooibos tea—a review of patterns and lessons learnt for the commercialisation of other indigenous teas in South Africa. *International Journal of African Renaissance Studies* 3: 5–20

[76] Wesgro (2006). Natural Products Sector Brief. Wesgrow, Western Cape

3) Aroma extract for use in flavoured beverages, but without the functional benefits.

There are many claims, often unsubstantiated, as to the benefits of *Aspalathus* in various products today[77].

According to the literature, *Aspalathus* extract is currently utilised globally in functional foods, beverages and nutraceuticals and cosmetics and personal care products. Table 3 below shows the products, according to the literature, to which *Aspalathus* extracts (and sometimes raw rooibos) is added.

Table 3: Value-adding products, from the literature, which have been shown to contain rooibos

Functional foods, beverages and nutraceuticals	Cosmetics and personal care products
• Ready to drink beverages such as iced teas and fruit juices	Baby care products such as:
• Sports beverages	• nappy cream,
• Yoghurt	• tissue oil,
• Jelly	• body wash
• Bread	• shampoo
• Jam	Adult skin care and cosmetic products such as
• Chocolates	• bath sachets,
• Honey	• glycerine soap,
• Ice cream	• body lotion,
• Nutritional supplements (e.g. antioxidant capsules, vitamin supplements)	• sunblock,
• Pet supplements	• lip balm,
	• facial scrub,
	• eau de perfume,
	• scalp treatments
	• make-up

Studies by the University of Orange Free State, currently known as University of Free State in South Africa indicated that the tea contains over 40 polyphenol compounds and flavonoids, which act as antioxidants (Noxon) [77]. Rooibos also contains an assortment of minerals including calcium, copper, fluoride, iron, magnesium, manganese, potassium, sodium, and zinc. Rooibos is naturally caffeine-free and is low in tannins (Noxon) [77].

Scientific studies dealing with the value-addition of *Aspalathus* extracts to topical/cosmetic application are, however, very limited[37]. Tiedtke and Marks (2002) indicated the properties shown in Table 4 below**Error! Bookmark not defined.**.

Table 4: Properties and cosmetic application of rooibos (taken from Error! Bookmark not defined.**)**

PROPERTIES	SUGGESTED COSMETIC APPLICATIONS
• increased hair growth, prevents hair loss • adds brilliancy and smoothness to the hair	• Hair products
• good for acneic skin • anti-inflammatory • antimicrobial • soothing	• products for anti-acne, problems or blemished skin • baby products • aftersun products
• antioxidant	• skin care products especially those for mature skin

[77] Wilson N.L.W. (2005). Cape Natural Tea Products and the U.S. market: rooibos rebels ready to raid. *Review of Agricultural Economics* 27, 139–148.

• free radical scavenger • tightens skin, adds gloss and smoothness	
• powder form	• solid products (deodorant and blemish sticks) • powder based products (colour cosmetics) • products marketed as 'natural' or purely botanical-based • transparent or colourless formulations • white or pale-colours skin care products

The role of aspalathin, the major *Aspalathus linearis* flavonoid and antioxidant, has not yet been scientifically studied or explained[37]. Despite this, cosmetic use of *Aspalathus linearis* has been linked to its antioxidant, anti-inflammatory and antimicrobial properties[Error! Bookmark not defined.].

Literature also indicates the hair loss benefits of *Aspalathus linearis*[37], with a recent US patent application submitted for the protective effect of *Aspalathus linearis* extract in hair colour loss[78].

Apart from cosmetics, *Aspalathus linearis* has been utilised in functional foods and beverages (yohgurt, drinking yogurt, ready-to-drink iced tea, jam and 'instant cappuccino), nutraceuticals and in the pet food and pet skin care products[37].

Like many plants which are used in cosmetics, *Aspalathus* has a long history of medicinal use[Error! Bookmark not defined.]. According to Joubert and de Beer (2011) pharmaceutical product applications of rooibos have not yet been exploited, but opportunities are likely to emerge as the phytopharmaceuticals markets develop and expand[37]. Rooibos extracts, usually combined with other ingredients, are available in pill form, but these products fall in the category of dietary supplements [37].

Despite the lack of scientific clinical trial studies of the health benefit of *Aspalathus*, it has been and is recommended for wide range of ailments[Error! Bookmark not defined.]:

- stomach and digestive problems
- antispasmodic properties
- allergies such as hay fever and asthma skin problems such as eczema, nappy rash and acne; applied topically has a soothing effect on the skin
- nervous problems, it acts as a relaxant and aids sleep
- ageing related problems due to its antioxidant activity.

Recent human studies have illustrated the potential of rooibos and its constituents to prevent and treat heart disease, while animal studies are pointing towards the potential role that rooibos can play in preventing and controlling diabetes[48].

[78] Joppe H., Hermann M. and Wiedemann J. (2009). Use of rooibos extract for the protection of hair colour. U.S. Patent Application No. US 2009/0104298 A1. In Joubert E. and de Beer, 2011. Rooibos (Aspalathus linearis) beyond the farm gate: From herbal tea to potential phytopharmaceutical. *South African Journal of Botany*, 77; 869–88

A recent market sizing of bioprospecting in South Africa, conducted by DEA (undated), found that of the 549 products found on the shelves of surveyed stores or from the internet search, 92 (17%) were products that contain *Aspalathus* spp[79]. Table 5 below shows that the majority of these products fell within the cosmetic and personal hygiene product categories. Rooibos cosmetic products included facial creams and products such as lip balms, toners and masks; while the personal hygiene products are dominated by oils, soaps, mouth products, body lotions, sunblock, shampoo and conditioners[79]. *Aspalathus* was used as a flavourant in iced tea, children and baby juice and slimming and metabolism teas.

Table 5: Number and percent of products containing *Aspalathus*, by category, from the survey of retail and specialist stores[7979] .

Product Category	No. of products	Percent of *Aspalathus* products
Complementary medicines	4	4%
Cosmetic	41	45%
Food Flavourant	16	17%
Personal Hygiene products	31	34%

The same market sizing, showed *Aspalathus spp* containing products could be found in retail stores such as Spar, Checkers, in specialist stores such as Clicks and Dischem and in health stores[79]. Companies manufacturing *Aspalathus spp* containing products included international organisations such as Aspen, Lather Unusual, and MichalGamera, Unilever, as well as African organisations such as[79]:

Herbex	EcoPure	Nature Fresh
African Extracts	Elain Dew	NutriLida
African Organics	ESSE	Nutripak
Amila	Herb Hair	Oh So Heavenly
Basix	Herbex	Oros
Bokomo	Innesense Vanilla	Phyto-nova
Clicks	Natrol	Sunumbra

Apart from Rooibos Ltd, Rampedi and Olivier (2008) indicated that there were over 200 medium-size enterprises involved in the production of rooibos products (chiefly tea) in the Western Cape[75].

4.5 Industry perceptions of traditional knowledge of *Aspalathus Linearis*

Academia, in many cases, support community assertion that the traditional knowledge of the use of *Aspalathus* stems from the Khoi and San communities in the area of *Aspalathus* products, with academic making statements related to rooibos ***tea*** such as:

[79] DEA (undated). A Study of the Scope and Extent of the Utilisation of Indigenous Resources by Bioprospecting Industries in South Africa. Unpublished report.

- *the Hottentots' use of this plant for beverage purposes was first reported by the botanist Carl Thunberg in 1772 (Thunberg, 1795-1796). Early settlers adopted the practice, lopping the bushes as needed, chopping the branches with axes, bruising with mallets, and letting them cure in heaps[39].*
- *the first person to realise the commercial potential of rooibos as a herbal tea was Benjamin Ginsberg, a merchant of Clanwilliam, who started marketing it in 1904.* ***He obtained the tea from descendants of the Khoi who crudely processed it during the warm summer months.*** *It was, however, only by 1930 that the agricultural value of rooibos was recognised by a medical practitioner and nature lover, P. Le Fras Nortier of Clanwilliam[37].*

Industry interviews on the other hand showed a strong perception that there was a weak link between local communities and the origin of TK for rooibos. Industry relies on the belief that there is no conclusive evidence that TK of rooibos rests with any particular community. Individual stakeholders in the rooibos industry point to research by Le Clerque which is believed to indicate that *the San people were probably the first to discover and use rooibos, though no reference exists in the 18th and 19th century's literature[27]*. This is largely linked to the literature which indicates that in 1772 Carl Thunberg, a botanist from Europe who visited the Cape, first reported the use of the rooibos plant as a health-beverage by the country people. The chief arguments is that the term 'country people' could cover both the local San community and settlers that had already settled in these naturally occurring areas of rooibos.

