



**University of Venda**

**The ethnobotanical investigation of the Mapulana of Ehlanzeni District  
Municipality, Mpumalanga Province, South Africa**

By

**Shalom Pabalelo Mashile**

**The ethnobotanical investigation of the Mapulana of Ehlanzeni District  
Municipality, Mpumalanga Province, South Africa**

By

**Shalom Pabalelo Mashile (11565014)**

Thesis submitted in fulfilment of the requirements for the degree

**DOCTOR OF PHILOSOPHY IN BOTANY**

In the

**School of Mathematical and Natural Sciences**

University of Venda

Thohoyandou 0950

South Africa

**Promoter : Prof M. P Tshisikhawe**

**Co-promoter: Dr N. A Masevhe**

**AUGUST 2019**

ii

## DECLARATION

I, **SHALOM PABALELO MASHILE** declare that this research thesis is my original work and has not been submitted for any degree at any other university or institution. The thesis does not contain another person's writing unless specifically acknowledged and referenced accordingly.

Signed (Student): ..... Date: .....

## DEDICATION

I dedicate the thesis to the Most-high God, my Father.

My family and mainly, to Bophelo my second son, who left me when I was busy with data collection for this research.

## ACKNOWLEDGEMENTS

I acknowledge the protection, mercy and grace from God, my Father, throughout the study.

The National Research Foundation (Grant number 102082) and the University of Venda (Project number SMNS/17/BOT/01) are appreciated for the provided funding for this study.

Promoters are valued for their mentoring. In my case, especially Prof MP Tshisikhawe, to whom my sincere gratitude is expressed for his patience and understanding.

Dr PP Kaburise is thanked for editing this document.

Moletete, Shatale and Marite tribal authorities are thanked for their support. Special thanks and appreciation are extended to all participants and village assistants for their willingness to share their valuable knowledge.

Everyone who assisted me physically and emotionally, are highly regarded.

My family, especially my husband and children are thanked for their support and patience while I was studying.

## ABSTRACT

Ethnobotanical information still needs documentation as this will assist in the preservation of information for future generation. It becomes most important, particularly when considering the neglected ethnic subgroups. From fourteen villages in the Ehlanzeni district; elders, community adults and youth were selected by means of snow balling technique and a semi-structured questionnaire was used to interview them. Data was analysed by calculating the use value of selected plant species on common ailments. Hundred and forty-eight plants were observed as being utilized by Mapulana as food (fruits and African leafy vegetables), fuelwood, medicine and the making of utensils. The majority of the recorded plant species (54%) were native while 46% were naturalized. The majority of plants (37%) were utilized as medicine only, while food contributed only 19 percent usage, followed by medicine (13%), fuelwood (4%) and utensils (1%). A total of hundred and six plant species were identified as medicine treating 50 different ailments. Roots and leaves were the highly preferred plant and herb parts collected.

The results showed that *Sclerocarya birrea* subsp. *caffra* (use value of 0.86) was reported as being used in four different ways; seconded by *Cucurbita maxima* (use value of 0.58) with two different uses. Numerous medicinal uses were observed from *Aloe zebrina* (use value 0.38) and *Aloe marlothii* (use value 0.29). Ailments with Informant Consensus Factor (ICF) were gonorrhoea (1.80), stomach cleansing (1.40), chicken and cow diseases (1.19), bad luck (0.88), flu (0.84), and diarrhoea (0.80). There were, in addition, many

ailments with low ICF known by the elders and few community adults proving that the elderly are custodians of indigenous knowledge.

Twenty-six line transects of 100m x 10m in size were constructed in determining the population structure of *Peltophorum africanum* Sond. in Bolla-Tau village. A total of 256 individuals were recorded from the transects. Data was analyzed using IBM Statistical Product and Service solutions (SPSS) statistics version 25 and Microsoft Excel 2013 version. The population structure of *P. africanum* was found to be bell-shaped. Logarithmic analysis, along with generalized log analysis depicts, that there was significance difference between the plant height and stem circumference. Resprouts of *P. africanum* individuals were only 18% and a majority of individuals (82%) were harvested. The study revealed that 43.84% of *P. africanum* individuals had traces of crown damage, as compared to individuals with healthy crowns (35.9%). The rest of the individuals had either light or moderate crown-health status.

**Keywords:** Indigenous knowledge, Mapulana, Ailment, Generalized log analysis

## TABLE OF CONTENTS

Contents	Pages
DECLARATION.....	iii
DEDICATION.....	iv
ACKNOWLEDGEMENTS.....	v
ABSTRACT.....	vi
LIST OF TABLES.....	xv
LIST OF FIGURES.....	xvi
LIST OF ABBREVIATIONS.....	xvii
CONFERENCE CONTRIBUTIONS.....	xviii
MANUSCRIPTS.....	xix
PUBLICATIONS.....	xx
<b>CHAPTER ONE.....</b>	<b>1</b>
GENERAL INTRODUCTION.....	1
1.1 Introduction.....	1
1.2 Statement of the problem.....	2
1.3 Aim.....	3

1.4 Objectives .....	3
1.5 Hypothesis .....	4
1.6 Structure of the research thesis.....	4
References.....	5
<b>CHAPTER TWO.....</b>	<b>9</b>
<b>LITERATURE REVIEW.....</b>	<b>9</b>
2.1 Introduction .....	9
2.2 History of Mapulana .....	11
2.2.1 Origin and history .....	11
2.2.2 Praise poem .....	14
2.2.3 Language .....	15
2.2.4 Tradition or Culture.....	16
2.2.5 Current location .....	17
2.3 Concerns about vegetation management in areas inhabited by the Mapulana .....	17
2.3.1 Fuelwood.....	18
2.3.2 Medicinal plants.....	20
2.3.3 Wild edible plants .....	21
2.4 Population studies.....	24
2.4.1. Population structure .....	24

2.4.2 Determinates of the structure of a population.....	25
2.4.3 Species frequency and regeneration.....	25
References.....	27
<b>CHAPTER THREE.....</b>	<b>41</b>
ETHNOBOTANICAL CHECKLIST OF INDIGENOUS PLANTS UTILIZED BY THE MAPULANA .....	41
Abstract.....	41
3.1 Introduction .....	42
3.2 Methodology.....	44
3.2.1 Study area.....	44
3.2.2 Study design and protocol.....	47
3.2.3 Data collection and analysis.....	48
3.3 Results and discussion.....	49
3.3.1 Demography of participants .....	49
3.3.2 Inventory of Mapulana plants .....	52
3.3.3 Utilization categories .....	70
3.3.3.1. Plants utilized as utensils and traditional tea .....	71
3.3.3.2. Plants utilized as food .....	71
3.3.3.3. Plants utilized as fuelwood .....	72

3.3.3.4. Plants utilized as medicine .....	73
3.4 Growth forms of utilized plants .....	74
3.5 Traditional indigenous classification of plants .....	75
3.6 Conclusion .....	76
References.....	77
<b>CHAPTER FOUR.....</b>	<b>85</b>
MEDICINAL PLANTS UTILIZED BY THE MAPULANA PEOPLE OF EHLANZENI DISTRICT.....	85
Abstract.....	85
4.1 Introduction .....	86
4.2 Methodology.....	88
4.2.1 Study area.....	88
4.2.3 Data collection.....	89
4.2.4 Data analysis.....	90
4.3 Results and Discussion .....	91
4.3.1 Demography of informants .....	91
4.3.2 Plants utilized by the Mapulana for medicinal purposes.....	92
4.3.3 Ailments treated by the Mapulana.....	122
4.3.3.1 Bad luck .....	122

4.3.3.2 Diarrhea and Stomach cleansing .....	123
4.3.3.3 Rescussions in children, preventing miscarriage and stillborn .....	124
4.3.3.4 Diabetes and high blood pressure .....	126
4.3.3.5 Flu and headache.....	127
4.3.3.6 Tooth ache .....	129
4.3.3.7 Wounds .....	130
4.3.3.8 Gonorrhoea .....	130
4.3.3.9 Stomach pains.....	131
4.3.3.10 Swollen legs .....	132
4.3.3.11 Dysmenorrhoea, conception, infertility and untie womb .....	132
4.3.3.12 Hematuria.....	134
4.3.3.13 Sunken and bulging fontanelles .....	134
4.3.3.14 Colic .....	135
4.3.3.15 Nail-biting .....	139
4.3.3.16 Typhoid .....	139
4.3.3.17 Chicken diseases .....	139
4.4 Perceptions about Mapulana traditional health practitioners .....	146
4.5 Conclusion .....	147
References.....	148

<b>CHAPTER FIVE</b> .....	164
POPULATION STRUCTURE OF <i>Peltophorum africanum</i> Sond. IN BOLLA-TAU .....	164
Abstract .....	164
5.1 Introduction .....	165
5.2 Methodology .....	167
5.2.1 Study area .....	167
5.2.2 Experiment's design, protocol and analysis .....	168
5.3 Results and discussions .....	170
5.3.1 Population structure and regeneration strategy .....	170
5.3.2 Harvesting impact .....	175
5.3.3 Crown health status .....	176
5.4 Conclusion .....	178
References .....	179
<b>CHAPTER SIX</b> .....	188
GENERAL SUMMARY, CONCLUSIONS AND RECOMMENDATIONS .....	188
6.1 General summary .....	188
6.2 Conclusions .....	192
6.3 Recommendations .....	192

APPENDIX A: QUESTIONNAIRES..... 194

APPENDIX B: LETTER FOR REQUESTING PERMISSION ..... 202

APPENDIX C: CONSENT FORM ..... 204

APPENDIX D: PUBLISHED MANUSCRIPT..... 206

APPENDIX E: LETTER FROM EDITOR ..... 217

APPENDIX F: PICTURES OF MAJORITY OF PLANT SPECIES UTILIZED ..... 218

## LIST OF TABLES

Table 2.1: Perceived origin villages of Mapulana people. ....	13
Table 2.2: Local roots words and suffixes used in Sepulana and Sepedi.....	16
Table 3.1: The municipality and villages surveyed. ....	48
Table 3.2: Demographic structure of participants.....	51
Table 3.3: Plants utilized by the Mapulana for various purposes. ....	55
Table 4.1: Demographic structure of participants.....	92
Table 4.2: Medicinal plants utilized by the Mapulana for treatment of different ailments.....	94
Table 4.3: Combinations of some plants utilized by the Mapulana.....	136
Table 4.4: Different ailments listed by the Mapulana.....	141

## LIST OF FIGURES

Figure 3.1: Map of Ehlanzeni local municipalities.....	45
Figure 3.2: Categories of plant species.....	70
Figure 3.3: Different growth forms.....	75
Figure 4.1: Map of Ehlanzeni local municipalities.....	89
Figure 4.2: Parts mostly utilized for treating ailments.....	119
Figure 5.1: A map showing Buffelshoek (Bolla-Tau).....	168
Figure 5.2: Stem circumference distribution of <i>Peltophorum africanum</i> population at Bolla-Tau village.....	171
Figure 5.3: Regeneration of <i>Peltophorum africanum</i> cut stems at Bolla-Tau village ...	173
Figure 5.4: Plant height distribution of <i>P. africanum</i> population at Bolla-Tau village. ...	174
Figure 5.5: Percentages of harvested against unharvested individuals of <i>Peltophorum africanum</i> population sampled at Bolla-Tau village .....	175
Figure 5.6: Crown healthiness of <i>P. africanum</i> population at Bolla-Tau village.....	177

## LIST OF ABBREVIATIONS

ALVs, African Leafy vegetables

IBC, International Botanical Congress

ICF, Informant Consensus Factor

MDA, Mine workers Development Agency

SAAB, South African Association of Botanists

SPSS, Statistical Product and Service solutions

THP, Traditional Health Practitioners

UV, Use value

## CONFERENCE CONTRIBUTIONS

1. **Mashile, S.P., Tshisikhawe, M.P. and Masevhe, N.A.** 2017. Medicinal plants used in treatment of maternal healthcare-related problems by the Mapulana of Ehlanzeni District, Mpumalanga Province, South Africa. XIX International Botanical Congress (IBC), 23-29 July 2017. Shenzhen Convention and Exhibition Center, China, Poster presentation.
2. **Mashile, S.P., Tshisikhawe, M.P. and Masevhe, N.A.** 2018. Indigenous fruit plant species of the Mapulana of Ehlanzeni district in Mpumalanga Province, South Africa. 44<sup>th</sup> South African Association of Botanists (SAAB) Annual Conference, 9-13 January 2018. University of Pretoria, Pretoria, South Africa. Oral presentation.
3. **Mashile, S.P., Tshisikhawe, M.P. and Masevhe, N.A.** 2019. Fuelwood tree species utilized by the Mapulana of Ehlanzeni district in Mpumalanga Province, South Africa. 45<sup>th</sup> South African Association of Botanists (SAAB) Annual Conference, 9-13 January 2019. University of Johannesburg, Johannesburg, South Africa. Oral presentation.

## MANUSCRIPTS

- **Mashile, S.P., Tshisikhawe, M.P. and Masevhe, N.A.** 2019. Population structure of *Peltophorum africanum* Sond. in Bolla-Tau, Mpumalanga Province. Pakistan Journal of Botany, submitted
- **Mashile, S.P., Tshisikhawe, M.P. and Masevhe, N.A.** 2019. Medicinal plants used in the treatment of maternal health-related problems by the Mapulana of Ehlanzeni District, Mpumalanga province, South Africa. Journal of Applied Pharmaceutical Science, submitted

## PUBLICATIONS

- **Mashile, S.P., Tshisikhawe, M.P. and Masevhe, N.A.** 2019. Fruit plant species of the Mapulana of Ehlanzeni District in Mpumalanga Province, South Africa. *South African Journal of Botany*, 122, 180-183.
- **Mashile, S.P., Tshisikhawe, M.P. and Masevhe, N.A.** 2019. Fuelwood Profile of the Mapulana of Ehlanzeni district in Mpumalanga Province, South Africa. *Indian Journal of Ecology*, 46(2), 340-346.

## CHAPTER ONE

### GENERAL INTRODUCTION

#### 1.1 Introduction

Utilization of plant species by indigenous people in South Africa has been documented for some time (Mabogo, 1990; Dovie *et al.*, 2007; Rasethe *et al.*, 2013; Kankara *et al.*, 2015), however, there is more information that remains undocumented from different ethnic groups and sub-groups across the world. South Africa has registered nine official languages and within each language there are unlimited number of different dialects (Light *et al.*, 2005). The current research is concentrated on the ethnobotanical study of the Mapulana people, a group of people who speaks Sepulana. It is a dialect of Sepedi (Northern Sotho) and it is also influenced by the Tsonga and Swati languages (Ritchken, 1990; Matshiye, 2002; Mojela, 2013). The Mapulana are taught Sepedi at school instead of Sepulana (Matshiye, 2002) and the people are distributed in the north-eastern part of Mpumalanga Province within the Ehlanzeni District Municipality. A limited number of Mapulana who co-habit either with Tsonga or Swati-speaking people, tend to raise their children under the influence of their neighbours languages, hence, depriving their children knowledge of Sepulana. It, therefore, leaves the elderly people within the Mapulana communities as the only group whose language is not diluted.

Seventy percent of Mapulana occupy Bushbuckridge Municipality, a place characterized by large population sizes of different ethnic groups, high levels of poverty and unemployment rate. Diseases such as Influenza, HIV, Tuberculosis and Intestinal infectious are regarded as the leading causes of death in that area (EDM, 2014). Due to the large population of people in Bushbuckridge, the utilization of plants within the villages is unsustainable causing inability in implementation of proper rules and regulations on vegetation utilization by traditional authorities (Kirkland *et al.*, 2007; Shumsky *et al.*, 2014).

Woody plant species are significant to the savanna ecology because they affect nutrient status of the soil by altering evapo-transpiration and provide shade. These plant species are directly significant to people as they provide fuelwood, material for construction and handy-craft, fruits and food for an unlimited number of herbivores (Källér, 2003).

## **1.2 Statement of the problem**

Numerous authors have pointed out the unsustainable harvesting of plant species in areas nearby or inhabited by the Mapulana people. Major cases of unsustainable harvesting of plants observed, were of fuelwood and for medicinal purposes (Kaschula *et al.*, 2005; Madubansi and Shackleton, 2007; Giannecchini *et al.*, 2007; Kirkland *et al.*, 2007; Findlay, 2013). In certain areas, coppices or stumps of plant species were found which in turn cause threat to the vegetation in question (Shackleton *et al.*, 2005; Higgins

*et al.*, 1999; Twine, 2005; Kaschula *et al.*, 2005; Prinsloo, 2014). Amahowe *et al.* (2017) elaborated that the high rate of unsustainable harvesting affects the plants population structure.

The Mapulana depend on communal rangelands for grazing, medicine, fuelwood, wild fruits and edible herbs. Plant diversity in these communal lands was observed to have lower vegetation structure and more bare ground relative to adjacent conservation areas (Shackleton, 2000). South Africa is known for its great medicinal diversity in plants, within the ethnic groups; these still need exploitation and documentation (van Vuuren 2008). The current study was carried out to investigate how the Mapulana utilize plants in their various communities.

### **1.3 Aim**

The aim of the study was to document ethnobotanical knowledge on indigenous plants used by the Mapulana people for different purposes.

### **1.4 Objectives**

The following specific objectives were investigated in order to achieve the aim of the study:

1. To document and analyze the utilization categories of indigenous plants by the Mapulana.
2. To investigate medicinal plants utilized by the Mapulana
3. To analyze the population structure of the most-utilized species.

### **1.5 Hypothesis**

1. Different utilization categories of indigenous plants by the Mapulana can be documented and analyzed.
2. Medicinal plants utilized by Mapulana can be investigated.
3. Population structure of the most-utilized species can be analyzed.

### **1.6 Structure of the research thesis**

The research thesis consists of six chapters, including this one. Chapter 1 is the general introduction of the study, while chapter 2 will deal with the literature review. Chapter 3 investigates the first objective, which is to provide a documented ethnobotanical checklist of plant species used by the Mapulana. Chapter 4 focuses on the second objective, which deals with the medicinal use of plants by the Mapulana. Chapter 5 deals with the last objective, which focuses on the population structure of the species highly preferred by the Mapulana. Lastly, chapter 6 outlines the general summary, conclusions and recommendations. Published papers from the study form part of the Appendix.

## References

- Amahowe, O. I., Biauou, S. S. H., Natta, A. K. and Balagueman, R.O. 2017. Multiple disturbance patterns and population structure of a tropical tree species, *Azelia africana* (Leguminosae – Caesalpinioideae), in two contrasting bioclimatic zones of the Republic of Benin. *Southern Forests: A Journal of Forest Science*, 1–9.
- Dovie, D., Shackleton, C. and Witkowski, E. 2007. Conceptualizing the human use of wild edible herbs for conservation in South African communal areas. *Journal of Environmental Management*, 84, 146–156.
- EDM, 2014. Ehlanzeni District Municipality (EDM) IDP Review 2013/14. [www.ehlanzeni.org.za](http://www.ehlanzeni.org.za). (Accessed on 18/5/2015).
- Findlay, S. 2013. *Clearing the confusion: The roles of local formal institutions in regulating firewood harvesting in Bushbuckridge, South Africa*. MSc dissertation, University of Witwatersrand Johannesburg, South Africa.
- Gianecchini, M., Twine, W. and Vogel, C. 2007. Land-cover change and human-environment interactions in a rural cultural landscape in South Africa. *The Geographical Journal*, 173 (1), 26–42.
- Higgins, S., Shackleton, C. and Robinson, E. 1999. Changes in woody community structure and composition under contrasting landuse systems in a semi-arid savanna, South Africa. *Journal of Biogeography*, 26 (3), 619–627.
- Källér, A. 2003. Growth pattern and reproduction of woody vegetation in a semi-arid

savanna in southern Botswana. Uppsala University, Uppsala, Sweden.

Kankara, S., Ibrahim, M., Mustafa, M. and Go, R. 2015. Ethnobotanical survey of medicinal plants used for traditional maternal healthcare in Katsina state, Nigeria.

*South African Journal of Botany*, 97, 165–175.

Kaschula, S., Twine, W. and Scholes, M. 2005. The effect of catena position and stump characteristics on the coppice response of three savannah fuelwood species.

*Environmental Conservation*, 32 (1), 76–84.

Kirkland, T., Hunter, L.M. and Twine, W. 2007. “ The Bush is No More ”: Insights on institutional change and natural resource availability in rural South Africa. *Society and Natural Resources*, 20 (4), 337–350.

Light, M.E., Sparg, S.G., Stafford, G.I. and Van Staden, J. 2005. Riding the wave: South Africa’ s contribution to ethnopharmacological research over the last 25 years.

*Journal of Ethnopharmacology*, 100, 127–130.

Mabogo, E.D.N. 1990. *The ethnobotany of the Vhavenda*. MSc dissertation, University of Pretoria. Pretoria, South Africa.

Madubansi, M. and Shackleton, C.M.Å., 2007. Changes in fuelwood use and selection following electrification in the Bushbuckridge lowveld, South Africa. *Journal of Environmental Management*, 83, 416–426.

Matshiye, J., 2002. Mapulana, Mapulaneng and the history of my people.

<http://www.geocities.ws/lepulana2002/>. (Accessed on the 1/05/ 2015).

Mojela, V.M. 2013. A balanced and representative corpus: The effects of strict corpus-

based dictionary compilation in Sesotho sa Leboa\*. <http://lexikos.journal.ac.za>, 23, 286–296. (Accessed on the 26/10/ 2016).

Prinsloo, O.S. 2014. *The relative influences of gradients in rainfall and landscape position on woody vegetation composition and structure in communal rangelands in Bushbuckridge, Mpumalanga Province*. MSc dissertation, University of Witwatersrand. Johannesburg, South Africa.

Rasethe, M., Semanya, S., Potgieter, M. and Maroyi, A. 2013. The utilization and management of plant resources in rural areas of the Limpopo Province, South Africa. *Journal of Ethnobiology and Ethnomedicine*, 9, 1–8.

Ritchken, E. 1990. Chiefs, migrants, the state and ethnicity: The Leihlo la Naga Migrant Workers Organisation 1978 - 1986. *Structure and Experience in the Making of Apartheid from Africana library*.

Shackleton, C.M. 2000. Comparison of plant diversity in protected and communal lands in the Bushbuckridge lowveld savanna, South Africa. *Biological Conservation*, 94, 273–285.

Shackleton, C.M., Guthrie, G. and Main, R. 2005. Estimating the potential role of commercial over-harvesting in resource viability: A case study of five useful tree species in South Africa. *Land Degradation and Development*, 16, 273–286.

Shumsky, S., Hickey, G.M., Johns, T., Pelletier, B. and Galaty, J. 2014. Institutional factors affecting wild edible plant (WEP) harvest and consumption in semi-arid Kenya. *Land Use Policy*, 38, 48–69.

Twine, W.C. 2005. Socio-economic transitions influence vegetation change in the communal rangelands of the South African lowveld. *African Journal of Range and Forage Science*, 22 (2), 93–99.

van Vuuren, S.F. 2008. Antimicrobial activity of South African medicinal plants. *Journal of Ethnopharmacology*, 119, 462–472.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

There is a significant need to document ethnobotanical information because the utilization of plant species is influenced by knowledge, climatic or ecological pattern and culture within communities (Masafu *et al.*, 2016). Ethnobotanical surveys assist in laying the ground work for relevant research on medicinal plants utilized by traditional health practitioners (Rana *et al.*, 2014). Bohra *et al.* (2017) elaborated that it is very significant to document indigenous knowledge before it fades away, and that the tradition of consumption of indigenous plants still exists, although it is vanishing. The drastically accelerated changes within cultures have resulted in few traditions and a small number of plant species being utilized. The changes in cultures have also led to degradation of native languages (Heinrich, 2003).

Sub-Saharan Africa has been reported as the lowest in the consumption of fruits and vegetables, meaning unhealthy and unbalanced meals (Bvenura and Sivakumar, 2017) although wild edible plants had sustained most African diets around the globe for many years (Grivetti and Ogle, 2000; Balemie and Kebebew, 2006). It is important to document knowledge about African leafy vegetables (ALVs) because traditions on their consumption are still alive within the rural populations (Bohra *et al.*, 2017). Loss of

knowledge concerning the consumption of ALVs and indigenous fruits are due to change of lifestyles, historical politics, stigmatization, habitat loss, introduction of new ALVs and availability (Dweba and Mearns, 2011). Perceptions around factors, such as colour, smell, taste, texture and appearance of certain indigenous food affect their consumption (van Rensburg *et al.*, 2007; van der Hoeven *et al.*, 2013; Bvenura and Afolayan, 2015). Harvesting of ALVs have also declined due to climatic conditions (Bvenura and Afolayan, 2014)

In South Africa, plants are trusted for treating many different ailments and this fact has been documented from different provinces and ethnic groups. Sickness such as gynecological complaints and sexually-transmitted diseases were recorded as responding to treatments from plants (Steenkamp, 2003; Semenya *et al.*, 2013a). Traditional health practitioners in South Africa regard their practices as at risk because of unsustainable utilization of medicinal plants, which as a result, are gradually becoming scarce (Semenya *et al.*, 2013c; Dzerefos *et al.*, 2016). Coughing, chasing of evil spirits, digestive problems and flu are among the sickness that are self-treated by most of South Africans (Marais *et al.*, 2015). In terms of medicinal plants utilization, great plant diversity within the communities and utilization levels of these plants show the significance of traditional medicines (Lewu and Afolayan, 2009; Giday *et al.*, 2010).

According to Street and Prinsloo (2013) as well as Aremu *et al.* (2015) medicinal plant species, such as *Siphonochilus aethiopicus*, *Bowiea volubilis* and *Hypoxis*

*hemerocallidea* are among the preferred in the Mpumalanga Province. Shackleton *et al.* (2000) documented a list of wild edible fruits, such as *Sclerocarya birrea* subsp. *caffra*, *Carissa edulis*, and *Diospyros mespiliformis* to mention few. Bvenura and Afolayan (2015) report that Mpumalanga is documented to have a low rate in consumption of African leafy vegetable (ALVs). Shackleton *et al.* (1998) and Tshikalange *et al.* (2016) are among the authors who documented a list of ALVs and medicinal plant species.

## **2.2 History of Mapulana**

### **2.2.1 Origin and history**

The origin of Mapulana people has been hidden or unknown to most communities; when the people are questioned about their history, they give little information but rather only names of places believed to be their place of origin, were identified (Table 2.1). Most of the participants listed at least one location name. Twenty-one different locations have been listed, where Moholoholo and Shakwaneng were mostly regarded as places where the Mapulana came from. Thirty percent of participants could not respond to the question regarding their original locations although most of the locations listed do portray an integral part of the history of Mapulana; they include locations such as Lepunama, Mokwena, Bedford, Vaalhoek, Lekokoto, and Swadini.

The Mapulana lived in Phageng near Mokwena (Crocodile river) and then settled in Shakwaneng (Lepunama-White River), Moholoholo, Hoedspruit, Sabie, Ohrigstad and Graskop (Matshiye, 2002; Mashile, 2016; Makhubedu-Chiloane, 2016;). Shakwaneng is the major area known to be one of the origin sites and it is used in praise poems. Mapulana history can be traced back to Barberton area where the people were scattered between Olifants River and Barberton due to the Swazi raid. Most were forced to live on the borders of the Swazi and Pedi areas while others dispersed to areas, such as the Kutswe, Pai, and Tsonga settlements (Ritchken, 1990). Matsiketane Mashile is the chief who successfully lead the Mapulana people in their battle against the Swazi people where they triumphed. The victory gave him a claim to a paramount status among the people (Ritchken, 1990; Mashile, 2016; Makhubedu-Chiloane, 2016).

An explanation of the history has revealed wars between the different Mapulana chieftaincies. It is explained according to lineage of the ancestors showing only one clan of Mapulana. Unfortunately, the Mashile and Chiloane families have withheld most of the important information on the history of the Mapulana.

**Table 2.1:** Perceived origin villages of Mapulana people.

<b>Place</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Bedford	5	5.1
Bolobedu	1	1.0
Branford	1	1.0
Burgersfort	1	1.0
Lekokoto	2	2.1
Lesotho (Mogotlhong)	1	1.0
Mapalagela (Setlhekeng)	1	1.0
Maponama	3	3.1
Matibidi	1	1.0
Meetse mokgoro	1	1.0
Moholoholo	10	10.3
Mokoena	3	3.1
Moremela	1	1.0
None	30	30.9
Phiring	1	1.0
Scotia	1	1.0
Sedwala	1	1.0
Sekhukhune	4	4.1

Shakwaneng	23	23.7
Swadini	1	1.0
Taung (Koromane)	1	1.0
Vaalhoek	4	4.1

---

### 2.2.2 Praise poem

The Mapulana are identified by their surnames and their praise poems. Surnames such as Mashile, Chiloane, Mashego, Matjie, Malele, Selekana, Sekgodi and recently Mokoena, Moreko, Malope, Morage, Dibakwane, Dilebo, Kwedi, Lebyane, Letswele, Makhubedu, Malumane, Mawele, Malope, Marule, Mogane, Mogakane, Moganedi, Morema, Nonyane, Sedibe, Segage, Mapaila, Phokwane, Makutu and Shakwane are recorded and they have emerged due to the different encounters during the Swazi war although not all of the people with these surnames accept to be called Mapulana. Places like Phageng and Shakwaneng are always included in praise poems to reveal that they are Mapulana (Matshiye, 2002; Mashile, 2016).

The Mapulana praise poem “Re batau a phaga a Malala a moenyane. Batho ba ba boyang Phageng, ba ba boyang Shakwaneng. Shakwana la kgomo le motho go phalang? Go phala motho gobane kgomo re lla re dja”. Which means – “we are the people of the lion, of the wild cat of Malala of Moenyane, we are people from Phageng, we are people

from Shakwaneng. Which is more important, the reeds of a cow and a human? A human is better since with a cow we cry while we eat the meat” (Mashile, 2016).

### **2.2.3 Language**

The Mapulana people speak Sepulana, a very robust and rich language which is neither taught nor written in schools (Matshiye, 2002). It is classified as one of the Northern Sotho dialects (Mojela, 2013). Khweyane (2014) further elaborated that dialects are variation from a standard language and aspects of vocabulary, pronunciation and grammar are usually recorded. Sepulana is broad in a sense that it is easily influenced by other languages (Ritchken, 1990; Matshiye, 2002; Mojela, 2013). People who reside in Thaba Chweu speak Sepulana which is influenced by Sepedi; in Mbombela it is influenced by siSwati and in Bushbuckridge it is Xitsonga-influenced. In the study it was observed that some people who carry the Mapulana surname cannot speak the language due to their location and different language influences. Local names written in the study were edited by the assistance of a book by Makhubedu-Chiloane (2016). Numerous words written as local names are similar to Sepedi and the five roots words used in the current study are shown in Table 2.2.

**Table 2.2:** Local roots words and suffixes used in Sepulana and Sepedi.

	<b>Sepulana</b>		<b>Sepedi</b>	
1.	“tlha”	Motlhalabu	“hla”	Mohlalabu
2.	“tjwa”	Motlhatjwa	“tswa”	Mohlatswa
3.	“tle”	Motlepo	“tle”	Motlepo
4.	“tjhi”	Motjhidi	“chi”	Mochidi
5.	“tja”	Moshitja	“tša”	Moshitša

#### 2.2.4 Tradition or Culture

As a result of their relative marginalization, the Mapulana have developed a tradition of cooperation across ethnic groupings based on regional loyalties (Ritchken 1990). The culture of initiation schools came about, whereby youths are initiated into manhood and womanhood. Initiation schools “koma” are held during winter seasons and their practices are performed secretly. Initiated boys would belong to the same “mphato/moroto” (regiment) only if they are initiated in the same school and at the same time. The system enables separation between two regiments – initiated and uninitiated youth. The uninitiated youth are not allowed to visit or come close to an initiation school gathering (Matshiye, 2002). Girls are made “setwaba” a day before the initiation celebration; this is used as an identification mark for girls who have gone to initiation school. Those who

undergo initiation are classified as women when their first-born children are initiated. The initiation school for women is “segokgo”.

### **2.2.5 Current location**

The Mapulana are scattered in the Mpumalanga province; they are in most villages in Bushbuckridge, Mbombela, and Thaba Chweu local municipalities. Other diluted groups of Mapulana are in Burgersfort and Sekhukhune in Limpopo Province; their language, Sepulana, is influenced by Sepedi and very different from those found in the Mpumalanga province.

### **2.3 Concerns about vegetation management in areas inhabited by the Mapulana**

In most rural areas, restrictions on vegetation access are placed by traditional leaders and enforced by headmen and traditional community policemen (Mabogo, 1990; Giannecchini *et al.*, 2007; Kurui *et al.*, 2016). These restrictions are put in place to reduce commercial exploitation of plant resources. Cultural change, poverty, large population and high unemployment rate have limited these controls (Cunningham and Mbenkum, 1993; Kirkland *et al.*, 2007; Giannecchini *et al.*, 2007; Findlay, 2013). Some of the communities, however have been given no restriction on fuelwood, wild edible herbs or medicinal plants as these are their only resource, although this in turn puts a strain on biodiversity. Giannecchini *et al.* (2007) argue that the arrival of non-South African citizens in

Bushbuckridge Municipality has led to an increase in the village population, thereby weakening of official control of local natural resources by the traditional authorities. It has led to an increase of unsustainable harvesting of resources.

### **2.3.1 Fuelwood**

Fuelwood is the primary energy source for the majority of rural households in African savannas (Prinsloo, 2014). Harvesting of fuelwood is associated with local abundance, quantity and availability of such species (de Oliveira *et al.*, 2007; Madubansi and Shackleton, 2007). Availability of electricity has not resolved the issue of people's dependency on fuelwood but rather has increased the demands for fuelwood (Matsika *et al.*, 2013). Preference for plant species for fuelwood has changed among villages over the years (Madubansi and Shackleton, 2007). Few species are now available because of scarcity associated with overharvesting.

Unsustainable harvesting of fuelwood changes the vertical stratification and biomass of vegetation which affects the ecosystem functioning because the height of a canopy is related to productivity and biomass (Mograbi *et al.*, 2015). Fuelwood scarcity has caused cutting down of live trees due to increased human population, poverty, and unemployment (Madubansi and Shackleton, 2007; Kirkland *et al.*, 2007). More problems have been created by unemployed youths who fail to follow the communal biodiversity rules and regulation practiced within their communities (Kirkland *et al.*, 2007). Shaheen *et al.* (2016) and Sulaiman *et al.* (2017) stipulated that unsustainable fuelwood harvesting causes

deforestation, climate change, biodiversity loss and land degradation. The myths, rules and regulation created within villages have preserved most of fuelwood plants in the past. Within the villages people are aware that unsustainable harvesting affect the biodiversity but are ignorant of its implications (Adam, 2014). The observable changes in vegetation structure includes an increase of coppice regrowth productions. The tree morphology of many woody species has been altered by the increased number of live stems cutting and widespread coppice regrowth. The population structure of numerous utilised plant species are shown by the absence of adult mature stems but rather the presence of large number of smaller sapling stems (Prinsloo, 2014).

Alien species from genera like *Pinus*, *Eucalyptus* and some *Acacia* have been eradicated through water management programmes (van Wilgen and Wannenburg, 2016). These invasive plants increase the biomass production, changing the nitrogen fixation and soil chemistry which impact the water quality (Chamier *et al.*, 2012). The only solution for saving fuelwood species is by the creation of public awareness, education, and job creation among communities. This can assist the communities on understanding the values of conserving forests (Ifegbesan *et al.*, 2016). Recently, policy makers are now involved in the struggle of reducing high levels of fuelwood consumption thereby addressing its impacts in climate change (Uhunamure *et al.*, 2016).

### 2.3.2 Medicinal plants

Minimum access to public health care have contributed to extreme reliance and preference of medicinal plants hence affordable prices of traditional medicine, availability of practitioners and treatment rendered means patients find the practice conducive (Giday *et al.*, 2010; Das *et al.*, 2013). Afflictions are sometimes treated at home by elders who are neither traditional health practitioners (THP) nor herbalists (Giday *et al.*, 2010). Traditional diagnose of illness is still practiced within the villages where initial physical inspection is performed and then symptoms checked to quantify the problem (Maroyi, 2011a). THPs are aware that patients do not always reveal their real condition, therefore, a combination of plant species, targeting different ailment known and unknown to the practitioner is employed (Mulaudzi *et al.*, 2015).

Preferred medicinal plants in South Africa are harvested from the wild (Street *et al.*, 2008; Mesfin *et al.*, 2013; Maroyi, 2017) which in turn threatens the population stability and biodiversity of plants. Yearly collection of medicinal plant promoted unsuitable harvesting whereby there is lack of mature tree and limited number of saplings resulting in inconsistent same-plant species availability. These problems have created a major loss in cultural practices as the knowledge of a particular plant is lost when the plant is no longer available (Street *et al.*, 2008). This means that plants which were more frequently utilized by the older generations have now become less important because of their unavailability. Additionally, the local names given to species are now the universal common name which are unknown to the older generation (Heinrich, 2003).

The utilization of traditional medicine is associated with faith, culture and perception; knowledge and use of traditional medicine is, therefore, region-specific making the fading away of such knowledge very possible because it is limited to a small region (Aziza *et al.*, 2017). The Mapulana have been using traditional medicine for over decades but their practice, concept and *materia medica* is unknown hence have not been recorded (Moteetee and Van Wyk, 2011). Traditional medicine's knowledge is passed on from one traditional health practitioner in the family to the next generation so new knowledge is acquired per generation (Rana *et al.*, 2014).

### **2.3.3 Wild edible plants**

African leafy vegetables (ALVs) and indigenous fruits are significant sources of vitamins and minerals but the nutritional value awareness of culinary used is limited to some cultures and not available to other regions (Dovie *et al.*, 2007; Bvenura and Afolayan, 2015; Ijang *et al.*, 2017; Mayekiso *et al.*, 2017; Bvenura and Sivakumar, 2017). The nutrients found in the ALVs and indigenous fruits assist in suppressing some of illnesses, for example, iron is provided by some plants for iron deficiency anemia. Potassium and magnesium decreases blood pressure; potassium is recommended for controlling skeletal muscle contraction and nerve impulse transmission, while potassium and calcium are remedies for soft bones; these are some of the ailments (Mensah *et al.*, 2008). ALVs possess phenolic compounds that assist in prevention or cure of diseases (Moyo *et al.*,

2017). In the world the consumption ALVs is low and the lowest in sub-Saharan Africa, hence, the need for ALVs (Bvenura and Sivakumar, 2017).