Much of the recent literature however does support the beliefs of the community, attributing TK of rooibos to the Khoi and San people residing in the Cederberg region of the Western Cape.

5 TRADITIONAL AND COMMERCIAL KNOWLEDGE AND USE OF *CYCLOPIA SPP.* IN SOUTH AFRICA

5.1 Current and historical use of *Cyclopia spp.* by interviewed communities

A wide range of uses are indicated for *Cyclopia* by interviewees in this study, with it being popular as a tea in areas where it grows.

Virtually all users ascribe to it being a tea that is used for stress relief (Table 6). Medicinal uses of honeybush were also linked to the regulation of blood pressure and it is said to be useful as a blood cleanser and for purposes of blood circulation. Honeybush may aid with stomach ailments and is used to relieve constipation and may be able to provide nutrition for both babies and animals. It may be used to treat colds and flus in combination with other herbal remedies. It is used by many Rastafarian herbalists to mask the bitter taste of other medicinal herbs and is thus used as a carrier tea in many herbal remedies. Claims to use of honeybush to treat epilepsy together with other herbal remedies was noted amongst the bushdoctor communities. Honeybush is also useful for treating skin ailments including acne and eczema and there are differences in prevalence of use amongst the different species of honeybush. Honeybush has a growing following for use for culinary purposes and these include making jams and fermented ice-teas, honeybush wine and brandies. Table 6 provides a summary of uses for honeybush.

Table 6: Medicinal uses of honeybush as indicated by communities interviewed in this study

Medicinal Uses	Herbal mixtures:	Cosmetic and dermaceutical uses	Horticultural uses	Other uses:
• drink as a tea; • relaxation and stress relief; • colic; • hypertension and hypotension; • chest ailments; • diarrhoea; • immune-boosting; • blood circulation and blood cleanser; • kidney ailments; • diabetes; eczema (internally); • stomach ailments; • constipation; • appetite stimulant; • breastfeed (stimulate milk in the mother); *provide nutrition for the baby and animals when mother's milk dries up*; colds and flus; cosmetics;	• mask the taste of other bitter medicinal herbs; • carrier tea for other herbal remedies; • epilepsy (together with other herbs)	• soothes the skin; • acne	• mulch; • fertilizer; • soil Mix	• jam; • fermented Ice-tea; • honeybush brandy; • honeybush wine;

*Some remedies are not included as the respondents were not willing to share the information; **Farming of cattle has resulted in the disappearance of some of the honeybush teas with location of plants being largely now in what are private farming lands.

Italics: *This may be newly recorded from a participant that was over 80 years old*

5.2 Traditional knowledge of the use of *Cyclopia spp.* by interviewed communities

According to interviewees, the traditional knowledge of honeybush is closely linked to the Khoi-San ancestry of communities where these plants are naturally found. The manner in which the plants are used is also said to have been traced from the oral histories linked to the Khoi-San. Communities have a strong sense of this knowledge belonging to those with a Khoi-San heritage and several stories pertaining to honeybush being traded amongst different groupings of people in the past are also recalled, particularly by members of the Haarlem communities.

Like rooibos, Figure 14 shows that the greatest source of knowledge of use of honeybush stems from immediate family and community elders. Parents and grandparents play a pivotal role in the transfer of knowledge related to the uses of honeybush.

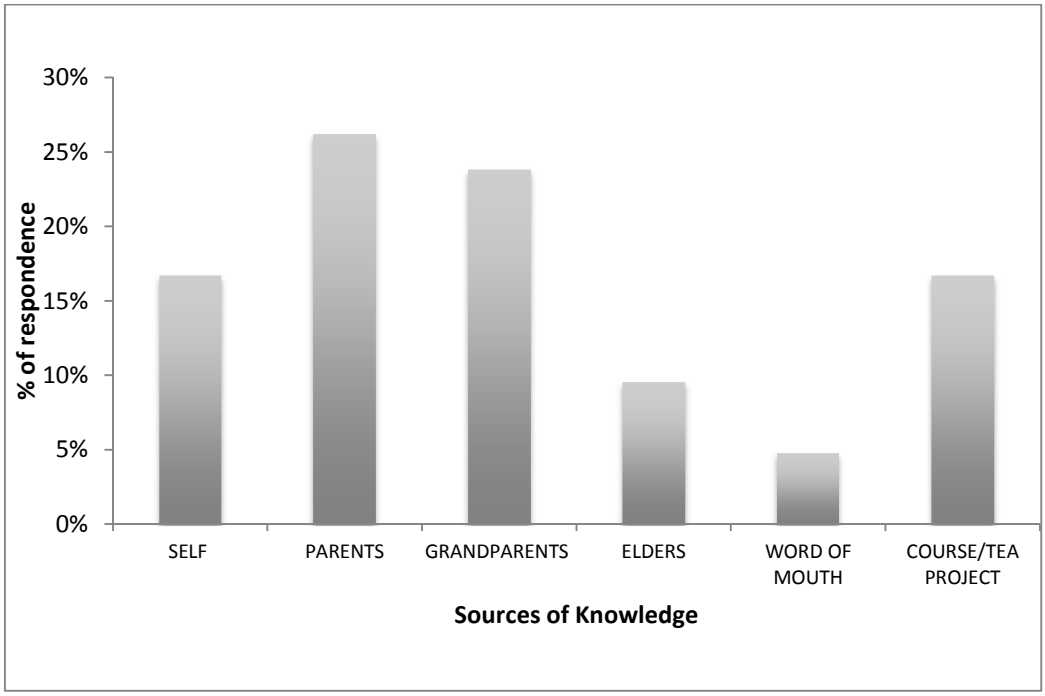


Figure 14: Knowledge transmission – honeybush

It is interesting to note in Figure 14, the impact self-experimentation and self-study as 15% of the respondents indicate that they are continuously gaining new knowledge regarding honeybush as the primary literature on honeybush efficacy increases. Even so, TK is directly linked to the KhoiSan descendants who are within the geographic areas where honeybush grows as wild populations.

In some instances, new knowledge of how to plant and grow honeybush has a vertical transfer route with communities interacting with researchers such as Agribusiness in Sustainable Natural African Plant Products (ASNAPP). Experimentation is also a factor in growing knowledge around honeybush cultivation. Otherwise,

aspects linked to identifying different species of honeybush in the wild is associated with being taught by family links with both paternal and maternal knowledge transfer being indicated.

There are regional differences in terms of the use of honeybush and in terms of the knowledge related to honeybush (Figure 15). Although honeybush is growing in its popularity as an herbal tea, those communities that have a better understanding of its uses as a medicinal product largely reside in rural areas. This is illustrated by the differences in terms of the diversity of uses when comparing the Haarlem community to that of Pletternberg Bay (Ericaville). The Haarlem community has a long history in the region whereas the Ericaville community was more recently positioned in the areas (See Figure 15). The depth of knowledge is shallower in the later community where as the Haarlem community understand the phenology of the plants, cultivation practices linked to the plants and the history of commercialisation of these plants. The most superficial knowledge was reflected by Knysna communities. This is linked to the fact that this is a young community of healers who are still learning from the elders with regards to honeybush. These herbalist mainly use honeybush as a carrier for other medicinal herbs. It is evident that TK on honeybush is linked to the areas where it naturally grows and those in those areas have a better appreciation of the ecology and commercial potential of the plant. Also, they exhibit a strong emotional connection to the plants and the land where they grow.

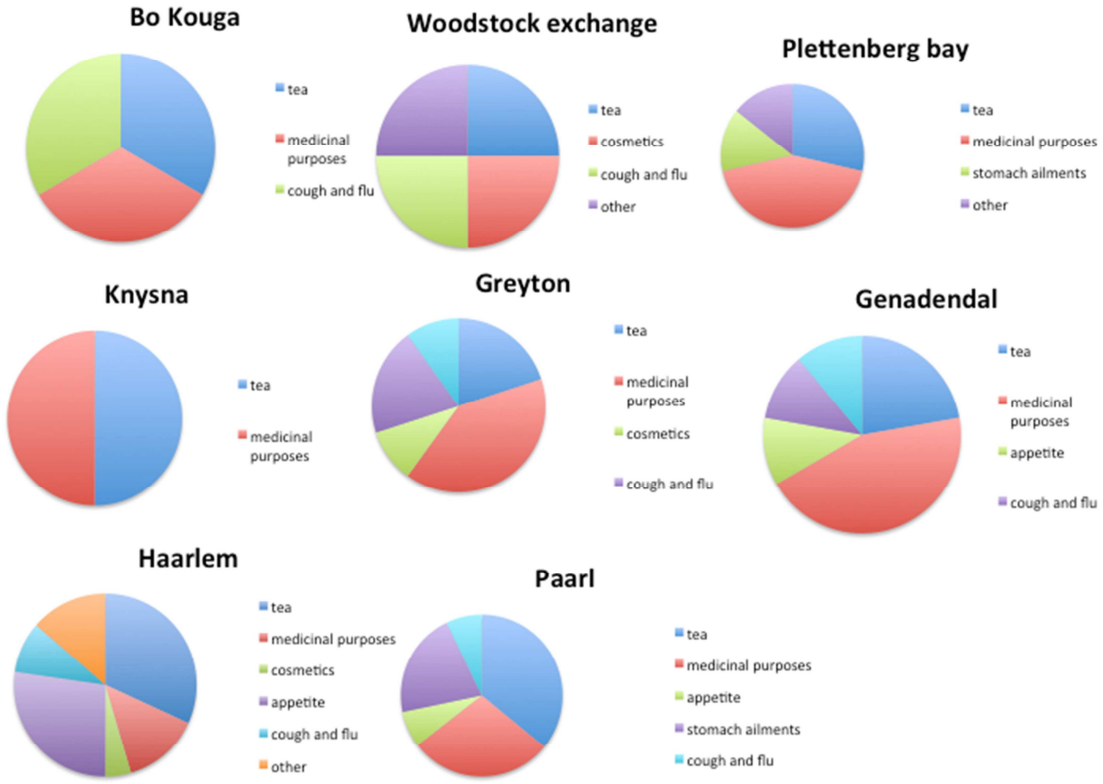


Figure 15: Differences related to current uses of honeybush linked to rural and urban centres

The level of knowledge when compared to the number of generations that are linked to that area appears to have a negative relationship as the diversity of uses is limited in areas where the communities have been living there for extended periods of time (Figure 16). They have a more conservative approach to using honeybush, preferring to use honeybush as a single herbal medicinal product. Those communities that are closer to urban centres have diversified the way in which honeybush is being used. They are largely using it for a wider batch of medicinal ailments incorporating it into polyherbal medicinal mixtures.

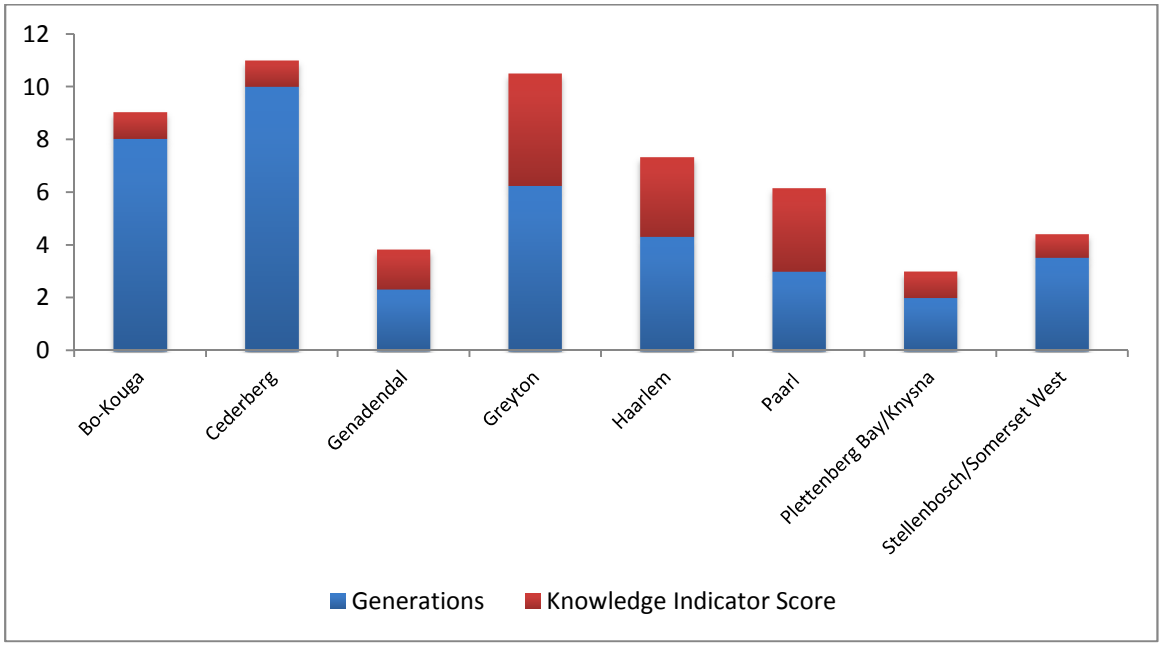


Figure 16: Comparison of the number of generations spent in a geographic region linked to honeybush versus the knowledge indicator score

In many instances, communities feel that the loss of this knowledge will be tragic but they would prefer for the TK to be used to benefit future generations.

5.3 Commercialisation of *Cyclopia* in South Africa

Hobson and Joubert (2011) estimated in 2011 that 70% of honeybush was harvested in the wild and 30% was cultivated on honeybush plantations by approximately 10 commercial farmers (providing 30% of the annual production) as well as two community owned farms (providing 30% of annual production)[50]. The community farms which are involved in commercial plantations of *Cyclopia spp.* are managed by emerging farmers of the Haarlem, Ericville and Groendal communities (Figure 17). Hobson and Joubert (2011) estimated in the same year, that 245 tons of honeybush was wild harvested and 105 tons was harvested commercially on plantations[50].

Figure 17: Position of honeybush community projects

There are an estimated 150 wild cultivators of honeybush which are harvested from 30 000 hectares[61].

Honeybush is traditionally harvested every two to three years either in early autumn or late spring, but this is dependent on the flowering season of the species and the larger demand for products. The bushes are often cut to the ground to facilitate future harvesting[80].

The cost of establishing a hectare of honeybush ranges between R10 000 and R20 000 with yields varying between 3 and 15 tons per hectare, significantly higher than rooibos yields[61].

Harvesting of *Cyclopia* spp include the cutting of branches of the plant and bundling these to be carried to the processing point, where stems and leaves are chopped into small sections using a modified silage cutter[8181]. Different harvesting practices used for *Cyclopia spp.* include[81]:

- Harvesting only the young growth on the plants;
- Cutting of the bush as low as possible from the ground with a sickle or pruning shears; or
- Cutting approximately 0, 33 m from the ground.

Chopped stems and leaves are bruised, moistened and fermented[81]. According to the literature, two forms of fermentation are utilised; (1) heap fermentation and (2) oven fermentation. In heap fermentation, cuttings are placed in a firmly packed heap and covered with canvas. The heap is left for three days to generate heat and ferment[8181]. During this process the plant material changes colour from green to brown. Once fermentation is complete, the canvas is removed and the heap content is spread in a thin layer to dry in the sun. The oven fermentation process includes the use of preheated ovens to ferment the product. The use of the fermentation

[80] Kamara B.I., Brandt E.V., Ferreira D. and Joubert E. (2003). Polyphenols from honeybush tea, *Journal Agricultural Food Chemistry* , 51(13): 3874-3879

[81] Gurib-Fakim et al., (2010)

process provides a product of better and more consistent quality and shortens the fermentation period to 24-36 hours.

The primary processing of *Cyclopia spp.* thus has four characteristic steps, namely:

- Harvesting
- Cutting
- Fermentation
- Drying – drying loss is 3:1 and the average dry yield per hectare is 2 tons.

In 2004, the average value of primary processed honeybush was R18 000.00 per ton (R18-22/kg).

Secondary process of honeybush occurs after the primary process product is transported to Cape Town or to a site at Riversdale, Mossel Bay, where it is subjected to further steam pasteurization, sieving and de-dusting[61]. Two key players in the secondary processing of honeybush are Honeybush Natural Products and Cape Honeybush Teas, which together represent 66% of the processed honeybush market[61]. The cost of transport on average is R2.00/kg, and pasteurization R3.00/kg. Secondary processed honeybush, in 2004, sold for R22/kg and R27/kg for non-organic and organic tea respectively allowing for 10-30% margins[60].

Honeybush extracts were sold at R400-R600/kg in 2004, and is an indication of the value-adding potential of this category, although the setup costs for machinery are high.

5.3.1 Commercialisation of Cyclopia spp. as a Tea

The honeybush industry in South Africa is still very much in the developmental phase, focusing on the tea industry. Despite this industry having a long history of traditional use in the country, it remained a cottage industry until the mid-1990s[31]. The bioprospecting value chain and market of this indigenous species remains ever more undeveloped (see section below). A history of the commercialization of honeybush as a tea is provided below (based largely on the work of Joubert et al. 2011[33]).