There are a number of plants used as ALVs, harvested from the wetlands, homesteads and field (Dovie *et al.*, 2007; Shackleton *et al.*, 1998). Several plant families within the genera *Vigna*, *Amaranthus*, *Bidens*, *Agathosma*, *Cleome*, *Corchorus* and *Chenopodium* (Dovie *et al.*, 2007) are common wild edible plants. Dovie *et al.* (2007); Shackleton *et al.* (1998) reported that ALVs are consumed when fresh during the wet season; since they are annuals, they are dried and stored for off- season. Most families prefer ALVs that are available the whole year and planted fruits in their homesteads (High and Shackleton, 2000). Some ALVs such as *Ipomoea batatas*, *Manihot esculenta*, *Colocasia esculenta* and *Moringa oleifera* as well as, *Corchorus* species, *Cleome gynandra* (Flyman and Afolayan, 2006) are stored to achieve an all-year-round supply (Maroyi, 2011b) ALVs in Uganda are preferred because of their nutrients and the diversity they bring in meals. Preference of people in urban areas for ALVs has reduced because of pollution, such as dust especially on plants harvested on the roadsides (Mollee *et al.*, 2017). In Malaysia people prefer to harvest ALVs that are found in their surrounds or from the wild (Asyira *et al.*, 2016).

Indigenous wild fruits such as *Ficus sur*, *Flueggea virosa* subsp. *virosa*, *Strychnos spinosa* and *Annona senegalensis* are highly preferred (Shomkegh *et al.*, 2013). They are either consumed as is or used to make traditional beverages (Rampedi and Olivier,

2013). Plant species grown in gardens include *Citrus limon*, *Citrus sinensis*, *Carica papaya*, *Prunus persica*, *Sclerocarya birrea* and *Persea americana* (Mosina *et al.*, 2014).

The occupation and age influence the preference for African leafy vegetable; *V. unguiculata* and *C. olerius* are highly preferred (Gido *et al.*, 2017) in South Africa. In Zimbabwe the consumption of ALVs increases as the age of people increases (Dube *et al.*, 2016). In other parts of South Africa, older generations have passed on the knowledge of nutritious ALVs to the younger generation (van der Hoeven *et al.*, 2013). Significant information of indigenous plants is restricted to certain communities; loss or decrease of specific knowledge will result in low consumption of ALVs and lack of diversity (Dweba and Mearns, 2011; Ahmad and Pieroni, 2016). Elderly women are knowledge custodians about matters concerning ALVs (Shackleton *et al.*, 1998; Orech *et al.*, 2008; Vorster *et al.*, 2008; Maroyi, 2011a or 2011b; Thandeka *et al.*, 2011; Taleni and Goduka, 2013; Ojelel and Kakudidi, 2015).

Naturalized ALVs species have replaced the native species and this is still a concern to the poor rural communities; this increases the risk of malnutrition or communicable diseases (Grivetti and Ogle, 2000; van Rensburg *et al.*, 2007; Lewu and Mavengahama, 2010; Shomkegh *et al.*, 2013; van der Hoeven *et al.*, 2013; Bvenura and Afolayan, 2014; Kucich and Wicht, 2016; Ahmad and Pieroni, 2016). It is perceived that naturalized ALVs are drought-tolerant, easily accessible and available all year round (Dovie *et al.*, 2007).

South African and Batswana people's gardens consist of 20% native species and 60% on naturalized plant species (Molebatsi *et al.*, 2010).

## **2.4 Population studies**

Woody plant species are significant to the savanna ecology because they affect the nutrient status of the soil by altering evapo-transpiration and provide shade. These plant species are directly significant to people as they provide fuelwood, material for construction or handy-crafts, fruits and food for unlimited number of herbivores (Källér, 2003). Wood harvesting for medicinal purposes, fuelwood, grazing, drought and fodder tree harvesting are factors that affect population of plants (Cuni-Sanchez *et al.*, 2018).

### **2.4.1. Population structure**

Population structure refers to the distribution or the number of plant species present in a size class in the aim of providing the regeneration profile of tree species, although the size of diameter is utilized to determine the population structure, the size-classes of seedlings and saplings can also be utilized. In other words, population structure reflects to the ecological and biological characteristic of plant species and regeneration patterns (Cunningham, 2001; Bharali *et al.*, 2012; Sarkar and Devi, 2014; Tzeng *et al.*, 2018). Bharali *et al.* (2012) further elaborate that altitude linked with environmental factors can affects the population structure.

#### **2.4.2 Determinates of the structure of a population**

In plant population studies, an inverse J-shape shows a stable population or good generation where seedlings are greater than the saplings and adults (Cousins *et al.*, 2014; Kflay and Kitessa, 2014). Bell-shape population structure shows a poor regeneration or unstable population where certain plant species survive only in the sapling or adult stage with no substantial recruitment of seedlings (Cousins *et al.*, 2014; Kflay and Kitessa, 2014; Aine-omucunguzi *et al.*, 2015; Bayen *et al.*, 2015; Nasrullah *et al.*, 2015; Lisao *et al.*, 2018). A bell-shape shows a hampered regeneration because of external factors and such a population structure indicate irregular recruitment opportunities (Tshisikhawe and Van Rooyen, 2013; Gaugris and Van Rooyen, 2007; Worku *et al.*, 2012; Nasrullah *et al.*, 2015)).

Reverse J-shape (L-shaped) is when the number of individuals is low in the lower size-classes (Sarkar and Devi, 2014; Mekonen *et al.*, 2015) and this shows that plant species are tolerant to shade and competition, whereas the recruitment strategies are regarded as continuous (Cunningham, 2001). In this scenario, future plant communities will be sustained (Sarkar and Devi, 2014).

#### **2.4.3 Species frequency and regeneration**

The frequency is the percentage of individuals within plots where different species occur (Källér, 2003). In savannas, woody plant species vegetatively regenerate through basal shoots or root suckering, since regeneration from seeds is a long-term strategy (Källér, 2003). Regeneration strategy of plants can be due to vegetation type and harvesting criteria which may limit the germination (Aine-omucunguzi *et al.*, 2015). A decrease of adult trees and lack of regeneration will show a decline in the population of plant species (Bayen *et al.*, 2015). Plant stem diameter is a significant determinant of stem resprout output (Neke *et al.*, 2006). The ability to resprout is also affected by stump size. Many tree species which resprout vigorously when the stumps are small however do not resprout from the large stumps of the mature trees (Cunningham, 2001).

Resprouters occurs in a wide range of habitats, with few seedlings growing more slowly through the use of bud banks. The multi-stemmed plants regenerate clonally by sprouting from new shoots or new stems from buds below or above ground. This way of regeneration declines tree age or size; regeneration recruitment is irregular or infrequent (Cunningham, 2001).

## References

- Adam, Y.O. 2014. Local knowledge on trees utilization and their existing threats in Rashad District of Nuba. *Journal of Forest and Environmental Science*, 30 (4), 342–350.
- Ahmad, K. and Pieroni, A. 2016. Folk knowledge of wild food plants among the tribal communities of Thakht-e-Sulaiman Hills, North-West Pakistan. *Journal of Ethnobiology and Ethnomedicine*, 12.
- Aine-omucunguzi, A., Byarugaba, D. and Rugunda, G.K. 2015. Population structure and regeneration status of *Trichilia dregeana* Sond . in heavily and less disturbed areas of Kalinzu Forest R .... *Journal of Forestry*, 5, 662–667.
- Aremu, A.O., Moyo, M., Amoo, S.O. and Van Staden, J. 2015. Ethnobotany, therapeutic value, phytochemistry and conservation status of *Bowiea volubilis*: A widely used bulbous plant in southern Africa. *Journal of Ethnopharmacology*, 174, 308–316.
- Asyira, S.A., Noorasmah, S., Sarbini, S.R. and Harah, Z.M. 2016. Mineral content of five indigenous leafy vegetables from Bintulu market, *Sarawak Malaysia*, 2, 26–35.
- Aziza, M.A., Khan, A.H., Adnan, M. and Izatullah, I. 2017. Traditional uses of medicinal plants reported by the indigenous communities and local herbal practitioners of Bajaur Agency, Federally Administrated Tribal Areas, Pakistan. *Journal of Ethnopharmacology*, 198, 268–281.
- Balemie, K. and Kebebew, F. 2006. Ethnobotanical study of wild edible plants in

- Derashe and Kucha. *Journal of Ethnobiology and Ethnomedicine*, 2, 1–9.
- Bayen, P., Lykke, A.M., Ouédraogo, A. and Thiombiano, A. 2015. Population structure in natural stands, seed germination and seedling growth of *Sterculia setigera* under nursery. *International Journal of Plant and Soil Science*, 7 (4), 202–210.
- Bharali, S., Paul, A., Khan, M.L. and Singha, L.B. 2012. Impact of altitude on population structure and regeneration status of two *Rhododendron* species in a temperate broad leaved forest of Arunachal. *International Journal of Ecosystem*, 2 (1), 19–27.
- Bohra, N., Tewari, L.M. and Tewari, A. 2017. Ethnobotany of wild edible plants traditionally used by the local people in the Ramnagar region from Nainital District, India. *Biolife*, 5 (1), 12–19.
- Bvenura, C. and Afolayan, A.J. 2014. Ethnobotanical survey of wild vegetables in Mbashe and Nkonkobe municipalities, Eastern Cape Province, South Africa. *Acta Botanica Gallica*, 161 (2), 189–199.
- Bvenura, C. and Afolayan, A.J. 2015. The role of wild vegetables in household food security in South Africa: A review. *Food Research International*, 76, 1001–1011.
- Bvenura, C. and Sivakumar, D. 2017. The role of wild fruits and vegetables in delivering a balanced and healthy diet. *Food Research International*, 99, 15–30.
- Chamier, J., Schachtschneider, K., Maitre, D.C., Ashton, P.J. and van Wilgen, B.W. 2012. Impacts of invasive alien plants on water quality, with particular emphasis on South Africa. *Water SA*, 38(2), 345–356.
- Cousins, S.R., Witkowski, E.T.F. and Pfab, M.F. 2014. Elucidating patterns in the

- population size structure and density of *Aloe plicatilis*, a tree aloe endemic to the Cape fynbos, South Africa. *South African Journal of Botany*, 90, 20–36.
- Cuni-Sanchez, A., Pfeifer, M., Marchant, R., Pompeu, P. V, and Burgess, N.D., 2018. Harvesting fodder trees in montane forests in Kenya: species, techniques used and impacts. *New Forests*, 1–18.
- Cunningham, A. 2001. Applied ethnobotany: people, wild plant use and conservation. London and Sterling: Earthscan Publications Ltd. London, United Kingdom.
- Cunningham, A. and Mbenkum, F. 1993. Sustainability of harvesting *Prunus africana* bark in Cameroon: A medicinal Plant in international trade. *People and Plants working paper 2. Paris, UNESCO*. Paris, France.
- Das, D.C., Sinha, N.K., Chattopadhyay, J.C., Das, M. and Samanta, P. 2013. The use of medicinal plants for the treatment of Gonorrhoea and Syphilis in West Bengal of India. *International Journal of Phytomedicine*, 5 (1), 14–17.
- van der Hoeven, M., Osei, J., Greeff, M., Kruger, A., Faber, M. and Smuts, C.M. 2013. Indigenous and traditional plants: South African parents' knowledge, perceptions and uses and their children's sensory acceptance. *Journal of Ethnobiology and Ethnomedicine*, 9, 1–12.
- Dovie, D., Shackleton, C. and Witkowski, E. 2007. Conceptualizing the human use of wild edible herbs for conservation in South African communal areas. *Journal of Environmental Management*, 84, 146–156.
- Dube, P., Ihle, R. and Heijman, W. 2016. Food security in Zimbabwe: Demand for

- African indigenous vegetables. 5th AAAE Conference in Addis Ababa, Ethiopia  
“Transforming smallholder agriculture in Africa: The role of policy and governance”,  
1–25.
- Dweba, T.P. and Mearns, M.A. 2011. Conserving indigenous knowledge as the key to  
the current and future use of traditional vegetables. *International Journal of  
Information Management*, 31 (6), 564–571.
- Dzerefos, C.M., Witkowski, E.T.F. and Kremer-Köhne, S. 2016. Aiming for the  
biodiversity target with the social welfare arrow: medicinal and other useful plants  
from a Critically Endangered grassland ecosystem in Limpopo Province, South  
Africa. *International Journal of Sustainable Development and World Ecology*, 1–13.
- Findlay, S. 2013. *Clearing the Confusion: The roles of local formal institutions in  
regulating firewood harvesting in Bushbuckridge, South Africa*. MSc dissertation,  
University of Witwatersrand, Johannesburg.
- Flyman, M. V and Afolayan, A.J. 2006. A survey of plants used as wild vegetables in  
four district of Botswana. *Ecology of Food and Nutrition*, 46 (6), 405–415.
- Gaugris, J.Y. and Van Rooyen, M.W. 2007. The structure and harvesting potential of  
the sand forest in Tshanini Game Reserve, South Africa. *South African Journal of  
Botany*, 73, 611–622.
- Giannecchini, M., Twine, W. and Vogel, C. 2007. Land-cover change and human-  
environment interactions in a rural cultural landscape in South Africa. *The  
Geographical Journal*, 173 (1), 26–42.

- Giday, M., Asfaw, Z. and Woldu, Z. 2010. Ethnomedicinal study of plants used by Sheko ethnic group of Ethiopia. *Journal of Ethnopharmacology*, 132 (1), 75–85.
- Gido, E., Ayuya, O., Owuor, G. and Bokelmann, W. 2017. Consumer acceptance of leafy african indigenous vegetables: comparison between rural and urban dwellers. *International Journal of Vegetable Science*, 23 (4), 346–361.
- Grivetti, L. and Ogle, B. 2000. Value of traditional foods in meeting macro- and micronutrient needs: the wild plant connection. *Nutrition Research Reviews*, 13, 31–46.
- Heinrich, M. 2003. Ethnobotany and natural products: The search for new molecules, new treatments of old diseases or a better understanding of indigenous cultures? *Current Topics in Medicinal Chemistry*, 3, 29–42.
- High, C. and Shackleton, C.M. 2000. The comparative value of wild and domestic plants in home gardens of a South African rural village. *Agroforestry Systems*, 48, 141–156.
- Ifegbesan, A.P., Annegarn, H.J., Pendlebury, S. and Rampedi, I.T. 2016. Gender relationships in forest resource utilization and conservation in Nigeria: implications for environmental sustainability. *Gender and Behaviour*, 14 (1), 6996–7010.
- Ijang, P., Ngome, T., Shackleton, C., Degrande, A. and Tieguhong, J.C. 2017. Addressing constraints in promoting wild edible plants' utilization in household nutrition: case of the Congo Basin forest area. *Agriculture and Food Security*, 6, 1–10.

- Källér, A. 2003. *Growth pattern and reproduction of woody vegetation in a semi-arid savanna in southern Botswana*. Uppsala University, Uppsala, Sweden.
- Kflay, G. and Kitessa, H. 2014. Species composition, plant community structure and natural regeneration status of Belete moist evergreen montane forest, Oromia Regional State, southwestern Ethiopia. *Momona Ethiopian Journal of Science*, 6 (1), 97–101.
- Khweyane, M.A. 2014. *The influence of the dialect sepulana on the learning of sepedi at Sabie circuit, Mpumalanga province, South Africa*. Master of Arts, University of Limpopo, Polokwane, South Africa
- Kirkland, T., Hunter, L.M. and Twine, W. 2007. “ The bush is no more ”: Insights on institutional change and natural resource availability in rural South Africa. *Society and Natural Resources*, 20 (4), 337–350.
- Kurui, C.M., Kiptui, M., Chelang’a, J.K. and Omondi, P. 2016. Traditional controls of harvesting and conserving medicinal plants in Keiyo South Sub-Country, Kenya. *International Journal of Humanities and Social Science*, 6 (11), 54–63.
- Lewu, F.B. and Afolayan, A. J. 2009. Ethnomedicine in South Africa: The role of weedy species. *African Journal of Biotechnology*, 8 (6), 929–934.
- Lewu, F.B. and Mavengahama, S. 2010. Wild vegetables in northern KwaZulu Natal , South Africa: Current status of production and research needs, *Scientific Research and Essays* 5 (20), 3044–3048.
- Lisao, K., Geldenhuys, C.J. and Chirwa, P.W. 2018. Assessment of the African baobab

(*Adansonia digitata* L.) populations in Namibia: Implications for conservation.

*Global Ecology and Conservation*, 14, e00386.

Mabogo, E.D.N. 1990. *The ethnobotany of the Vhavenda*. MSc dissertation, University of Pretoria. Pretoria, South Africa.

Madubansi, M. and Shackleton, C.M.Å. 2007. Changes in fuelwood use and selection following electrification in the Bushbuckridge lowveld, South Africa. *Journal of Environmental Management*, 83, 416–426.

Makhubedu-Chiloane, T. 2016. *Tjiba ho wo tjwang*. Sebosegolo sa Mapulana Writers Association. Nelspruit, South Africa.

Marais, A., Steenkamp, V. and Du Plooy, W.J. 2015. Conditions frequently self-treated with herbal remedies by patients visiting a tertiary hospital in Gauteng, South Africa. *South African Family Practice*, 57 (1), 8–11.

Maroyi, A., 2011a. An ethnobotanical survey of medicinal plants used by the people in Nhema communal area, Zimbabwe. *Journal of Ethnopharmacology*, 136 (2), 347–354.

Maroyi, A. 2011b. Potential role of traditional vegetables in household food security: A case study from Zimbabwe. *African Journal of Agricultural Research*, 6 (26), 5720–5728.

Maroyi, A. 2017. Diversity of use and local knowledge of wild and cultivated plants in the Eastern Cape province, South Africa. *Journal of Ethnobiology and Ethnomedicine*, 13 (43), 1–16.

- Masafu, M.M., Mbajiorgu, C.A., Nematodzi, L.E. and Kabine, E.S. 2016. A study of natural habitats and uses of medicinal plants in Thulamela and JS Moroka Municipalities, South Africa. *Indian Journal of Traditional Knowledge*, 15 (3), 363–369.
- Mashile, J. 2016. *Mapulana - The nation buried alive*. Africa Chuto Books (PTY) LTD. Pretoria, South Africa.
- Matshiye, J. 2002. Mapulana, Mapulaneng and the history of my people. <http://www.geocities.ws/lepulana2002/>. (Accessed on the 1/05/ 2015).
- Matsika, R., Erasmus, B.F.N. and Twine, W.C. 2013. Double jeopardy: The dichotomy of fuelwood use in rural South Africa. *Energy Policy*, 52, 716–725.
- Mayekiso, A., Taruvinga, A. and Mushunje, A. 2017. Perceptions and determinants of smallholder farmers' participation in the production of indigenous leafy vegetables: The case of Coffee Bay, Eastern Cape province of South Africa. *African Journal of Science, Technology, Innovation and Development*, 9 (3), 281–287.
- Mekonen, T., Ayele, B. and Ashagrie, Y. 2015. Woody Plant Species Diversity, Structure and regeneration status of Woynwuha Natural Forest, North West Ethiopia. *Asian Journal of Ethnopharmacology and Medicinal Foods*, 1 (1), 7–19.
- Mensah, J., Okoli, R., Ohaju-Obodo, J. and Eifediyi, K. 2008. Phytochemical, nutritional and medical properties of some leafy vegetables consumed by Edo people of Nigeria. *African Journal of Biotechnology*, 7 (14), 2304–2309.
- Mesfin, K., Tekle, G. and Tesfay, T. 2013. Ethnobotanical study of traditional medicinal

- plants used by indigenous people of Gemad District, northern Ethiopia. *Journal of Medicinal Plants Studies*, 1 (4), 32–37.
- Mograbi, P.J., Erasmus, B.F.N. Witkowski, E.T.F., Asner, G.P., Wessels, K.J., Mathieu, R., Knapp, D.E., Martin, R.E. and Main, R. 2015. Biomass increases go under cover: woody vegetation dynamics in South African rangelands. *PLoS ONE*, 10 (5).
- Mojela, V.M. 2013. A balanced and representative corpus: The effects of strict corpus-based dictionary compilation in Sesotho sa Leboa\*. <http://lexikos.journal.ac.za>, 23, 286–296. (Accessed on the 26/10/ 2016).
- Molebatsi, L.Y., Siebert, S.J., Cilliers, S. and Lubbe, C.S. 2010. The Tswana tshimo: a homegarden system of useful plants with a particular layout and function. *African Journal of Agricultural Research*, 5 (21), 2952–2963.
- Mollee, E., Pouliot, M. and McDonald, M. 2017. Land use policy Into the urban wild: Collection of wild urban plants for food and medicine in Kampala, Uganda. *Land Use Policy*, 63, 67–77.
- Mosina, G.K.E., Maroyi, A. and Potgieter, M. 2014. Comparative analysis of plant use in peri-urban domestic gardens of the Limpopo Province, South Africa. *Journal of Ethnobiology and Ethnomedicine*, 10 (35), 2–9.
- Moteetee, A. and Van Wyk, B.E. 2011. The medical ethnobotany of Lesotho: A review. *Bothalia*, 41 (1), 209–228.
- Moyo, S.M., Mavumengwana, V. and Kayitesi, E. 2017. Effects of cooking and drying on phenolic compounds and antioxidant activity of African green leafy vegetables.

*Food Reviews International.*

- Mulaudzi, R.B., Ndhlala, A.R. and Van Staden, J. 2015. Ethnopharmacological evaluation of a traditional herbal remedy used to treat gonorrhoea in Limpopo province, South Africa. *South African Journal of Botany*, 97, 117–122.
- Nasrullah, K., Fayaz, A., Kishwar, A. and Shahid, S. 2015. Composition, structure and regeneration dynamics of *Olea ginea* Royle Forests from Hindukush Range of Pakistan. *Journal of Mountain Science*, 12 (3), 647–658.
- Neke, K.S., Owen-Smith, N. and Witkowski, E.F. 2006. Comparative resprouting response of Savanna woody plant species following harvesting: the value of persistence. *Forest Ecology and Management*, 232, 114–123.
- Ojelel, S. and Kakudidi, E.K. 2015. Wild edible plant species utilized by a subsistence farming community in Obalanga sub-county, Amuria district, Uganda. *Journal of Ethnobiology and Ethnomedicine*, 11, 1–8.
- de Oliveira, R.L.C., Lins Neto, E., Araujo, E., and Albuquerque, U., 2007. Conservation priorities and population structure of woody medicinal plants in an area of caatinga vegetation (Pernambuco State, NE Brazil). *Environmental Monitoring and Assessment*, 132, 189–206.
- Orech, F., Christensen, D., Larsen, T., Frils, H., Aagard-Hansen, J. and Estambale, B. 2008. Mineral content of traditional leafy vegetables from Western Kenya. *International Journal of Food Science and Nutrition*, 58 (8), 595–602.
- Prinsloo, O.S. 2014. *The relative influences of gradients in rainfall and landscape*

- position on woody vegetation composition and structure in communal rangelands in Bushbuckridge , Mpumalanga Province. MSc dissertation, University of Witwatersrand. Johannesburg, South Africa.*
- Rampedi, I. and Olivier, J. 2013. Traditional beverages derived from wild food plant species in the Vhembe District, Limpopo Province in South Africa. *Ecology of Food and Nutrition*, 52 (3), 203–222.
- Rana, S., Islam, M., Bosunia, S., Mahmud, S., Santa, S., Snigdha, S., Mahal, M. and Rahmatullah, M. 2014. A survey of medicinal plants used by a village folk medicinal practitioner in Sreemangal Upazila of Maulvibazar District, Bangladesh. *American-Eurasian Journal of Sustainable Agriculture*, 8 (1), 1–9.
- van Rensburg, W., van Averbeke, W., Slabbert, R., Faber, M., van Jaarsveld, P., van Heerden, I., Wenhold, F. and Oelofse, A. 2007. African leafy vegetables in South Africa. *Water SA*, 33 (3), 317–326.
- Ritchken, E. 1990. Chiefs, migrants, the state and ethnicity: The Leihlo La Naga Migrant Workers Organisation 1978 - 1986. Structure and Experience in the Making of Apartheid from Africana library.
- Sarkar, M. and Devi, A. 2014. Assessment of diversity, population structure and regeneration status of tree species in Hollongapar Gibbon wildlife sanctuary, Assam, northeast India. *Tropical plant research*, 1 (2), 26–36.
- Semenya, S.S., Potgieter, M.J. and Erasmus, L.J.C. 2013a. Bapedi phytomedicine and their use in the treatment of sexually transmitted infections in Limpopo Province, South Africa. *African Journal of Pharmacy and Pharmacology*, 7 (6), 250–262.

- Semenya, S.S., Potgieter, M.J. and Erasmus, L.J.C. 2013c. Exotic and indigenous problem plant species used, by the Bapedi, to treat sexually transmitted infections in Limpopo Province, South Africa. *African Health Sciences*, 13 (2), 320–326.
- Shackleton, C., Dzerefos, C., Shackleton, S. and Mathabela, F. 2000. The use of and trade in indigenous edible fruits in the Bushbuckridge savanna region, South Africa. *Ecology of Food and Nutrition*, 39 (3), 225–245.
- Shackleton, S., Dzerefos, C., Shackleton, C. and Mathabela, E.R. 1998. Use and trading of wild edible herbs in the central lowveld savanna region, South Africa. *Economic Botany*, 52, 251–259.
- Shaheen, H., Azad, B., Mushtaq, A. and Khan, R. 2016. Fuelwood consumption pattern and its impact on forest structure in Kashmir Himalayas. *Bosque*, 37 (2), 419–424.
- Shomkegh, S., Mbakwe, R. and Dagba, B. 2013. Ethnobotanical survey of edible wild plants in Tiv Communities of Benue State, Nigeria. *Journal of Natural Sciences Research*, 3 (7), 17–24.
- Steenkamp, V. 2003. Traditional herbal remedies used by south African women for gynaecological complaints. *Journal of Ethnopharmacology*, 86 (1), 97–108.
- Street, R., Stirk, W. and Van Staden, J. 2008. South African traditional medicinal plant trade - Challenges in regulating quality, safety and efficacy. *Journal of Ethnopharmacology*, 119, 705–710.
- Street, R.A. and Prinsloo, G. 2013. Commercially important medicinal plants of South Africa: A Review. *Journal of Chemistry*, 1–16.

- Sulaiman, C., Abdul-rahim, A.S., Mohd-shahwahid, H.O., and Chin, L. 2017. Wood fuel consumption , institutional quality , and forest degradation in sub-Saharan Africa: Evidence from a dynamic panel framework. *Ecological Indicators*, 74, 414–419.
- Taleni, V. and Goduka, N. 2013. Perceptions and use of indigenous leafy vegetables (ILVs) for nutritional value: A case study in mantusini community, Eastern Cape Province, South Africa. *2013 International Conference on Food and Agricultural Sciences, IPCBEE*, 55 (24), 127–131.
- Thandeka, N., Sithole, N. and Thamaga-chitja, J. 2011. The role of traditional leafy vegetable in household food security in rural Kwazulu-Natal. *African Journal of Indigenous Knowledge Systems*, 10 (2), 195–209.
- Tshikalange, T.E., Mophuting, B.C., Mahore, J. and Lall, N. 2016. An Ethnobotanical study of medicinal plants used in villages under Jongilanga tribal council, Mpumalanga, South Africa. *African Journal of Traditional, Complementary and Alternative Medicines*, 13 (6), 83–89.
- Tshisikhawe, M.P. and Van Rooyen, M.W. 2013. Population biology of *Elaeodendron transvaalense* Jacq . in the presence of harvesting. *International Journal of Experimental Botany*, 82, 303–311.
- Tzeng, H.Y., Wang, W., Tseng, Y.H., Chiu, C.A., Kuo, C.C. and Tsai, S. Te, 2018. Tree mortality in response to typhoon-induced floods and mudslides is determined by tree species, size, and position in a riparian Formosan gum forest in subtropical Taiwan. *PLoS ONE*, 13 (1), 1–22.
- Uhunamure, S.E., Nethengwe, N. and Musyoki, A. 2016. Emissions and deforestation

associated with household fuel wood use a case of the Thulamela local municipality, South Africa. *Africa Insight*, 45 (4), 109–128.

van Wilgen, B.W. and Wannenburg, A. 2016. Co-facilitating invasive species control, water conservation and poverty relief: achievements and challenges in South Africa's Working for Water programme. *Current Opinion in Environmental Sustainability*, 19, 7–17.

Worku, A., Teketay, D., Lemenih, M. and Fetene, M. 2012. Diversity, regeneration status, and population structures of gum and resin producing woody species in Borana, Southern Ethiopia. *Forests, Trees and Livelihoods*, 21 (2), 85–96.

## CHAPTER THREE

### ETHNOBOTANICAL CHECKLIST OF INDIGENOUS PLANTS UTILIZED BY THE MAPULANA

#### Abstract

Ethnobotanical information still needs documentation as this will preserve such information for the future generations. From fourteen villages, elders, community adults and youth interviews were conducted through semi-structured questionnaire. Participants were selected through the use of snowball sampling technique. Hundred and forty-eight plant species were observed from sixty-five plant families and the use value index for each plant species was calculated. The documented plant list had more native species (54%) as compared to naturalized species (46%). Trees (43%) and herbs (30%) were the most dominant plant forms utilized in the ethnobotany of Mapulana. *Sclerocarya birrea* subsp. *caffra* received the highest use value of 0.86 and was used in four different ways. Its use frequency was followed by *Cucurbita maxima* with two different uses. Plants were also classed in four different categories either for food, fuelwood, medicine or utensils. The results showed that most plants utilization category among the Mapulana was medicinal (37.2%) followed by food (18.9%). There was an average of 12.8 percent which are used equally for medicine and food. The majority of these plant species are cultivated in the homestead and are mostly naturalized as compared to the native.

**Keywords:** Native, Naturalized, Snowball sampling technique, Utensils

### 3.1 Introduction

The African continent is characterized by a rich plant diversity, with high flora endemism. Determining these plants ethnobotanical status is a recent venture which began in the nineteenth hundreds upon the arrival of the Europeans. In southern Africa the documentation needs further administrations (Nigro *et al.*, 2004). Ethnobotanical information has been documented from numerous ethnic communities around the world, but urbanization, acculturation, increased population and industrialization have reduced this process hence, information transfer is reduced or limited (Giday *et al.*, 2010; Güzel *et al.*, 2015; Bohra *et al.*, 2017). The documentation of ethnobotanical information is required because traditional communities have significant multicultural diversity (Güzel *et al.*, 2015)

The Mapulana use plants for various purposes with no restriction to activities; this has created threats to the vegetation. The people depend on communal rangelands for fuelwood, food, medicines and grazing. Wood is used for construction, tools and craft materials (Shackleton 2002). Food plants such as *Momordica balsamina*, *Cleome gynandra*, *Bidens pilosa*, *Corchorus tridens*, *Amaranthus hybridus* have always been part of the Mapulana diet (Shackleton *et al.*, 1998; Dovie *et al.*, 2007; Vorster *et al.*, 2008). Some of these plants, especially *Momordica balsamina* are also consumed by the Tsonga people (Vorster *et al.*, 2008). Wild edible herbs are preferred for livelihood strategies

because of their easy access and being drought-tolerant (Dovie *et al.*, 2007). Within the villages of Bushbuckridge, wild edible herb's consumption is estimated to be  $15.4 \pm 2.8$  kg per household per annum (Dovie *et al.*, 2007). In South Africa the overall consumption mass of wild herbs ranges from 12 to over 130 kg, per household per annum.

Ninety percent of households in the villages rely on fuelwood as one of their energy sources (Madubansi and Shackleton, 2007; Wessels *et al.*, 2013). A few households use paraffin and gas for cooking but usually, in combination with fuelwood. Only one percent of households use electricity for all thermal purposes (Madubansi and Shackleton, 2007). Shackleton and Shackleton (2004) reported that there is an average of approximately 5.3 tons of fuelwood consumed, per household, per annum. There is five predominantly preferred plant species for fuelwood, such as *Sclerocarya birrea* subsp. *caffra*, *Combretum imberbe*, *Dalbergia melanoxylon*, *Dichrostachys cinerea* and *Combretum apiculatum* (Madubansi and Shackleton, 2007).

Neighboring villages in Thulamahashe have been selling *S. birrea* subsp. *caffra* fruits to the Mine workers Development Agency Marula Project (MDA). Marula beer is made from the fermented juice of the fruits of *S. birrea* subsp. *caffra*, which is associated with a number of cultural traditions (Shackleton, 2002; Shackleton and Shackleton, 2004).

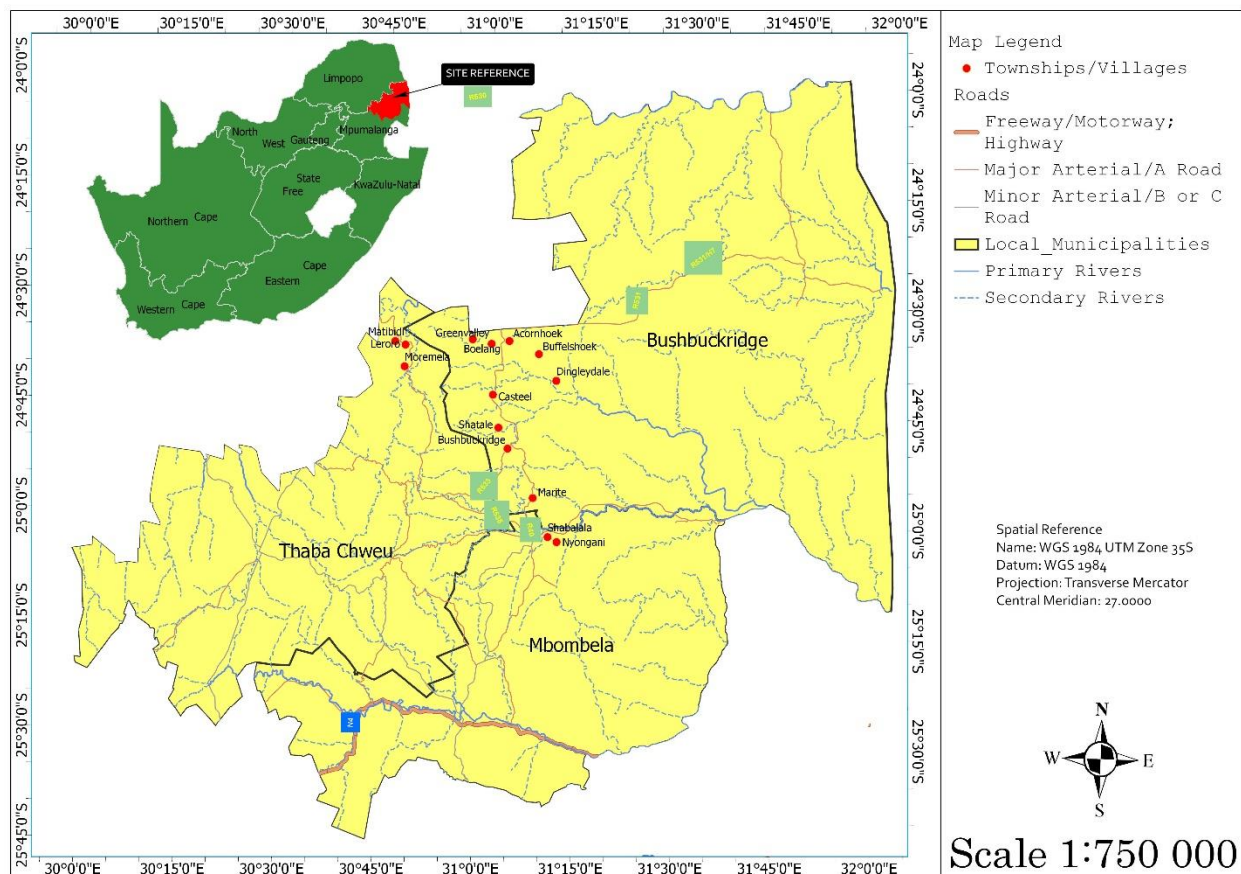
The aim of this chapter was to investigate the utilization of plants by the Mapulana with the objectives being to document plants used, determine the frequency of use, and to

identify the different utilization categories; this is the first baseline study to document the ethnobotany of the Mapulana.

## **3.2 Methodology**

### **3.2.1 Study area**

The study was conducted in fourteen villages in the Ehlanzeni District - 25.39'46° S, 31.26'26° E (Figure 3.1) - within three local municipalities, namely; Bushbuckridge, Mbombela and Thaba Chweu; the Mapulana are mainly found within these three local municipalities. The Ehlanzeni district is among the three district municipalities located at the north-eastern area of Mpumalanga Province of South Africa; it is bordered by Mozambique and Swaziland.



**Figure 3.1:** Map of Ehlanzeni local municipalities.

Ehlanzeni district comprises of five local municipalities, namely: Bushbuckridge, Mbombela, Thaba Chweu, Nkomazi and Umjindi with a total area of approximately 27895 47 Km<sup>2</sup> (EDM, 2014). The district is characterized by humid subtropical climate with mild winters and warm summers with rainfall from 500-1200 mm per annum. Its landscape is characterised by flat to undulating terrain that is underlain by granites and gradiorite (Shackleton 2002). Vegetation types range from Lowveld to Legogote Sour Bushveld (Coetzer *et al.*, 2010; Mograbi *et al.*, 2015). The study areas also lie within the Mapulaneng Scarp forest type (Lötter *et al.*, 2014). The type of a forest is subtropical,

moist and relict extending to Mpumalanga Escarpment. Constant taxa are *Asparagus falcatus*, *Celtis africana*, *Combretum kraussii*, *Bridelia micrantha* and *Diospyros whyteana*. Trees make up a total of 49.6, shrubs 12.4, climbers 15.6, herbs 16.4, graminoid 4.8 and epiphyte 1.2 percent in the mentioned forests (Lötter *et al.*, 2014).