Early years: According to van Wyk et al. (2008) the value of honeybush (*Cyclopia* spp.) was identified by the Khoi-San population who primarily used it to make herbal tea for treatment of coughs and other upper respiratory symptoms associated with infections[15]. The health benefit of honeybush herbal infusions is its lack of caffeine, with a reputation as a calming beverage.

The yellow pigment of the flowers has also been historically used as a dye (most often obtained for this purpose from the plant called Dyer's Weld, Resedaluteola).

1652: a settlement, which eventually became Cape Town, was established as a source for the Dutch East India Company that was trading in Indian tea and Southeast Asian species.

1705: the use of honeybush as a tea was first documented.

1775: similar to the documenting of rooibos as a tea in the country, the Swedish botanist Thunberg recorded that he found "honigtee" during one of his field trips at the Cape.

1808: The genus *Cyclopia* was first described taxonomically by Ventena in 1880, with at least three species having being described by 1925[37].

1815: Latrobe, travelling in the Langkloof is reported to have been served 'tea-water' prepared from a local plant (believed to be honeybush).

1830: The earliest record of the early colonists at the Cape using honeybush as a restorative drink (medicinal use) dates back to 1830, reported by Bowie (1830).

1881: The earliest evidence of scientific research on honeybush in a scientist's document, listed it as an herbal drink that is caffeine free. Greenish (1881) noted that *Cyclopia genistoides* (Cape tea, "honig-thee") was used as a substitute for tea[34]. Although *Cyclopia vogeliiwas* was principally used for tea preparation[26].

1898: By the late 1880s, honeybush was already listed as a substitute in the King's American Dispensatory indicating its use as a tea in the Cape Colony of South Africa**Error! Bookmark not defined.**.

1920s: all the tea made on the Cape Peninsula was from *Cyclopia genistoides*, while in the Caledon (Overberg) and George areas *Cyclopia subternata* was used[26].

1930s -1940s: Honeybush showed limited commercial activity in the Langkloof area, with G Nortje selling processed *C. intermedia* harvested from the Kouga Mountains[33]. During these early years honeybush tea was sold for about 1½ c per kg. However, similar to the boom of the rooibos tea market during World War II, the prices of honeybush increased in the 1940s to 5c per kg[33]. Watt and Breyer-Brandwijk (1932) noted the medicinal properties for *Cyclopia genistoides*, indicating the use of the plant as a restorative and as an expectorant in chronic catarrh and pulmonary tuberculosis (Bowie, 1830 in [31]).

1960s: Caspa Cyclopia Tea, the first branded honeybush product, appeared on the market in the 1960s through the involvement of Benjamin Ginsberg[33]**Error! Bookmark not defined.**. Other companies which followed with honeybush branded products included International Foods in Johannesburg and Goldberger Trading in East London.

1992: Despite the scientific research on honeybush plant which started in 1881, it was only first researched for cultivation in 1993 at the National Botanical Institute (NBI) now called South African National Biodiversity Institute (SANBI). Resulting from this research was a protocol for the propagation of honeybush seedlings[33]**Error! Bookmark not defined.**.

1996: the first harvests from honeybush commercial plantations were collected. This year also saw the development of a standardised method for processing honeybush by Agricultural Research Council and Stellenbosch University[33Error! Bookmark not defined.].

1998: small scale and emerging farmers got involved in the honeybush markets and the first organic honeybush was produced and researchers at the ARC[33Error! Bookmark not defined.]. This year also saw the production of the first green honeybush tea. ARC started collaborating with scientists at the University of the Free State and the Medical Research Council to investigate the composition and cancer-fighting properties of honeybush[33Error! Bookmark not defined.]. Other research highlights were the first studies on phytoestrogen activity (2003, Stellenbosch University); demonstration of protective role against skin cancer (2005, Medical Research Council) and bioavailability studies (2006, ARC & MRC) [33Error! Bookmark not defined.].

1999: The Agricultural Research Council (ARC), supported the SANBI initiative to establish the South African Honeybush Producers Association (SAHPA), later renamed as the South African Honeybush Tea Association (SAHTA) [33Error! Bookmark not defined.]. SAHPA was formed to coordinate activities within the industry (Neven et al., 2005; ARC, 2008). This led to the first emergency of the honeybush market. SAHTA consists of 12 members who are elected from produces, processors and marketers of honeybush[60].

2000: The export regulations for honeybush tea were formalised by the National Department of Agriculture, in consultation with SAHPA[33Error! Bookmark not defined.].

2006: Preliminary guidelines for the cultivation and harvesting of honeybush tea were released by the Agricultural Research Council[33Error! Bookmark not defined.].

2011: SAHPA started a large scale plantation of honeybush operation in 2011 in the town of Haarlem, Western Cape. The farm is the result of a joint partnership between South Africa and the U.S. (as one of the potential large customers), along with Japan and Canada.

2011: Kouga Municipality allocated funds for the development of the honeybush tea industry in their jurisdiction. The mayoral State of the Municipality address of 2013 indicated that *our LED section also facilitated a workshop on honeybush tea farming, presented by Stellenbosch University. There were 15 participants from Kruisfontein and KwaNomzamo, who will now participate in a pilot project to grow tea on their land. The university will mentor the emerging tea farmers and market the product.*

Recent developments: in the last 10 years the honeybush tea industry has developed a global market and has seen a significant growth in the trade, with the tea now being sold in 25 countries, with the major markets being Netherlands, Germany, United Kingdome and the United States of America[60]. The Netherlands and Germany represent the major markets for the tea, with these two countries buying 74% of the build tea exported in 2010[60].

Community participation in the honeybush tea market has been lagging behind the rapid growth shown in the industry[33Error! Bookmark not defined.]. Major contributing factors to this slow transformation of the sector can be attributed to the per hectare cost of establishing a honeybush plantation and the lag time before any community can realise their first crop from the plantation[60].

5.3.2 Commercial Use of Cyclopia spp. in the Bioprospecting Industry

According to Hobson and Joubert (2011), although still a relatively new market, honeybush has the potential to be used extensively in food ingredients, cosmetic and pharmaceutical industries[50]. Because of its antioxidant properties, honeybush can also be used in the feed sector as an additive, although this still needs to be substantiated by research. A recent study by DEA of bioprospecting with honeybush showed that the resource is used in flavourant of drinks, teas, baby juices and cereals, breakfast cereals, slimming teas and health drinks[79].

The ready-to-drink honeybush iced tea market is not developed to the same extent as that of rooibos, while honeybush "espresso", etc. has not been tried[31]. The number of available toiletries and cosmetic products lags, at this stage, behind rooibos.

Approximately 85% of honeybush is exported with 15% being sold domestically[50]. Over 90% of honeybush exports are in bulk form whilst domestic sales are mainly in the form of bagged tea.

From the market sizing of the bioprospecting market in South Africa, DEA (undated) found that 3 organisations were found to be involved in the sale of raw *Cyclopia* spp. and extracts; including Global Fusion Trading (raw product and extract) AfriNatural Holdings (raw product) and Afriplex (extract)[79]. The survey, linked to this market sizing, of products found in South African retail and specialist stores confirms that of the 549 products found on the shelves of stores or on the internet during the store survey, only 15 of the products contained *Cyclopia* spp[79]. Of these products, 7 were cosmetic products (face and body creams); 6 were personal hygiene products (wipes and face wash) and 2 were products contain honeybush as a flavourant (Ready-to-drink kids juice and a detox tea) [79].

The market sizing store survey shows that there are only six (6) South African companies which have honeybush containing products[79]. These organisations include Cape Kingdom; African Organics; Esse Trust; Spa Brands; Spar and Herbex. In addition, two internationally based organisations also have honeybush containing products, namely Cuticura and Aspen[79].

5.4 Industry perceptions of traditional knowledge of *Cyclopia spp*

Honeybush TK has similar issues to rooibos, with industry indicating that they were largely not aware of any particular community in which the TK can be attributed. This seems particularly relevant in the Eastern Cape area of the range of the honeybush species, which are utilised for tea and medicinal purpose. The Sustainability

Report 2013 “Honeybush Tea Industry Development Project” Eastern Cape Report states that Latrobe (1815) mentioned that the most popular refreshment on greeting any visitor was tee-water and this was certainly not any other tea other than honeybush tea; a logical assumption that the knowledge of this indigenous tea came through interactions with the Khoi and San people, original custodians of the area[79]. Unfortunately, there are no published reports at that time of its use as a tea by the native populations (KhoiSan).

The SAHTA (website) states that the use of honeybush tea was first documented in 1705 and in 1772 the Swedish botanist Thunberg recorded that he found “honigtee” during one of his field trips at the Cape. The earliest record of the early colonists at the Cape using it as a restorative drink (medicinal use) dates back to 1830. The earliest evidence of scientific research – when scientists documented that this herbal drink is caffeine free – comes from 1881.

It is said that tea drinking certainly became established in China many centuries before it had even been heard of in the west. The concept of tea infusion in the rooibos and honeybush area is assumed that the practice may have been introduced by the arrival of the settlers even though literature states that in 1772, a Swedish naturalist Carl Thunberg noted that “the country people made tea”.

6 CONCLUSIONS AND RECOMMENDATIONS ON THE EXISTENCE AND LEGITIMATE OWNERSHIP OF TRADITIONAL KNOWLEDGE ASSOCIATED WITH ROOIBOS AND HONEYBUSH SPECIES IN SOUTH AFRICA

This study needed to be able to provide:

- information on the original distribution of the species in South Africa and link it with the existing associated traditional use by indigenous and local communities; and
- reveal how traditional knowledge has provided valuable leads into the scientific and commercial environment; and
- make recommendations on the existence and legitimate ownership of traditional knowledge associated with rooibos and honeybush species in South Africa

There is anecdotal evidence in historical literature of the use of both rooibos and honeybush as a tea in the Western Cape. The use of the species for this purpose is first reported as early as 1847. This literature highlights the use of rooibos tea for the medicinal purposes of soothing asthma and hydrothorax and as a diuretic. The tea from these species was thus recognized and used for medicinal purposes. Similarly, this early literature does indicate the use of indigenous species (*Hylchrysum spp.*) as a tea utilized by the "Hottentots" (Khoi) people in the Western Cape. Merloth does, in 1917, indicate the use of bushtea by the "natives". From this anecdotal evidence one could conclude that indigenous and genetic resources were being utilized for tea in the Western Cape, over 150 years ago

Perceptions of community members interviewed in this study were very clear that the originators of the knowledge of the use of these two species was the Khoi and the San people.

Individuals interviewed in this study had a long history in the communities, in some cases more than 300 years. Knowledge of the use of the species is passed orally from generation to generation of family members. Current use of the species is for its health benefits but also for other purposes such as in cosmetics and to treat skin disorders. The sources of indigenous knowledge in a family was largely passed from the older to younger generations of the family. The harvesting and preparation practices currently used for these species is also passed orally from one generation to the next. One could conclude that rooibos and honeybush has been utilized by local communities for many generations and that traditional knowledge of this use had been passed through the generations.

The fact that these species is endemic in areas shown in Figure 18, combined with the fact that the San and Khoikhoi populations were resident in these areas for centuries before the arrival of the settlers and that the industry has evolved and expanded in these particular areas does largely support the communities *perception* that the TK for rooibos and honeybush rests with the communities who originate in these areas.

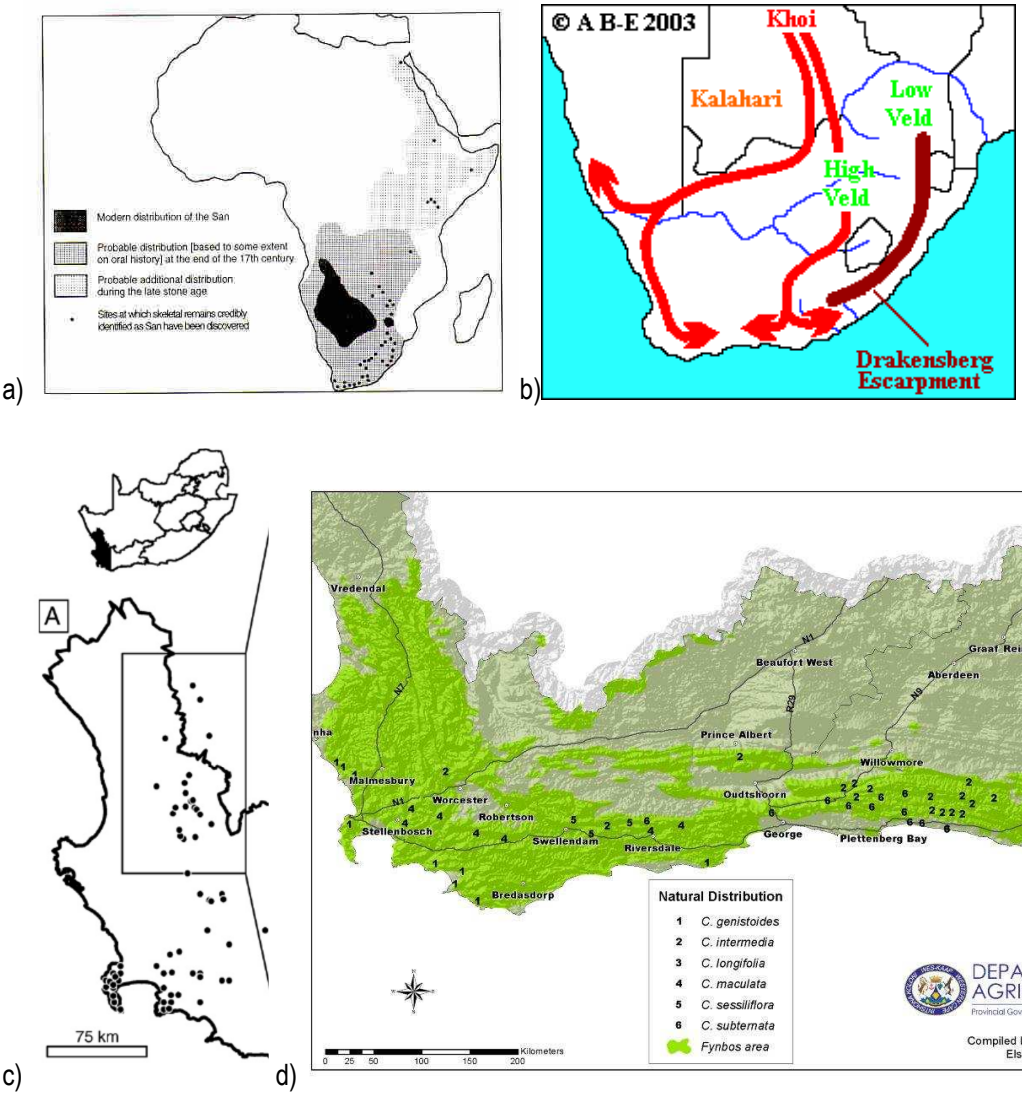


Figure 18:: (a) Area probably occupied by Khoisanids in Africa round 10 kya at the end of the seventeenth century; (b) Model for the origins of the Khoikhoi approx 1800–2000 years before present, c) distribution maps of *Aspalathus* (d) current distribution of *Cyclopia* (compiled by Jacobs and supplied courtesy of DEA Eastern Cape) and (d) Natural Distribution of *Cyclopia spp.*

This conclusion is further supported by this study which shows that the depth of knowledge regarding the use of the species is particularly rich in the areas of the province where the indigenous species are found naturally.

There is very little clinical trial evidence of the medicinal benefits of rooibos and honeybush. Research of the benefits of these species is ongoing, hence it is currently not possible to make a direct link between the species, traditional knowledge and valuable scientifically validated leads in the scientific and commercial environment.

Based on (1) the above conclusions of this study and (2) the absence of evidence, gathered from individuals and organisation during this study, that disputes the Khoi and the San as holders of TK for these species, the following are recommended:

1. DEA to engage with the sector to indicate the outcome of the study, which concludes that there is no evidence to dispute the communities' perceptions that TK rests with the communities where the species is endemic and/or with the Khoi and the San people of South Africa.
2. DEA should encourage any individual or organization planning a bioprospect ing or biotrade project with rooibos or honeybush to engage with the above mentioned communities/people to negotiate and enter into a benefit sharing agreement in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) and the Bioprospecting, Access and Benefit Sharing Regulations, 2008.