Within the three local municipalities, demographic studies have estimated Mbombela to have a population of 588 794 followed by Bushbuckridge with 541 248 and lastly, Thaba Chweu with 98 387 people. Bushbuckridge is estimated to have an increasing rate of households at 4.02%; poverty and unemployment rate also increased in 2011 to 45.40 and 53.11%, respectively. Mbombela municipality followed with increases in poverty rate of 42.20; unemployment of 28.14 and households of 3.59 percent. Thaba Chweu showed the least percentages of poverty, unemployment and household size (EDM, 2014). The study area has poor services and infrastructure as compared to other parts of the country (Shackleton, 2002).

Ehlanzeni district is known for its opulent mineral resources and biodiversity. There are gold mines operating at Barberton and Pilgrim Rest to mention a few. Biodiversity plays an important role in terms of uplifting the tourism industry of the province since the area covers the Kruger National Park and Drakensberg Mountains. The climate is sub-tropical which enables the region to be appropriate for the cultivation of deciduous fruits and sub-tropical citrus (EDM, 2014).

### 3.2.2 Study design and protocol

Due to the lack of provincial Tribal office in Mapulaneng, Traditional counsellors and local tribal authorities within the selected villages were consulted for permission to conduct interviews within the community.

The study was conducted in fourteen villages in the Ehlanzeni District within three local municipalities (Table 3.1) due to minimal distribution of the Mapulana within Mpumalanga Province. It was difficult in the case of Mbombela to conduct the interviews where the Mapulana within the villages were Swati speaking and unable to communicate in Sepulana. Few participants were able to translate Sepulana to SiSwati while still only a small number where interviewed.

**Table 3.1:** The municipality and villages surveyed.

Municipality	Villages
Bushbuckridge	Bolla-Tau (Buffelshoek), Dingledale, Greenvally, Boelang, Casteel, Acornhoek, Marite, Bushbuckridge, Shatale
Thaba Chweu	Matibidi, Moremela and Leroro
Mbombela	Shabalala and Nyongani

A snow-ball sampling method was used for this study, whereby a small number of individuals who have characteristics suitable for the study were initially identified as the participants, thereafter these people identified others who qualify for the study to be interviewed face-to-face or in the form of questionnaire; participants were, therefore sampled based on referrals (Cohen *et al.*, 2007).

### 3.2.3 Data collection and analysis

The interviews were mainly with traditional health practitioners, herbalists, community adults, elderly people and youth. A semi-structured questionnaire was used to collect data from participants. All participants signed prior consent forms to show their willingness to participate in the study (see Appendix C). Voucher specimens of reported plant species were identified and deposited in the Department of Botany Herbarium, University of

Venda. Ethical clearance was approved from the research department project number SMNS/17/BOT/01 prior commencement of the research.

The use value was calculated using the mathematical expression adapted from Aziza *et al.* (2017). The formula  $UV = \sum U_i / N$  stated that UV denotes the use values, which express the relative importance of each plant species.  $\sum U_i$  is the number of uses elaborated by each participant for a particular species and N is the total number of participants. IBM Statistical Product and Service solutions (SPSS) statistics version 25 was also utilized in analysing data.

### **3.3 Results and discussion**

#### **3.3.1 Demography of participants**

Ninety-seven participants were interviewed for the study. The demographic profile of participants is depicted in Table 2, whereby elders (52.6%), were more knowledgeable about plants utilized by Mapulana people. The community adults (33.0%) came second while the youth responded the least with 14.4%. Nine percent of community adults were traditional health practitioner (THP) along with 2% of herbalists. Elderly THPs were 7% with 2% of herbalists. A percent of herbalist and 3% of THP were youth. In overall, females (81.4%) were participants. Teklehaymanot (2009) has established that females are knowledgeable custodians of plant species utilization. In terms of educational background

most of the participants had at least attended secondary education and were pensioners. Participants from Bolla tau, Casteel and Shatale responded well to the research, with percentages ranging from 13.4 to 11.3%. In Nyongani and Shabalala participants were unable to express their views due to language barrier, while in Acornhoek people were unwilling to participate in the study.

**Table 3.2:** Demographic structure of participants.

<b>Parameter</b>	<b>Specification</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Status	Community adult (36-59)	32	33.0
	Elder (60-99)	51	52.6
	Youth (20-35)	14	14.4
Gender	Female	79	81.4
	Male	18	18.6
Education	None	20	20.6
	Primary	24	24.7
	Secondary	43	44.3
	Tertiary	10	10.3
Occupation	Employed	20	20.6
	Pensioner	52	53.6
	Unemployed	25	25.8
Villages	Acornhoek	2	2.1
	Boelang	10	10.3
	Bolla tau	13	13.4
	Bushbuckridge	5	5.2
	Casteel	11	11.3
	Dingleydale	6	6.2
	Greenvalley	7	7.2

Hlabekisa	5	5.2
Leroro	5	5.2
Marite	9	9.3
Matibidi	6	6.2
Nyongani	4	4.1
Shabalala	3	3.1
Shatale	11	11.3

---

### 3.3.2 Inventory of Mapulana plants

The study has documented and identified a total of hundred and forty-eight plant species distributed amongst sixty-five plant families (Table 3). Fabaceae (n = 20) was found to be the most dominant family while Anacardiaceae (n = 6), Vitaceae (n = 6) and Apocynaceae (n = 5) were some of the families which were frequently observed. The recorded plant list amounted to 54% native and 46% naturalized within the villages. In terms of growth forms, the recorded plant species ranged from epiphytes, climbers, shrubs, herbs to trees. The most preferred growth forms utilized by the Mapulana were trees and herbs amounting to 43% and 30% respectively. The villages visited for the study were dominated by trees. Lötter *et al.* (2014) observed that trees make up 49.6% of vegetation in Mapulaneng Scarp forest type. Use value of plants ranged from 0.01 to 0.86; some of the fruits tree species and herbs have acquired high use values. African leafy vegetables such as *Cucurbita maxima*, *Bidens pilosa*, *Amaranthus hybridus* and *Corchorus olitorius* received the use

value of 0.58, 0.46, 0.44 and 0.42% respectively. Similar results were observed in studies on leafy vegetables conducted in other parts of Africa (Thandeka *et al.*, 2011; Maroyi, 2011; Bvenura and Afolayan, 2014; Dube *et al.*, 2016; Ochieng *et al.*, 2016). *Sclerocarya birrea* subsp. *caffra* received the highest use value of 0.86 and was used in four different ways. In Bolla tau village *S. birrea* subsp. *caffra* was among the few trees which were above two meters, due to strict village rules protecting it. Rasethe *et al.* (2013) has noted that *S. birrea* subsp. *caffra* is also a protected species in terms of South African National Forests Act of 1998.

Some plant species with numerous uses also received higher use value; *Psidium guajava* and *Mangifera indica* received same use value of 0.52, *Persea americana* and *Ximenia caffra* var. *caffra* have use values of 0.51 and 0.46 respectively. *Vangueria infausta* subsp. *infausta*, *Syzygium cumini* and *Carissa edulis* are used for alternative fuelwood and fruits have use values of 0.45, 0.44 and 0.42 respectively. Thirty different plant species received use value of 0.01. The majority of species with high use values and uses were fruit plants. Reason for the latter is that the plants are easily accessible (Shackleton *et al.*, 2000; Shumsky *et al.*, 2014; Mosina and Maroyi, 2016). Participants noted that bushes or fields have been turned into habitation sites resulting in loss of natural vegetation. There are no more bushes among the Mapulana villages as was observed by Kirkland *et al.* (2007), in a study conducted in Bushbuckridge Municipality.

*Hypoxis hemerocallidea* and *Peltophorum africanum* were reported to be used medicinally each but with low use values of 0.14 and 0.27 respectively. With four uses *Sclerocarya birrea* subsp. *caffra* had a use value of 0.86. *Aloe zebrina*, *Prunus perseae* and *Ximenia caffra* with three each received use values of 0.34, 0.37 and 0.46 respectively. Aziza *et al.* (2017) elaborate that species with high use value are highly significant to the communities. *Aloe marlothii*, *Annona senegalensis* subsp. *senegalensis*, *Euclea crispa* subsp. *crispa*, *Persea americana*, *Syzygium cumini* and *Vangueria infausta* received use values of 0.26, 0.35, 0.14, 0.51, 0.44, and 0.45 respectively. It is anticipated that plant species with high number of uses but low use value may be as a result of the fact that the knowledge about the usage of the species is with few people, hence, not known or undiscovered. The trusted known plants are utilized very often, while other plant species which were more frequently utilized by the older generations and have now become less important because of their availability, known side effects, accessibility and because the knowledge on them are based on experience (Heinrich, 2003). Below is an inventory of plants used by the Mapulana.

**Table 3.3:** Plants utilized by Mapulana for various purposes.

Local name	Scientific name	Family	Species number	Growth form	Plant status	Utilization of plant	Use value
Bobatsane	<i>Obetia tenax</i> (N.E.Br.) Friis	Urticaceae	SP 244	Herb	Native	Food (ALVs)	0.15
Bohlwehlwe	<i>Searsia glauca</i> (Thunb.) Moffett	Anacardiaceae	SP 304	Tree	Native	Food (Fruits)	0.03
Bolopi	<i>Morus alba</i> L. var. <i>alba</i>	Moraceae	SP 205	Tree	Naturalized	Food (ALVs, Fruits) and Medicine	0.06
Botlhotlho	<i>Searsia leptodictya</i> (Diels) T.S.Yi, A.J.Mill. and J.Wen	Anacardiaceae	SP 260	Tree	Native	Food (Fruits)	0.03
Dikgare	<i>Ipomoea batata</i> (L.) Lam	Convolvulaceae	SP 269	Herb	Naturalized	Food (ALVs)	0.07
Dithoke	<i>Cucurbita maxima</i> Dechesne	Cucurbitaceae	SP 11	Herb	Naturalized	Food (ALVs) and Medicine	0.58
Foyyiya	<i>Opuntia ficus-indica</i> (L.) Mill.	Cactaceae	SP 84	Shrub	Naturalized	Medicine	0.07
Kgopa	<i>Aloe marlothii</i> A.Berger	Asphodelaceae	SP 9	Succulent	Native	Medicine	0.26
Komashahla	<i>Adenia gummifera</i> (Harv.) Harms var. <i>gummifera</i>	Passifloraceae	SP 153	Climber	Native	Medicine	0.01
Konofolo	<i>Allium sativum</i> L.	Alliaceae	SP 92	Herb	Naturalized	Medicine	0.02

Lebatsabatsa	<i>Datura stramonium</i> L.	Solanaceae	SP 154	Herb	Naturalized	Medicine	0.01
Lebipo	<i>Cocculus hirsutus</i> (L.) Diels	Menispermaceae	SP 75	Herb	Naturalized	Food (ALVs)	0.02
Lefalatsamaru	<i>Asparagus exuvialis</i> Burch. forma <i>ecklonii</i>	Asparagaceae	SP 29	Herb	Native	Medicine	0.02
Legalane	<i>Aloe zebrina</i> Baker	Asphodelaceae	SP 10	Succulent	Native	Medicine	0.34
Lekgwara	<i>Cyperus latifolius</i>	Cyperaceae	SP 134	Herb	Native	Traditional mat	0.01
Lekgwathane	<i>Cucumis zeyheri</i> Sond.	Cucurbitaceae	SP 12	Herb	Naturalized	Food (ALVs)	0.25
Lenganangana	<i>Artemisia afra</i> Jacq. ex Willd. var. <i>afra</i>	Asteraceae	SP 102	Herb	Native	Medicine	0.06
Lenogane	<i>Senna occidentalis</i> (L.) Link	Fabaceae	SP 97	Shrub	Naturalized	Medicine	0.07
Lerokwa	<i>Cleome monophylla</i> L.	Capparaceae	SP 198	Herb	Naturalized	Food (ALVs)	0.14
Lerotho	<i>Cleome gynandra</i> L.	Capparaceae	SP 4	Herb	Native	Food (ALVs)	0.35
Lesegi	<i>Cyperus latifolius</i> Poir.	Iridaceae	SP 46	Herb	Naturalized	Medicine	0.01
Letladiane	<i>Agapanthus africanus</i> (L.) Hoffmanns. subsp. <i>africanus</i>	Agapanthaceae	SP 79	Shrub	Native	Medicine	0.04
Mabelemabutjwa	<i>Lantana rugosa</i> Thunb.	Verbenaceae	SP 119	Shrub	Naturalized	Food (Fruits) and medicine	0.09
Motlhemaphogo	<i>Clematis brachiata</i> Thunb.	Ranunculaceae	Sp 73	Climber	Native	Medicine	0.02

Makgobata	<i>Fallopia convolvulus</i> (L.) Holub	Polygaceae	SP 53	Herb	Naturalized	Food (ALVs) and medicine	0.02
Malala a kwaele	<i>Dicerocaryum eriocarpum</i> (Decne.) Abels	Pedaliaceae	SP 65	Herb	Native	Medicine	0.01
Mashuping	<i>Chenopodium album</i> L.	Chenopodiaceae	SP 230	Herb	Naturalized	Food (ALVs) and medicine	0.05
Matlho ya baloi	<i>Erythrina lysistemon</i> Hutch	Fabaceae	SP 254	Tree	Native	Medicine	0.01
Mmilo	<i>Vangueria infausta</i> Burch. subsp. <i>infausta</i>	Rubiaceae	SP 19	Tree	Native	Alternative fuelwood, food (Fruits) and medicine	0.45
Mmilofasane	<i>Vangueria pygmaea</i> Schltr.	Rubiaceae	SP 129	Shrub	Naturalized	Food (Fruits)	0.07
Mmola	<i>Parinari curatellifolia</i> Planch. ex Benth.	Chrysobalanaceae	SP 135	Tree	Native	Food (Fruits) and alternative fuelwood	0.30
Mmolafasane	<i>Parinari capensis</i> Harv. subsp. <i>capensis</i>	Chrysobalanaceae	SP 212	Shrub	Native	Food (Fruits), traditional tea and medicine	0.06
Mmoyo	<i>Acalypha villicaulis</i> Hochst.	Euphorbiaceae	SP 280	Herb	Native	Gonorrhoea	0.01
Modimotsane mogolo	<i>Hypoxis hemerocallidea</i> Fisch., C.A.Mey. and Ave- Lall	Hypoxidaceae	SP 67	Herb	Native	Medicine	0.14

Modimotsane monyana	wo <i>Hypoxis rigidula</i>	Baker var. rigidula	Hypoxidaceae	SP 77	Herb	Native	Medicine	0.02
Mofethhala	<i>Bauhinia galpinii</i>	N.E.Br	Fabaceae	SP 42	Shrub	Native	Medicine	0.02
Mogaletlwa	<i>Senegalia ataxacatha</i>	(DC.) Kyalangaliwa and Boatwr.	Fabaceae	SP 109	Tree	Native	Fuelwood	0.19
Mogamose	<i>Eucalyptus grandis</i>	W.Hill	Myrtaceae	SP 114	Tree	Naturalized	Fuelwood and medicine	0.20
Mogo	<i>Ficus sur</i>	Forssk.	Moraceae	SP 138	Tree	Native	Alternative fuelwood, food (Fruits) and medicine	0.34
Mogokgoma	<i>Berchemia</i> (Klotzsch) Hemsl.	<i>discolor</i>	Rhamnaceae	SP 1	Tree	Native	Food (Fruits)	0.05
Mogonono	<i>Terminalia sericea</i>	Burch. ex DC.	Combretaceae	SP 131	Tree	Native	Fuelwood, medicine and utensils	0.13
Mogotlho	<i>Trichilia dregeana</i>	Sond.	Meliaceae	SP 136	Tree	Native	Alternative fuelwood, medicine and food (Fruits)	0.16
Mogranata	<i>Punica granatum</i>	L.	Lythraceae	SP 91	Shrub	Naturalized	Food (Fruits) and medicine	0.05
Mograndela	<i>Passiflora edulis</i>	Sims	Passifloraceae	SP 233	Climber	Naturalized	Food (Fruits)	0.03

Mogwagwa	<i>Strychnos madagascariensis</i> Poir	Strychnaceae	SP 95	Tree	Naturalized	Alternative fuelwood and food (Fruits)	0.35
Mokabe	<i>Combretum collinum</i> Fresen.	Combretaceae	SP 158	Tree	Naturalized	Fuelwood	0.01
Mokgakgwa	<i>Cyphostemma woodii</i> (Gilg and M.Brandt) Desc.	Vitaceae	SP 69	Herb	Native	Medicine	0.01
Mokgoropo	<i>Piliostigma thonningii</i> (Schumach.) Milne-Redh.	Fabaceae	SP 175	Tree	Native	Medicine and food (Fruits)	0.04
Mokgoshi	<i>Sansevieria hyacinthoides</i> (L.) Druce	Ruscaceae	SP 171	Herb	Native	Medicine	0.02
Mokhura	<i>Ricinus communis</i> L.	Euphorbiaceae	SP 86	Shrub	Naturalized	Medicine	0.04
Mokumo	<i>Ficus thonningii</i> Blume	Moraceae	SP 88	Tree	Naturalized	Alternative fuelwood, medicine and food (Fruits)	0.06
Mokomo	<i>Rauvolfia caffra</i> Sond.	Apocynaceae	SP 172	Tree	Native	Fuelwood and utensil	0.04
Mokorola kgogo	<i>Senna petersiana</i> (Bolle) Lock	Fabaceae	SP 173	Shrub	Native	Medicine	0.03

Mokotapeni	<i>Persea americana</i> Mill.	Lauraceae	SP 141	Tree	Naturalized	Alternative fuelwood, medicine and food (Fruits)	0.51
Monamona	<i>Citrus sinensis</i> Pers.	Rutaceae	SP 181	Tree	Naturalized	Medicine and alternative fuelwood	0.20
Monarinkisi	<i>Citrus reticulate</i> Blanco	Rutaceae	SP 185	Tree	Naturalized	Food (Fruits)	0.02
Monawa	<i>Vigna unguiculata</i> (L.) Walp.	Fabaceae	SP 14	Herb	Naturalized	Food (ALVs)	0.36
Monepenepe	<i>Cassia abbreviata</i> Oliv. subsp. <i>beareana</i> (Holmes) Brenan	Fabaceae	SP 62	Tree	Native	Medicine	0.01
Moneyi	<i>Berchemia zeyheri</i> (Sond.) Grubov	Rhamnaceae	SP 188	Tree	Native	Alternative fuelwood and food (Fruits)	0.14
Mongaba	<i>Psidium guajava</i> L.	Myrtaceae	SP 105	Shrub	Naturalized	Alternative fuelwood, flu, diarrhea and Food (Fruits)	0.52
Mongosi	<i>Mangifera indica</i> L.	Anacardiaceae	SP 180	Tree	Naturalized	Alternative fuelwood, medicine and food (Fruits)	0.52
Monopi	<i>Schotia brachypetala</i> Sond.	Fabaceae	SP 60	Tree	Native	Medicine	0.01

Mooka	<i>Vachellia nilotica</i> (L.) P.J.H. Hurter and Mabb. subsp. <i>kraussiana</i> (Benth) Kyal. and Boatwr.	Fabaceae	SP 157	Tree	Native	Food (Fruits) and alternative fuelwood	0.05
Mopai	<i>Pinus patula</i> schltld. and cham. var. <i>patula</i>	Pinaceae	SP 263	Tree	Naturalized	Fuelwood	0.08
Mopanana	<i>Musa acuminata</i> Colla	Musaceae	SP 142	Tree	Naturalized	Medicine and food (Fruits)	0.31
Mopatilane	<i>Tylosema fassoglense</i> (Schweinf.) Torre and Hillc.	Fabaceae	SP 201	Climber	Naturalized	Medicine	0.01
Mopayi	<i>Ficus glumosa</i> Delile	Moraceae	SP 234	Tree	Native	Fuelwood	0.03
Mopeta	<i>Prunus persica</i> (L.) Barsch	Rosaceae	SP 186	Tree	Naturalized	Medicine alternative fuelwood and food (Fruits)	0.37
Mophiroku	<i>Lannea edulis</i> (Sond.) Engl. var. <i>edulis</i>	Anacardiaceae	SP 259	Shrub	Native	Medicine and food (Fruits)	0.37
Mophopho	<i>Carica papaya</i> L.	Caricaceae	SP 7	Tree	Naturalized	Medicine and food (Fruits)	0.35
Mophopholosa	<i>Cissus quadrangularis</i> L. var. <i>quadrangularis</i>	Vitaceae	SP 37	Herb	Native	Medicine	0.01

Mopremo	<i>Prunus domestica</i> L.	Rosaceae	SP 195	Tree	Naturalized	Food (Fruits)	0.03
Mopupudu	<i>Mimusops zeyheri</i> Sond.	Sapotaceae	SP 192	Tree	Native	Food (Fruits)	0.09
Moreke	<i>Dichrostachys cinerea</i> (L.) Wight and Arn. subsp. <i>africana</i> Brenan and Brummitt var. <i>Africana</i>	Fabaceae	SP 116	Shrub	Native	Fuelwood and medicine	0.35
Moringa	<i>Moringa oleifera</i> Lam.	Moringaceae	SP 2	Tree	Naturalized	Medicine	0.04
Morita	<i>Colocasia esculenta</i> (L.) Schott	Araceae	SP 268	Herb	Naturalized	Food (ALVs)	0.13
Morogowa		Euphorbiaceae	SP 174	Shrub	Naturalized	Food (ALVs)	0.14
motombhula	<i>Manihot esculenta</i> Crantz						
Morotho	<i>Cussonia transvaalensis</i> Reyneke	Araliaceae	SP 170	Shrub	Native	Medicine, utensil and fuelwood	0.12
Morula	<i>Sclerocarya birrea</i> (A.Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro	Anacardiaceae	SP 103	Tree	Native	Alternative fuelwood, medicine, utensil and food (Fruits)	0.86
Moseemane	<i>Vachellia karroo</i> (Hayne) Banfi and Glasso	Fabaceae	SP 67	Tree	Native	Medicine	0.04
Mosetlha	<i>Peltophorum africanum</i> Sond.	Fabaceae	SP 24	Tree	Native	Fuelwood, medicine	0.27

Mosetlla	<i>Schinus molle</i> L.	Anacardiaceae	SP 249	Tree	Naturalized	Food (ALVs)	0.09
Moshala	<i>Strychnos spinosa</i> Lam. subsp. <i>Spinose</i>	Strychnaceae	SP 258	Tree	Native	Alternative fuelwood, medicine and Food (Fruits)	0.27
Moshekamolapo	<i>Gomphocarpus fruticosus</i> (L.) Aiton f. subsp. <i>fruticosus</i>	Apocynaceae	SP 40	Shrub	Native	Medicine and food (ALVs)	0.01
Moshiteshite	<i>Acacia cyclops</i> A.Cunn. ex G.Don	Fabaceae	SP 247	Tree	Naturalized	Fuelwood	0.02
Moshitja	<i>Bidens pilosa</i> L.	Asteraceae	SP 267	Herb	Naturalized	Food (ALVs)	0.46
Moshomanyana wa dipudi	<i>Macledium zeyheri</i> (Sond.) S.Ortiz	Asteraceae	SP 314	Herb	Native	Medicine	0.02
Moshukutjwane	<i>Lippia javanica</i> (Burm.f.) Spreng.	Verbenaceae	SP 106	Shrub	Naturalized	Medicine	0.25
Moswiri	<i>Citrus limon</i> (L.) Burm.f.	Rutaceae	SP 184	Tree	Naturalized	Medicine and food (Fruits)	0.13
Motangtang	<i>Momordica balsamina</i> L.	Cucurbitaceae	SP 144	Herb	Native	Food (ALVs) and medicine	0.36
Motatabaloyi	<i>Abrus precatorius</i> L. subsp. <i>africanus</i> Verdc.	Fabaceae	SP 41	Climber	Native	Medicine	0.01

Mothalo	<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	Rhamnaceae	SP 17	Tree	Native	Alternative fuelwood, medicine and Food (Fruits)	0.05
Mothalofasane	<i>Ziziphus zeyheriana</i> Sond.	Rhamnaceae	SP 282	Shrub	Native	Food (Fruits)	0.01
Mothibela tladi	<i>Kalanchoe beharensis</i> Drake	Crassulaceae	SP 115	Succulent	Naturalized	Medicine	0.01
Mothobesetsane	<i>Castanospermum australe</i> A.Cunn. and C.Fraser	Fabaceae	SP 59	Tree	Naturalized	Medicine	0.01
Mothokolo	<i>Carissa edulis</i> (Forssk.) Vahl	Apocynaceae	SP 182	Shrub	Native	Alternative fuelwood, medicine and food (Fruits)	0.42
Mothokolopudi	<i>Rhoicissus tridentata</i> (L.f.) Wild and R.B.Drumm.	Vitaceae	SP 137	Tree	Native	Medicine	0.01
Motilwane	<i>Antidesma venosum</i> E.Mey. ex Tul.	Phyllanthaceae	SP 248	Tree	Native	Alternative fuelwood and Food (Fruits)	0.04
Motiribe	<i>Vitis vinifera</i> L.	Vitaceae	SP 217	Climber	Naturalized	Food (Fruits) and medicine	0.02
Motjihidi	<i>Ximenia caffra</i> Sond var. <i>caffra</i>	Olivaceae	SP 23	Tree	Native	Medicine and food (Fruits)	0.46

Motlhakola swifi	<i>Euclea crispa</i> (Thunb.) Gurke subsp. <i>Crispa</i>	Ebenaceae	SP 21	Shrub	Native	Food (Fruits) and Medicine	0.14
Motlhakolane	<i>Euclea divinorum</i> Hiern	Ebenaceae	SP 19	Shrub	Native	Alternative fuelwood and medicine	0.09
Motlhalabu	<i>Flueggea virosa</i> (Roxb. ex Willd.) Voigt subsp. <i>virosa</i>	Phyllanthaceae	SP 176	Tree	Native	Alternative fuelwood, medicine and food (Fruits)	0.40
Motlhatswa	<i>Litchi chinensis</i> Sonn.	Sapindaceae	SP 209	Tree	Naturalized	Alternative fuelwood and Food (Fruits)	0.27
Motlhatswa wa tlhaga	<i>Englerophytum</i> <i>magalismontanum</i> (Sond.) T.D.Penn.	Sapotaceae	SP 133	Tree	Native	Alternative fuelwood and Food (Fruits)	0.16
Motlho	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	SP 3	Tree	Naturalized	Alternative fuelwood, food (Fruits) and medicine	0.44
Motlho wa sekgowa	<i>Eriobotrya japonica</i> (Thunb.) Lindl.	Rosaceae	SP 150	Tree	Naturalized	Food (Fruits)	0.08
Motlho wa tlhaga	<i>Syzygium cordatum</i> Hochst. ex C.Krauss subsp. <i>cordatum</i>	Myrtaceae	SP	Tree	Native	Food (Fruits)	0.02

Motllepo	<i>Annona senegalensis</i> Pers. subsp. <i>senegalensis</i>	Annonaceae	SP 76	Shrub	Naturalized	Medicine, food (Fruits) and alternative fuelwood	0.35
Motsadi	<i>Ximenia americana</i> L. var. <i>americana</i>	Olacaceae	SP 183	Tree	Naturalized	Food (Fruits)	0.14
Motsere	<i>Bridelia micrantha</i> (Hochst.) Baill.	Phyllanthaceae	SP 216	Tree	Native	Food (Fruits) and alternative fuelwood	0.07
Motsoma	<i>Diospyros mespiliformis</i> Hochst. ex A.DC.	Ebenaceae	SP 22	Tree	Native	Medicine, fuelwood, Food (Fruits)	0.36
Mpharatshena	<i>Grewia flavescens</i> Juss	Tilliaceae	SP 43	Shrub	Native	Untie womb and fruits	0.04
Mphata	<i>Philenoptera violacea</i> (Klotzsch) Schrire	Fabaceae	SP 31	Tree	Native	Detect water, utensil and medicine	0.06
Nkhutsega	<i>Momordica foetida</i> Schumach	Cucurbitaceae	SP 152	Herb	Naturalized	Food (ALVs) and medicine	0.32
Ntshukelane	<i>Eriosema psoraleoides</i> (Lam.) G.Don	Fabaceae	SP 278	Shrub	Native	Medicine	0.01
Patja	<i>Cannabis sativa</i> L.	Cannabaceae	Sp 107	Herb	Native	Medicine	0.07
Phedikakato	<i>Steganotaenia araliacea</i> Hochst. var. <i>araliacea</i>	Apiaceae	SP 111	Tree	Native	Medicine	0.01

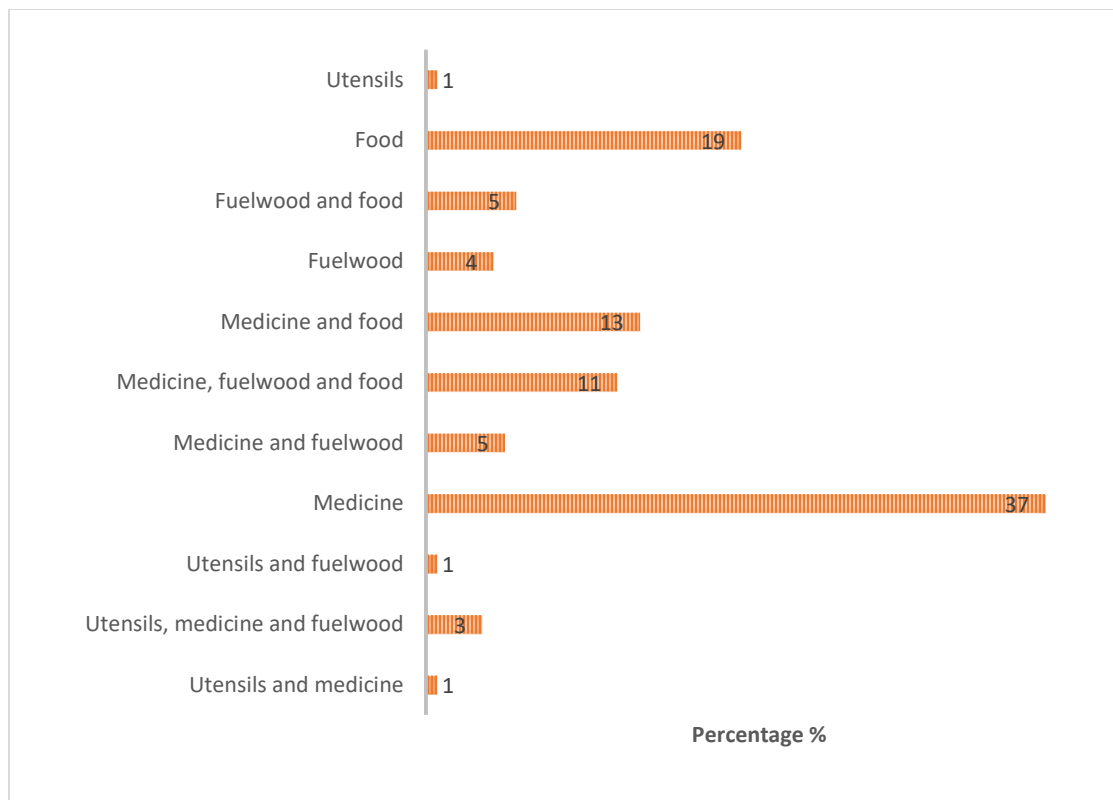
Roselinah	<i>Cinnamomum camphora</i> (L.) J.Presl	Lauraceae	SP 162	Tree	Naturalized	Medicine	0.06
Sebabo	<i>Cyphostemma cirrhosum</i> (Thunb.) Desc. ex Wild and R.B.Drumm. subsp. <i>cirrhosum</i>	Vitaceae	SP 113	Climber	Naturalized	Medicine	0.01
Sefagama	<i>Ansellia africana</i> Lindl.	Orchidaceae	SP 168	Epiphyte	Native	Medicine	0.02
Segabja	<i>Ipomoea oblongata</i> E.Mey. ex Choisy	Convolvulaceae	SP 238	Herb	Native	Food (ALVs) and medicine	0.03
Sekeketjane	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	SP 239	Herb	Naturalized	Food (ALVs)	0.19
Semata	<i>Zanthoxylum capense</i> (Thunb.) Harv.	Rutaceae	SP 50	Tree	Native	Utensil and medicine	0.04
Semoto	<i>Combretum imberbe</i> Wawra	Combretaceae	SP 33	Tree	Native	Fuelwood, utensil and medicine	0.11
Semoto	<i>Combretum molle</i> R.Br. ex G.Don	Combretaceae	SP 157	Tree	Native	Gonorrhoea and fuelwood	0.06
Sepalate	<i>Albizia versicolor</i> Welw. ex Oliv.	Fabaceae	SP 87	Tree	Native	Fuelwood and Medicine	0.12

Sephashu se segolo	<i>Gymnosporia buxifolia</i> (L.) Szyszyl.	Celastraceae	SP 266	Shrub	Native	Fuelwood	0.02
Sephashu se senyana	<i>Maytenus senegalensis</i> (Lam.) Excell	Celastraceae	SP 104	Shrub	Naturalized	Medicine	0.04
Serokolo	<i>Siphonochilus aethiopicus</i> (Schweinf.) B.L.Burt	Zingiberaceae	SP 89	Herb	Native	Medicine	0.24
Sethuse	<i>Ledebouria revoulute</i> (L.f.) Jessop	Hyacinthaceae	SP 97	Herb	Native	Medicine	0.01
Setlhaku	<i>Sonchus oleraceus</i> L.	Asteraceae	SP 202	Herb	Naturalized	Food (ALVs)	0.13
Tamatie	<i>Lycopersicon esculentum</i> L.	Solanaceae	SP 267	Herb	Naturalized	Medicine	0.02
Teletsane	<i>Corchorus olitorius</i> L.	Tiliaceae	SP 143	Herb	Naturalized	Food (ALVs)	0.42
Thepe	<i>Amaranthus hybridus</i> L.	Amaranthaceae	SP 15	Herb`	Naturalized	Food (ALVs)	0.45
Tholwane	<i>Solanum campylacanthum</i> Hochst. ex A.Rich. subsp. <i>panduriforme</i> (Drège ex Dunal) J.Samuels	Solanaceae	SP 159	Herb	Naturalized	Medicine	0.05
Thotho	<i>Solanum nigrum</i> L.	Solanaceae	SP 208	Herb	Naturalized	Food (ALVs)	0.13
Tsebe ya tlou	<i>Kalanchoe luciae</i> Raym.-Hamet subsp. <i>luciae</i>	Crassulaceae	SP 169	Succulent	Naturalized	Medicine	0.02

Unknown	<i>Adenium multiflorum</i> Klotzsch	Apocynaceae	SP 164	Tree	Native	Medicine	0.01
Unknown	<i>Albuca seineri</i> (Engl. and K.Krause) J.C.Manning and Goldblatt	Hyacinthaceae	SP 112	Herb	Naturalized	Medicine	0.01
Unknown	<i>Carpobrotus edulis</i> (L.) L.Bolus subsp. <i>edulis</i>	Aizoaceae	SP 149	Succulent	Native	Medicine	0.01
Unknown	<i>Cissus cactiformis</i> Gilg	Vitaceae	SP 34	Succulent	Naturalized	Medicine	0.01
	<i>Conostomium natalense</i> (Hochst.) Bremek. var.	Rubiaceae	SP 63	Shrub	Native	Medicine	0.01
Unknown	<i>natalense</i>						
Unknown	<i>Crassula obovata</i> Haw. var. obovata	Crassulaceae	SP 168	Succulent	Native	Medicine	0.02
Unknown	<i>Guilleminea densa</i> (Willd. ex Roem. and Schult.)	Amaranthaceae	SP 85	Herb	Naturalized	Medicine	0.01
	<i>Leonotis ocyimifolia</i> (Burm.f.) Iwarsson	Lamiaceae	SP 141	Herb	Naturalized	Medicine	0.01
Unknown	<i>Nerium oleander</i> L.	Apocynaceae	SP 148	Tree	Naturalized	Medicine	0.01
Unknown	<i>Sida acuta</i> Burm.f. subsp. <i>Acuta</i>	Malvaceae	SP 64	Herb	Naturalized	Medicine	0.01

### 3.3.3 Utilization categories

Utilization of plants by Mapulana has been practiced since time immemorial although limited information has been documented, from different sources (Makhubedu-Chiloane, 2016). It is perceived that there are no more bushes, therefore, insufficient plants to support all the needs of communities. The utilization of plants has been reduced; the plants were being used as utensils (1%), medicine, fuelwood and food as the four main categories identified in the study (Figure 3.2). Some plant species were used in a number of categories.



**Figure 3.2:** Categories of plant species use.

### 3.3.3.1. Plants utilized as utensils and traditional tea

The utensils category was the lowest category with 1% (Figure 3.2). Limited number of plant species are utilized in making different types of traditional cooking stirrers “lekgwana” or “lefehlo”. Such category included species such as *Rauvolfia caffra*, *Cussonia transvaalensis*, *Peltophorum africanum*, *Philenoptera violacea* and *Combretum imberbe*. Species such as *Zanthoxylum capense*, *Albizia versicolor*, *Sclerocarya birrea* subsp. *caffra* and *Rauvolfia caffra* were utilized in curving of traditional pestles and mortars used in grinding of peanuts “magwudu”. *Cyperus latifolius* is used in the making of traditional mat “mosemo”. Leaves of *Parinari capensis* subsp. *capensis* are used in the making of traditional tea.