7 REFERENCE

1. Lewis and Ramani (2007). Ethics and practice in ethnobiology: analysis of the international cooperative biodiversity group project in Peru. In: Biodiversity and the Law: Intellectual Property, Biotechnology and Traditional Knowledge. McManis C.R (ed). Earthscan, London.
2. Hanazaki N., Firme Herbst D., Simionato Marques M. and Vandebroek I.(2013). Evidence of the shifting baseline syndrome in ethnobotanical research. Journal of Ethnobiology and Ethnomedicine 9 (75): 1-11
3. CBD (undated). [Online]. Available: http://www.cbd.int/convention/articles/?a=cbd-01
4. South Africa (2004). National Environmental Management: Biodiversity Act, Act No. 10 of 2004. Government Printers, Pretoria.
5. DEAT (2008). National Environmental Management: Biodiversity Act, 2004: Regulations On Bio-Prospecting, Access And Benefit-Sharing. No. R. 138 8 February 2008. . Government Printers, Pretoria.
6. World Intellectual Property Organisation (WIPO) (2001). Intellectual property needs and expectations of traditional knowledge holders. WIPO Report on Fact-Finding Missions on Intellectual Property and Traditional Knowledge (1998-1999). WIPO, Geneva.
7. James W.G (2013). Invitation for public comment on Draft Protection of Traditional Knowledge Bill. Government Gazette No. 36354, General Notice 376 of 2013. Government Printers, Pretoria.
8. South Africa (2013). NEM:BA (10/2004): Draft amendment regulations on bio-prospecting access and benefit-sharing. Government Gazette 37331. Government Printers, Pretoria.
9. DTi (2008). Policy Framework for the Protection of Indigenous Traditional Knowledge through the Intellectual Property System and the Intellectual Property Laws Amendment Bill, 2008. Government Gazette No. 31026. Government Printers, Pretoria.
10. DTi (2011). Intellectual Property Law Amendment Bill (2011) of South Africa. Government Printers, Pretoria.
11. Goldblatt P. and Manning J.C. (2002). Plant Diversity of the Cape Region of Southern Africa. *ANN. MISSOURI BOT. GARD*. 89: 281–302.
12. Donaldson J.S. and Scott G. (1994) in Philander L.E.A., Makunga N.P. and Platten S.J. (2011). Local Medicinal Plant Knowledge in South Africa Preserved by Apartheid. *Hum Ecol*, 39:203–216
13. Van Wyk B.-E. (2008). A review of Khoi-San and Cape Dutch medical ethnobotany. *Journal of Ethnopharmacology* 119: 331–341
14. Mountain A. (2003). The First Peoples of the Cape. David Philip, Cape Town.
15. Taken from Cavalli-Sforza et al. (1994) [Online]. Availble: http://www.unc.edu/~nielsen/soci111/m10/soci111m10.htm
16. Wynberg R. and Chennells R. (2009). Green Diamonds of the South: An overview of the San-*Hoodia* Case. In: Indigenous Peoples, Consent and Benefit Sharing. Lessons from the San-Hoodia Case. (Eds) Wynberg R., Schroeder D. and Chennells R. Springer Science+Business Media.
17. Lee, R.B. (1976) in Chennells R., Haraseb V. and Ngakaeaja M. (2009). Speaking for the San: Challenges for Representative Institutions. In: Indigenous Peoples, Consent and Benefit Sharing. Lessons from the San-Hoodia Case. (Eds) Wynberg R., Schroeder D. and Chennells R. Springer Science+Business Media.
18. Chennells R., Haraseb V. and Ngakaeaja M. (2009). Speaking for the San: Challenges for Representative Institutions. In: Indigenous Peoples, Consent and Benefit Sharing. Lessons from the San-Hoodia Case. (Eds) Wynberg R., Schroeder D. and Chennells R. Springer Science+Business Media.

19. Boddy-Evans A. (undated). Pre-Colonial cultures in South Africa. The San and Khoikhoi. [Online]. Available: http://africanhistory.about.com/library/weekly/aa-SAColonists1.htm
20. Gerlach L. and Berthold F. (2011). The sociolinguistic situation of ǂHoan, a moribund 'Khoisan' language of Botswana [Online]. Available: https://www.afrikanistik-aegyptologie-online.de/archiv/2011/3164
21. Pappe L. (1847). A List South African Indigenous Plants Used as Remedies by the Colonists of the Cape of Good Hope. O.I. Pike, Cape Town.
22. Pappe L. (1850). Florae Capensis Medicae Prodromus. A.S. Robertson, Cape Town.
23. Pappe L. (1857). Florae Capensis Medicae Prodromus, 2nd ed. W. Britain Press, Cape Town.
24. Marloth R. (1917). The Flora of South Africa Darter, 4 vols. Cape Town and William Wesley, London.
25. LeClercq M., Bienabe E. and Caron P (undated). The case of the South African Rooibos: Biodiversity conservation as a collective consensus. [Online]. Available: http://localiserlesproduits.mnhn.fr/20_Paper_LECLERCQ_M.pdf
26. Keahey J.A. (2013). Emerging markets, sustainable methods: political economy empowerment in South Africa's rooibos tea sector. Dissertation, Colorado State University Fort Collins, Colorado
27. Strassberger E. (1969). The Rhenish Mission Society in South Africa 1830 – 1950, Struik, 1969 in A joint research project of the Surplus People Project and the Legal Resource Centre (2000). An Inventory and Description of the Historical Acquisition of Moravian Church Land. A Report Compiled for the Moravian Church of South Africa.
28. Kies P. (1951). Revision of the genus Cyclopia and notes on some other sources of bush tea. Bothalia 6: 161‐176.
29. Joubert E, Gelderblom W.C.A., Louw A. and de Beer D. (2008). South African herbal teas: Aspalathus linearis, *Cyclopia spp*. and *Athrixia phylicoides*–A review. *Journal of Ethnopharmacology* 119: 376‐412.
30. Latrobe (1818). Journal visit to South Africa, 1815, AND 1816. Account of the missionary settlements United Brethren, The Cape Of Good Hope. L. B. Seeley, 169, Fleet Street and H. Ackerma, 101, Strand.
31. Joubert E, Joubert M.E., Bester C., de Beer D. and de Lange J.H. (2011). Honeybush *(Cyclopia spp.*): From local cottage industry to global markets — The catalytic and supporting role of research. South African Journal of Botany 77: 887–907
32. Greenish, H.G., 1881. Cape tea. The Pharmaceutical Journal and Transactions 11, 549‐551.
33. Bowie J., (1830). Sketches of the botany of South Africa. South African Quarterly Journal I, 27‐36.
34. Mahomoodally M.F. (2013). Traditional Medicines in Africa: An Appraisal of Ten Potent African Medicinal Plants. Evidence-Based Complementary and Alternative Medicine, 2013.
35. Joubert E. and de Beer, 2011. Rooibos (Aspalathus linearis) beyond the farm gate: From herbal tea to potential phytopharmaceutical. *South African Journal of Botany*, 77; 869–886
36. Dahlgren R. (1988).Crotalarieae (Aspalathus). *Flora of Southern Africa* 16, 84–90.
37. Morton J.F. (1983). Rooibos Tea, Aspalathus linearis, a Caffeineless, Low-Tannin Beverage Author(s): Economic Botany,37 (2): 164-173
38. van Niekerk C. and Viljoen A. (2008). Indigenous South African Medicinal Plants. Part 11: Aspalathus linearis ('Rooibos'). *SA Pharmaceutical Journal Nov/Dec 2008.*
39. Muofhe M.L., Dakora, F.D., 2000. Modification of rhizosphere pH by the symbiotic legume Aspalathus linearis growing in sandy acidic soil. *Australian Journal of Plant Physiology* 27, 1169–1173.
40. Hawkins, H-J., Malgas, R. and Biénabe, E. (2011) Ecotypes of wild rooibos (Aspalathus linearis (Burm. F) Dahlg., Fabaceae) are ecologically distinct. [Online]. Available: http://www.experts.scival.com/stellenbosch/pubDetail.asp?t=pm&id=79955469784&n=Rhoda+Malgas&u_id=470
41. Van der Bank M., Van der Bank F.H. and Van Wyk B.-E. (1999). Evolution of sprouting versus seeding in Aspalathus linearis. *Plant Systematics and Evolution* 219: 27–38.

42. Taken from: http://commons.wikimedia.org/wiki/Aspalathus_linearis#mediaviewer/File:Rooibos_(Aspalathus_linearis).jpg
43. Myers N., Mittermeier R.A., Mittermeier C.G., Da Fonseca G.A.B. and Kent J. (2000). Biodiversity hotspots for conservation priorities. *Nature* 403, 853–858.
44. Taken from Malgas R.R., Potts A.J., Oettlé N.M., Koelle B., Todd S.W., Verboom G.A. and Hoffman M.T. (2010). Distribution, quantitative morphological variation and preliminary molecular analysis of different growth forms of wild rooibos (Aspalathus linearis) in the northern Cederberg and on the Bokkeveld Plateau. South African Journal of Botany , 76: 72–81
45. Taken from the South Africa Risk & Vulnerability Atlas. [Online]. Available: http://rava.qsens.net/themes/agriculture_template/subsistence-agriculture-2/Current%20wild.jpg/view?searchterm=rooibos
46. Joubert M. (undated). The history of rooibos. [Online]. Available: http://www.bosicetea.com/wp-content/uploads/2011/05/klipopmekaar.pdf
47. Schutte A. L. (1997). Systematics of the genus Cyclopia Vent. (Fabaceae, Podalyrieae). *Edinburgh Journal of Botany*, 54: 125-170
48. Hobson S. and Joubert M. (2011). Eastern Cape Honeybush Tea Project. Indsutry overview, assessment and proposed interventions. DEDEA, Eastern Cape.
49. van der Walt, L. (2000). *Cyclopia genistoides* (L) R.Br. [Online]. Available: http://www.plantzafrica.com/frames/plantsfram.htm
50. van Wyk B-E., van Oudtshoorn B. and Gericke N. (2009) Medicinal Plant of South Africa. Biza Publication, Pretoria, South Africa.
51. taken from http://www.sahta.co.za/photos/species-cyclopia-genistoides/category/4.html
52. Compiled by Ronelda Jacobs: DoA and supplied courtesy of DEA Eastern Cape
53. taken from www.oikoumene.org
54. Anon (2007). South Africa Sector Report Food and Beverage Industry. Swiss Business Hub South Africa, Pretoria, South Africa.
55. Van Heerden, F.R., Van Wyk, B.-E., Viljoen, A.M., Steenkamp, P.A., 2003. Phenolic variation in wild populations of Aspalathus linearis (rooibos). Biochemical Systematics and Ecology 31, 885–895.
56. Cheney and Scholtz (1963) in Morton J.F. (1983). Rooibos Tea, *Aspalathus linearis*, a Caffeineless, Low-Tannin Beverage Author(s): *Economic Botany*,37 (2): 164-173.
57. Street R.A. and Prinsloo G. (2013). Commercially important medicinal plants of South Africa: A review. *Journal of Chemistry*, 2013. Article ID 205048, 16 pages, http://dx.dot.org/10.1155/2013/205048
58. Trade and Investment South Africa (2004). CSP Development for Rooibos Sector. Unpublished Report.
59. Kaiser Associates Economic Development Practice (2010). Rooibos and Honeybush market development programme framework. Revised final report. Western Cape Department of Economic Development and Tourism.
60. Govender M. (2007). ***Aspalathus linearis*** (Burm.f.) R.Dahlgren. [Online]. Available: http://www.plantzafrica.com/frames/plantsfram.htm
61. Tiedtke D. and Marks O. (2002). Rooibos – The New "White Tea" for Hair And Skin Care. Cosmetochem International Ltd., Sennweidstrasse 44/46, CH-6312, Steinhausen/Zug, Switzerland
62. Small E. and Catling P. M. (2009) Blossoming Treasures of Biodiversity. *Biodiversity*, 10:2-3, 113-119, DOI: 10.1080/14888386.2009.9712853
63. South African Rooibos Council (undated). [Online]. Available: http://www.sarooibos.org.za/research
64. Cant M. and Machado R. (1999). Marketing success stories. New York: Oxford University Press.
65. Carter L. (2005). South Africa. Rooibos tea. TED case studies No. 777.
66. Heard and Faull (1970) in Morton J.F. (1983). Rooibos Tea, Aspalathus linearis, a Caffeineless, Low-Tannin Beverage Author(s): *Economic Botany*, 37 (2): 164-173

67. Rooibos Tea Control Board (1982) in Morton J.F. (1983). Rooibos Tea, Aspalathus linearis, a Caffeineless, Low-Tannin Beverage Author(s): *Economic Botany*,37 (2): 164-173.
68. Joubert E. and Schulz H. (2006). Production and quality aspects of rooibos tea and related products. A review. *Journal of Applied Botany and Food Quality*, 80: 138 – 144
69. Gerz A. and Bienabe, E. (2006). Rooibos tea, South Africa: The challenge of an export boom. In: Van de Kop, P., Sautier, D., Gerz, A. (Eds.), Origin-Based Products. Lessons for Pro-Poor Market Development, Royal Tropical Institute (KIT), Amsterdam, Netherlands, pp. 53–63.
70. Grazioli A. (2002). The Protection of Geographical Indications. [Online]. Available: http://www.iprsonline.org/ictsd/docs/GrazioliBridgesYear6N1January2002.pdf
71. Nel et al., 2007 in Joubert E. and de Beer (2011). Rooibos (Aspalathus linearis) beyond the farm gate: From herbal tea to potential phytopharmaceutical. *South African Journal of Botany*, 77; 869–886
72. Malgas R.R., Potts A.J., Oettlé N.M., Koelle B., Todd S.W., Verboom G.A. and Hoffman M.T. (2010). Distribution, quantitative morphological variation and preliminary molecular analysis of different growth forms of wild rooibos (Aspalathus linearis) in the northern Cederberg and on the Bokkeveld Plateau. South African Journal of Botany , 76: 72–81
73. Rampedi I. and Olivier J. (2008). The development path of rooibos tea—a review of patterns and lessons learnt for the commercialisation of other indigenous teas in South Africa. *International Journal of African Renaissance Studies* 3: 5–20
74. Wesgro (2006). Natural Products Sector Brief. Wesgrow, Western Cape
75. Wilson N.L.W. (2005). Cape Natural Tea Products and the U.S. market: rooibos rebels ready to raid. *Review of Agricultural Economics* 27, 139–148.
76. Joppe H., Hermann M. and Wiedemann J. (2009). Use of rooibos extract for the protection of hair colour. U.S. Patent Application No. US 2009/0104298 A1. In Joubert E. and de Beer, 2011. Rooibos (Aspalathus linearis) beyond the farm gate: From herbal tea to potential phytopharmaceutical. *South African Journal of Botany*, 77; 869–88
77. DEA (undated). A Study of the Scope and Extent of the Utilisation of Indigenous Resources by Bioprospecting Industries in South Africa. Unpublished report.
78. Kamara B.I., Brandt E.V., Ferreira D. and Joubert E. (2003). Polyphenols from honeybush tea, *Journal Agricultural Food Chemistry* , 51(13): 3874-3879
79. (Gurib-Fakim et al., 2010)

8 APPENDIX 1: INDUSTRY SEMI-STRUCTURED INTERVIEW SHEET

The Department of Environmental Affairs is conducting a study on the traditional knowledge and distribution of rooibos in the country. We would like to discuss your organisations current use of rooibos and your perspectives on traditional knowledge related to rooibos.

1-ORGANISAITONAL DETAILS

A1: **City/ town/ village name:** _____

Organisation name: _____

A2:

Activities of the organisation:_____

A3: **Geographic focus area of org sales (i.e. global, national, provincial, local:**_____

A4: **Interviewee name**_____

A5: **Verified contact details:**

Address: _____

Telephone_____

Email_____

<u>TOPIC TO BE ADDRESS IN THE STAKEHOLDER/SPECIALIST DISCUSSIONS</u> – the list below should be utilised to guide discussions with the stakeholder but should not restrict this discussion, also allow the stakeholder to discuss topics/issues which are pertinent to their situation.

- What role does rooibos currently play in your organisation?
- In your opinion, has the distribution of rooibos changed over time (please explain)?
- Do you currently cultivate rooibos for this purpose?
- If not, where do you source this rooibos?
- Who collects the rooibos which you utilise?

- Do they process the rooibos for you?
- Where does this processing occur?
- Can you explain this processing activity?
- Where do you think this processing method originated from?
- What was the source of the knowledge/research which informs your organisation current rooibos use (please keep probing on the source of each source mentioned)?
- According to research what are the medicinal or health properties associated with rooibos species?

- In your opinion, where do you think the knowledge of the value of rooibos originated from (please explain?
- In your opinion, has the use of rooibos changed over the years (please explain?)
- What was the cause of this change?
- Is rooibos still available from the original source area (please explain)?
- What were these original source areas (what your source of this information)?
- To your knowledge, is rooibos still used as a traditional medicine (what is it used to treat)?
- To your knowledge who still uses rooibos in this manner?
- In your opinion who are the original knowledge holders of the knowledge of the value and use of rooibos?
- Is there anything else we need to capture related to the knowledge of use of rooibos?
- Are there conflicting stories about the origin of the knowledge of use of rooibos (please explain?
- In your knowledge what has informed current rooibos market?
- Do you think the rooibos value chain is saturated in South Africa?
- What are the currently 'blockages' in this value chain?
- How can the rooibos market be expanded/grown in South Africa?
- Do you have anything that you would like say regarding rooibos species and its utilization?
- Do you think this value chain is economically transformed (please explain)?
- How can we (improve) economic transformation of this value chain?