### 3.3.3.2. Plants utilized as food

The category of food included the use of plants such as African leafy vegetable and fruits which was 18.9% (Figure 3.2). The study has identified twenty-five African leafy vegetable species and fifty-two fruit plant species. Species in this category were preferred in supplementing the livelihood of the Mapulana. The majority of the food species were naturalized (55%) as compared to native (45%). Elderly people were the main consumers of these food plants when compared to the youth who had little knowledge of the species. These food plants are still part of the elders’ daily diets. Grivetti and Ogle (2000), van der Hoeven *et al.* (2013) as well as Ahmad and Pieroni (2016) further elaborated that reliance on naturalized species has caused a decline in traditional knowledge transfer and consumption of the limited native food species. African leafy vegetables cited by youth

were the same ones that were highly cited by the elderly people. Most of the elderly people were concerned about the low consumption of their preferred plants by the youth, stating that the youth are not interested in these indigenous food plants.

### **3.3.3.3. Plants utilized as fuelwood**

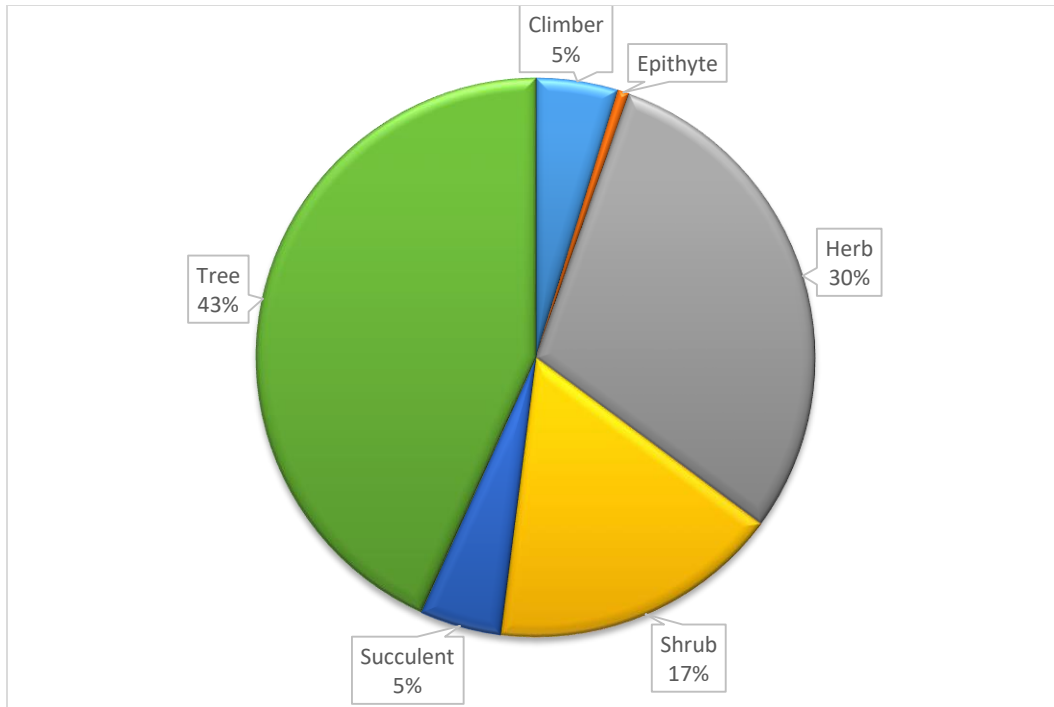
Fuelwood was the second lowest category with 4.1% (Figure 3.2). Sixteen tree species and 29 fruit plant species were also identified as fuelwood. A minimal percentage of naturalized species was utilized as compared to the native species. Shackleton *et al.* (2015) explained that community members utilize naturalized species due to their availability and not because of the displacement of native species. To remedy the shortage of fuelwood, fruit plant species are utilized as alternative fuelwood by community members. Rules and regulation of harvesting plant species for fuelwood clearly state that live trees and fruits plant species cannot be harvested but due to the large population size and high unemployment rates, the rules are ignored. This state of affairs shows little respect for traditional authorities as communities continue to disregard them (Cunningham and Mbenkum, 1993; Kirkland *et al.*, 2007; Giannecchini *et al.*, 2007; Findlay, 2013). Recently people who do not want to be seen as being disrespectful to their traditional leaders, travel to other villages in search of fuelwood, therefore, they tend to disregard the rules issued by authorities in those other villages but follow the rules in their own villages.

#### 3.3.3.4. Plants utilized as medicine

Most species (37%) were mentioned as being used as medicine for treatment of different ailments (Figure 3.2). Plants which were used for medicine and food were 12.8%, followed by the category of medicine, fuelwood and food at 11.5%. The latter category received a higher percentage when plants were also used as medicine and fuelwood at 3.4%. More plant species were identified as being utilized for different ailments. In some instances, same species were utilized for different ailments, especially the native species. Genuine traditional health practitioners (THP) have been issued permits or certificates validating their work (Hughes *et al.*, 2015), however, they face difficulties when collecting plant species for medicine. This may be due to the fact that the bogus or ill-informed traditional health practitioners and assistants have been unsustainably harvesting plants, for example, plant species were uprooted. Most of the villages have lost different plant species causing the THP to travel to neighboring villages in search of the species. In some villages, cattle feeding camps have been established and fenced to prevent animal theft; the THPs also use these camps as their safe sites for collection of medicinal plants, especially herbs.

### 3.4 Growth forms of utilized plants

The current study has identified six different growth forms as shown in Figure 3.3, which were trees (n = 64), herbs (n = 44), shrubs (n = 25), succulents (n = 7), climbers (n = 7), and epiphyte (n = 1). The majority of the trees and shrubs are used mainly for medicinal purposes (Figure 3.2) and to obtain fruits. Supporting the use of trees, Lötter *et al.* (2014) observed that in the Mapulaneng Scarp, forest-type trees and herbs make a total of 49.6 and 16.4 percent of the vegetation. The use of a certain growth form may be influenced by a change in vegetation (Eshete *et al.*, 2016). The utilization of trees and shrubs is supported by their availability during the year (Maroyi, 2011; Masevhe *et al.*, 2015) however, the rate becomes unstainable when most of the same plant species are harvested year in and year out. Street *et al.*, (2008) further elaborated that yearly collection of plant species has promoted an unsuitable harvesting pattern, whereby there is lack of mature tree and limited number of shrubs resulting in inconsistency of same plant species availability. The trusted and known plants are utilized very often. The harvesting of roots is very problematic because it destroys the trees gradually. Maroyi (2011) and Masevhe *et al.* (2015) explain that traditional health practitioners (THPs) prefers roots for treating medicinal conditions. Herbs are also used medicinally although their occurrence is mostly seasonal (Teklehaymanot, 2009; Otang *et al.*, 2012; Masafu *et al.*, 2016). Relative abundance of herbs is the main reason for their utilization (Giday *et al.*, 2010).



**Figure 3.3:** Different growth forms

### 3.5 Traditional indigenous classification of plants

Local names play a significant role in ethnobotanical studies; indigenous people name plants based on factors like, their appearance, smell, taste, colour, size and habits (Singh, 2008). Naming of these plants by local people demonstrates an indigenous classification system where some of the plants had local names showing preference, size or other morphological features of the species. In names such as “Mmola and Mmolafasane” the word “fasane” means ‘below the ground’. “Mmola” is ‘a tree’ while “Mmolafasane” is a ‘perennial herb’; these species fall under one genus. Another case is of “Modimotsane wo mogolo” and “Modimotsane wo monyana”, whereby, “wo mogolo” means ‘the big one’

while “wo monyana” means ‘the small one’. The classification has been assisting in differentiating plants from one community to the other, although sometimes confusing members of other communities. In some areas local names are adopted and become the universal common names (Heinrich, 2003). Regularly, local names have been created because of morphological characteristics that correspond with medicinal use or only the morphology (Cunningham, 2001; Slathia *et al.*, 2017). In addition, local names change over time (Hoffman and Gallaher, 2007) and description of locality-specifics may differ with villages (Kala, 2005).

### 3.6 Conclusion

It is concluded that the Mapulana utilize same plant species for different purposes, especially plants which are cultivated in their homesteads. The majority of these plants are naturalized with high use value as compared to the native species, depicting that the preference for plant species is shifting towards the naturalized species. Trees were the preferred growth form utilized and this results in the unsustainable harvesting of the plant species, particularly, if the same trees species are utilized as fuelwood. The study revealed that the Mapulana utilize plant species, mainly as medicine, food and fuelwood. *Sclerocarya birrea* subsp. *caffra* was a highly preferred plant species with a high use value. It is one of the plant species protected by the South African National Forests Act of 1998. In most of the villages, these plant species are still protected but this status is ignored due to the high level of utilization. The traditional classification of plant species is still practiced to differentiate the species.

## References

- Ahmad, K. and Pieroni, A. 2016. Folk knowledge of wild food plants among the tribal communities of Thakht-e-Sulaiman Hills, North-West Pakistan. *Journal of Ethnobiology and Ethnomedicine*, 12, 17.
- Aziza, M.A., Khan, A.H., Adnan, M. and Izatullah, I. 2017. Traditional uses of medicinal plants reported by the indigenous communities and local herbal practitioners of Bajaur Agency, Federally administrated tribal areas, Pakistan. *Journal of Ethnopharmacology*, 198, 268–281.
- Bohra, N., Tewari, L.M. and Tewari, A. 2017. Ethnobotany of wild edible plants traditionally used by the local people in the Ramnagar region from Nainital District, India. *Biolife*, 5 (1), 12–19.
- Bvenura, C. and Afolayan, A.J. 2014. Ethnobotanical survey of wild vegetables in Mbashe and Nkonkobe municipalities, Eastern Cape Province, South Africa. *Acta Botanica Gallica*, 161 (2), 189–199.
- Coetzer, K.L., Erasmus, B.F.N., Witkowski, E.T.F. and Bachoo, A.K. 2010. Land-cover change in the Kruger to Canyons Biosphere Reserve (1993–2006): A first step towards creating a conservation plan for the subregion. *South African Journal of Science*, 106 (7/8), 221–230.
- Cohen, L., Manion, L. and Morrison, K. 2007. *Research Methods in Education*. Sixth edit. Taylor and Francis or Routledge. London, United Kingdom.

- Cunningham, A. 2001. *Applied ethnobotany: pople, wild plant use and conservation*. Earthscan Publications Ltd. London, United Kingdom.
- Cunningham, A. and Mbenkum, F., 1993. Sustainability of harvesting *Prunus africana* bark in Cameroon: A medicinal Plant in International Trade. *People and Plants Working Paper 2*. Paris, UNESCO. Paris, France.
- van der Hoeven, M., Osei, J., Greeff, M., Kruger, A., Faber, M. and Smuts, C.M. 2013. Indigenous and traditional plants: South African parents' knowledge, perceptions and uses and their children's sensory acceptance. *Journal of Ethnobiology and Ethnomedicine*, 9, 1–12.
- Dovie, D., Shackleton, C. and Witkowski, E. 2007. Conceptualizing the human use of wild edible herbs for conservation in South African communal areas. *Journal of Environmental Management*, 84, 146–156.
- EDM, 2014. Ehlanzeni District Municipality (EDM) IDP Review 2013/14. [www.ehlanzeni.org.za](http://www.ehlanzeni.org.za). (Accesed on 18/5/2015)
- Eshete, M.A., Kelbessa, E. and Dalle, G. 2016. Ethnobotanical study of medicinal plants in Guji Agro-pastoralists, Blue Hora District of Borana Zone, Oromia Region, Ethiopia. *Journal of Medicinal Plants Studies*, 4 (2), 170–184.
- Findlay, S., 2013. *Clearing the confusion: The roles of local formal institutions in regulating firewood harvesting in Bushbuckridge, South Africa*. MSc dissertation, University of Witwatersrand, Johannesburg.
- Giannecchini, M., Twine, W. and Vogel, C. 2007. Land-cover change and human-

- environment interactions in a rural cultural landscape in South Africa. *The Geographical Journal*, 173 (1), 26–42.
- Giday, M., Asfaw, Z. and Woldu, Z. 2010. Ethnomedicinal study of plants used by Sheko ethnic group of Ethiopia. *Journal of Ethnopharmacology*, 132 (1), 75–85.
- Grivetti, L. and Ogle, B. 2000. Value of traditional foods in meeting macro- and micronutrient needs: the wild plant connection. *Nutrition Research Reviews*, 13, 31–46.
- Güzel, Y., Güzel, M. and Miski, M. 2015. Ethnobotany of medicinal plants used in Antakya: A multicultural district in Hatay Province of Turkey. *Journal of Ethnopharmacology*, 174, 118–152.
- Heinrich, M. 2003. Ethnobotany and natural products: The search for new molecules, new treatments of old diseases or a better understanding of indigenous cultures? *Current Topics in Medicinal Chemistry*, 3, 29–42.
- Hoffman, B. and Gallaher, T. 2007. Importance indices in ethnobotany importance indices in ethnobotany. *Ethnobotany Research and Applications*, 5, 201–218.
- Hughes, G., Blouws, T., Aboyade, O., Davids, D., Mbamalu, O., Van't Klooster, C., De Jong, J. and Gibson, D. 2015. An ethnobotanical survey of medicinal plants used by traditional health practitioners to manage HIV and its related opportunistic infections in Mpoza, Eastern Cape Province, South Africa. *Journal of Ethnopharmacology*, 171, 109–115.
- Kala, C.P. 2005. Indigenous uses, population density, and conservation of threatened

- medicinal plants in protected areas of the Indian Himalayas. *Conservation Biology*, 19 (2), 368–378.
- Kirkland, T., Hunter, L.M. and Twine, W. 2007. “The Bush is No More”: Insights on Institutional Change and Natural Resource Availability in Rural South Africa. *Society and Natural Resources*, 20 (4), 337–350.
- Lötter, M.C., Mucina, L. and Witkowski, E.T.F. 2014. Classification of the indigenous forests of Mpumalanga Province, South Africa. *South African Journal of Botany*, 90, 37–51.
- Madubansi, M. and Shackleton, C.M. 2007. Changes in fuelwood use and selection following electrification in the Bushbuckridge lowveld, South Africa. *Journal of Environmental Management*, 83, 416–426.
- Makhubedu-Chiloane, T. 2016. *Tjiba ho wo tjwang*. Sebosegolo sa Mapulana Writers Association. Nelspruit, South Africa.
- Maroyi, A. 2011. An ethnobotanical survey of medicinal plants used by the people in Nhema communal area, Zimbabwe. *Journal of Ethnopharmacology*, 136 (2), 347–354.
- Masafu, M.M., Mbajjorgu, C.A., Nemadodzi, L.E. and Kabine, E.S. 2016. A study of natural habitats and uses of medicinal plants in Thulamela and JS Moroka Municipalities, South Africa. *Indian Journal of Traditional Knowledge*, 15 (3), 363–369.
- Masevhe, N.A., McGaw, L.J. and Eloff, J.N. 2015. The traditional use of plants to

- manage candidiasis and related infections in Venda, South Africa. *Journal of Ethnopharmacology*, 168, 364–372.
- Mograbi, P.J., Erasmus, B.F.N. Witkowski, E.T.F., Asner, G.P., Wessels, K.J., Mathieu, R., Knapp, D.E., Martin, R.E. and Main, R. 2015. Biomass increases go under cover: woody vegetation dynamics in South African rangelands. *PLoS ONE*, 10 (5).
- Mosina, G.K.E. and Maroyi, A. 2016. Edible plants of urban domestic gardens in the Capricorn District, Limpopo Province, South Africa. *Tropical Ecology*, 57 (2), 181–191.
- Nigro, S.A., Makunga, N.P. and Grace, O.M. 2004. Medicinal plants at the ethnobotany-biotechnology interface in Africa. *South African Journal of Botany*, 70 (1), 89–96.
- Ochieng, J., Afari-sefa, V. and Karanja, D. 2016. Promoting consumption of traditional African vegetables and its effect on food and nutrition security in Tanzania. Fifth conference of the African Association of Agricultural Economists (5th CAAAE) “Transforming smallholder agriculture in Africa: The role of policy and governance”, 1–20.
- Otang, W.M., Grierson, D.S. and Ndip, R.N. 2012. Ethnobotanical survey of medicinal plants used in the management of opportunistic fungal infections in HIV/AIDS patients in the Amathole District of the Eastern Cape Province, South Africa. *Journal of Medicinal Plants Research*, 6 (11), 2071–2080.
- Rasethe, M., Semanya, S., Potgieter, M. and Maroyi, A. 2013. The utilization and management of plant resources in rural areas of the Limpopo Province, South Africa. *Journal of Ethnobiology and Ethnomedicine*, 9, 1–8.

Shackleton, C.M., Dzerefos, C.M., Shackleton, S.E. and Mathabela, F.R. 2000. The use of and trade in indigenous edible fruits in the Bushbuckridge savanna region, South Africa. *Ecology of Food and Nutrition*, 39 (3), 225-245.

Shackleton, C. and Shackleton, S. 2003. Value of non-timber forest products and rural safety nets in South Africa value of non-timber forest products and rural safety nets in South Africa. The international conference on rural livelihoods, Forests and Biodiversity 19-23 May 2003, Bonn, Germany.

Shackleton, R.T., Le Maitre, D.C., van Wilgen, B.W. and Richardson, D.M. 2015. Use of non-timber forest products from invasive alien *Prosopis* species (mesquite) and native trees in South Africa: implications for management. *Forest Ecosystems*, 2, 1–11.

Shackleton, C. and Shackleton, S. 2004. The importance of non-timber forest products in rural livelihood security and as safety nets: a review of evidence from South Africa. *South African Journal of Science*, 100, 658–664.

Shackleton, S. 2002. *The informal marula beer traders of Bushbuckridge, Limpopo Province, South Africa*. Department of Environmental Science, Rhodes University. Grahamstown, South Africa.

Shackleton, S., Dzerefos, C., Shackleton, C. and Mathabela, E.R., 1998. Use and trading of wild edible herbs in the central lowveld Savanna Region, South Africa. *Economic Botany*, 52, 251–259.

Shumsky, S., Hickey, G.M., Johns, T., Pelletier, B. and Galaty, J. 2014. Institutional factors affecting wild edible plant (WEP) harvest and consumption in semi-arid

- Kenya. *Land Use Policy*, 38, 48–69.
- Singh, H. 2008. Importance of local names of some useful plants in ethnobotanical study. *Indian Journal of Traditional Knowledge*, 7 (2), 365–370.
- Slathia, P.S., Paul, N., Gupta, S.K., Sharma, B.C., Kumar, R. and Kher, S.K. 2017. Traditional uses of under-utilized tree species in sub tropical rainfed areas of Kathua, Jammu and Kashmir. *Indian Journal of Traditional Knowledge*, 16 (1), 164–169.
- Street, R., Stirk, W. and Van Staden, J. 2008. South African traditional medicinal plant trade - Challenges in regulating quality, safety and efficacy. *Journal of Ethnopharmacology*, 119, 705–710.
- Teklehaymanot, T. 2009. Ethnobotanical study of knowledge and medicinal plants use by the people in Dek Island in Ethiopia. *Journal of Ethnopharmacology*, 124 (1), 69–78.
- Thandeka, N., Sithole, N. and Thamaga-chitja, J. 2011. The role of traditional leafy vegetable in household food security in rural Kwazulu-Natal. *African Journal of Indigenous Knowledge Systems*, 10 (2), 195–209.
- Vorster, H.J., Stevens, J.B. and Steyn, G.J. 2008. Production systems of traditional leafy vegetables: challenges for research and extension. *South African Journal of Agricultural Extension*, 37, 85–96.
- Wessels, K.J.; Colgan, M.S.; Erasmus, B.F.N.; Asner, G.P.; Twine, W.C.; Mathieu, R.; Van Aardt, J.A.N.; Fisher, J T. and Smit, I.P.J. 2013. Unsustainable fuelwood

extraction from South African savannas. *Environmental Research Letters*, 8,  
014007.

## CHAPTER FOUR

### MEDICINAL PLANTS UTILIZED BY THE MAPULANA PEOPLE OF EHLANZENI DISTRICT

#### Abstract

South African government has declared public health care free for all citizens. Traditional medicine is preferred as supplement to avoid challenges faced by the public health care system; most people rely on both health-care systems. A semi-structured questionnaire was administered to participants who included elderly people, community adults and youths. Data was analysed by calculating the use value and informants' consensus factor. The study revealed that the elderly are custodians of traditional medicine. Hundred and six plant species were identified in treatment of 50 different ailments. The recorded medicinal plant species were distributed amongst 55 plant families with Fabaceae (20%), Crassulaceae (5%) and Cucurbitaceae (5%) as dominating families. Plant parts such as roots (48%), leaves (26%) and barks (15%) were collected from herbs (45%), trees (37%) and shrubs (18%). *Aloe zebrina* (0.38), *Aloe marlothii* (0.29), *Sclerocarya birrea* subsp. *caffra* (0.28) and *Siphonochilus aethiopicus* (0.28) use values were the highest. Gonorrhoea (1.80), stomach cleansing (1.40) chicken diseases (1.19), bad luck (0.88), flu (0.84), and diarrhoea (0.80) received the highest informants' consensus factor (ICF). Plant species with low use value and ICF were known by the elder and few community adults.

**Keywords:** Traditional medicine, bad luck, Informants consensus factor

## 4.1 Introduction

The South African government has made funds available for health services, declaring that public health is a priority for the people. It was declared that public health care is free for everyone, with special emphasis on lactating women and children under six (Kautzky and Tollmani, 2008; Peltzer, 2009a; Lomahoza, 2013). South African health services provide medicines for almost all sickness diagnosed by doctors, specialists and health practitioners although, the complexity of communicable and non-communicable diseases has been a challenge to the health care sector (Peltzer, 2009a; Dookie and Singh, 2012; Mayosi *et al.*, 2012; Lomahoza, 2013). In Mpumalanga Province, a total 67% medical systems personnel posts remained vacant with more health practitioners moving from public to private sector (Kautzky and Tollmani, 2008). The Mpumalanga Provincial Health Department received the second least share from the provincial budget allocation from 2007-2011 (Lomahoza 2013). It is perceived that significant strengths of health care system is meeting the requirements of communities as the public health care caters for 80% of South Africans (Dookie and Singh, 2012; Lomahoza, 2013). Due to these challenges, people are resorting to either modern or traditional medicine, while others are depending on faith healers.

Traditional or modern medicine is preferred because of culture, religion and one's own choice (Tabi *et al.*, 2006, Aziza *et al.*, 2017). Traditional medicine is preferred for its healing efficacy (Ondicho *et al.* 2015). Minimum access to public health care has contributed to extreme reliance and preference for medicinal plants (Giday *et al.*, 2010,

Urso *et al.*, 2016). Traditional health practitioners (THPs) also support the medical needs for the majority of South African over time. They are cultural custodians who influence the interpretation of illnesses and health behaviour (Mbatha *et al.*, 2012; Kankara *et al.*, 2015). In African communities they are well-known custodians for treatment of all different types of illnesses from communicable to non-communicable diseases and complex spiritual problems (Tabi *et al.*, 2006; Peltzer, 2009b; Abdullahi, 2011), however, THPs have been accepted to practice over the years sick notes for absence from them are not accepted by the South African government institutes. The unacceptance of sick notes from THPs is defeating the right to choose any suitable healthcare system (Mbatha *et al.*, 2012). Ondicho *et al.* (2015) further elaborate that THPs are committed to their work because they are always available, their medicines are accessible, less time is spent waiting for consultation and ailments seem to be healed quicker. People in villages without public health care are able to self-diagnose and use medicinal plants to treat the ailments, then if not healed they consult traditional health practitioners (Moteetee and Van Wyk, 2011). Results from Peltzer (2009b) showed a decline in the use of traditional medicine over time. Teklehaymanot (2009), Kankara *et al.* (2015) and Aziza *et al.* (2017) assert that the decline in the use of traditional medicine is based on the inability of elders to pass the knowledge from one generation to the next.

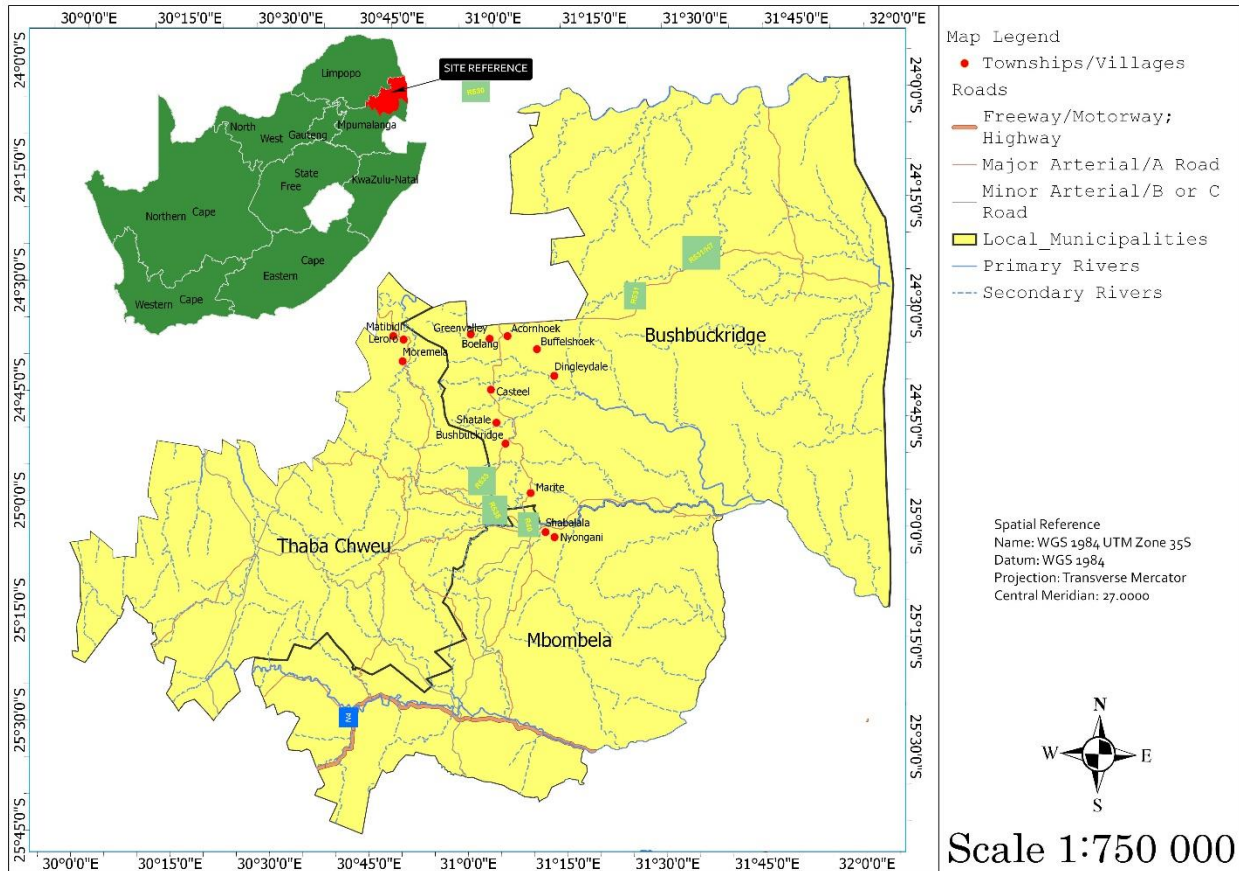
South Africa has a rich plant biodiversity with an estimate of more than 3000 plant species utilized as medicine (van Wyk, 2008). Some medicinal plant species have been commercialized and there is still a need to document more plants from all ethnic groups (van Wyk, 2008, Street and Prinsloo, 2013). Documentation of these medicinal plant

species is significant as it can assist in discovering plant species used synergistically between now and the ever evolving generation which can be commercialized in the future (Ndhlala *et al.*, 2011). Utilization of medicinal plants has been recorded in all African countries and around the world (Das *et al.*, 2013, Fenetahun *et al.*, 2017, Idu *et al.*, 2017, Ahmed *et al.*, 2018). The recording has been in accordance to major sub groups and classes of people (Lewu and Afolayan, 2009, Masafu *et al.*, 2016, Aziza *et al.*, 2017, Bohra *et al.*, 2017). Mapulana have been using traditional medicine for over decades. But their practice, concept and *materia medica* is unknown and have not been recorded (Moteetee and Van Wyk, 2011). The aim of this chapter is to explore plant species used medicinally by the Mapulana. The objective is to explain the utilization of the plants from the Mapulana people's perspective.

## 4.2 Methodology

### 4.2.1 Study area

The study was conducted in fifteen villages in the Ehlanzeni District at 25.39'46° S, 31.26'26° E (Figure 1), within three local municipalities, namely: Bushbuckridge, Mbombela and Thaba Chweu. The Ehlanzeni district is among the three district municipalities located at the north-eastern part of the Mpumalanga Province of South Africa; it is bordered by Mozambique and Swaziland.



**Figure 4.1:** Map of Ehlanzeni local municipalities

#### 4.2.3 Data collection

A semi-structured questionnaire was administered through interviews of participants. The interviews were conducted face-to-face with participants who included elderly people, community adults and youths. Snowball sampling technique was used whereby initial participants identified others for the interviews for the study (Cohen *et al.*, 2007). All participants signed prior consent forms to show their willingness to participate in the study (see Appendix C). Ethical clearance was approved from the research department project

number SMNS/17/BOT/01. Voucher specimens of plant species discussed during the interviews were collected, identified as to their taxon and deposited in the Herbarium housed in the Department of Botany, University of Venda.

#### 4.2.4 Data analysis

The use value was calculated using the mathematical expression adapted from Aziza *et al.* (2017). The formula states  $UV = \sum U_i / N$  with UV denoting the use values which expresses the relative importance of each plant species.  $\sum U_i$  is the number of uses elaborated by each participant for a particular species and N is the total number of participants. The informant consensus factor (ICF) which check if there is an agreement with the use of plants among the ailment categories was also calculated. The formula used by Eddouks *et al.* (2017) was followed where  $ICF = (N_{ur} - N_t) / (N_{ur} - 1)$  and  $N_{ur}$  is number of use reports from participants for a particular listed ailment and  $N_t$  is the total number of plant species utilized for a particular ailment.

## 4.3 Results and Discussion

### 4.3.1 Demography of informants

Eighty-seven participants identified through snowball sampling method were interviewed on the use of plants in traditional medicine by the Mapulana (Table 4.1). Overall more females (83%) participated and according to Bouasla and Bouasla (2017); Wintola *et al.* (2017) females are the ones who frequently administer medicinal plants to family members. More elders (49%) participated in comparison to community adults and the youths. The trend is not surprising since elders hold the custody of medicinal plants utilization in their communities (Aziza *et al.*, 2017, Adhikari *et al.*, 2018). The second most-participating category was that of community adults at 34%. Only 16% of the youth participated in the study. The informants' profile also revealed that 13% of elders, 8% of community adults and 3% of youths were traditional health practitioners (THPs). In a study by Giday *et al.* (2010), ailments were treated at household level resulting in elders who were neither THPs nor herbalists being able to treat certain ailments. Two percent of elders and community adult were herbalists including 1% of youth. In terms of educational background, most of the participants had at least secondary education. Bouasla and Bouasla (2017) note that educated people were less interested in acquiring tradition knowledge and use of medicinal plants while the opposite is true of less-educated people.

**Table 4.1:** Demographic structure of participants.

Parameter	Specification	Frequency	Percentage (%)
Status	Youth (20-35)	14	16
	Community adult (36-59)	30	35
	Elder (60-99)	43	49
Gender	Male	15	17
	Female	72	83
Education	None	17	20
	Primary	20	23
	Secondary	42	48
	Tertiary	8	9

#### 4.3.2 Plants utilized by the Mapulana for medicinal purposes

A total of 106 plant species were identified as treating 50 ailments from 55 plant families. Dominating families were Fabaceae (20%), Crassulaceae (5%), Cucurbitaceae (5%) and Asteraceae (4%) just to mention a few. The majority of the families had percentages below five (Table 2). As one of the large families, Fabaceae was also recorded from different sources as treating different ailments (Luseba and Tshisikhawe, 2013, Masevhe *et al.*, 2015; Kankara *et al.*, 2015; Tugume *et al.*, 2016; Chinsembu, 2016; Yazbek *et al.*, 2016). Roots (48%), leaves (26%), and bark (15%) were the most utilized parts for treating

different ailments, as depicted in Figure 3. Bulbs, twigs and fruits were 6%, 2% and 3% in terms of use, respectively. Plant parts were mostly collected from herbs (45%) then trees (37%) and shrubs (18%).

**Table 4.2:** Medicinal plants utilized by Mapulana for treatment of different ailments.

Local name	Scientific name, voucher no and family	Plant form	Ailment	Part used, route of preparation and administration	UV
Dithoke	<i>Cucurbita maxima</i> SP 11 CUCURBITACEAE	Herb	Flu	Leaves are used to make a decoction that is taken orally	0.01
Foyyiya	<i>Opuntia ficus-indica</i> (L.) Mill. SP 84 CACTACEAE	Shrub	Wounds High blood Birth related problems Diabetes	Leaves are applied as ointment on affected area Roots are used to make a decoction that is taken orally Roots are used to make a decoction that is taken orally Roots are used to make a decoction that is taken orally	0.08
Komashatlha	<i>Adenia gummifera</i> (Harv.) Harms <i>var. gummifera</i> SP 153 PASSIFLORACEAE	Herb	Colic	Bulbs are used to make a decoction that is taken orally	0.01
Kgopa	<i>Aloe marlothii</i> A.Berger SP 9 ASPHODELACEAE	Herb	Tooth ache High blood pressure	Leaves are used to make a decoction that is taken orally Leaves are used to make a decoction that is taken orally	0.29

			Chicken diseases	Soak leaves in water and juice is placed for the chickens	
			Gonorrhoea	Roots are used to make a decoction that is taken orally	
			Insecticide for corn	Crash burned leaves and spray on corn plantation	
			Wounds	Crash dried leaves to ash and apply as ointment on affected areas	
Konofolo	<i>Allium sativum</i> L. SP 92 ALLIACEAE	Herb	Prevent snakes	Planted in the yard	0.02
			Colic	Leaves are used to make a decoction that is taken orally	
Lebatsabatsa	<i>Datura stramonium</i> L. SP 154 SOLANACEAE	Herb	Wounds	Crash leaves and apply as ointment on affected area	0.01
Lefalatsamaru	<i>Asparagus exuvialis</i> Burch. forma ecklonii SP 29 ASPARAGACEAE	Herb	Kidney diseases	Roots are used to make a decoction that is taken orally	0.01
			Chase clouds	The whole plant is burned in fire	0.01
Legalane	<i>Aloe zebrina</i> Baker SP 10 ASPHODELACEAE	Herb	Eye infection	Crash leaves applied as ointment on affected area and wash instantly	0.38
			Diabetes	Soak leaves in water and juice is taken orally	

			Chicken diseases	Soak leaves in water and juice is placed for the chickens	
			Swollen legs	Bark is used to make a decoction that is taken orally	
			Conception	Roots are used to make a decoction that is taken orally	
			High blood	Soak leaves in water and juice is taken orally	
			Ear infection	Soak leaves in water and use the juice as ear droplets	
Lenganangana	<i>Artemisia afra</i> Jacq. ex Willd. var. <i>afra</i> SP 102 ASTERACEAE	Herb	Flu	Leaves are used to make a decoction that is taken orally	0.07
Lenogane	<i>Senna occidentalis</i> (L.) Link SP 97 FABACEAE	Shrub	Head ache	Leaves are burned, and smoke is inhaled	
			Stomach pains	Roots are used to make a decoction that is taken orally	0.10
			Sunken and bulging fontanelles	Roots are used to make a decoction that is taken orally	
			Colic	Roots are used to make a decoction that is taken orally	
Lesegi	<i>Cyperus latifolius</i> Poir. SP 47 IRIDACEAE	Herb	Dysmenorrhea	Roots are used to make a decoction that is taken orally	0.01

Letladiane	<i>Agapanthus africanus</i> (L.) Hoffmanns. subsp. <i>africanus</i> SP 79 AGAPANTHACEAE	Shrub	Resuscitation of children	Roots are used to make a decoction that is taken orally	0.05
Mabelemabutswa	<i>Lantana rugosa</i> Thunb. SP 119 VERBENACEAE	Shrub	Eye infection	Soak leaves in water and use the juice as eye droplets	0.02
			Sunken and bulging fontanelles	Roots are used to make a decoction that is taken orally	
Makgobata	<i>Fallopia convolvulus</i> (L.) Holub SP 53 POLYGONACEAE	Herb	Diarrhea	Leaves are used to make a decoction that is taken orally	0.02
			Colic	Roots are used to make a decoction that is taken orally	
Malala a kwaele	<i>Dicerocaryum eriocarpum</i> (Decne.) Abels SP 65 PEDALIACEAE	Herb	Dandruff	Soak the whole plant and wash hair	0.02
			Gonorrhoea	Roots are used to make a decoction that is taken orally	
Matlhakanisa	<i>Ochna natalitia</i> (Meisn.) Walp. SP 222 OCHNACEAE	Tree	Broken bones	Bark is used to make a decoction that is taken orally or tie two stems along on both sides of the leg	0.02
Matlho ya baloi	<i>Erythrina lysistemon</i> Hutch SP 254 FABACEAE	Tree	Hematuria	Roots are used to make a decoction that is taken orally	0.03

Mmilo	<i>Vangueria infausta</i> Burch. subsp. <i>infausta</i>	Tree	Broken bones	Roots are used to make a decoction that is taken orally	0.06
	SP 19 RUBIACEAE		Head ache	Roots are used to make a decoction that is taken orally	
			Bad luck	Roots are burned, and smoke is inhaled	
Mmolafasane	<i>Parinari capensis</i> Harv. subsp. <i>capensis</i>	Herb	Chicken diseases	Roots are used to make a decoction that is placed for the chickens	0.02
	SP 212 CHRYSOLALANACEAE				
Mmoyo	<i>Acalypha villicaulis</i> Hochst.	Herb	Gonorrhoea	Roots are used to make a decoction that is taken orally	0.01
	SP 280 EUPHORBIACEAE				
Modimotsane wo mogolo	<i>Hypoxis hemerocallidea</i> Fisch., C.A.Mey. and Ave-Lall	Herb	Enhance men impotency	Crash bulb add to any desired drink of choice and mixture is taken orally	0.15
	SP 67 HYPOXIDACEAE		Wounds	Crash the bulb, root and leaves and apply as ointment on affected area	
			Tooth ache	Roots are used to make a decoction that is taken orally	
			Tonsillitis	Leaves are used to make a decoction that is taken orally	
			Ear infection	Crash leaves and squeeze the juice on the ear as droplets	