9 APPENDIX 2: COMMUNITY SEMI-STRUCTURED INTERVIEW SHEET

COMMUNITY QUESTIONNAIR ON THE TRADITIONAL KNOWLEDGE AND USE OF ROOIBOS

The Department of Environmental Affairs is conducting a study on the traditional knowledge and distribution of rooibos in the country. We have a short survey of approximately 40 questions in which we would like to discuss your current use of rooibos and how your ancestors used rooibos.

Would you be willing to participate in this survey?

I WOULD LIKE TO EMPHATHISE THE FOLLOWING:

- You can say anything you want as long as that is truly how you feel.
- There are no right or wrong answers, only your ideas and opinions.
- Be assured that I will NOT tell anyone what you say in the interview. All information will be confidential. Your name will not be used.

1-LOCATION

A1: **City/ town/ village name** _____

A2: **Suburb/Zone/Section** _____

A3: **Household no**. _____

(In case where there is no household no. write the name and surname of the head of the household)

2. INTERVIEWEE AND HOUSEHOLD PROFILE

No.	Question	Tick or fill in the answer	Code	Go to
1	Gender of interviewee	Male……..... Female…….……	1 2	
2	What is your relationship to the Head of the Household? (***Ask, you are the ..... of the head of the household***?) (***Head-of-household is the main decision-maker, or the person who owns or rents the dwelling, or the person who is the main breadwinner***).	Husband/wife/partner..... Husband/wife/partner..... Son/daughter/step child/adopted child..... Brother/sister/step brother/step sister..... Father/mother/step father/ step mother..... Grandparent/great grandparent..... Grandchild/great grandchild..... Other relative (e.g. in-law or aunt/uncle)..... Non-related persons.....	2 2 3 4 5 6 7 8 9	

No.	Question	Tick or fill in the answer	Code	Go to
3	How old are you? (*write in age)*	YEARS		
4	How long have you lived in this village/community?	Months/years		
5	How long has your family lived in this community?	Months/years		

3. CURRENT INDIVIDUAL/HOUSEHOLD USE OF ROOIBOS

No.	Question	Tick or fill in the answer	Code	Go to
6	Do you currently use rooibos in your household?	Yes……	1	
		No……	2	→Section 5
7	What do you currently use rooibos for? (Please capture in details what the uses of rooibos are).			IF **self-collect** the go to Section 3 If **purchased or from other source** go to Section 4
8	Where do you get this rooibos?			

4. CURRENT COLLECTION OF ROOIBOS

No.	Question	Tick or fill in the answer	Code	Go to
9	If collects/harvested, where are the plants?			
10	Who owns the land where the plants are?			
11	How do you find the plants?			
12	How did you learn about finding/where the rooibos plants are?			
13	How did you learn about where to find the rooibos? (Please keep asking who each person learnt from?)			
14	What do you use to collect the rooibos?			
	Who taught you what to use to collect rooibos? Please keep asking who each person learnt from?)			
15	What part (s) of the plant do you collect? (e.g. Roots, stems, branches, flowers, seeds etc.)			
16	Why do you take this part of the plant? (please ask this question for each part of the plant collected)?			
17	Who taught you what parts to collect? (please keep asking who each person learnt from?)			
18	How many of each part do you collect from			

No.	Question	Tick or fill in the answer	Code	Go to
	each plant? (please write the number of each part collected from the plant)			
19	How many plants do you collect from on each trip?			
20	How often do you make this trip in a month?			
21	Do you use rooibos to treat any aliments?	Yes…….....	1	
		No…….……	2	
22	Please explain what aliments			
23	Please explain how you prepare the rooibos to treat (each) aliment			
24	Who taught you to treat the aliment like this? (please keep asking who each person learnt from if they learn from a person)			

5. HISTORICAL USE AND COLLECTION OF ROOIBOS

No	Question	Tick or fill in the answer	Code	Go to
25	Did you parents/grandparent/ancestors use rooibos?	Yes……	1	
		…….....	2	
		No…….……		
		……		
26	Please explain what they used rooibos for?			
27	How did they learn to use rooibos like that? (who taught them?)			
28	Where and how did they get the rooibos? (who taught them?)			
29	Has the use of rooibos changes since your ancestors used it?	Yes……	1	
		…….....	2	
		No…….……		
		……		
30	If yes, how has it changed?			
31	Why do you think the use changed?			
32	Can you still get rooibos in the places your ancestors collected if from?	Yes……	1	
		…….....	2	
		No…….……		
		……		
33	If not, what has changed?			
34	Why do you think this change happened?			
35	Does anyone else (other than you) use rooibos in the same way as your ancestors?	Yes……	1	
		…….....	2	

No	Question	Tick or fill in the answer	Code	Go to
		No……..… ……		
36	If you, who are these people?			
37	How do you think they learnt to use rooibos like your ancestors? (explain)			
38	Who else do you think we should include in our survey?			

THANK YOU VERY MUCH FOR YOUR PARTICIPATION

10 Appendix 3: Summary of data capture and analysis

Methods for Rooibos and Honeybush

Data collection sites

Interviews were conducted eleven geographic regions in the Western Cape Western Cape which included: Greyton, Genadendal, Haarlem, Stellenbosch, Paarl, Woodstock, Plettenberg Bay, Knysna, Somerset West, Eselbank, Wuppertal, Bo-Kouga region (in close proximity to Uniondale) and Cederberg Mountains. The interviews focused on both rooibos and honeybush in all areas but a greater focus was placed on honeybush in areas where it naturally grows geographically and vice versa.

Population sampling method

A random sampling method was utilized and this included also a referral basis where participants where asked to recommend other potential interviewees. This random sampling procedure was followed with the aim of interviewing as many community members as possible. A questionnaire regarding general uses, possible medicinal uses, farming and harvesting practices, sourcing of indigenous knowledge and possible social problems/dynamics with regards to access and harvesting of rooibos/honey bush was completed and all data was imported into Excel spreadsheets. The Cape Bush Doctors Association was involved in securing interviews with many IK holders. In some instances, interviews were set up with specific communities including those in the Ericaville trust region. Participating members were not solely those involved in the industry but those that were also not directly linked to the industry. These members were regarded as control groupings. Interviews were also conducted with members of who may be involved in the natural products industry especially in urban centres such as Stellenbosch and Somerset West. We targeted regions which may have a strong community involvement in the herbal sector in areas such as Knysna where the Rastafarian community who sell medicinal plant products was interviewed.

Data capture

Data was captured directly on printed interview sheets. Voice recordings were also made in some instances. In 90% of the cases, the interviewer was responsible for noting the answers and in some instances participants were given the opportunity to fill out the questionnaire. Interviewing was conducted in both Afrikaans and English and the most appropriate language for each respective participant was used.

Data were then transcribed to an Excel spreadsheet. All answers were recorded for each participating member. No names were recorded for each member to make it anonymous. Different answers were coded according to responses. Thereafter, a selection of similar answers was grouped and coded into respective categories. The qualitative answers were then turned into quantitative responses by recording the percentages for each type of

response. This type of information was then utilized to draw histograms and pie charts in Excel.

Statistical analysis

For all statistical analyses, data were assessed for normality using a t-test using Statistica version 11. Percentage data should be arcsine transformed in Microsoft Excel prior to analyses. The arcsine transformed data may be exported into Statistica and basic statistical analyses to test assumptions of normality and equal variances for parametric or nonparametric data where applicable. Boxplots were constructed in Statistica but high levels of variation were observed and there were no significant differences noted for all the data which were compiled.

The coded data was then used to form graphical presentations for ease interpretation of the data using pie charts and historgrams as not all data were normally distributed and variation was present, therefore basic statistics was done to show general trends in the uses of both honeybush and rooibos among regions in the Western Cape.

The knowledge shared in communities over generations was also compared. For each site, the extent to which honeybush/rooibos is being used for a specific purpose was calculated by frequency. This was put together (all recorded uses) and grouped according to regions, producing histograms for comparison among these regions. These data were then grouped according to the level of development in a region (urban/rural), so that uses could be compared with regards to these factors.

A knowledge indication factor was calculated based on the number of traditional uses mentioned by each candidate, together with vital information with regards to traditional farming and harvesting methods. The average number of generations of a community from each site was then compared to the knowledge that the people of that region have (knowledge indication factor) and produced graphically for interpretation. This was done using secondary y-axis histograms.