			Bad luck	Bulb is burned, and smoke is inhaled	
			Sunken and bulging fontanelles	Roots are used to make a decoction that is taken orally	
			Gonorrhoea	Bulbs are used to make a decoction that is taken orally	
			Head ache	Roots are used to make a decoction that is taken orally	
Modimotsana wo monyana	<i>Hypoxis rigidula</i> Baker var. <i>rigidula</i> SP 77 HYPOXIDACEAE	Herb	Hematuria	Roots are used to make a decoction that is taken orally	0.03
			Gonorrhoea	Bulbs are used to make a decoction that is taken orally	
Mofethhala	<i>Bauhinia galpinii</i> N.E.Br SP 42 FABACEAE	Shrub	Conception	Roots are used to make a decoction that is taken orally	0.02
			Gonorrhoea	Bark are used to make a decoction that is taken orally	
Mogamose	<i>Eucalyptus grandis</i> W.Hill SP 114 MYRTACEAE	Tree	Flu	Leaves are used to make a decoction that is taken orally	0.02
Mogo	<i>Ficus sur</i> Forssk. SP 138 MORACEAE	Tree	Bad luck	Bark is burned and smoke is inhaled	0.02
			Gonorrhoea	Roots are used to make a decoction that is taken orally	

Mogotlho	<i>Trichilia dregeana</i> Sond. SP 136 MELIACEAE	Tree	Diarrhea	Bark is used to make a decoction that is taken orally	0.10
			Stomach cleansing	Bark is used to make a decoction that is taken orally	
Mogonono	<i>Terminalia sericea</i> Burch. Ex DC. SP 131 COMBRETACEAE	Tree	Stomach pains	Roots are used to make a decoction that is taken orally	0.08
			Diarrhea	Bark is used to make a decoction that is taken orally	
			Diarrhea in goats and cows	Bark and roots are used to make a decoction that is taken orally	
Mogranata	<i>Punica granatum</i> L. SP 91 LYTHRACEAE	Shrub	Flu	Soak fruits or leaves in water and juice is taken orally	0.03
			Diarrhea	Leaves are used to make a decoction that is taken orally	
Mogwagwa	<i>Strychnos madagascariensis</i> Poir. SP 95 STRYCHNACEAE	Tree	Diarrhea	Roots are used to make a decoction that is taken orally	0.02
Mokgakgwa	<i>Cyphostemma woodii</i> (Gilg and M.Brandt) Desc. SP 176 VITACEAE	Herb	Painful womb	Bark are used to make a decoction that is taken orally	0.01

Mokgoropo	<i>Piliostigma thonningii</i> (Schumach.) Milne-Redh SP 175 FABACEAE	Tree	Chicken diseases	Decoction is made from fruits and placed for the chickens to drink	0.02
			Dysmenorrhea	Roots are used to make a decoction that is taken orally	
Mokgoshi	<i>Sansevieria hyacinthoides</i> (L.) Druce SP 171 RUSCACEAE	Herb	Broken bones	Steam the leaves and applied as ointment on affected areas	0.02
Mokhura	<i>Ricinus communis</i> L. SP 86 EUPHORBIACEAE	Shrub	Tooth ache	Roots are used to make a decoction that is taken orally	0.05
			Swollen legs	Leaves are used to make a decoction that is taken orally	
			Stomach pains	Roots are used to make a decoction that is taken orally	
Mokorola kgogo	<i>Senna petersiana</i> (Bolle) Lock SP 173 FABACEAE	Shrub	Chicken diseases	Decoction is made from roots and placed for the chickens to drink	0.03
			Tooth ache	Roots are used to make a decoction that is taken orally	
Mokotapeni	<i>Persea americana</i> Mill. SP 141 LAURACEAE	Tree	Goat disease	Decoction is made from roots and placed for the goats to drink	0.07

			Gonorrhea	Roots are used to make a decoction that is taken orally	
			Prevent miscarriage and still born	Roots are used to make a decoction that is taken orally	
			Flu	Leaves are used to make a decoction that is taken orally	
Mokumo	<i>Ficus thonningii</i> Blume SP 88 MORACEAE	Tree	Gonorrhea	Roots are used to make a decoction that is taken orally	0.01
Monamona	<i>Citrus sinensis</i> (L.) Osbeck SP 181 RUTACEAE	Tree	Goat diseases	Decoction is made from roots and placed for the goats to drink	0.02
			Prevent miscarriage and still born	Roots are used to make a decoction that is taken orally	
Monepenepe	<i>Cassia abbreviata</i> Oliv. subsp. <i>beareana</i> (Holmes) Brenan SP 62 FABACEAE	Tree	Infertility	Roots are used to make a decoction that is taken orally	0.01
Mongaba	<i>Psidium guajava</i> L. SP 105 MYRTACEAE	Tree	Flu	Leaves are used to make a decoction that is taken orally	0.20

			Diarrhea	Roots are used to make a decoction that is taken orally	
Mongosi	<i>Mangifera indica</i> L. SP 180 ANACARDIACEAE	Tree	Flu	Leaves are used to make a decoction that is taken orally	0.05
Monopi	<i>Schotia brachypetala</i> Sond. SP 60 FABACEAE	Tree	Diarrhea	Bark is used to make a decoction that is taken orally	0.02
Mopanana	<i>Musa acuminata</i> Colla SP 8 MUSACEAE	Tree	Heart disease	Roots are used to make a decoction that is taken orally	0.13
			Gonorrhea	Roots are used to make a decoction that is taken orally	
Mopatilane	<i>Tylosema fassoglense</i> (Schweinf.) Torre and Hillc. SP 201 FABACEAE	Herb	Gonorrhea	Bulbs are used to make a decoction that is taken orally	0.01
Mopeta	<i>Prunus persica</i> (L.) Barsch SP 186 ROSACEAE	Tree	Insecticide for tsetse fly	Crash leaves and spray on the yard	0.22
			Flu	Leaves are used to make a decoction that is taken orally	
			Typhoid	Leaves are used to make a decoction that is taken orally	

			Gonorrhoea	Roots are used to make a decoction that is taken orally	
			Diarrhea	Bark is used to make a decoction that is taken orally	
Mopharatshena	<i>Grewia flavescens</i> Juss SP 43 MALVACEAE	Shrub	Infertility	Roots are used to make a decoction that is taken orally	0.01
Mophiroku	<i>Lannea edulis</i> (Sond.) Engl. Var. <i>edulis</i> SP 259 ANACARDIACEAE	Herb	Bad luck	Roots are burned and smoke inhaled	0.05
			Gonorrhoea	Roots are used to make a decoction that is taken orally	
Mophopho	<i>Carica papaya</i> L. SP 7 CARICACEAE	Shrub	Swollen legs	Leaves are used to make a decoction that is taken orally	0.14
			Resuscitation of children	Roots are used to make a decoction that is taken orally	
			Gonorrhoea	Roots are used to make a decoction that is taken orally	
			Blood diseases	Roots are used to make a decoction that is taken orally	
Mophopholosa	<i>Cissus quadrangularis</i> L. var. <i>quadrangularis</i> SP 37 VITACEAE	Herb	Stomach ache	Roots are used to make a decoction that is taken orally	0.01

Moreke	<i>Dichrostachys cinerea</i> (L.) Wight and Arn. Subsp. <i>africana</i> Brenan and Brummitt var. <i>africana</i> SP 116 FABACEAE	Shrub	Swollen legs	Roots are used to make a decoction that is taken orally	0.09
			Wounds	Crash the legume to ash and apply as ointment on affected area	
			Diabetes	Roots are used to make a decoction that is taken orally	
Moringa	<i>Moringa oleifera</i> Lam. SP 2 MORINGACEAE	Tree	Diabetes	Leaves are used to make a decoction that is taken orally	0.05
			High blood	Leaves are used to make a decoction that is taken orally or crash dry leaves and add as seasoning to food	
Morotho	<i>Cussonia transvaalensis</i> Reyneke SP 171 ARALIACEAE	Shrub	Stomach cleansing	Bark is used to make a decoction that is taken orally	0.07
			Increase body weight	Roots are used to make a decoction that is taken orally	
			Bad luck	Bark is used to make a decoction that is taken orally	
Morotomabela		Tree	Constipation	Soak bark in water and juice is taken orally	0.07

	<i>Albezia versicolor</i> Wolw. Ex Oliv.		Stomach pains	Roots are used to make a decoction that is taken orally	
	SP 87 FABACEAE		(Sedyiso)		
			Stomach cleansing	Bark is used to make a decoction that is taken orally	
Morubeila	<i>Morus alba</i> L. var. <i>alba</i>	Tree	Gonorrhoea	Root are used to make a decoction that is taken orally	0.03
	SP 205 MORACEAE				
Morula	<i>Sclerocarya birrea</i> (A.Rich.)	Tree	Sprinkling of	Twigs with leaves are used to spray traditional	0.28
	Hochst. Subsp. <i>caffra</i> (Sond.)		traditional	medicine	
	Kokwaro		medicine		
	SP 103 ANACARDIACEAE		Bad luck	Bark is burned and smoke is inhaled	
			Flu	Bark is used to make a decoction that is taken orally	
			Prevent miscarriage and still born	Bark are used to make a decoction that is taken orally	
			Prevent menstruation	Bark are used to make a decoction that is taken orally	
			Diarrhea	Bark is used to make a decoction that is taken orally	

Moseemane	<i>Vachellia karroo</i> (Hayne) Banfi and Glasso SP 67 FABACEAE	Tree	Nail-biting	Root are used to make a decoction that is taken orally	0.01
Mosetlha	<i>Peltophorum africanum</i> Sond. SP 24 FABACEAE	Tree	Bad luck	Soak root or bark and use it for bathing or burn bark and in hail the smoke	0.16
			Kidney diseases	Leaves are used to make a decoction that is taken orally	
			Stomach cleansing	Bark is used to make a decoction that is taken orally	
			Sprinkling of traditional medicine	Twigs with leaves are used to spray traditional medicine	
			Stomach pains	Soak bark in water and juice is taken orally	
			Blood related diseases	Bark is used to make a decoction that is taken orally	
Moshala	<i>Strychnos spinosa</i> Lam. SP 95 LOGANIACEAE	Tree	Diarrhea	Roots are used to make a decoction that is taken orally	0.01
Moshala mashuping	<i>Chenopodium album</i> L. SP 230 CHENOPODIACEAE	Herb	Diabetes	Soak leaves in water and juice is taken orally	0.01

Moshekamolapo	<i>Gomphocarpus fruticosus</i> (L.) <i>Aiton f. subsp. fruticosus</i> SP 40 APOCYNACEAE	Herb	Sunken and bulging fontanelles Gonorrhoea	Roots are used to make a decoction that is taken orally Root are used to make a decoction that is taken orally	0.02
Moshukutjwane	<i>Lippia javanica</i> (Burm.f.) Spreng. SP 106 VERBENACEAE	Shrub	Flu Sunken and bulging fontanelles Typhoid Stomach cleansing Head ache	Leaves are used to make a decoction that is taken orally Roots are used to make a decoction that is taken orally Leaves are used to make a decoction that is taken orally Soak leaves in water and juice is taken orally Crash leaves and in hail the smell	0.29
Moswiri	<i>Citrus limon</i> (L.) Osbeck SP 184 RUTACEAE	Tree	Sinusitis Flu	Squeeze the fruit juice and drink Leaves and fruits are used to make a decoction that is taken orally	0.15
Motatabaloyi	<i>Abrus precatorius</i> L. subsp. <i>africanus</i> Verdc. SP 41 FABACEAE	Herb	Nail-biting	Roots are used to make a decoction that is taken orally	0.01

Mothalo	<i>Ziziphus mucronata</i> Willd. Subsp. <i>mucronata</i> SP 17 RHAMNANCE	Tree	Ring worm (Leshopa)	Crash leaves and applied as ointment on affected area	0.02
Mothibela tladi	<i>Kalanchoe beharensis</i> Drake SP 115 CRASSULACEAE	Herb	Prevent lightning	Planted in the yard	0.01
Mothobesetsane	<i>Castanospermum australe</i> A.Cunn. and C.Fraser SP 59 FABACEAE	Tree	Conception	Roots are used to make a decoction that is taken orally	0.01
Motiribe	<i>Vitis vinifera</i> L. SP 217 VITACEAE	Tree	High blood  Diabetes	Roots are used to make a decoction that is taken orally  Roots are used to make a decoction that is taken orally	0.02
Motjhidi	<i>Ximenia caffra</i> Sond var. <i>caffra</i> SP 23 OLACACEAE	Tree	Diarrhea  Prevent miscarriage and still born  Bad luck  Gonorrhoea	Roots are used to make a decoction that is taken orally  Roots are used to make a decoction that is taken orally  Roots are burned and smoke is inhaled  Roots are used to make a decoction that is taken orally	0.16

			Flu	Roots are used to make a decoction that is taken orally	
Motlhakola swifi	<i>Euclea crispa</i> (Thunb.) Gurke subsp. <i>crispa</i> SP 55 EBENACEAE	Shrub	Flu	Leaves are used to make a decoction that is taken orally	0.11
			Bad luck	Roots are burned and smoke inhaled or decoction from roots is used to bath	
			Lung diseases	Leaves are used to make a decoction that is taken orally	
			Resuscitation of children	Roots are used to make a decoction that is taken orally	
			Sunken and bulging fontanelles	Roots are used to make a decoction that is taken orally	
			Stomach cleansing	Roots are used to make a decoction that is taken orally	
Motlhakolane	<i>Euclea divinorum</i> Hiern SP 117 EBENACEAE	Shrub	Bad luck	Decoction from roots is used to bath	0.03
			Gonorrhoea	Roots are used to make a decoction that is taken orally	
Motlhalabu		Tree	Bad luck: Family protection	Soak roots in water and spray in the yard	0.07

	<i>Flueggea virosa</i> (Roxb. ex Willd.) Royle subsp. <i>virosa</i>		Gonorrhoea	Roots are used to make a decoction that is taken orally	
	SP 176 PHYLLANTHACEAE		Sunken and bulging fontanelles	Roots are used to make a decoction that is taken orally	
Motlho	<i>Syzygium cumini</i> (L.) Skeels SP 3 MYRTACEAE	Tree	Broken bones	Roots are used to make a decoction that is taken orally	0.05
			Head ache	Roots are used to make a decoction that is taken orally	
			Body pains	Roots are used to make a decoction that is taken orally	
			Diarrhea	Bark is used to make a decoction that is taken orally	
Motlhemaphogo	<i>Clematis brachiata</i> Thunb. SP 73 RANUNCULACEAE	Herb	Sunken and bulging fontanelles	Roots are used to make a decoction that is taken orally	0.02
Motllepo	<i>Annona senegalensis</i> Pers. subsp. <i>senegalensis</i> SP 76 ANNONACEAE	Shrub	Stomach pains	Bark is used to make a decoction that is taken orally	0.15
			Sunken and bulging fontanelles	Roots are used to make a decoction that is taken orally	
			Conception	Roots are used to make a decoction that is taken orally	

				Gonorrhoea	Bark are used to make a decoction that is taken orally	
Motsoma	<i>Diospyros mespiliformis</i> Hochst. Ex A.DC. SP 22 EBENACEAE	Tree	Blood related diseases	Bark is used to make a decoction that is taken orally	0.04	
			Sunken and bulging fontanelles	Roots are used to make a decoction that is taken orally		
Mphata	<i>Philenoptera violacea</i> (Klotzsch) Schrire SP 31 FABACEAE	Tree	Flu	Bark is used to make a decoction that is taken orally	0.06	
Nkaka	<i>Momordica balsamina</i> L. SP 144 CUCURBITACEAE	Herb	High blood	Leaves are used to make a decoction that is taken orally	0.01	
Nkhutsega	<i>Momordica foetida</i> Schumach SP 152 CUCURBITACEAE	Herb	High blood	Leaves are used to make a decoction that is taken orally	0.01	
Ntshukelane	<i>Eriosema psoraleoides</i> (Lam.) G.Don SP 298 FABACEAE	Shrub	Gonorrhoea	Roots are used to make a decoction that is taken orally	0.01	
Patja	<i>Cannabis sativa</i> L. SP 107 CANNABACEAE	Herb	Flu	Leaves are used to make a decoction that is taken orally	0.08	
			Head ache	Leaves are used to make a decoction that is taken orally		

Phedikakato	<i>Steganotaenia araliacea</i> Hochst. var. <i>araliacea</i> SP 111 APIACEAE	Tree	Unresolved issues or cases disappear (legal or not)	Decoction from roots or leaves are used to bath or included in food	0.01
Phela	<i>Callilepis salicifolia</i> Oliv. SP 223 ASTERACEAE	Herb	Diarrhea Flu Blood related diseases	Chew the bark and split Soak roots for 12 hours and add to cooked porridge Bulbs are used to make a decoction that is taken orally	0.05
Roselinah	<i>Cinnamomum camphora</i> (L.) J.Presl SP 162 LAURACEAE	Tree	Stomach cleansing Bad luck	Bark is used to make a decoction that is taken orally Soak root or bark in water and use it for bathing	0.07
Sebabo	<i>Cyphostemma cirrhosum</i> (Thunb.) Desc. ex Wild and R.B.Drumm. subsp. <i>cirrhosum</i> SP 113 VITACEAE	Herb	Conception	Roots are used to make a decoction that is taken orally	0.01
Sefagama	<i>Ansellia africana</i> Lindl. SP 167 ORCHIDACEAE	Herb	Sunken and bulging fontanelles	Twigs are used to make a decoction that is taken orally	0.02

Segabja	<i>Ipomoea oblongata</i> E.Mey. ex Choisy SP 308 CONVOLVULACEAE	Herb	Gonorrhoea	Roots are used to make a decoction that is taken orally	0.02
Semata	<i>Zanthoxylum capense</i> (Thunb.) Harv. SP 124 RUTACEAE	Tree	High blood	Roots are used to make a decoction that is taken orally	0.02
			Stop bleeding for pregnant women	Roots are used to make a decoction that is taken orally	
Semoto	<i>Combretum imberbe</i> Wawra SP 33 COMBRETACEAE	Tree	Tooth ache	Bark is burned to ashes and applied as ointment on affected area	0.02
	<i>Combretum molle</i> R.Br. ex G.Don SP 157 COMBRETACEAE	Tree	Gonorrhoea	Roots are used to make a decoction that is taken orally	0.01
Sepepetlane	<i>Cotyledon orbiculata</i> L. var. <i>orbiculata</i> SP 161 CRASSULACEAE	Herb	Ear infection	Steam leaves and squeeze the juice to the affected ear as droplets	0.01
Sephashu se senyana	<i>Maytenus senegalensis</i> (Lam.) Excell SP 104 CELESTRACEAE	Shrub	Stop vomiting	Roots are used to make a decoction that is taken orally	0.06
			Sunken and bulging fontanelles	Roots are used to make a decoction that is taken orally	
			Gonorrhoea	Roots are used to make a decoction that is taken orally	

Serokolo	<i>Siphonochilus aethiopicus</i> (Schweinf.) B.L.Burt SP 89 ZINGIBERACEAE	Herb	Flu  Prevent miscarriage and stillborn  Typhoid  Gonorrhea	Chew the bulb or roots are used to make a decoction that is taken orally  Roots are used to make a decoction that is taken orally  Leaves are used to make a decoction that is taken orally  Bulbs are used to make a decoction that is taken orally	0.28
Sethuse	<i>Ledebouria revoulute</i> (L.f.) Jessop SP 97 HYACINTHACEAE	Herb	Gonorrhea  Painful womb	Roots are used to make a decoction that is taken orally  Roots are used to make a decoction that is taken orally	0.02
Tamatie	<i>Lycopersicon esculentum</i> L. SP 267 Solanaceae	Herb	Typhoid	Leaves are used to make a decoction that is taken orally	0.02
Tholwane	<i>Solanum campylacanthum</i> Hochst. ex A.Rich. subsp. <i>panduriforme</i> (Drège ex Dunal) J.Samuels SP 159 CUCURBITACEAE	Herb	Tooth ache	Roots are used to make a decoction that is taken orally	0.06

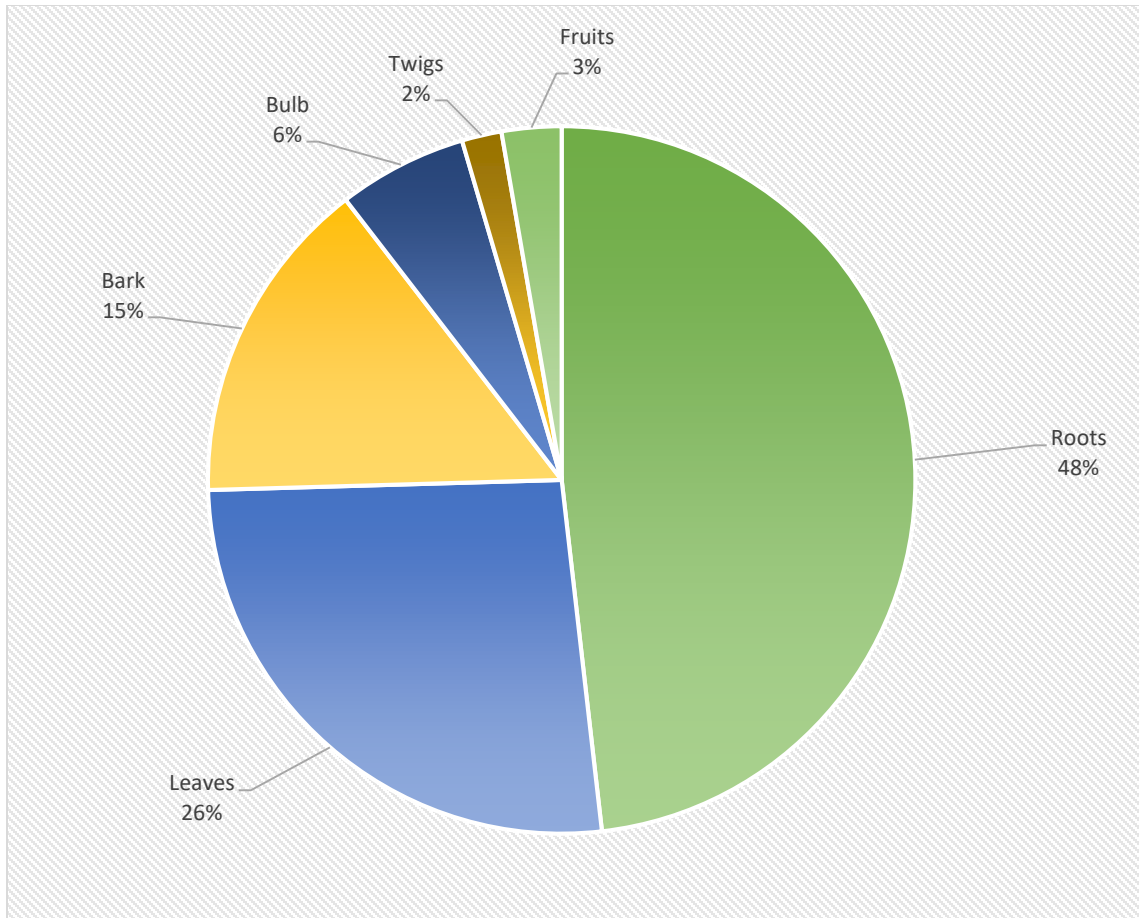
Tjhikwane	<i>Bulbine frutescens</i> (L.) Willd. SP 268 ASPHODELACEAE	Herb	Sunken or bulging fontanelles Typhoid	Bulbs are used to make a decoction that is taken orally Leaves are used to make a decoction that is taken orally	0.04
Tsebe ya tlou	<i>Kalanchoe luciae</i> Raym.-Hamet subsp. <i>luciae</i> SP 169 CRASSULACEAE	Herb	Ear infection	Steam leaves for a minute and squeeze the juice as ear droplets on the infected and uninfected ear	0.02
Unknown	<i>Cissus cactiformis</i> Gilg SP 34 VITACEAE	Herb	Insecticide for cows	Crash leaves, soak in water and spray the cows	0.01
Unknown	<i>Conostomium natalense</i> (Hochst.) Bremek. var. <i>natalense</i> SP 63 RUBIACEAE	Shrub	Conception	Roots are used to make a decoction that is taken orally	0.01
Unknown	<i>Sida acuta</i> Burm.f. subsp. <i>acuta</i> SP 64 MALVACEAE	Herb	Stop bleeding for pregnant women	Roots are used to make a decoction that is taken orally	0.01
Unknown	<i>Leonotis ocymifolia</i> (Burm.f.) Iwarsson SP 141 LAMIACEAE	Herb	Sunken or bulging fontanelles	Roots are used to make a decoction that is taken orally	0.01
Unknown	<i>Guilleminea densa</i> (Willd. Ex Roem. and Schult.) SP 85 AMARANTHACEAE	Herb	Stomach cleansing	Roots are used to make a decoction that is taken orally	0.01

Unknown	<i>Albuca seineri</i> (Engl. and K.Krause) J.C.Manning and Goldblatt SP 112 HYACINTHACEAE	Herb	Enhance in men impotency	Bulbs are used to make a decoction that is taken orally	0.01
Unknown	<i>Carpobrotus edulis</i> (L.) L.Bolus subsp. <i>edulis</i> SP 149 AIZOACEAE	Herb	Tonsillitis	Leaves are used to make a decoction that is taken orally	0.01
Unknown	<i>Adenium multiflorum</i> Klotzsch SP 164 APOCYNACEAE	Herb	Prevent lightning	Planted in the yard	0.01
Unknown	<i>Crassula obovata</i> Haw. var. <i>obovata</i> SP 168 CRASSULACEAE	Herb	Ear infection	Soak leaves in water and use the juice as ear droplets	0.01
Unknown	<i>Nerium oleander</i> L. SP 148 APOCYNACEAE	Tree	Tonsillitis	Leaves are used to make a decoction that is taken orally	0.01

---

UV denotes 'use value'

As indicated in Figure 4.2 the study revealed that the major plant parts used are roots (48%) from herbs and trees; this possess a threat to the vegetation. Chinsebu (2016) elaborates that roots are favoured for their efficient pharmacological compounds and that people who harvest these parts should be educated about conservation of the plants in general; Masevhe *et al.* (2015) and Neelo *et al.* (2015) add that roots are perceived to have healing powers by most traditional health practitioners, that is why they mainly preferred them. Availability of roots throughout the year was another reason for their preference (Neelo *et al.*, 2015). From the current study, manner of preparation and administration for ninety five percent of the plant species was mostly decoctions which were taken orally. Similar results were also observed by Kankara *et al.* (2015) were the majority of decoctions were taken orally. The preference for these plants, however, depends on the habitat, wherein lowlands receive minimal rainfall, therefore, shrubs and herbs dominate, while trees dominate in highlands which receive maximum rainfall (Masafu *et al.*, 2016).



**Figure 4.2:** Parts mostly utilized for treating ailments

Information on different ailments treated by the Mapulana is indicated in Table 4.4. In the treatment of some ailments, the plant species utilized were combined - two to a maximum of five. Gonorrhoea and flu were ailments treated with most combinations (Table 4.3). *Prunus persica* was the only plant species which can be utilized to treat four different ailments; other species such as *Ximenia caffra* var. *caffra*, *Psidium guajava*, *Lippia javanica* and *Carica papaya* were utilized in treating a maximum of two ailments. De Wet *et al.* (2012) and Gbadamosi and Egunyomi (2014) recorded *Hypoxis hemerocallidea* being combined with *X. caffra*, *Musa acuminata* or *C. papaya* in the treatment of sexually-

transmitted diseases. It was observed that combinations from different plant parts were also prepared by using different preparation methods (Das *et al.*, 2015); combinations of these different plant species have remained a secret, only known to the traditional health practitioners (Igoli *et al.*, 2005).

*Aloe zebrina* (0.38) use value was the highest; it could be utilized for eye and ear infections, diabetes, chicken diseases, swollen legs and high blood pressure as shown in Table 4.2. Seconded by *Aloe marlothii* (0.29) which can be used for tooth ache, high blood pressure, chicken diseases, insecticide for maize and wounds. Treatment of high blood pressure and chicken disease were common between the medicinal utilization of several species. With similar use value as *A. marlothii*, *Lippia javanica* was utilized for flu, stomach cleansing and headache. *Sclerocarya birrea* subsp. *caffra* and *Siphonochilus aethiopicus* received a use value of 0.28. *Prunus persica* with few uses had a use value of 0.22. *Psidium guajava* (0.20) was utilized for treating flu and diarrhea with similar uses and use value to *S. birrea* subsp. *caffra*. *Ximenia caffra* var. *caffra* (0.16), and *Prunus persica*, were recorded as sharing the same three uses. According to Albuquerque *et al.* (2006) high use value is not determined by the number of uses per different plant species but by the participants. *Hypoxis hemerocallidea* is utilized to treat nine different ailments but the use value is 0.15. Ullah *et al.* (2013); Ngarivhume *et al.* (2015); Aziza *et al.* (2017); Bruschi *et al.* (2017) explain that the higher the use value, the higher the importance of that particular species. In other cases, when use values are high, even the number of uses are high (Bruschi *et al.*, 2017). Thirty-three plant species had a use value of 0.01. The trusted and preferred plant species are utilized very often in the treatment of different

ailments, while plants with low use values were more frequently utilized by the elders; these plants are now becoming less important because of reported side effects, their unavailability and inaccessibility (Heinrich, 2003).

Gonorrhoea (1.80), stomach cleansing (1.40), chicken diseases (1.19), bad luck (0.88), flu (0.84), and diarrhoea (0.80) received the highest informants' consensus factor (ICF) (Table 4). Güler *et al.* (2015) states that informants' consensus above one indicates high level of utilization. Tangjang *et al.*, (2011), Güler *et al.* (2015) and Sadat-Hosseini *et al.* (2017) have recorded flu to have high ICF in their studies. In a study by Eddouks *et al.* (2017), informant consensus factor showed that there is an agreement in the use of plant species for the different ailments. Treatment of ailments such as gonorrhoea and flu with numerous plant species had also high ICF. Stomach cleansing, and chicken and cow diseases have high ICF with few plant species. Conception problems, high blood pressure and swollen legs were some of the ailments with ICF of zero; this simply means that there is minimal agreement in the utilization of the plant species among the participants (Tugume *et al.*, 2016). Tangjang *et al.* (2011) further elaborated that low ICF results, when many plant species have almost or equal high use citation. High ICF results, when few plant species have high use citation. Informant consensus factor is low when participants fail to share their knowledge about the use of plants and high when participants reveal their knowledge on utilization of plants (Mugisha *et al.* 2014)

### 4.3.3 Ailments treated by the Mapulana

#### 4.3.3.1 Bad luck

*Ximenia caffra* var. *caffra*, *Euclea crispa* subsp. *crispa*, *Euclea divinorum*, *Lannea edulis* var. *edulis*, *Peltophorum africanum* and *Cinnamomum camphora* were identified as removing bad luck. The ailment is called “Senyama” or “Leswiswi” by the Mapulana and can also be caused by “Makgoma”. It is assumed that a person has bad luck when everything regarding that individual is not going well, things such as, marriage, employments and relationships with other people. Bad luck results in things not moving according to plan or such persons may be facing difficulty in everything they wish to do, no matter how much they try. Such a person may be attached to certain spirits that cause bad luck and the spirits may need to be chased away by traditional healers. Cocks and Moller (2002) attest that bad luck may be caused by witchcraft or supernatural powers because nothing happens by chance. Moteetee and Van Wyk (2011) continue that bad luck can be caused by ancestors punishing an individual for neglecting them and *Pentanisia prunelloides* and *Aloe aristata* can be used as charms to remove this kind of bad luck. *Typha capensis*, *Boophone disticha* and *Elaeis guineensis* were also reported as being capable of removing bad luck (Gruca *et al.*, 2014; Masafu *et al.*, 2016; Tshikalange *et al.*, 2016). It is also documented that *Vangueria infausta* subsp. *infausta* cannot be utilized as fuelwood since this act brings bad luck to the community as a whole (Chinsamy and Koitsiwe, 2016). The current study has documented *Flueggea virosa* subsp. *virosa* as being utilized for homestead protection which in turn chases away bad spirits that attack a family. Other plant species: *Myrothamnus flabellifolius*, *Typha*

*capensis*, *Pentanisia prunelloides* and *Siphonochilus aethiopicus* were also documented as protecting homesteads (Masafu *et al.*, 2016).

#### 4.3.3.2 Diarrhea and Stomach cleansing

Diarrhea and stomach cleansing are two ailments that most of the Mapulana fail to differentiate although the plant species treating the two are different. Twelve plant species were identified as stopping diarrhea “Letjhologo” in humans and animals. *Fallopia convolvulus*, *Ximenia caffra* var. *caffra*, *Trichilia dregeana*, *Terminalia sericea*, *Punica granatum*, *Syzygium cumini*, *Strychnos spinosa*, *Psidium guajava*, *Schotia brachypetala*, *Prunus persica*, *Sclerocarya birrea* subsp. *caffra* and *Callilepis salicifolia* were utilized. *T. sericea* was also utilized against diarrhea in the cases of goats and cows. In the southern African countries, most of these plants supporting the current study are been utilized and recorded for treating diarrhea. Plant species such as *P. granatum*, *Psidium guajava*, *T. sericea*, *Syzygium cumini* and *S. birrea* subsp. *birrea* was recorded (Wondimu *et al.*, 2007; Ribeiro *et al.*, 2010; van Vuuren *et al.*, 2015; Madikizela *et al.*, 2012; Neelo and Kashe, 2015; Masafu *et al.*, 2016; Urso *et al.*, 2016; Mahmud *et al.*, 2016). The list contains other plant species for treating the ailment, such as *Ziziphus mucronata*, *Peltophorum africanum* and *Albezia versicolor*, *Lippia javanica*, *Maytenus senegalensis* and *Hypoxis hemerocallidea* (Ribeiro *et al.*, 2010; Maroyi, 2011; Madikizela *et al.*, 2012; van Vuuren *et al.*, 2015, Chinsemu *et al.*, 2015; Urso *et al.*, 2016; Chinsamy and Koitsiwe, 2016), however, for chronic diarrhea, Masafu *et al.*, (2016) reported the use of *Cotyledon orbiculata*.

Laxatives are utilized to clean the stomach (Nyamukuru *et al.*, 2017). Traditional health practitioners complained of people who misuse plants, especially plants utilized for stomach cleansing to stop diarrhea have caused untimely deaths, although some species can be safely utilized. Participants warned that people should follow the exact procedures given by THPs to ensure these plants are used safely. From the current study, *T. dregeana* was the only plant species utilized in treatment of both ailments. *Euclea crispa*, *A. versicolor*, *Peltophorum africanum*, *T. dregeana*, *L. javanica* and *Cinnamomum camphora* are utilized for stomach cleaning, wherein half to one cup of the decoction should be taken, not more than that. *Dichrostachys cinerea* subsp. *cinerea*, *Amaranthus hybridus*, *Cinnamomum zeylanicum* and *R. communis* were also utilized for stomach cleansing (Rahmatullah *et al.*, 2009; Ribeiro *et al.* 2010; Nduche *et al.*, 2016; Wintola *et al.*, 2017). *C. zeylanicum* was tested and found to possess laxative effects (Rahmatullah *et al.*, 2009). Plant species utilized for stomach cleansing are also being used for treating diarrhea. *P. africanum*, *L. javanica* *A. versicolor* were recorded in the current study for stomach cleansing and also recorded by Maroyi (2011); van Vuuren *et al.* (2015); Chinsebu *et al.* (2015) Chinsamy and Koitsiwe (2016) and Urso *et al.* (2016) as a treatment for diarrhea.

#### **4.3.3.3 Rescussions in children, preventing miscarriage and stillborn**

The above-mentioned ailments are separate illnesses and treated differently but are interconnected. Negligence of tradition mainly by ignoring generic (birth) order in the family tree is called “difeka”. For example, a women’s negligence might cause her baby to be instantly disabled (resuscitated) or disabled after twenty months of birth ‘turning’

into an infant. Also, a third- born woman having intercourse on a first-born pregnant woman's bed. When the pregnant women later use the bed "o fikegele" might be the result, meaning that she might deliver a disable child. In the case of a women who loses a baby, non-observance of traditional rules might result in that women not conceiving again or death, *Agapanthus africanus* subsp. *africanus* and *Carica papaya* were reported to prevent "difeka" from the current study. *A. africanus* subsp. *africanus* is utilized to treat prolonged labor (Kaido *et al.*, 1997; Steenkamp, 2003; Abdillahi and Van Staden, 2013), while *C. papaya* is used to induce lactation (Randrianarivony *et al.*, 2016). Niehaus (2001) agrees with the findings that "difeka" is caused by transgression of seniority rules and symptoms are shown by a woman's inability to bear children.

'Makgoma' is a term used to describe people's negligence of their tradition. The symptoms include, swollen stomach or body parts (legs, hands), coughing and shiny appearance. In the case of pregnant women, they can be affected if they do not follow all the rules in their tradition. Certain rules, such as pregnant women being restricted from having sexual relations when there is a funeral in their families; they are to wait for seven days cleansing period before engaging in any such activity. In addition, if a woman sleeps elsewhere and cooks for people at her family funeral, whoever eats will be sick, as it is believed the food is contaminated "o kgomisiwe". Niehaus (2001) writes that 'makgoma' is caused by a person who comes into contact with a corpse and symptoms include shortness of breath or convulsions. Makgoma can be associated with "Idliso" which is caused when an individual neglects his or her ancestors (Davids *et al.* 2014). *Sclerocarya birrea* subsp. *caffra*, *Ximenia caffra* var. *caffra*, *Persea americana*, *Siphonochilus*

*aethiopicus* and *Citrus sinensis* were the identified species utilized to prevent miscarriage and stillborn. Nduche *et al.* (2015) recorded *S. acuta* subsp. *acuta* as arresting threatened miscarriage. Maliwichi-Nyirenda and Maliwichi (2010), Maliwichi-Nyirenda *et al.* (2016), Abdillahi and Van Staden (2013) and Malan and Neuba (2011) have recorded *Bauhinia petersiana*, *Sansevieria hycacinthoides*, *Pyrenacantha scandens*, *Desmodium adscendens*, *Ficus exasperate* and *Cyanthyla prostrate* in prevention of miscarriage.

#### 4.3.3.4 Diabetes and high blood pressure

*Opuntia ficus-indica*, *Aloe zebrina*, *Dichrostachys cinerea* subsp. *africana*, *Moringa oleifera*, *Chenopodium album* and *Vitis vinifera* are utilized to treat diabetes “Malwele a tjhukele”. *O. ficus-indica*, *A. marlothii*, *A. zebrina*, *M. oleifera*, *V. vinifera*, *Momordica balsamina*, *M. foetida* and *Zanthoxylum capense* were identified as medicinal plants used in treatment of high blood pressure. It is assumed that people suffering with diabetes might also have high blood pressure, but the ailments are treated separately. Community members from the current study assert that ailments, such as diabetes and high blood pressure are not cured but managed due to difficulty in detecting them, therefore, results from health facilities are the only mode of detection that traditional health practitioners rely on. Mapulana believe traditional sicknesses, like “Makgoma and Difeka” cause this ailment. Chauke *et al.* (2015) add that diabetes and high blood pressure co-occur causing high mortality and morbidity among people. The ailments are associated with unhealthy life style and genetic features.

Few plant species are recorded in treatment of high blood pressure; Tshikalange *et al.* (2016) has recorded *Hypoxis hemerocallidea* and *A. marlothii* in a study conducted in South Africa, Mpumalanga Province. *Allium sativum* was found in Pakistan to be another species that treats the ailment (Aziza *et al.*, 2017). *R. communis*, *M. balsamina*, *S. cumini*, *P. granatum*, *M. indica*, *S. cumini*, *E. crispa* var. *crispa*, *Carpobrotus edulis*, *M. oleifera*, and *Artemisia afra*, *A. sativum* and *Aloe* species were recorded as treatments for diabetes (Chauke *et al.*, 2015; Rahmatullah, 2015; Mahmud *et al.*, 2016; Davids *et al.*, 2016; Aadhan and Anand, 2017; Chinsamy and Koitsiwe, 2016), while *O. ficus-indica* was recorded by Chauke *et al.* (2015) and Tshikalange *et al.* (2016) for treatment of the same ailment.

From the current study *O. ficus-indica*, *A. zebrina*, *M. oleifera* and *V. vinifera* plant species are utilized for treatment of both ailments - diabetes and high blood pressure. There are a number of plant species used in treating both these ailments, such as *Lessertia frutescent*, *Leonotis leonurus*, *Artemisia afra* and *Tulbaghia violacea* to mention the few recorded by Chauke *et al.* (2015).

#### **4.3.3.5 Flu and headache**

Among the Mapulana communities, people with flu also suffer from headaches; these ailments are symptoms associated with other serious diseases, like HIV/AIDS (Semenya *et al.*, 2013a). Flu, fever, cough and colds are treated by the Mapulana with *Cucurbita maxima*, *Artemisia afra*, *Ximenia caffra* var. *caffra*, *Eucalyptus grandis*, *Punica granatum*,

*Euclea crispa* var. *crispa*, *Psidium guajava*, *Mangifera indica*, *Prunus persica*, *Sclerocarya birrea* subsp. *caffra*, *Lippia javanica*, *Citrus limon*, *Philenoptera violacea*, *Cannabis sativa*, *Callilepis salicifolia* and *Siphonochilus aethiopicus*. No matter how severe the sickness is, the above-mentioned plants have been trusted over the years to cure it. The majority of the plants are used in combinations, in their preparation of medicinal materials for effective treatment. The combination of plant species used for flu are depicted in Table 4.3. A combination of *P. persica*, *P. guajava*, *L. javanica*, *S. aethiopicus* and *C. limon* is preferred among the Mapulana in the treatment of flu. The combination of medicinal plants, in this case, can be from two to a maximum of five plant species, to treat the ailment in its different stages. Other combination are used elsewhere for example, in Uganda; combinations, such as *Carica papaya*, *M. indica*, *P. guajava* and *E. grandis* have been reported.

Similar to the current study, a list of plant species has been recorded to treat flu, fever, cough and chest pains from different African countries; these plants include, *Maytenus senegalensis*, *C. sinensis*, *Flueggea virosa* subsp. *virosa*, *C. papaya*, *Artemisia afra*, *A. sativum*, *Euclea crispa* var. *crispa*, *Citrus limon*, *Ricinus communis*, *Piliostigma thonningii*, *Lantana rugosa*, *S. birrea* subsp. *caffra*, *L. javanica*, *M. indica*, *Psidium guajava*, *Ziziphus mucronata*, *S. aethiopicus*, *E. grandis*, *C. sativa*, *Leonotis leonurus* (Wondimu *et al.*, 2007; Maroyi, 2011, Van Wyk, 2011; Asimwe *et al.*, 2013; Mahwasane *et al.*, 2013; Rahmatullah, 2015; Kankara *et al.*, 2015; Neelo and Kashe, 2015; Urso *et al.*, 2016; Chinsamy and Koitsiwe, 2016; Mahmud *et al.*, 2016; Rankoana, 2016; Tshikalange *et al.*, 2016; Idu *et al.*, 2017)

Six plant species were identified as treating headaches by the Mapulana; these are, *Artemisia afra*, *V. infausta*, *H. hemerocallidea*, *S. cumini*, *L. javanica*, and *C. sativa*. Plant species, such as *A. afra*, *L. javanica* and *C. sativa* are utilized to treat both flu and headache in the current study; the benefit of these were also documented from different sources (Van Wyk, 2011; Asiimwe *et al.*, 2013; Rankoana, 2016; Tshikalange *et al.*, 2016; Urso *et al.*, 2016). *E. grandis*, *L. javanica*, *R. communis* and *S. birrea* subsp. *caffra* also treat both ailments (Teklehaymanot and Giday, 2010; York *et al.*, 2011).

#### 4.3.3.6 Tooth ache

The Mapulana treat toothaches with *Aloe marlothii*, *Hypoxis hemerocallidea*, *Ricinus communis*, *Senna petersiana*, *Dichrostachys cinerea* subsp. *africana* and *Solanum campylacanthum*. A study by Akhalwaya *et al.* (2017) argues that plants that treat oral infection should be screened for cytotoxic properties which is beneficial for the treatment; from the same study it was observed that *D. cinerea* showed inability to inhibit oral pathogens. It is evident that African countries use different plant species for treatment of toothache species, such as *Sclerocarya birrea* subsp. *birrea*, *Cissus quadrangularis*, *R. communis*, *Vangueria infausta*, *Peltophorum africanum*, *D. cinerea* and *Parinari curatellifolia* which were recorded by different authors Mabogo (1990); Wondimu *et al.* (2007); Maroyi, (2011); Neelo and Kashe (2015) and Chinsamy and Koitsiwe (2016). *Psidium guajava* was recorded in Bangladesh as having the same usage (Rahmatullah, 2015).

#### 4.3.3.7 Wounds

Six plant species were identified in the treatment of wounds, namely, *Opuntia ficus-indica*, *Aloe marlothii*, *Datura stramonium*, *Hypoxis hemerocallidea*, and *Dichrostachys cinerea* subsp. *africana*. Succulent plants, especially the *Aloe* species have high water content and polysaccharide that help in ailments concerning the skin, hence, heals wounds (Grace *et al.* 2009). Several authors, from different countries have recorded different plant species that were used in treating wounds. From South Africa *Ricinus communis*, *O. ficus-indica*, *Peltophorum africanum*, *Ziziphus mucronata* and *Diospyros mespiliformis* were among the recorded plant species (Lewu and Afolayan, 2009; Chinsamy and Koitsiwe, 2016; Rankoana, 2016; Maroyi, 2011). From Mozambique and Bangladesh, plant species such as *Cissus quadrangularis* and *Terminalia sericea* were recorded by Ribeiro *et al.* (2010) and Rahmatullah (2015). *Ximenia americana* and *Momordica foetida* were recorded from Botswana and Ethiopia as treatment for wounds (Neelo and Kashe, 2015; Giday *et al.*, 2010).

#### 4.3.3.8 Gonorrhoea

Twenty-four plant species were identified as being utilized for treatment of gonorrhoea “drop” or “teropo” or “letjhofela” from the study (Table 4.2). Five out of the reported twenty-four plant species were highly preferred due to their easy accessibility. These are, *Carica papaya*, *Ximenia caffra* var. *caffra*, *Hypoxis hemerocallidea*, *M. acuminata* and *P. persica*. *Carica papaya* which were identified by a number of authors to be preferred in treatment of general sexually-related issues - gonorrhoea, impotency in men, erectile dysfunction, as

well as improvement of fertility in men and women across Africa (Njoroge and Bussmann, 2009; De Wet *et al.*, 2012; Semanya *et al.*, 2013a; Semanya *et al.*, 2013b; Gbadamosi and Egunyomi, 2014; Chauke *et al.*, 2015; Erasmus *et al.*, 2015; Nduche *et al.*, 2015; Masevhe *et al.*, 2015; Olanipekun *et al.*, 2016; Kayode *et al.*, 2016; Urso *et al.*, 2016). *Ximenia caffra var. caffra* is another important plant species that has been reported in treatment of gonorrhoea and general STIs (Fernandes *et al.*, 2008; De Wet *et al.*, 2012; Chauke *et al.*, 2015; Maroyi, 2016; Chinsebu *et al.*, 2015; Chinsebu, 2016). *Hypoxis hemerocallidea* has also been cited by various authors in treatment of STIs and HIV (De Wet *et al.*, 2012; Naidoo *et al.*, 2013; Semanya and Potgieter 2013; Semanya *et al.*, 2013b; Davids *et al.*, 2014; Gail *et al.*, 2015). *M. acuminata* and *P. persica* were reported in the treatment of erectile dysfunction, gonorrhoea and STIs (De Wet *et al.*, 2012, Gbadamosi and Egunyomi, 2014, Erasmus *et al.*, 2015, Mulaudzi *et al.*, 2015).

#### 4.3.3.9 Stomach pains

Stomach pains were sometimes associated with evil spirits causing pains and these were called “Sedyiso” by the Mapulana. Sedyiso literally means that ‘a person has eaten spiritually poisonous substances’ which caused that person to have setbacks in life or to misbehave. Seven plant species that were identified in treating stomach pains were *Senna occidentalis*, *Terminalia sericea*, *Ricinus communis*, *Cissus quadrangularis var. quadrangularis*, *Albezia versicolor* *P. africanum* and *Annona senegalensis* subsp. *senegalensis*.

In support of the current study, *A. senegalensis* subsp. *senegalensis*, *T. sericea*, *R. communis* were recorded in the treatment of stomach pains (Lewu and Afolayan, 2009; Teklehaymanot, 2009 Ribeiro *et al.*, 2010; Mahwasane *et al.*, 2013). Numerous records, from different authors, on plant species treating stomach pains species list *Zanthoxylum capense*, *Combretum imberbe*, *Diospyros mespiliformis*, *Ricinus communis*, *Ziziphus mucronata*, *A. sativum*, *P. africanum* and *S. birrea* subsp. *caffra* (Maroyi, 2011; Madikizela *et al.* 2012; Mahwasane *et al.*, 2013; Rankoana 2016; Eshete *et al.* 2016; Ribeiro *et al.*, 2010; Urso *et al.*, 2016; Wintola *et al.*, 2017)

#### **4.3.3.10 Swollen legs**

Four plant species reported to be utilized in the treatment of swollen legs by the Mapulana were *Aloe zebrina*, *Ricinus communis*, *Carica papaya* and *Dichrostachys cinerea* subsp. *africana*. The ailment is called 'Sefolane', whereby a person might experience swollen painful legs which do not heal even when treatment is taken orally or applied as ointment on the legs. Participants from the current study assert that treatments from the public health care system do not heal swollen legs but makes the condition worse, to an extent that the leg may be amputated. Traditional medicines are all that are required for these ailments. *Adenia digitata* was recorded as treatment for swollen legs, by Mabogo (1990).

#### **4.3.3.11 Dysmenorrhea, conception, infertility and untie womb**

Dysmenorrhea is when women experience heavy period pains, "Selomi", and some of the women are unable to conceive as a result. It is perceived that most women with 'Selomi'

have tied-up wombs and the participants argued that tying of the womb could also be spiritually connected. The current study identified two plant species to treat dysmenorrhea with - *Cyperus latifolius* and *Piliostigma thonningii*, while *Cassia abbreviata* subsp. *beareana* was the only species utilized to treat cases of infertility. A number of plant species treating dysmenorrhea were recorded from studies conducted around South African provinces like, Limpopo and Kwazulu-Natal to mention a few; such species were *Peltophorum africanum*, *Pterocarpus angolensis*, *Siphonochilus aethiopicus*, *Rhoicissus tridentata*, *Senna occidentalis*, *Euclea crispa* var. *crispa*, *Senna petersiana*, *Lantana camara*, *Flueggea virosa* subsp. *virosa* (Mabogo, 1990; Steenkamp, 2003; Mahwasane *et al.*, 2013; de Wet and Ngubane, 2014). In Lesotho and South Africa studies reveal that infertility is treated with the following plant species - *F. virosa* subsp. *virosa*, *S. petersiana*, *Bauhinia galpinii*, *Ajuga ophrydis*, *Equisetum ramosissimum* and *Haplocarpha scaposa*, *Grewia flavescens*, *Sclerocarya birrea* subsp. *caffra*, *Hypoxis hemerocallidea* with *Gymnosporia senegalensis* (Mabogo, 1990; Steenkamp, 2003; Moteetee and Van Wyk, 2011; Mahwasane *et al.*, 2013; de Wet and Ngubane, 2014; Masafu *et al.*, 2016).

The current study identified *Aloe zebrina*, *Castanospermum australe*, *B. galpinii* and *Conostomium natalense* var. *natalense* as species for the treatment of conception-related issues. Kitula (2007) and Awai as well as Igoli (2015) have also recorded plant species for the treatment of conception difficulties in Tanzania and Nigeria; which are *A. senegalensis* subsp. *senegalensis*, *Rhamnus mucronata*, *Casearia gladiiformis*, *Scolopia stolzii*, *Carica papaya* and *S. occidentalis*. From the current study, *G. flavescens* and *C. abbreviata* subsp. *beareana* plant species were reported as 'untying' women's womb,

while *C abbreviata* subsp. *beareana* was used to both untie the womb and to treat infertility. Its usage clearly explains the belief that a woman cannot be fertile if her womb is tied up. Literature has revealed that *B. galpinii* and *G. flavescens* treats infertility (Mabogo, 1990; Steenkamp, 2003) while in the current study these plants are utilized for conception and untying of womb, which details that conception comes after the womb is untied.

#### 4.3.3.12 Hematuria

Hematuria is a term used when women experiences blood in the urine referred to as “Motlhapo”. *Erythrina lysistemon* and *Hypoxis rigidula* var. *rigidula* were recorded as treating such an ailment. Tshikalange *et al.* (2016) has recorded *Abrus precatorius* in the treatment of blood in urine due to kidney problems.

#### 4.3.3.13 Sunken and bulging fontanelles

The phrase, ‘sunken or bulging fontanelles’ represents the protruding of the soft spots on infants’ head and are treated within the first twelve months of the baby’s life; the condition is called “Phogwana”. The study has identified thirteen plant species that treat the ailment and depending on the severity of the fontanelles the plants are combined as shown in Table 4.3. The treatment species include, *Hypoxis hemerocallidea*, *Senna occidentalis*, *Annona senegalensis* subsp. *senegalensis*, *Lantana rugosa*, *Clematis brachiate*, *Gomphocarpus fruticosus* subsp. *fruticosus*, *Diospyros mespiliformis*, *Ansellia africana*, *Leonotis ocymifolia*, *Euclea crispa* var. *crispa*, *Flueggea virosa* subsp. *virosa*,

*Gymnosporia senegalensis*, *Sida acuta* and *Lippia javanica*. Amongst the Vhavenda people, *A. senegalensis* subsp. *senegalensis* was also recorded as treatment for fontanelles (Mabogo, 1990). *Persia americana* was one of the species recorded by Shosan *et al.* (2012) to treat fontanelles in Nigeria while Abdillahi and Van Staden (2013) recorded *Ormocarpum trichocarpum* in treatment of fontanelles from other parts of South Africa.

#### 4.3.3.14 Colic

The study has recorded *Allium sativum*, *Senna occidentalis* and *Fallopia convolvulus* as the only species utilized in the treatment of colic among infants. The term *colic* “Mokhuba” or “Lela” refer to the weak intestine that results from slow internal wound healing process after the baby’s umbilical cord was removed. Treatment of abdominal pains (colic) in infants is referred to as “inkaba” in Zulu (Bland *et al.*, 2004). Among the Vhavenda’s ethnobotany studies, the healing of a stomach wound is also supported by food supplements prepared with *Bauhinia galpinii* (Mabogo, 1990). The food supplements can in turn also facilitate relief of constipation. *Hypoxis hemerocallidea* was recorded as being used in the treatment of constipation and intestinal parasites. *Equisetum ramosissimum* and *Vachellia karroo* were recorded in treatment of colic in Lesotho (Moteetee and Van Wyk, 2011). *Mewilla plumbea* is used as treatment for colic and *H. hemerocallidea* as treatment for constipation and intestinal parasites among the Vhavenda people (Masafu *et al.*, 2016). *A. sativum* is the only species recorded among the Mapulana to have similar use of treating abdominal cramps as in Nigeria (Shosan *et al.*, 2012).

**Table 4.3:** Combinations of some plants utilized by Mapulana.

Plant species	Ailment	Parts used
<i>Ximenia caffra</i> var. <i>caffra</i> + <i>Peltophorum africanum</i> + <i>Lannea edulis</i> var. <i>edulis</i> + <i>Euclea crispa</i> subsp. <i>crispa</i>	Bad luck	Roots
<i>Sclerocarya birrea</i> subsp. <i>caffra</i> + <i>Vangueria infausta</i> + <i>Hypoxis hemerocallidea</i>	Bad luck	Barks and bulb
<i>Syzygium cumin</i> + <i>Vangueria infausta</i>	Broken bones	Roots
<i>Aloe zebrina</i> + <i>Piliostigma thonningii</i>	Chicken diseases	Leaves and root
<i>Psidium guajava</i> + <i>Prunus persica</i>	Diarrhea	Roots
<i>Prunus persica</i> + <i>Psidium guajava</i> + <i>Lippia javanica</i> + <i>Siphonochilus aethiopicus</i> + <i>Citrus limon</i>	Flu	Leave
<i>Eucalyptus grandis</i> + <i>Lippia javanica</i> + <i>Psidium guajava</i>	Flu	Leaves
<i>Prunus persica</i> + <i>Mangifera indica</i> + <i>Persea americana</i>	Flu	Leaves
<i>Psidium guajava</i> + <i>Mangifera indica</i>	Flu	leaves
<i>Lippia javanica</i> + <i>Artemisia afra</i> var. <i>afra</i> + <i>Euclea crispa</i> subsp. <i>crispa</i> + <i>Cannabis sativa</i>	Flu	Leaves

<i>Morus alba</i> var. <i>alba</i> + <i>Musa acuminata</i> + <i>Ficus sur</i> + <i>Ficus thonningii</i>	Gonorrhoea	Roots
<i>Carica papaya</i> + <i>Musa acuminata</i> + <i>Persea americana</i>	Gonorrhoea	Roots
<i>Hypoxis hemerocallidea</i> + <i>Hypoxis rigidula</i> var. <i>rigidula</i> + <i>Ximenia caffra</i> var. <i>caffra</i> +	Gonorrhoea	Bulb + Root +Root
<i>Musa acuminata</i> + <i>Prunus persica</i> + <i>Carica papaya</i> + <i>Ximenia caffra</i> var. <i>caffra</i>	Gonorrhoea	Roots
<i>Annona senegalensis</i> subsp. <i>senegalensis</i> + <i>Gomphocarpus fruticosus</i> subsp. <i>Fruticosus</i>	Gonorrhoea	Root + Bark + Root
<i>Flueggea virosa</i> subsp. <i>virosa</i> + <i>Morus alba</i> var. <i>alba</i>	Gonorrhoea	Roots
<i>Syzygium cumin</i> + <i>Vangueria infausta</i>	Head ache	Roots
<i>Momordica balsamina</i> + <i>Momordica foetida</i>	High blood	Leave
<i>Euclea crispa</i> subsp. <i>crispa</i> + <i>Carica papaya</i>	Resuscitation of children	Roots
<i>Albezia versicolor</i> + <i>Ricinus communis</i>	Stomach pains	Roots
<i>Diospyros mespiliformis</i> + <i>Euclea crispa</i> var. <i>crispa</i>	Sunken and bulging fontanelles	Roots

*Senna occidentalis* + *Annona senegalensis* subsp. *senegalensis*

Sunken and  
bulging  
fontanelles

Roots

*Lippia javanica* + *Prunus persica*

Typhoid

Leaves

*Prunus persica* + *Lycopersicon esculentum*

Typhoid

Leaves

---

#### 4.3.3.15 Nail-biting

When babies are frequently seen chewing or licking their nails, the ailment is called 'nail-biting' and locally as "Metjhwa". *Vachellia karroo* and *Abrus precatorius* subsp. *africanus* are the two species reported being used for treatment of such a condition by the Mapulana. Both plant species are under the Fabaceae family; a family rich with medicinal plants which are found throughout the year, hence, in all seasons and different regions (Kankara *et al.* 2015). *A. precatorius* subsp. *africanus* is utilized in the treatment of bilharzia in children (Cock *et al.*, 2018).

#### 4.3.3.16 Typhoid

"Ditshemane or Manogane or Nkusu" are the local names referring to typhoid amongst the Mapulana. The treatment is applicable to children of all ages. Leaves of *Prunus persica* var. *persica* and *Lycopersicon esculentum* are used in combination to treat typhoid. Other combinations are shown in Table 4. In their study conducted in Nigeria, Shosan *et al.* (2012), recorded four plant species for treating typhoid, including *Mangifera indica* and *Sorghum bicolor*.

#### 4.3.3.17 Chicken diseases

*Aloe marlothii*, *Aloe zebrina*, *Piliostigma thonningii*, *Senna petersiana* and *Parinari capensis* subsp. *capensis* are the recorded plant species utilized to treat chicken diseases

in the current study. van Der Merwe *et al.* (2001) claims that *A. marlothii* is one of the significant species in ethno-veterinary. It was also reported as being used for chicken or Newcastle diseases (Luseba and van der Merwe, 2006; Luseba and Tshisikhawe, 2013). *A. marlothii* and *A. zebrina* have been reported as treatment for diarrhea, and other general ailments (van Der Merwe *et al.*, 2001). *A. zebrina* is also used for burns and wounds as revealed from a study conducted in South Africa (Luseba and van der Merwe, 2006). *S. petersiana* has been reported in treatment of general goats' ailments in a study on medicinal plants used in treatment of livestock in Vhembe District Municipality (Luseba and Tshisikhawe, 2013).

**Table 4.4:** Different ailments listed by Mapulana.

Name of ailment	Name of species	ICF
Bad luck	<i>Ximenia caffra</i> , <i>Euclea crispa</i> , <i>Euclea divinorum</i> , <i>Lansea edulis</i> var. <i>edulis</i> , <i>Peltophorum africanum</i> , <i>Cinnamomum camphora</i> , <i>Vangueria infausta</i> , <i>Hypoxis hemerocallidea</i> , <i>Ficus sur</i> , <i>Cussonia transvaalensis</i> and <i>Flueggea virosa</i> subsp. <i>virosa</i>	0.88
Birth related issues	<i>Carissa edulis</i> and <i>Opuntia ficus-indica</i>	0.11
Blood related disease	<i>Carica papaya</i> , <i>P. africanum</i> , <i>Diospyros mespiliformis</i> , <i>Callilepis salicifolia</i> ,	0.50
Body pain	<i>Syzygium cumini</i>	0.00
Body weight	<i>C. transvaalensis</i>	0.00
Broken bones	<i>Ochna natalitia</i> , <i>V. infausta</i> , <i>S. cumini</i> , <i>Sansevieria hyacinthoides</i>	0.20
Chicken diseases	<i>Aloe marlothii</i> , <i>A. zebrina</i> , <i>Piliostigma thonningii</i> , <i>Senna petersiana</i> and <i>Parinari capensis</i> subsp. <i>Capensis</i>	1.19
Colic	<i>Allium sativum</i> , <i>Fallopia convolvulus</i> and <i>S. occidentalis</i>	0.00
Conception	<i>Castanospermum australe</i> , <i>A. zebrina</i> , <i>Bauhinia galpinii</i> , <i>Conostomium natalense</i> var. <i>natalense</i>	0.00
Constipation	<i>Albezia versicolor</i>	0.00
Dandruff	<i>Dicerocaryum eriocarpum</i>	0.00

Diabetes	<i>O. ficus-indica</i> , <i>A. zebrina</i> , <i>Dichrostachys cinerea</i> subsp. <i>africana</i> , <i>Moringa oleifera</i> , <i>Chenopodium album</i> , <i>Vitis vinifera</i>	0.33
Diarrhea	<i>Fallopia convolvulus</i> , <i>X. caffra</i> , <i>Trichilia dregeana</i> , <i>Terminalia sericea</i> , <i>Punica granatum</i> , <i>S. cumini</i> , <i>Strychnos spinosa</i> , <i>Psidium guajava</i> , <i>Schotia brachypetala</i> , <i>Prunus persica</i> , <i>Sclerocarya birrea</i> subsp. <i>caffra</i> and <i>C. salicifolia</i>	0.80
Dysmenorrhea	<i>Cyperus latifolius</i> and <i>Piliostigma thonningii</i>	0.00
Ear infection	<i>A. zebrina</i> , <i>H. hemerocallidea</i> , <i>Kalanchoe luciae</i> , <i>Crassula obovata</i> var. <i>obovata</i> ,	0.25
Enhance men impotency	<i>H. hemerocallidea</i> and <i>Albuca seineri</i> ,	0.11
Eye infection	<i>A. zebrina</i> , <i>Lantana rugosa</i> , <i>Cotyledon orbiculata</i> L. var. <i>orbiculata</i> ,	0.13
Flu	<i>Cucurbita maxima</i> , <i>Artemisia afra</i> , <i>X. caffra</i> , <i>Eucalyptus grandis</i> , <i>Punica granatum</i> , <i>Euclea crispa</i> var. <i>crispa</i> , <i>P. guajava</i> , <i>Mangifera indica</i> , <i>P. persica</i> , <i>S. birrea</i> subsp. <i>caffra</i> , <i>Lippia javanica</i> , <i>Citrus limon</i> , <i>Philenoptera violacea</i> , <i>Cannabis sativa</i> , <i>C. salicifolia</i> , <i>Siphonochilus aethiopicus</i>	0.84
Goat disease	<i>C. sinensis</i>	0.13
Gonorrhea	<i>Ipomoea oblongata</i> , <i>Eriosema psoraleoides</i> , <i>Tylosema fassoglense</i> , <i>Acalypha villicaulis</i> , <i>A. marlothii</i> , <i>Annona senegalensis</i> subsp. <i>senegalensis</i> , <i>Bauhinia galpinii</i> , <i>Carica papaya</i> , <i>Combretum molle</i> , <i>Dicerocaryum eriocarpum</i> , <i>E. divinatorum</i> , <i>Ficus sur</i> , <i>F. thonningii</i> , <i>F. virosa</i> subsp. <i>virosa</i> , <i>Gomphocarpus</i> <i>fruticosus</i> subsp. <i>fruticosus</i> , <i>H. hemerocallidea</i> , <i>H. rigidula</i> var. <i>rigidula</i> , <i>Lannea edulis</i> var. <i>edulis</i> , <i>Morus</i>	1.80

*alba* var. *alba*, *Musa acuminata*, *Persea americana*, *Prunus persica*, *Siphonochilus aethiopicus* and *X. caffra* var. *caffra*

Head ache	<i>Artemisia afra</i> , <i>V. infausta</i> , <i>H. hemerocallidea</i> , <i>S. cumini</i> , <i>L. javanica</i> , <i>C. sativa</i>	0.00
Heart disease	<i>Musa acuminata</i>	0.13
Hematuria	<i>Erythrina lysistemon</i> and <i>H. rigidula</i> var. <i>rigidula</i>	0.00
High blood	<i>O. ficus-indica</i> , <i>A. marlothii</i> , <i>A. zebrina</i> , <i>M. oleifera</i> , <i>Vitis vinifera</i> , <i>Momordica balsamina</i> , <i>M. foetida</i> , <i>Zanthoxylum capense</i>	0.00
Infertility	<i>Cassia abbreviata</i> subsp. <i>Beareana</i>	0.11
Insecticide for corn	<i>A. marlothii</i> ,	0.00
Insecticide for cows	<i>Cissus cactiformis</i>	0.00
Insecticide for tsetse fly	<i>P. persica</i>	0.00
Kidney diseases	<i>Asparagus exuvialis</i> and <i>P. africanum</i>	0.20
Stomach cleansing	<i>Trichilia dregeana</i> , <i>Euclea crispa</i> , <i>Albezia versicolor</i> , <i>P. africanum</i> , <i>L. javanica</i> , <i>Cinnamomum camphora</i> ,	1.40
Lung diseases	<i>E. crispa</i> var. <i>crispa</i>	0.00
Nail-biting	<i>Vachellia karroo</i> and <i>Abrus precatorius</i> subsp. <i>africanus</i>	0.00

Painful womb	<i>Ledebouria revoulute</i> and <i>Cyphostemma woodii</i>	0.11
Prevent lightning	<i>Kalanchoe beharensis</i> and <i>Adenium multiflorum</i>	0.11
Prevent miscarriage	<i>S. birrea</i> subsp. <i>caffra</i> , <i>X. caffra</i> var. <i>caffra</i> , <i>Persea americana</i> , <i>C. sinensis</i> , <i>S. aethiopicus</i>	0.00
Prevent snakes	<i>Allium sativum</i> ,	0.00
Resuscitation of children	<i>C. papaya</i> and <i>Agapanthus africanus</i> subsp. <i>africanus</i>	0.14
Ring worm	<i>Ziziphus mucronata</i> subsp. <i>mucronata</i>	0.13
Sinusitis	<i>C. limon</i>	0.00
Sunken and bulging fontanelles	<i>H. hemerocallidea</i> , <i>Lantana rugosa</i> , <i>Clematis brachiata</i> , <i>Gomphocarpus fruticosus</i> subsp. <i>fruticosus</i> , <i>D. mespiliformis</i> , <i>Ansellia africana</i> , <i>Sida acuta</i> subsp. <i>acuta</i> , <i>Leonotis ocymifolia</i> , <i>Annona senegalensis</i> subsp. <i>senegalensis</i> , <i>E. crispa</i> var. <i>crispa</i> , <i>Gymnosporia senegalensis</i> , <i>L. javanica</i> and <i>Bulbine frutescens</i>	0.41
Sprinkling traditional medicine	<i>S. birrea</i> subsp. <i>caffra</i> and <i>P. africanum</i> ,	0.33
Stomach pains	<i>S. occidentalis</i> , <i>T. sericea</i> , <i>Ricinus communis</i> <i>Cissus quadrangularis</i> var. <i>quadrangularis</i> , <i>Albezia versicolor</i> , <i>P. africanum</i> and <i>A. senegalensis</i> subsp. <i>senegalensis</i>	0.25
Stop vomiting	<i>Maytenus senegalensis</i>	0.10
Swollen legs	<i>A. zebrina</i> , <i>Ricinus communis</i> , <i>C. papaya</i> and <i>D. cinerea</i> subsp. <i>africana</i> ,	0.00

Tonsillitis	<i>H. hemerocallidea, Carpobrotus edulis</i> subsp. <i>edulis, Nerium oleander</i>	0.13
Tooth ache	<i>A. marlothii, H. hemerocallidea, R. communis S. petersiana, D. cinerea</i> subsp. <i>africana, Solanum campylacanthum</i>	0.20
Typhoid	<i>Bulbine frutescens, P. persica</i> var. <i>persica</i> and <i>Lycopersicon esculentum</i>	0.13
Unsolved matters disappear	<i>Steganotaenia araliacea</i>	0.00
Untie womb	<i>Grewia flavescens</i> and <i>Cassia abbreviata</i> subsp. <i>beareana</i>	0.11
Wounds	<i>O. ficus-indica, A. marlothii, Datura stramonium, H. hemerocallidea, H. hemerocallidea, D. cinerea</i> subsp. <i>africana</i>	0.00

---

ICF denotes 'informant consensus factor'

#### 4.4 Perceptions about Mapulana traditional health practitioners

The interviewed participants were either traditional health practitioners (THPs) “Ngaka” or herbalists “Sethupi”. Herbalists were the people who never went to initiation school but have knowledge of plants from parents or through dreams. THPs go to initiation schools and have certificates and permits to collect plant materials and to perform their duties (Hughes *et al.*, 2015). THPs complain that few people consult them and because of this people are afflicted by different ailments which cannot be cured. The majority of people within the Mapulana villages have become Christians, and have very little interaction with THPs, although medicinal plants are used in some of the churches. In some provinces, THPs are grouped into three categories - diviner, herbalist and traditional doctor (Peltzer and Mngundaniso 2008, Davids *et al.* 2014, Hughes *et al.* 2015). THPs complained of unsustainable harvesting of medicinal plants within villages and have observed different people from neighbouring villages uprooting large quantities of plants. These people always claim that they have been employed by other THPs to collect plants. Now medicinal plant species have become scarce, hence one needs to travel to other villages for collection of plants. Now THPs have resorted to using plant species available in their homesteads and they also continue planting species which are becoming rare in their villages.

## 4.5 Conclusion

The study revealed that the elderly generation is more knowledgeable about plants utilized for medicinal purposes. Showing that information transfer is limited within the villages. The majority of plants with fewer use value and informant consensus factor were known only by the elderly. Information on ailments, such as gonorrhoea, stomach cleansing, bad luck, diarrhoea, flu, chicken and cow diseases were known by community adults and few youth. Many plant combinations have been reported for treating gonorrhoea and flu. The use of roots from herbs has resulted in unsustainable harvesting within the villages because these herbs are uprooted hence are lost to villages. Some ailments among the Mapulana seem to be treatable with the assistance of traditional health practitioners or experienced elder because they are said to be mainly spiritual.

## References

- Aadhan, K. and Anand, S.P. 2017. Survey of medicinal plants used for the treatment of diabetes by the Paliyar's Tribe in Sadhuragiri hills, Tamil Nadu, India. *International Journal of Herbal Medicine*, 5 (3), 17–25.
- Abdillahi, H.S. and Van Staden, J. 2013. Application of medicinal plants in maternal healthcare and infertility: A south African perspective. *Planta Medica*, 79 (7), 591–599.
- Abdullahi, A.A. 2011. Trends and challenges of traditional medicine in Africa. *African Journal of Traditional, Complementary and Alternative Medicines*, 8 (S), 115–123.
- Adhikari, P.P., Talukdar, S. and Borah, A. 2018. Ethnomedicobotanical study of indigenous knowledge on medicinal plants used for the treatment of reproductive problems in Nalbari district, Assam, India. *Journal of Ethnopharmacology*, 210, 386–407.
- Ahmed, S.M., Nordeng, H., Sundby, J., Ahmed, Y.A. and de Boer, H.J. 2018. The use of medicinal plants by pregnant women in Africa: A systematic review. *Journal of Ethnopharmacology*, 224, 297–313.
- Akhalwaya, S., Van Vuuren, S. and Patel, M. 2017. An *in vitro* investigation of indigenous south African medicinal plants used to treat oral infections. *Journal of Ethnopharmacology*, 210, 359–371.
- Asiimwe, S., Kamatenesi-mugisha, M., Namutebi, A., Borg-karlsson, A. and

- Musiimenta, P. 2013. Ethnobotanical study of nutri-medicinal plants used for the management of HIV/AIDS opportunistic ailments among the local communities of western Uganda. *Journal of Ethnopharmacology*, 150, 639–648.
- Awai, E.P., Igoli, J.O. 2015. Medicinal plants used in antenatal and perinatal care among the tiv people of Benue State, Nigeria. *Indo Global Journal of Pharmaceutical Sciences*, 5 (1), 90–93.
- Aziza, M.A., Khan, A.H., Adnan, M. and Izatullah, I. 2017. Traditional uses of medicinal plants reported by the indigenous communities and local herbal practitioners of Bajaur Agency, Federally administrated tribal areas, Pakistan. *Journal of Ethnopharmacology*, 198, 268–281.
- Bland, R., Rollins, N., Van Den Broeck, J. and Coovadia, H. 2004. The use of non-prescribed medication in the first 3 months of life in rural South Africa. *Tropical Medicine and International Health*, 9 (1), 118–124.
- Bohra, N., Tewari, L.M. and Tewari, A. 2017. Ethnobotany of wild edible plants traditionally used by the local people in the Ramnagar region from Nainital District, India. *Biolife*, 5 (1), 12–19.
- Bouasla, A. and Bouasla, I. 2017. Ethnobotanical survey of medicinal plants in northeastern of Algeria. *Phytomedicine*, 36, 68–81.
- Bruschi, P., Urso, V., Solazzo, D., Tonini, M. and Signorini, A.M. 2017. Traditional knowledge on ethno-veterinary and fodder plants in South Angola: an ethnobotanic field survey in Mopane woodlands in Bibala, Namibe province. *Journal of Agriculture and Environment for International Development*, 111 (1), 105–121.

- Chauke, M.A., Shai, L., Mogale, M.A., Tshisikhawe, M.P. and Mokgotho, M. 2015. Medicinal plant use of villagers in the Mopani district, Limpopo province, South Africa. *African Journal of Traditional, Complementary and Alternative Medicines*, 12 (3), 9.
- Chinsamy, M. and Koitsiwe, M. 2016. Traditional knowledge of medicinal and food plant uses for sustainable community livelihoods: A case of Batswana communities in South Africa. *Journal of Social Science*, 46 (2), 146–153.
- Chinsembu, K.C. 2016. Ethnobotanical study of medicinal flora utilised by traditional healers in the management of sexually transmitted infections in Sesheke District, Western Province, Zambia. *Revista Brasileira de Farmacognosia*, 26 (2), 268–274.
- Chinsembu, K.C., Hjarunguru, A. and Mbangu, A. 2015. Ethnomedicinal plants used by traditional healers in the management of HIV/AIDS opportunistic diseases in Rundu, Kavango East Region, Namibia. *South African Journal of Botany*, 100, 33–42.
- Cock, I.E., Selesho, M.I. and Van Vuuren, S.F. 2018. A review of the traditional use of southern African medicinal plants for the treatment of selected parasite infections affecting humans. *Journal of Ethnopharmacology*, 220, 250–264.
- Cocks, M. and Moller, V. 2002. Use of indigenous and indigenised medicines to enhance personal well-being: A south African case study. *Social Science and Medicine*, 54 (3), 387–397.
- Cohen, L., Manion, L. and Morrison, K. 2007. *Research Methods in Education*. Sixth edit. Taylor and Francis or Routledge. London, United Kingdom.

- Das, D., Sinha, N., Chattopadhyay, J., Das, M. and Samanta, P. 2013. The use of medicinal plants for the treatment of Goonorrhea and Sypphilis in West Bengal of India. *International Journal of Phytomedicine*, 5, 14–17.
- Das, D.C., Sinha, N.K. and Das, M. 2015. The use of medicinal plants for the treatment of gynaecological disorders in the Eastern parts of India. *Indian Journal of Obstetrics and Gynaecology*, 2 (1), 16–27.
- Davids, D., Blouws, T., Aboyade, O., Gibson, D., De Jong, J., Van Klooster, C. and Hughes, G. 2014. Traditional health practitioners' perceptions, herbal treatment and management of HIV and related opportunistic infections. *Journal of Ethnobiology and Ethnomedicine*, 10, 77.
- Davids, D., Gibson, D. and Johnson, Q. 2016. Ethnobotanical survey of medicinal plants used to manage high blood pressure and Type 2 Diabetes mellitus in Bitterfontein, Western Cape Province, South Africa. *Journal of Ethnopharmacology*, 194, 755–766.
- van Der Merwe, D., Swan, G.E. and Botha, C.J. 2001. Use of ethnoveterinary medicinal plants in cattle by Setswana speaking people in the Madikwe area of the North West Province of South Africa. *Journal of South African Veterinary Association*, 72 (4), 189–196.
- de Wet, H. and Ngubane, S.C. 2014. Traditional herbal remedies used by women in a rural community in northern Maputaland (South Africa) for the treatment of gynaecology and obstetric complaints. *South African Journal of Botany*, 94, 129–139.

- de Wet, H., Nzama, V.N. and Van Vuuren, S.F. 2012. Medicinal plants used for the treatment of sexually transmitted infections by lay people in northern Maputaland, KwaZulu – Natal Province, South Africa. *South African Journal of Botany*, 78, 12–20.
- Dookie, S. and Singh, S. 2012. Primary health services at district level in South Africa: a critique of the primary health care approach. *BMC Family Practice*, 13, 67.
- Eddouks, M., Ajebli, M. and Hebi, M. 2017. Ethnopharmacological survey of medicinal plants used in Daraa-Tafilalet region (Province of Errachidia), Morocco. *Journal of Ethnopharmacology*, 198, 516–530.
- Erasmus, L.J.C., Potgieter, M.J. and Semanya, S.S. 2015. Erectile dysfunction : Definition and materia medica of Bapedi traditional healers in Limpopo province, South Africa. *Journal of Medicinal Plants Research*, 9 (3), 71–77.
- Eshete, M.A., Kelbessa, E. and Dalle, G. 2016. Ethnobotanical study of medicinal plants in Guji Agro-pastoralists, Blue Hora District of Borana Zone, Oromia Region, Ethiopia. *Journal of Medicinal Plants Studies*, 4 (2), 170–184.
- Fenetahun, Y., Eshetu, G., Worku, A. and Abdella, T. 2017. A survey on medicinal plants used by traditional healers in Harari regional State, East Ethiopia. *Journal of Medicinal Plants Studies*, 5 (1), 85–90.
- Fernandes, L., van Rensburg, C.E.J., Hoosen, A.A. and Steenkamp, V. 2008. In vitro activity of medicinal plants of the Venda region, South Africa, against *Trichomonas vaginalis*. *South African Journal of Epidemiol Infect*, 23 (2), 26–28.

- Gbadamosi, I.T. and Egunyomi, A. 2014. Ethnobotanical survey of plants used for the treatment and management of sexually transmitted infections in Ibadan, Nigeria. *Ethnobotany Research and Applications*, 12, 659–669.
- Giday, M., Asfaw, Z. and Woldu, Z. 2010. Ethnomedicinal study of plants used by Sheko ethnic group of Ethiopia. *Journal of Ethnopharmacology*, 132 (1), 75–85.
- Grace, O.M., Simmonds, M.S.J., Smith, G.F. and Van Wyk, A.E. 2009. Documented utility and biocultural value of Aloe L. (Asphodelaceae ): A review. *Economic Botany*, 63, 167–178.
- Gruca, M., van Andel, T.R. and Balslev, H. 2014. Ritual uses of palms in traditional medicine in sub-Saharan Africa: a review. *Journal of Ethnobiology and Ethnomedicine*, 10, 1–24.
- Güler, B., Manav, E. and Emin, U. 2015. Medicinal plants used by traditional healers in Bozüyük. *Journal of Ethnopharmacology*, 173, 39–47.
- Heinrich, M. 2003. Ethnobotany and natural products: The search for new molecules, new treatments of old diseases or a better understanding of indigenous cultures? *Current Topics in Medicinal Chemistry*, 3, 29–42.
- Hughes, G., Blouws, T., Aboyade, O., Davids, D., Mbamalu, O., Van't Klooster, C., De Jong, J. and Gibson, D. 2015. An ethnobotanical survey of medicinal plants used by traditional health practitioners to manage HIV and its related opportunistic infections in Mpoza, Eastern Cape Province, South Africa. *Journal of Ethnopharmacology*, 171, 109–115.

- Idu, M., Oghale, O.-U. and Sarah, I.-M. 2017. Indigenous plants used by the Otuo tribe of Owan East Local Government Area, Edo State, Nigeria. *Journal of Medicinal Plants For Economic Development*, 1 (1), 1–10.
- Igoli, J.O., Ogaji, O.G. and Igoli, N.P. 2005. Traditional medicine practice amongst the Igede people of Nigeria. Part II. *African Journal of Traditional, Complementary and Alternative Medicines*, 2 (2), 134–152.
- Kaido, T.L. Veale, D.J. Havlik, I. Rama, D.B.K. 1997. Preliminary screening of plants used in South Africa as traditional herbal remedies during pregnancy and labour. *Journal of ethnopharmacology*, 55 (3), 185–191.
- Kankara, S., Ibrahim, M., Mustafa, M. and Go, R. 2015. Ethnobotanical survey of medicinal plants used for traditional maternal healthcare in Katsina state, Nigeria. *South African Journal of Botany*, 97, 165–175.
- Kautzky, K. and Tollmani, S. 2008. A Perspective on Primary Health Care in South Africa. *South African Health Review*, 17–30.
- Kayode, J., Sanni, C. and Ademiluyi, B.O. 2016. Ethnomedicinal survey of plants used in treating sexually transmitted diseases in Akoko Region of Ondo State, Nigeria. *Bulletin of Pure and Applied Sciences*, 35–B (1–2), 25–34.
- Kitula, R.A. 2007. Use of medicinal plants for human health in Udzungwa Mountains Forests: a case study of New Dabaga Ulongambi Forest Reserve, Tanzania. *Journal of Ethnobiology and Ethnomedicine*, 3 (7), 2–5.
- Lewu, F.B. and Afolayan, A. J. 2009. Ethnomedicine in South Africa: The role of weedy

- species. *African Journal of Biotechnology*, 8 (6), 929–934.
- Lomahoza, K. 2013. Monitoring the right to health care in South Africa: an analysis of the policy gaps, resource allocation and health outcomes. *Studies in poverty and inequality institute*, 1–16.
- Luseba, D. and van der Merwe, D. 2006. Ethnoveterinary medicine practices among Tsonga speaking people of South Africa. *The Onderstepoort Journal of Veterinary Research*, 73, 115–122.
- Luseba, D. and Tshisikhawe, M.P. 2013. Medicinal plants used in the treatment of livestock diseases in Vhembe region, Limpopo province, South Africa. *Journal of Medicinal Plants Research*, 7 (10), 593–601.
- Mabogo, E.D.N. 1990. *The ethnobotany of the Vhavenda*. MSc dissertation, University of Pretoria. Pretoria, South Africa.
- Madikizela, B., Ndhlala, A. and Finnie, J.F. and Van Staden, J. 2012. Ethnopharmacological study of plants from Pondoland used against diarrhea. *Journal of Ethnopharmacology*, 141 (1), 61–71.
- Mahmud, S.M.N., Mahmud, S., Hasan, M.K., Rahman, S., Kar, A., Shathy, E.J. and Mohiuddin, A.K.M. 2016. A Survey on medicinal plants usage by folk medicinal practitioners in different villages of Jhenaigati Upazila, Sherpur District, Bangladesh. *Journal of Pharmacognocny and Phytochemistry*, 5 (4), 167–180.
- Mahwasane, S.T., Middleton, L. and Boaduo, N. 2013. An ethnobotanical survey of indigenous knowledge on medicinal plants used by the traditional healers of the

- Lwamondo area, Limpopo province, South Africa. *South African Journal of Botany*, 88, 69–75.
- Malan, D.F. and Neuba, D.F.R. 2011. Traditional practices and medicinal plants use during pregnancy by Anyi-Ndenye women (Eastern Cote d'Ivoire). *African Journal of Reproductive Health*, 15, 85–93.
- Maliwichi-Nyirenda, C.P. and Maliwichi, L.L. 2010. Medicinal plants used for contraception and pregnancy-related cases in Malawi: A case study of Mulanje District. *Journal of Medicinal Plants Research*, 4 (20), 2121–2127.
- Maliwichi-Nyirenda, C.P., Maliwichi, L.L. and Msosa, Y. 2016. The role of indigenous knowledge in the provision of health care in Malawi. *Studies on Ethno-Medicine*, 10 (4), 481–487.
- Maroyi, A. 2011. An ethnobotanical survey of medicinal plants used by the people in Nhema communal area, Zimbabwe. *Journal of Ethnopharmacology*, 136 (2), 347–354.
- Maroyi, A. 2016. *Ximenia caffra* Sond. (Ximeniaceae) in sub-Saharan Africa: A synthesis and review of its medicinal potential. *Journal of Ethnopharmacology*, 184, 81–100.
- Masafu, M.M., Mbajiorgu, C.A., Nemadodzi, L.E. and Kabine, E.S. 2016. A study of natural habitats and uses of medicinal plants in Thulamela and JS Moroka Municipalities, South Africa. *Indian Journal of Traditional Knowledge*, 15 (3), 363–369.

- Masevhe, N.A., McGaw, L.J. and Eloff, J.N. 2015. The traditional use of plants to manage candidiasis and related infections in Venda, South Africa. *Journal of Ethnopharmacology*, 168, 364–372.
- Mayosi, B.M., Lawn, J.E., Van Niekerk, A., Bradshaw, D., Karim, S.S.A. and Coovadia, H.M. 2012. Health in South Africa: Changes and challenges since 2009. *The Lancet*, 380, 2029–2043.
- Mbatha, N., Street, R.A., Ngcobo, M. and Gqaleni, N. 2012. Sick certificates issued by South African traditional practitioneres: Current legislation, challenges and the way forward. *South African Medical Journal*, 102 (3), 129–131.
- Moteetee, A. and Van Wyk, B.E. 2011. The medical ethnobotany of Lesotho: A review. *Bothalia*, 41 (1), 209–228.
- Mugisha, M., Asimwe, S., Namutebi, A., Borg-karlson, A. and Kyomugisha, E. 2014. Ethnobotanical study of indigenous knowledge on medicinal and nutritious plants used to manage opportunistic infections associated with HIV/AIDS in western Uganda. *Journal of Ethnopharmacology*, 155, 194–202.
- Mulaudzi, R.B., Ndhlala, A.R. and Van Staden, J. 2015. Ethnopharmacological evaluation of a traditional herbal remedy used to treat gonorrhoea in Limpopo province, South Africa. *South African Journal of Botany*, 97, 117–122.
- Naidoo, D., van Vuuren, S.F., van Zyl, R.L. and de Wet, H. 2013. Plants traditionally used individually and in combination to treat sexually transmitted infections in northern Maputaland, South Africa: Antimicrobial activity and cytotoxicity. *Journal of Ethnopharmacology*, 149 (3), 656–667.

- Ndhlala, A.R., Stafford, G.I., Finnie, J.F. and Van Staden, J. 2011. Commercial herbal preparations in KwaZulu-Natal, South Africa: The urban face of traditional medicine. *South African Journal of Botany*, 77 (4), 830–843.
- Nduche, M.U., Omosun, G. and Okwulehie, I.C. 2015. Ethnobotanical survey of plants used as remedy for fertility conditions in Ebonyi State of Nigeria. *Scholars Academic Journal of Biosciences*, 3 (2B), 214–221.
- Neelo, J., Kashe, K., Teketay, D. and Masamba, W. 2015. Ethnobotanical survey of woody plants in Shorobe and Xobe Villages, northwest region of Botswana. *Ethnobotany Research and Applications*, 14, 367–379.
- Ngarivhume, T., vant Loeester, C.I.E.A., de Jong, J.T.V.M. and Van de Westhuizen, J. 2015. Medicinal plants used by traditional healers for the treatment of malaria in the Chipinge District in Zimbabwe. *Journal of Ethnopharmacology*, 159, 224–237.
- Niehaus, I. 2001. *Witchcraft, power and politics*. David Philip Publishers. Claremont, South Africa.
- Njoroge, G.N. and Bussmann, R.W. 2009. Ethnotherapeutic management of sexually transmitted diseases (STDs) and reproductive health conditions in central province of Kenya. *Indian Journal of Traditional Knowledge*, 8 (2), 255–261.
- Nyamukuru, A., Tabuti, J.R.S., Lamorde, M., Kato, B., Sekagya, Y. and Aduma, P.R. 2017. Medicinal plants and traditional treatment practices used in the management of HIV/AIDS clients in Mpigi District, Uganda. *Journal of Herbal Medicine*, 7, 51–58.
- Olanipekun, M.K., Arowosegbe, S., Kayode, J.O. and Oluwole, T.R. 2016.

- Ethnobotanical survey of medicinal plants used in the treatment of women related diseases in Akoko Region of Ondo-State, Nigeria. *Journal of Medicinal Plants Research*, 10 (20), 270–277.
- Ondicho, J., Ochora, J., Matu, E. and Mutai, J. 2015. Factors associated with use of herbal medicine among patients in herbal clinics in Gucha, District, Kenya. *Basic and Applied Sciences*, 174–187.
- Peltzer, K. 2009a. Patient experiences and health system responsiveness in South Africa. *BMC Health Services Research*, 9, 117.
- Peltzer, K. 2009b. Utilization and practice of traditional/complementary/alternative medicine (TM/CAM) in South Africa. *African Journal of Traditional, Complementary and Alternative Medicines*, 6 (2), 175–185.
- Peltzer, K. and Mngundaniso, N. 2008. Patients consulting traditional health practitioners in the context of HIV/AIDS in urban areas in Kwazulu-Natal, South Africa. *African Journal of Traditional, Complementary and Alternative Medicines*, 5 (4), 370–379.
- Rahmatullah, M. 2015. An ethnobotanical survey and pharmacological evaluation of medicinal plants used by the Garo tribal community living in Netrakona District, Bangladesh. *Advances in Natural and Applied Sciences*, 3(3), 402-418
- Rahmatullah, M., Noman, A., Hossan, S., Harun-Or-Rahman, T., Chowdhury, M.H. and Jahan, R. 2009. A survey of medicinal plants in two areas of Dinajpur district, Bangladesh including plants which can be used as functional foods. *American-Eurasian Journal of Sustainable Agriculture*, 3 (78), 862–876.

- Randrianarivony, T., Randrianasolo, A., Andriamihajarivo, T., Ramarosandratana, A. V., Jeannoda, V.H., Rakotoarivony, F. and Bussmann, R.W. 2016. Useful plants and tradition for pregnancy, child delivery and for post-partum care used by people living around Analavelona forest in South West Madagascar. *Indian Journal of Traditional Knowledge*, 15 (1), 68–78.
- Rankoana, S.A. 2016. Curative care through administration of plant-derived medicines in Sekhukhune District municipality of Limpopo Province, South Africa. *African Journal of Traditional, Complementary and Alternative Medicines*, 13 (2), 47–51.
- Ribeiro, A., Romeiras, M.M., Tavares, J. and Faria, M.T. 2010. Ethnobotanical survey in Canhane village, district of Massingir, Mozambique: medicinal plants and traditional knowledge. *Journal of Ethnobiology and Ethnomedicine*, 6, 33.
- Sadat-Hosseini, M., Farajpour, M., Boroomand, N. and Solaimani-Sardou, F. 2017. Ethnopharmacological studies of indigenous medicinal plants in the south of Kerman, Iran. *Journal of Ethnopharmacology*, 199, 194–204.
- Semenya, S.S. and Potgieter, M.J. 2013. Ethnobotanical survey of medicinal plants used by Bapedi traditional healers to treat erectile dysfunction in the Limpopo Province, South Africa. *Journal of Medicinal Plants Research*, 7 (7), 349–357.
- Semenya, S.S., Potgieter, M.J. and Erasmus, L.J.C. 2013a. Bapedi phytomedicine and their use in the treatment of sexually transmitted infections in Limpopo Province, South Africa. *African Journal of Pharmacy and Pharmacology*, 7 (6), 250–262.
- Semenya, S.S., Potgieter, M.J. and Erasmus, L.J.C. 2013b. Exotic and indigenous problem plant species used, by the Bapedi, to treat sexually transmitted infections

- in Limpopo Province, South Africa. *African Health Sciences*, 13 (2), 320–326.
- Shosan, L.O., Fawibe, O.O. Ajiboye, A.A., Abeegunrin, T. and Agboola, D.A. 2012. Ethnobotanical survey of medicinal plants used in curing some diseases in infants in Abeokuta south local government area of Ogun State, Nigeria. *American Journal of Plant Sciences*, 5 (5), 3258–3268.
- Steenkamp, V. 2003. Traditional herbal remedies used by South African women for gynaecological complaints. *Journal of Ethnopharmacology*, 86 (1), 97–108.
- Street, R.A. and Prinsloo, G. 2013. Commercially important medicinal plants of South Africa: A review. *Journal of Chemistry*, 1–16.
- Tabi, M.M., Powell, M. and Hodnicki, D. 2006. Use of traditional healers and modern medicine in Ghana. *International Nursing Review*, 53, 52–58.
- Tangjang, S., Namsa, N., Aran, C. and Litin, A. 2011. An ethnobotanical survey of medicinal plants in the Eastern Himalayan zone of Arunachal Pradesh, India. *Journal of Ethnopharmacology*, 134 (1), 18–25.
- Teklehaymanot, T. 2009. Ethnobotanical study of knowledge and medicinal plants use by the people in Dek Island in Ethiopia. *Journal of Ethnopharmacology*, 124 (1), 69–78.
- Teklehaymanot, T. and Giday, M. 2010. Quantitative ethnobotany of medicinal plants used by Kara and Kwego semi-pastoralist people in lower Omo River Valley, Debub Omo Zone, southern nations, nationalities and Peoples Regional State , Ethiopia. *Journal of Ethnopharmacology*, 130 (1), 76–84.

- Tshikalange, T.E., Mophuting, B.C., Mahore, J. and Lall, N. 2016. An Ethnobotanical study of medicinal plants used in villages under Jongilanga tribal council, Mpumalanga, South Africa. *African Journal of Traditional, Complementary and Alternative Medicines*, 13 (6), 83–89.
- Tugume, P., Kakudidi, E.K., Buyinza, M., Namaalwa, J., Kamatenesi, M., Mucunguzi, P. and Kalema, J. 2016. Ethnobotanical survey of medicinal plant species used by communities around Mabira Central Forest Reserve, Uganda. *Journal of Ethnobiology and Ethnomedicine*, 12, 5.
- Ullah, M., Khan, M.U., Mahmood, A., Malik, R.N., Hussain, M., Wazir, S.M., Daud, M. and Shinwari, Z.K. 2013. An ethnobotanical survey of indigenous medicinal plants in Wana District south Waziristan agency, Pakistan. *Journal of Ethnopharmacology*, 1–7.
- Urso, V., Signorini, M.A., Tonini, M. and Bruschi, P. 2016. Wild medicinal and food plants used by communities living in Mopane woodlands of southern Angola: Results of an ethnobotanical field investigation. *Journal of Ethnopharmacology*, 177, 126–139.
- van Vuuren, S.F. Nkwanyana, M.N. de Wet, H. 2015. Antimicrobial evaluation of plants used for the treatment of diarrhea in a rural community in South Africa. *Complementary and Alternative medicine*, 15 (53), 1–8.
- Wintola, O.A., Otang, W.M. and Afolayan, A.J. 2017. The prevalence and perceived efficacy of medicinal plants used for stomach ailments in the Amathole District Municipality, Eastern Cape, South Africa. *South African Journal of Botany*, 108,

144–148.

Wondimu, T., Asfaw, Z. and Kelbessa, E. 2007. Ethnobotanical study of medicinal plants around 'Dheeraa' town, Arsi Zone, Ethiopia. *Journal of Ethnopharmacology*, 112, 152–161.

van Wyk, B. 2008. A broad review of commercially important southern African medicinal plants. *Journal of Ethnopharmacology*, 119, 342–355.

Yazbek, P. B., Tezoto, J., Cassas, F., Rodrigues, E. 2016. Plants used during maternity, menstrual cycle and other women's health conditions among Brazilian cultures. *Journal of Ethnopharmacology*, 179, 310–331.

York, T., De Wet, H. and Van Vuuren, S.F. 2011. Plants used for treating respiratory infections in rural Maputaland, KwaZulu-Natal, South Africa. *Journal of Ethnopharmacology*, 135 (3), 696–710.

## CHAPTER FIVE

### POPULATION STRUCTURE OF *Peltophorum africanum* Sond. IN BOLLA-TAU

#### Abstract

Population structure of plants assists in identifying the health of plant species within a particular area of habitat. Twenty-six line transects were established within an area of 100m x 10m on *Peltophorum africanum* Sond. Population; the height of the plants, stem circumference, healthiness of crown and information on whether the plant species was being harvested or not, were recorded. A total of 256 individuals were recorded from the study. The results showed that the population structure of *P. africanum* was bell-shaped and the Logarithmic analysis along with generalized log analysis depict that there is significance between the plant height and stem circumference. Resprout of *P. africanum* individuals were only 18% of and 82% of the individuals were harvested. The study observed that plant individuals had traces of crown damage (43.8%) as compared to healthy crown (35.9%).

**Keywords:** Population structure, line transects, Bell-shaped, Crown damage

## 5.1 Introduction

Population structure reveals the ecological characteristic of plant species along with their regeneration patterns (Cunningham, 2001; Bharali *et al.*, 2012; Sarkar and Devi, 2014; Tzeng *et al.*, 2018). The structure is determined by assessing the number of plant species in size classes. Population structure of plant species can be bell-shaped whereby plant species found will have a greater number of sapling with few seedlings and adults (Cousins *et al.*, 2014, Kflay and Kitessa, 2014, Aine-omucunguzi *et al.*, 2015, Bayen *et al.*, 2015, Nasrullah *et al.*, 2015, Lisao *et al.*, 2018). Other population shows a reverse J-shape where there will be few seedlings and saplings (Sarkar and Devi, 2014; Mekonen *et al.*, 2015). An inverse J-shaped population reveals a great number of seedlings as compared to saplings and adults (Cousins *et al.*, 2014, Kflay and Kitessa, 2014).

*Peltophorum africanum* Sond. is a semi-deciduous tree with a dense spreading crown, well established on well-drained, less fertile sandy soils' bushveld (Fisher, 2013). Its distribution ranges from south of the Democratic Republic of Congo, Mozambique, Namibia and South Africa (Venter and Venter, 2012; van Wyk *et al.*, 2014). *P. africanum* is the only species under the *Peltophorum* genus within southern Africa (Bizimenyera *et al.*, 2005). It is classified in the Fabaceae family in the sub-family Caesalpinoideae and characterized with bipinnate leaves, multi-stems with no spines with a height reaching up to 15m (Barbosa *et al.*, 2014).

In South Africa, the utilization of *P. africanum* has been well documented as medicine in veterinary, antimicrobial and ethnobotanical studies but limited information is documented on aspects of population status. Known to treat different ailments, such as menorrhagia, tooth ache, wounds, stomach ache, infertility body pains dysmenorrhea, diarrhea, sexually-transmitted infections, dysentery, tuberculosis, coughs and sore throat (Fernandes *et al.*, 2008; Maroyi, 2011; De Wet *et al.*, 2012; Venter and Venter, 2012; Semenya *et al.*, 2013; Motlhanka and Nthoiwa, 2013; Naidoo *et al.*, 2013; de Wet and Ngubane, 2014; van Wyk *et al.*, 2014; Masevhe *et al.*, 2015; Chinsembu *et al.*, 2015; Chinsamy and Koitsiwe, 2016; Rankoana, 2016; Chinsembu, 2016; Tshikalange *et al.*, 2016; Mophuting, *et al.*, 2016; Urso *et al.*, 2016). Antimicrobial activities have been documented by Samie *et al.* (2005); Theo *et al.* (2009); Naidoo *et al.* (2013) and Tshikalange *et al.* (2016). Bark and roots of *P. africanum* have several antioxidant compounds (Bizimenyera *et al.*, 2005). The in-vitro activity from crude extracts of *P. africanum* justifies its utilization in traditional medicine (Okeleye *et al.*, 2010).

Population structure of plants assists in identifying the health of plant species within a vegetation community. Population monitoring is therefore important in making sure that the community is kept intact and viable. In Botswana, *Peltophorum africanum* population is characterized by stable population structure with high density of individuals (seedlings) (Teketay *et al.*, 2016). In Kwazulu-Natal the size structure had remained the same between 1992 and 2000, where elephants were responsible for the damage of the species (Wiseman *et al.*, 2004). In a study done-in South Africa the plant species was reported as being affected by bark harvesting from human activities (Tshisikhawe *et al.*,

2012). The species sometimes show an aggregated distribution pattern (random pattern) (Källér, 2003). It is a significant plant species used for fuelwood in numerous villages around South Africa (Madubansi and Shackleton, 2007, Dovie *et al.*, 2008, Rasethe *et al.*, 2013) and as a fodder tree (Mongalo, 2013, Mugabe *et al.*, 2017).

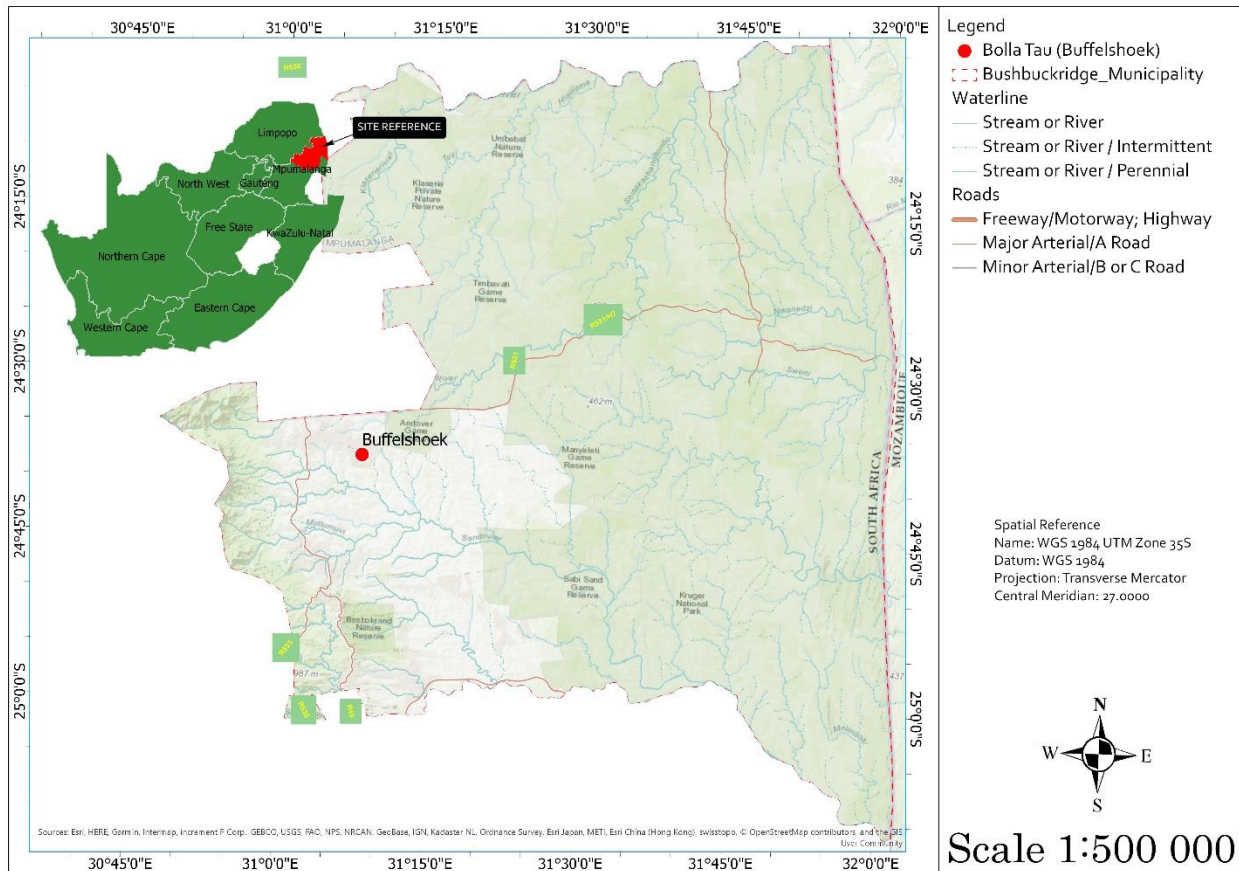
The Mapulana people utilize *P. africanum* for fuelwood and as medicine for treating bad luck, kidney diseases, stomach cleansing, sprinkling traditional medicine, stomach pains, blood-related diseases and making of traditional cooking stirrer. *P. africanum* was observed to be declining from 1991 to 2002 at a rate of 5% or more in some villages around the Bushbuckridge Municipality; the degree of fuelwood harvesting, within the villages, was observed to be moderate (Madubansi and Shackleton, 2007). The aim of this chapter was to determine the population structure of *Peltophorum africanum* in Bolla-Tau village in the Bushbuckridge area.

## 5.2 Methodology

### 5.2.1 Study area

The study was conducted in Bolla-Tau (Buffelshoek) village situated at 24.63'27° S 31.13'09° E. The village is 16 km from Acornhoek town within the Bushbuckridge Municipality in the Ehlanzeni District, Mpumalanga Province. The vegetation type of the area is classified as Mapulaneng Scrap forest which is moist and subtropical. Fabaceae,

Asteraceae, and Rubiaceae are dominant families and the genera are dominantly represented by *Rhoicissus*, *Ficus* and *Syzygium* to mention a few (Lötter *et al.*, 2014).



**Figure 5.1:** A map showing Buffelshoek (Bolla-Tau).

### 5.2.2 Experiment's design, protocol and analysis

The results presented in chapter three indicated that *Peltophorum africanum* was among the most utilized plant species by the Mapulana. The species was reported to be utilized

for fuelwood, medicine as well as making of traditional cooking stirrers. In traditional medicine, the species has been reported as treating kidney diseases, stomach pains, as well as blood-related diseases; it was also reported to address problems of bad luck. The high rate of utilization citation by participants from Bolla-Tau made *P. africanum* a candidate for the investigation of its population status. Twenty-six line transects of 100 m x 10 m were constructed within the *Peltophorum africanum* population.

The sampling of ecological data focused on the height of plants, stem circumference, healthiness of crown and evidence of harvesting on all *P. africanum* individuals within the demarcated transects. Plant height gives a visible image of population structure for individuals (Cousins *et al.*, 2014). Stem circumference provides growth pattern of plant species (Sop *et al.*, 2011; Aine-omucunguzi *et al.*, 2015). Crown-health status indicates the health of the species (Morin *et al.*, 2012). The most significant impact of harvesting is extinction of species, therefore studying the impacts can assist in determining the possibility of species survival if harvesting is reduced (Tshisikhawe and Van Rooyen 2013)

Stem circumference were categorized into several size classes. Seedlings were categorized in 0-10 cm, saplings in 10.1 to 20 cm size class, juveniles in 20.1 to 30 cm size class while adults were categorized in the 30.1 to 40cm size class. Cousins *et al.* (2014) as well as Kflay and Kitessa, (2014) claim that the classification of plants into

seedlings, saplings, juveniles, and adults assists in determining the plant species regeneration status' changes over time.

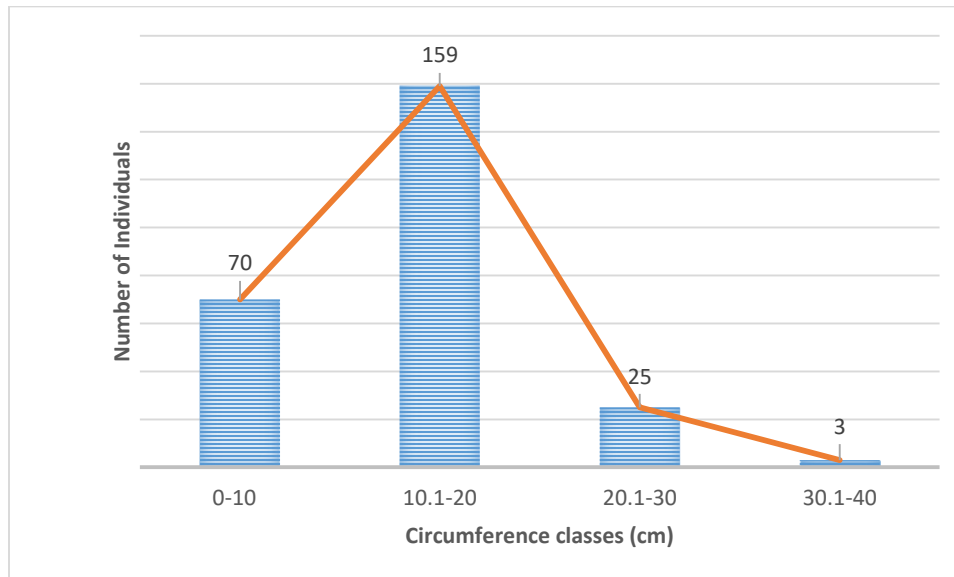
The crown healthiness sliding-scale estimates used in this study were from 0 to 5 where 0 = no crown, 1 = severe crown damage, 2 = moderate crown damage, 3 = light crown damage, 4 = traces of crown damage, 5 = healthy crown (Sadiki *et al.*, 2018). Data was analyzed using IBM Statistical Product and Service solutions (SPSS) statistics version 25 and Microsoft Excel 2013 version.

## **5.3 Results and discussions**

### **5.3.1 Population structure and regeneration strategy**

A total of 256 individuals were recorded from the study on a total sampled area of 26 000 m<sup>2</sup> (i.e. 100 m x 10 m x 26), which translate to a density of 9.85 individuals per hectare obtained from total number of individuals recorded per total area sampled. Understanding the density of species in communal areas is important because unsustainable harvesting of plants affects the density most in undisturbed areas (Lalfakawma *et al.* 2009). It was noted that in areas accessible to the public, the density tends to be low (Phama *et al.* 2014). Anthropogenic activities in communal areas can drive a vegetation into patchiness or narrow distribution of plant species (Worku *et al.*, 2012; Nasrullah *et al.*, 2015). A study

by Sadiki *et al.*, (2018) on *Pterocarpus angolensis* population in a protected area revealed a density of 9.62 individuals, per hectare.

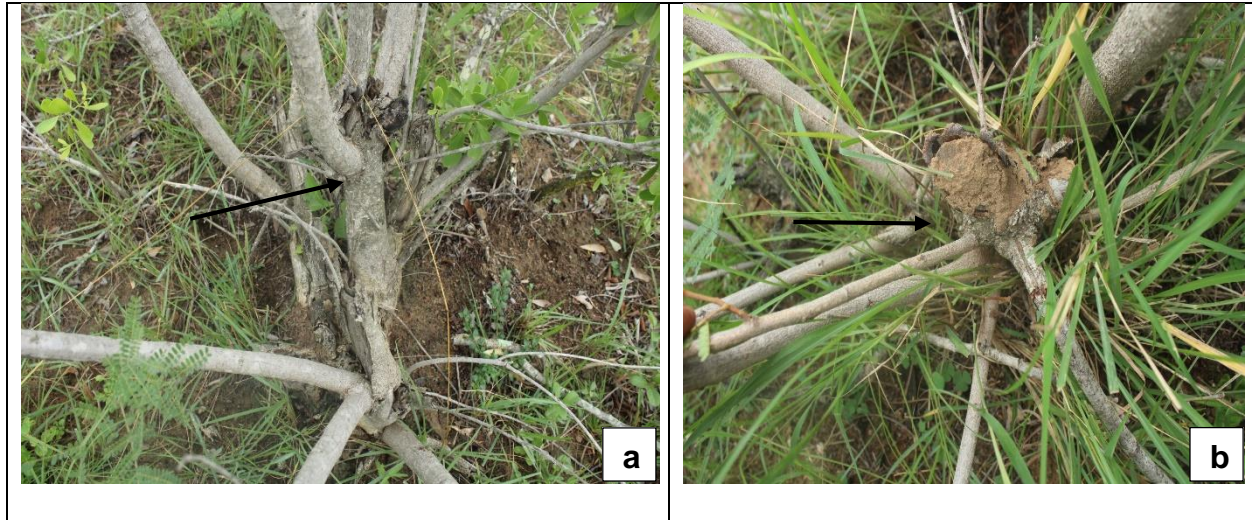


**Figure 5.2:** Stem circumference distribution of *Peltophorum africanum* population at Bolla-Tau village.

The distribution of sampled *Peltophorum africanum* individuals as per stem circumference size classes depicted poor regeneration strategies, whereby the size class of 10.1 - 20 cm had a high number of saplings as compared to seedlings and adult tree classes. The regeneration of the species was through stem re-sprouting. Similar findings were observed by Neke *et al.*, (2006) where *P. africanum* stem circumference sizes of 10.1 – 20 cm were highly harvested and re-sprouted from stems. The latter was due to the fact that re-sprouting was influenced by the height position of cutting of the stems (Neke *et al.*, 2006); wherein the taller the stump, the more re-sprouts from the cut stem.

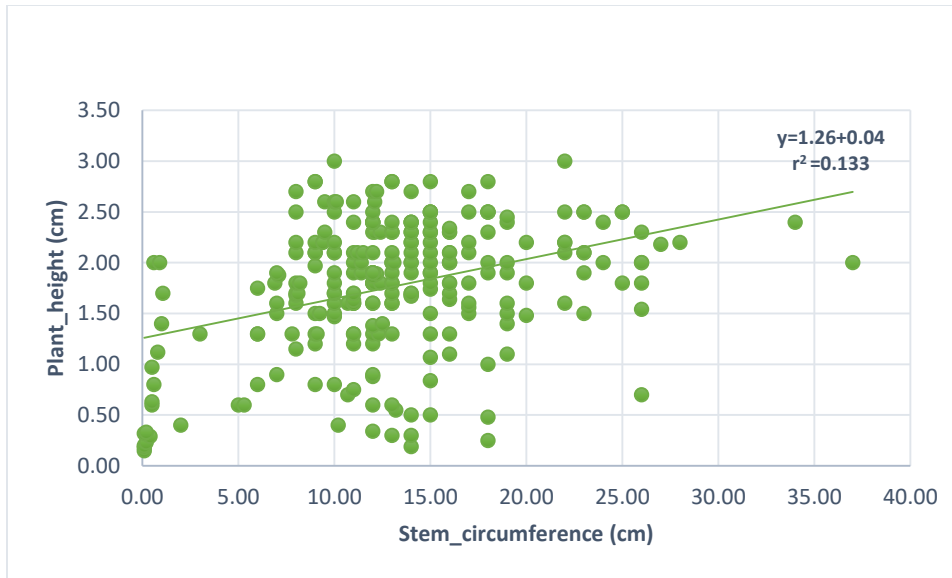
The population structure of *Peltophorum africanum* observed in this study is bell-shaped; meaning that the number of individuals with stem circumferences in the middle classes is higher as compared to both low and high stem-size classes (Figure 5.2). Similar results were recorded by Cousins *et al.* (2014); Kflay and Kitessa, (2014) who also observed high numbers of individuals in the middle classes as compared to the number of individuals in both low and high stem-size classes. A bell-shape shows a hampered regeneration because of external factors (Worku *et al.*, 2012). The decrease of adult trees and lack of regeneration showed a decline in the population of plant species (Bayen *et al.*, 2015). Regeneration strategy of plants showing a bell-shape is unstable and under threat because there is few or low numbers of plant species regenerating, therefore, the limitation in germination of seedlings from seeds may be due to vegetation types and harvesting techniques (Aine-omucunguzi *et al.*, 2015).

*P. africanum* is severely harvested for use as fuelwood in the village. Evidence of bark harvesting was not in the area. The observed stem removal for fuelwood purposes were regenerating as shown in Figure 5.3.



**Figure 5.3:** Regeneration of *Peltophorum africanum* cut stem at Bolla-Tau village, a. showing regeneration of stem from an old stem. B. shows multiple small stems regenerating from below the harvested stem.

Height of plants in a population signifies the growth pattern and survival strategies of plant species. The seedlings become threatened due to unsustainable harvesting of plant species. A larger number of saplings in height classes signifies that the individuals were able to survive the disturbances (Sop *et al.*, 2011). Figure 5.4 depicts that numerous individuals were in size class 1.7 - 2.4 with the others in lower classes. The number of seedlings and adults were significantly the same with high amounts of saplings and juveniles; implying that the plants are harvested during their adult phase. Tshisikhawe *et al.* (2012) stated that other criteria should be taken into consideration in order to classify a species as being at risk.

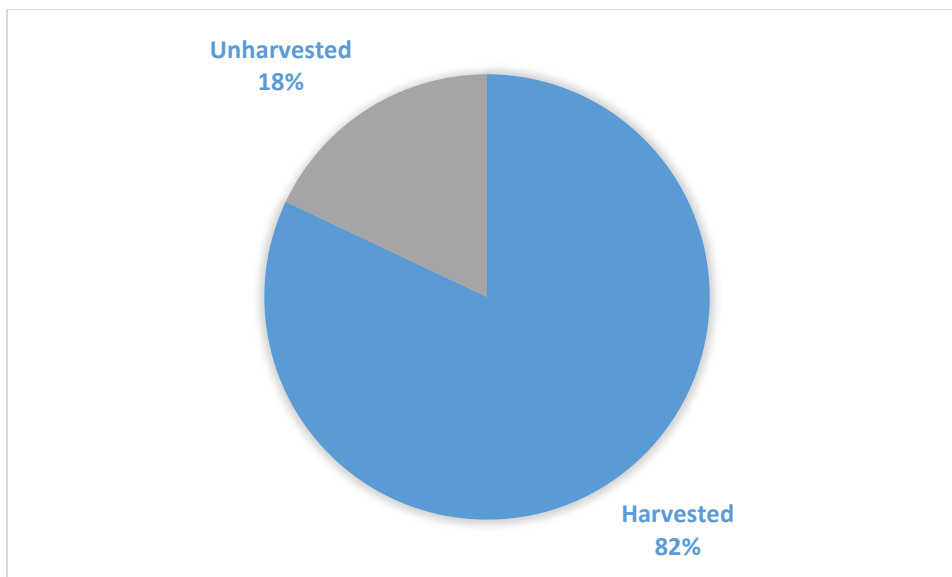


**Figure 5.4:** Plant height distribution of *P. africanum* population at Bolla-Tau village.

Logarithmic analysis, along with generalized log analysis depicts that there is significance between the plant height and stem circumference, indicating that the higher the stem circumference, the higher the plants height  $y = 1.26+0.04x$ ,  $r^2 = 0.133$  ( $p < 0.01$ ) (Figure 5.4). Similar results were observed by Tshisikhawe and Van Rooyen (2013) where stem circumference correlates with plant height. Both the stem circumference and height of *P. africanum* showed a bell-shaped structure. The majority of individuals were found in circumference class 10-19 (cm), with 0-9 (cm) and 30-39 (cm) being the lowest as compared to the other classes.

### 5.3.2 Harvesting impact

The majority (82%) of *P. africanum* individuals in Bolla-Tau were re-sprouts form with only 18% of the individuals being recorded as unharvested (Figure 5.5). The overall results showed poor reproduction strategies where there is high number of juveniles, few seedlings, saplings and adult trees. The ability of *P. africanum* to resprout from severe harvesting is due to it being multi-stemmed, occurs in variety of habitats and shows slow growth. Stump size affects the resprouting ability, location of resprout which occurs vigorously when the plant species are small (Cunningham, 2001; Neke *et al.*, 2006).



**Figure 5.5:** Percentage distribution of harvested against unharvested individuals of *Peltophorum africanum* population sampled at Bolla-Tau village.

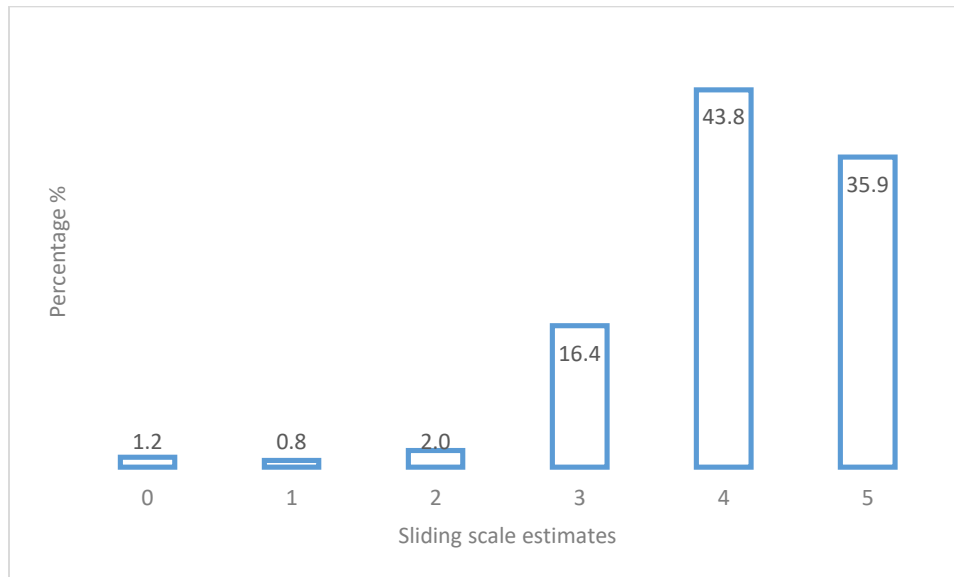
Unsustainable harvesting for fuelwood does not only affect the survival of plant species but also the reproduction strategies and growth, thereby affecting the population dynamics and structure (Ticktin, 2004; Amahowe *et al.*, 2017). The parts of plant harvested, the intensity, frequency and quantity of harvesting of plant species, all affect the population structure; extinction normally occurs due to severity of harvesting certain species (Cunningham, 2001). A study done by Neke *et al.* (2006) observed that *P. africanum* was severely harvested, especially stems larger than a centimeter. Severe harvesting of *P. africanum* can be from the possibility of the species' local abundance but, it is not dependent on its spatial distribution (de Oliveira *et al.*, 2007)

Shackleton *et al.* (2005) observed that the removal of mature stems resulted in a decrease of tree density after a period of 10 years, therefore, the population structure's highly preferred plant species were observed to lack large mature stems, rather a large number of small stems were noted (Higgins *et al.*, 1999, Kaschula *et al.*, 2005). As a result, it can be concluded that unsustainable harvesting for fuelwood may cause the extinction of most plant species.

### **5.3.3 Crown health status**

The study observed that most of the individuals sampled had traces of crown damage (43.8%) when compared to individuals with healthy crowns (35.9%) (Figure 5.6). The fact

that individuals that were either dead or in severe damaged states were few, is a good sign of a population that is not badly affected by harvesting.



**Figure 5.6:** Crown healthiness of *P. africanum* population at Bolla-Tau village

Morin *et al.* (2012) explains that crown healthiness predicts the survival and health of plant species. An improved growth is shown by healthy crown while minimal growth is shown by damaged crowns. Ugarković *et al.* (2012) in a study done in Croatia recorded extensive crown defoliation on damaged trees.

## 5.4 Conclusion

The study revealed that population structure of *Peltophorum africana* was bell-shaped that results in an unstable population. The ability of the plant to resprout after harvesting is seen as a clear recruitment strategy. The severe harvesting of the species in Bolla-tau if not monitored could lead to plant's disappearance from the village. The crown health status of most individuals showed traces of crown damage, while others had healthy crowns.

## References

- Aine-omucunguzi, A., Byarugaba, D. and Rugunda, G.K. 2015. Population structure and regeneration status of *Trichilia dregeana* Sond. in heavily and less disturbed areas of Kalinzu Forest R .... *Journal of Forestry*, 5, 662–667.
- Amahowe, O. I., Biaou, S. S. H., Natta, A. K. and Balagueman, R.O., 2017. Multiple disturbance patterns and population structure of a tropical tree species, *Azelia africana* (Leguminosae – Caesalpinioideae), in two contrasting bioclimatic zones of the Republic of Benin. *Southern Forests: A Journal of Forest Science*, 1–9.
- Barbosa, E.R.M., van Langevelde, F., Tomlinson, K.W., Carvalheiro, L.G., Kirkman, K., de Bie, S. and Prins, H.H.T. 2014. Tree species from different functional groups respond differently to environmental changes during establishment. *Oecologia*, 174, 1345–1357.
- Bayen, P., Lykke, A.M., Ouédraogo, A. and Thiombiano, A. 2015. Population structure in natural stands, seed germination and seedling growth of *Sterculia setigera* under nursery. *International Journal of Plant and Soil Science*, 7 (4), 202–210.
- Bharali, S., Paul, A., Khan, M.L. and Singha, L.B. 2012. Impact of altitude on population structure and regeneration status of two *Rhododendron* species in a temperate broad leaved forest of Arunachal. *International Journal of Ecosystem*, 2 (1), 19–27.
- Bizimenyera, S.E., Swan, G.E., Chikoto, H. and Eloff, J.N. 2005. Rationale for using *Peltophorum africanum* (Fabaceae) extracts in veterinary medicine. *Journal of South African Veterinary Association*, 76 (2), 54–58.

- Chinsembu, K.C. 2016. Ethnobotanical study of medicinal flora utilised by traditional healers in the management of sexually transmitted infections in Sesheke District, Western Province, Zambia. *Revista Brasileira de Farmacognosia*, 26 (2), 268–274.
- Chinsembu, K.C., Hjarunguru, A. and Mbangi, A. 2015. Ethnomedicinal plants used by traditional healers in the management of HIV/AIDS opportunistic diseases in Rundu, Kavango East Region, Namibia. *South African Journal of Botany*, 100, 33–42.
- Cousins, S.R., Witkowski, E.T.F. and Pfab, M.F. 2014. Elucidating patterns in the population size structure and density of *Aloe plicatilis*, a tree aloe endemic to the Cape fynbos, South Africa. *South African Journal of Botany*, 90, 20–36.
- Cunningham, A. 2001. *Applied ethnobotany: people, wild plant use and conservation*. London and Sterling: Earthscan Publications Ltd.
- de Oliveira, R.L.C., Lins Neto, E., Araujo, E. and Albuquerque, U. 2007. Conservation priorities and population structure of woody medicinal plants in an area of caatinga vegetation (Pernambuco State, NE Brazil). *Environmental Monitoring and Assessment*, 132, 189–206.
- De Wet, H., Nzama, V.N. and Van Vuuren, S.F. 2012. Medicinal plants used for the treatment of sexually transmitted infections by lay people in northern Maputaland, KwaZulu–Natal Province, South Africa. *South African Journal of Botany*, 78, 12–20.
- Dovie, D.B.K., Witkowski, E.T.F. and Shackleton, C.M. 2008. Knowledge of plant resource use based on location, gender and generation. *Applied Geography*, 28, 311–322.

- Fernandes, L., van Rensburg, C.E.J., Hoosen, A.A. and Steenkamp, V. 2008. In vitro activity of medicinal plants of the Venda region, South Africa, against *Trichomonas vaginalis*. *South African Journal of Epidemiol Infect*, 23 (2), 26–28.
- Fisher, J.T. 2013. *People, parks and rangelands: an analysis of three-dimensional woody vegetation structure in a semi-arid savanna*. PhD thesis, Faculty of Science, University of Witwatersrand, Johannesburg.
- Higgins, S., Shackleton, C. and Robinson, E. 1999. Changes in woody community structure and composition under contrasting landuse systems in a semi-arid savanna, South Africa, *Journal of Biogeography* 26 (3), 619–627.
- Källér, A. 2003. *Growth pattern and reproduction of woody vegetation in a semi-arid savanna in southern Botswana*. Uppsala University, Uppsala, Sweden.
- Kaschula, S., Twine, W. and Scholes, M. 2005. The effect of catena position and stump characteristics on the coppice response of three savannah fuelwood species. *Environmental Conservation*, 32 (1), 76–84.
- Kflay, G. and Kitessa, H. 2014. Species composition, plant community structure and natural regeneration status of Belete moist evergreen montane forest, Oromia Regional State, southwestern Ethiopia. *Momona Ethiopian Journal of Science*, 6 (1), 97–101.
- Lalfakawma, U.K., Sahoo, S., Roy, K. and Vanlalhriatpuia, 2009. Community composition and tree population structure in undisturbed and disturbed tropical semi-evergreen forest stands of North-East Indis. *Applied Ecology and Environmental Research*, 7 (4), 303–318.

- Lisao, K., Geldenhuys, C.J. and Chirwa, P.W. 2018. Assessment of the African baobab (*Adansonia digitata* L.) populations in Namibia: Implications for conservation. *Global Ecology and Conservation*, 14, e00386.
- Lötter, M.C., Mucina, L. and Witkowski, E.T.F. 2014. Classification of the indigenous forests of Mpumalanga Province, South Africa. *South African Journal of Botany*, 90, 37–51.
- Madubansi, M. and Shackleton, C.M. 2007. Changes in fuelwood use and selection following electrification in the Bushbuckridge lowveld, South Africa. *Journal of Environmental Management*, 83, 416–426.
- Maroyi, A. 2011. An ethnobotanical survey of medicinal plants used by the people in Nhema communal area, Zimbabwe. *Journal of Ethnopharmacology*, 136 (2), 347–354.
- Masevhe, N.A., McGaw, L.J. and Eloff, J.N. 2015. The traditional use of plants to manage candidiasis and related infections in Venda, South Africa. *Journal of Ethnopharmacology*, 168, 364–372.
- Mekonen, T., Ayele, B. and Ashagrie, Y. 2015. Woody plant species diversity, structure and regeneration status of Woynwuha Natural Forest, north west Ethiopia. *Asian Journal of Ethnopharmacology and Medicinal Foods*, 1 (1), 7–19.
- Mongalo, N.I. 2013. *Peltoporum africanum* Sond [Mosetlha]: A review of its ethnomedicinal uses, toxicology, phytochemistry and pharmacological activities. *Journal of Medicinal Plants Research*, 7 (48), 3484–3491.

- Motlhanka, D.M.T. and Nthoiwa, G.P. 2013. Ethnobotanical survey of medicinal plants of Tswapong North, in eastern Botswana: A case of plants from Mosweu and Seolwane villages. *European Journal of Medicinal Plants*, 3 (1), 10–24.
- Morin, R., Steinman, J. and Randolph, K.C. 2012. Utility of tree crown condition indicators to predict tree survival using remeasured forest inventory and analysis data. *Moving from Status to Trends: Forest Inventory and Analysis Symposium*, 210–215.
- Mugabe, W., Akanyang, L., Nsinamwa, M., Moatswi, B., Matthews, N., Dipheko, K., Ujjan, I.A. and Shah, A.A. 2017. Fodder tree species composition and density in grazing gradients of fenced and unfenced grazing areas of the Gaborone north, Botswana. *Sarhad Journal of Agriculture*, 33 (2), 306–314.
- Naidoo, D., Vuuren, S.F. Van, Zyl, R.L. Van, and Wet, H. De, 2013. Plants traditionally used individually and in combination to treat sexually transmitted infections in northern Maputaland, South Africa: Antimicrobial activity and cytotoxicity. *Journal of Ethnopharmacology*, 149 (3), 656–667.
- Nasrullah, K., Fayaz, A., Kishwar, A. and Shahid, S. 2015. Composition, structure and regeneration dynamics of *Olea ginea* Royle forests from Hindukush range of Pakistan. *Journal of Mountain Science*, 12 (3), 647–658.
- Neke, K.S., Owen-Smith, N. and Witkowski, E.F. 2006. Comparative resprouting response of savanna woody plant species following harvesting: the value of persistence. *Forest Ecology and Management*, 232, 114–123.
- Okeleye, B.I., Samie, A., Bessong, P.O., Mkwetshana, N.F., Green, E. and Clarke, A.M.

2010. Crude ethyl acetate extract of the stem bark of *Peltophorum africanum* (Sond, Fabaceae) possessing in vitro inhibitory and bactericidal activity against clinical isolates of *Helicobacter pylori*. *Journal of Medicinal Plants Research*, 4 (14), 1432–1440.
- Phama, J.O., Panagos, M.D., Myburgh, W.J. and Pfab, M.F. 2014. The population status of the Endangered endemic plant *Aloe peglerae* : Area of occupancy, population structure, and past population trends. *South African Journal of Botany*, 93, 247–251.
- Rankoana, S.A. 2016. Sustainable use and management of indigenous plant resources: A case of Mantheding community in Limpopo Province, South Africa. *Sustainability*, 8, 1–13.
- Rasethe, M., Semanya, S., Potgieter, M. and Maroyi, A. 2013. The utilization and management of plant resources in rural areas of the Limpopo Province, South Africa. *Journal of Ethnobiology and Ethnomedicine*, 9, 1–8.
- Sadiki, T., Tshisikhawe, M. and Potgieter, M. 2018. The Dynamics on the Ecology of *Pterocarpus angolensis* DC. *Journal of Agriculture and Allied Sciences*, 7 (1), 22–26.
- Samie, A., Obi, C.L., Bessong, P.O. and Namrita, L. 2005. Activity profiles of fourteen selected medicinal plants from rural Venda communities in South Africa against fifteen clinical bacterial species. *African Journal of Biotechnology*, 4, 1443–1451.
- Sarkar, M. and Devi, A. 2014. Assessment of diversity, population structure and regeneration status of tree species in Hollongapar Gibbon wildlife sanctuary,

- Assam, northeast India. *Tropical plant research*, 1 (2), 26–36.
- Semenya, S.S., Potgieter, M.J. and Erasmus, L.J.C. 2013. Ethnobotanical survey of medicinal plants used by Bapedi traditional healers to manage HIV/AIDS in the Limpopo Province , South Africa. *Journal of Medicinal Plants Research*, 7 (8), 434–441.
- Shackleton, C.M., Guthrie, G. and Main, R. 2005. Estimating the potential role of commercial over-harvesting in resource viability: A case study of five useful tree species in South Africa. *Land Degradation and Development*, 16, 273–286.
- Sop, T.K., Oldeland, J., Schmiedel, U., Ouedraogo, I. and Thiombiano, A. 2011. Population structure of three woody species in four ethnic domains of the Sub-Sahel of Burkina Faso. *Land Degradation and Development*, 22, 519–529.
- Teketay, D., Geeves, G., Kopong, I., Mojeremane, W., Sethebe, B. and Smith, S. 2016. Diversity, stand structure and regeneration status of woody species, and spatial cover of herbaceous species in Mokolodi Nature Reserve, southeastern Botswana. *International Journal of Biodiversity and Conservation*, 8 (8), 180–195.
- Theo, A., Masebe, T., Suzuki, Y., Kikuchi, H., Wada, S., Obi, C.L., Bessong, P.O., Usuzawa, M., Oshima, Y. and Harrori, T. 2009. *Peltophorum Africanum*, a traditional south African medicinal plant, contains an anti HIV-1 constituent, betulinic acid. *Tohoku Journal of Experimental Medicine*, 217, 93–99.
- Tickin, T. 2004. The ecological implications of harvesting non-timber forest. *Journal of Applied Ecology*, (41), 11–21.

- Tshikalange, T.E., Mamba, P. and Adebayo, S.A. 2016. Antimicrobial, antioxidant and cytotoxicity studies of medicinal plants used in the treatment of sexually transmitted diseases. *International Journal of Pharmacognosy and Phytochemical Research*, 8 (11), 1891–1895.
- Tshisikhawe, M.P. and Van Rooyen, M.W., 2013. Population biology of *Elaeodendron transvaalense* Jacq . in the presence of harvesting. *International Journal of Experimental Botany*, 82, 303–311.
- Tshisikhawe, M.P., van Rooyen, M.W. and Bhat, R.B. 2012. An evaluation of the extent and threat of bark harvesting of medicinal plant species in the Venda region, Limpopo Province, South Africa. *International Journal of Experimental Botany*, 81, 89–100.
- Tzeng, H.Y., Wang, W., Tseng, Y.H., Chiu, C.A., Kuo, C.C. and Tsai, S. Te, 2018. Tree mortality in response to typhoon-induced floods and mudslides is determined by tree species, size, and position in a riparian Formosan gum forest in subtropical Taiwan. *PLoS ONE*, 13 (1), 1–22.
- Ugarković, D., Tikvić, I., Anić, I. and Mikac, S. 2012. Effect of Tree Damage on crown defoliation and diameter increment of Silver fir (*Abies alba* Mill.) during timber skidding in Gorski Kotar region. *Forest Engineering - Concer, Knowledge and Accountability in Today's Evironment*, Formec, Cr, 1–9.
- Urso, V., Signorini, M.A., Tonini, M. and Bruschi, P. 2016. Wild medicinal and food plants used by communities living in Mopane woodlands of southern Angola: Results of an ethnobotanical field investigation. *Journal of Ethnopharmacology*,

177, 126–139.

van Wyk, B., van Wyk, P. and van Wyk, B.-E. 2014. *Photo guide to trees of southern Africa*. Pretoria: Briza Publications.

Venter, F. and Venter, J.-A. 2012. *Making the most of indigenous trees*. Pretoria: Briza Publications.

Wiseman, R., Page, B.R. and O'Connor, T.G. 2004. Woody vegetation change in response to browsing in Ithala game reserve, South Africa. *South African Journal of Wildlife Research*, 34 (1), 25–37.

Worku, A., Teketay, D., Lemenih, M. and Fetene, M. 2012. Diversity, regeneration status, and population structures of gum and resin producing woody species in Borana, southern Ethiopia. *Forests, Trees and Livelihoods*, 21 (2), 85–96.

## CHAPTER SIX

### GENERAL SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 6.1 General summary

The Mapulana is a tribe of people who speak Sepulana, a language classified as a dialect of Sepedi. They are easily identified by their surnames, which include, Mashego, Malele, Chiloane, Mashile, Matjie, Selekana and Sekgodu, to mention a few. The Mapulana women and girls can be identified with a “setwaba”, a round small circle on the cheeks. Most of the ‘undiluted’/pure Mapulana are distributed in the Bushbuckridge municipality. Most of the Mapulana found in the Mbombela Municipality were unable to speak Sepulana (this applies only to those encountered during the data collection phase). It was observed that the Sepulana in Bushbuckridge is influenced by Xitsonga while in Mbombela and Thaba Chweu, it has siSwati and Sepedi influences; the tone of the language used is different within the municipalities.

The current study was conducted with fourteen villages distributed in the Ehlanzeni District in the Mpumalanga Province. The study was conducted through the use of semi-structured questionnaires and a snowball sampling technique was used to select participants. Participants were mainly the elderly, community adults and youth. The use value of plant species were calculated to check for the highly used; this resulted in the

identification of preferred plant species, such as *Sclerocarya birrea* subsp. *caffra*, *Peltophorum africanum* and *Cucurbita maxima* to mention just a few.

The population structure of *Peltophorum africana* was investigated due to the fact that it was the among the preferred plant species utilized for fuelwood, mentioned by the participants. Twenty-six line transects were established within an area of 100 x 10m. Population status was established, whereby the height of plants, stem circumference, healthiness of crown and information on whether the plant species was harvested or not, were recorded. A total of 256 individuals were recorded in the study; this showed that the stem circumference size class of 10.1 - 20 cm had a high number of saplings as compared to seedlings and adult tree classes. The population structure of *P. africanum* was bell shaped and the plant species individuals had traces of crown damage (43.8%) as compared to healthy crown (35.9%). There were signs that 82% of *P. africanum* individual had been harvested. A Logarithmic analysis along with generalized log analysis depicted that there is significance between the plant height and stem circumference.

The elderly are the sole custodians of plant knowledge among the Mapulana, followed by the community adults and lastly, the younger generation. The fact shows that information has been transferred from the elderly to the community adults, in most of the communities, however, due to factors like urbanization there is limited, or no transfer of information between the community adults and youth. It is assumed that the younger generation are

less interested in issues concerning traditional usage of plant species; only the youth who are called to become traditional health practitioners would be interested.

The use of plant species was acknowledged by this tribe. Plants were mainly utilized as food, fuelwood, utensils and medicine. A total of 52 plant species were used as fruit and 25 of which are African leafy vegetables. There was a minimum of 16 tree species being used as fuelwood along with 28 fruit species being utilized as alternative fuelwood. Usage as utensils was represented by 9 plants; included in the category of utensils were traditional mats, cooking stirrers and traditional pestles and mortars. *Parinari capensis* subsp. *capensis* was the only plant species found to be used in making traditional tea. Plant species which were categorized as food received high use value; these were *Sclerocarya birrea* subsp. *caffra*, *Cucurbita maxima*, *Psidium guajava*, *Mangifera indica*, *Persea americana*, *Bidens pilosa*, *Ximenia caffra* var. *caffra*, *Vangueria infausta* subsp. *infausta*, and *Amaranthus hybridus* to mention a few. In the Mapulana communities, these plants are harvested from the homestead and gardens; this is a viable proof of the utilization of naturalized species. The Mapulana communities have large number of population, hence, there is minimum bush, since most of the area have now been turned into habitation space.

From this study, a total of 106 plant species were recorded as being mainly used for medicinal purposes. The recorded medicinal plants were mainly used in the treatment of 50 ailments which are mostly interconnected. Gonorrhoea was the most treated ailment

with 24 plant species. Flu was recorded to be treated with 16 and bad luck with 11 plant species. Ailments for infants and babies, like sunken and bulging fontanelles were treated with 13 plant species; high blood pressure and stomach pains were controlled by 7 and 8 species respectively. Cases of wounds, tooth and head aches, were treated with 6 plant species each. *Aloe zebrina*, *Aloe marlothii*, *Lippia javanica*, *Sclerocarya birrea subsp. caffra*, *Siphonochilus aethiopicus*, *Prunus persica*, *Psidium guajava*, *Ximenia caffra* var. *caffra* and *Hypoxis hemerocallidea* are plant species with high use values. The Mapulana treat ailments which are spiritually connected, hence, needs a spiritualist to identify them. It is assumed that *makgoma* and *difeka* cause other sickness such as bad luck.

Trees and herbs were preferred growth forms in the utilization profile of the local communities. Plant species used as fruits were also used as fuelwood and medicine. Since most of the plants are in the homesteads, the majority of the traditional health practitioners still follow sustainable ways of harvesting plants. Most of the herbaceous species were harvested from the livestock feeding camps or other communities. Roots were the part mostly used, therefore, the level of harvesting has become high and unsustainable for most plant species found in the wild. People travel long distances in the search for certain species due to scarcity of the preferred species close to their homesteads. Uprooting is perceived to be the preferred way for harvesting herbs.

*Peltophorum africanum* is used as fuelwood according to the study and is severely harvested from Bolla-Tau. Its population structure was bell-shaped, meaning that there

were many saplings and juveniles as compared to seedlings and adult trees. Its multi-stemmed strategy helps it to resprout.

## 6.2 Conclusions

It can be concluded that the Mapulana utilize same plant species for different purposes, especially for medicine, fruits and fuelwood. Some of the medicinal plant species were combined for effective healing. The majority of these plant species are cultivated in the homesteads and are mostly naturalized. It is evident that the elders are the knowledge custodians in the Mapulana villages and not the youths. Unsustainable harvesting of plant species was shown to be escalating and this may lead to minimum vegetation for the upcoming generation. Population structure of *Peltophorum africanum* was observed to be bell-shaped revealing that the population is unstable. The ethnobotany of the Mapulana is broad; ailments treated are mostly known among them and it is assumed that most of the sicknesses start in the spirit or are caused by spiritual forces, such as “makgoma and difeka”.

## 6.3 Recommendations

It is recommended that further research may be carried out among the Mapulana distributed in Burgersfort and Sekhukhune. A synthesis of the differences between plant species utilized by Bapedi and Mapulana should be prioritized, since Sepulana being a

dialect of Sepedi, there might be a link between the two languages and communities. In case of growth forms, where trees and herbs are preferred, their roots are harvested; this calls for environmental awareness education program among the Mapulana communities.

## APPENDIX A: QUESTIONNAIRES



### The ethnobotanical investigation of the Mapulana People of Ehlanzeni District Municipality, Mpumalanga Province South Africa by Shalom Pabalelo Mashile

---

Sir/Madam

.....

We request for your right of participation in a Research Project: The information that you are requested to deliver will be used for academic research purposes and for the completion of my Doctor of Philosophy degree in Botany at the University of Venda. Information you will provide will be treated with strict confidentiality. You are advised to withdraw your participation at any time.

Thank you

**Date:**..... **Questionnaire no.:**.....

**Traditional health practitioner questionnaire: Please fill in the provided spaces**

**Age**

**Gender**


**Village**

**Occupation**

1. Are you a  traditional health practitioner or  herbalist? Tick the correct one.

2. May you give us the name of the traditional association you are member of

3. How many patients come for consultation a day?

4. Could you name the plants you administer to people for different sickness?

5. Which parts of the plant do you prefer to use?

6. How do you prepare the plants?

7. Do you sometimes refer your patients to the clinic or hospital  Yes or  No: tick the correct one?

8.1 Have you used the plants on animals?  Yes or  No: tick the correct one.

8.2. If yes, could you name them and their uses?

9. Could you tell us what you know about the history of Mapulana people?


10. Are you allowed to collect the plants anywhere in the village  Yes or  No: tick the correct one

11. May you name any laws used for collecting plants in your village?


12. What do you think is the solution to prevent over-harvesting of plants in your village?


13. What are the problems, opportunities and challenges of harvesting medicinal plants from the wild?


14. What can be done to ensure the effective conservation of all medicinal plant species?


15.1 Do you collect the plants by yourself  Yes or  No: tick the correct one?

15.2 If no, who collects them for you?

16. May you assist by showing us the plants  Yes or  No: tick the correct one

17. Can you give us the name of the area where the plants can also be collected

**The ethnobotanical investigation of the Mapulana People of Ehlanzeni District Municipality, Mpumalanga Province South Africa by Shalom Pabalelo Mashile**

---

Sir/Madam

.....

We request for your right of participation in a Research Project: The information that you are requested to deliver will be used for academic research purposes and for the completion of my Doctor of Philosophy degree in Botany at the University of Venda. Information you will provide will be treated with strict confidentiality. You are advised to withdraw your participation at any time.

Thank you

Date:.....

Questionnaire no.:.....

**Village participants questionnaire: Please fill in the provided spaces**

<b>Age</b>	
<b>Gender</b>	
<b>Village</b>	
<b>Occupation</b>	

1. When you are sick do you visit the  clinic or  traditional health practitioner: tick the correct one?

2.1. Do you know about plants found in your village  Yes or  No: tick the correct one?

2.2. If yes, could you name the plants and their uses?


3. Which parts of the plant do you use

4. How do you prepare the plants?


5. Have you ever used the plants before on yourself  Yes or  No: tick the correct one?

6. Who informed you about these plants?

7.1 Have you ever used the plants on animals  Yes or  No: tick the correct one?

7.2. If yes, could you name them and their uses?


8. Could you tell us what you know about the history of Mapulana people?


9. Are you allowed to collect the plants anywhere in the village  Yes or  No: tick the correct one

10. May you name any laws used for collecting plants in your villages?

--

11. What do you think is the solution to prevent over-harvesting of plants in your village?


12. What are problems, opportunities and challenges of harvesting medicinal plants from the wild?

--

13. What can be done to ensure the effective conservation of all medicinal plant species?

14.1 Do you collect the plants by yourself  Yes or  No: tick the correct one?

14.2 If no, who collects them for you

15. May you assist by showing us the plants  Yes or  No: tick the correct one

16. Can you give us the name of the area where the plants can be collected

## APPENDIX B: LETTER FOR REQUESTING PERMISSION

Mashile S.P

Department of Botany

University of Venda

Private Bag X5050

Thohoyandou

0950

---

---

---

---

---

**REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT \_\_\_\_\_**

**Dear Sir / Madam**

My name is Shalom Pabalelo Mashile, a PhD candidate from the University of Venda. I hereby request for permission to conduct research within the above mentioned village / township. My research is entitled the “The ethnobotanical investigation of the Mapulana

of Ehlanzeni District, Mpumalanga Province, South Africa”, promoted by Prof MP Tshisikhawe and Dr NA Masevhe.

I hope to conduct face to face interviews and use semi-structured questionnaires on participants. Participants will include traditional health practitioner, herbalist, elderly people and youth within the village. Voucher plant specimens will be collected as a reference for plants used. The aim of the study is to document ethnobotanical knowledge on indigenous plants used by the Mapulana people for different purposes.

For any queries about this letter please contact me on 079 048 3931 or [shalompabalelo@yahoo.com](mailto:shalompabalelo@yahoo.com).

I hope my request will be taken into consideration.

Yours Sincerely

Mashile S.P

## APPENDIX C: CONSENT FORM

### Research Project Consent form

This form serves to request your permission to be interviewed for an academic research project. The research project by Shalom Pabalelo Mashile, a student at the University of Venda (Student number 11565014), is about the “The ethnobotanical investigation of the Mapulana People of Ehlanzeni District Municipality, Mpumalanga Province, South Africa”. Before your participation in the interviews, it is important for you to understand the following information:

- ✓ Please take note that your participation for the research is voluntary. You may stop the interview at any desired time. You have the right to avoid question that are not conducive to you or stop the interview at any time.
- ✓ The average allocated time for the interview is 15-45 minutes which depends on your ability to answer questions and note that the interview will be digitally recorded
- ✓ The information collected for this research will be kept with strict confidentiality.

Please sign below to signify your agreement to participate

\_\_\_\_\_  
**Signature** (Participant)

\_\_\_\_\_  
Date

\_\_\_\_\_  
**Signature** (Researcher)

\_\_\_\_\_  
Date

## FOCUS GROUP INTERVIEW CONSENT AND CONFIDENTIALITY AGREEMENT

I \_\_\_\_\_

grant my consent that the facts shared during this focus group interview can be used by the researcher, Shalom Pabalelo Mashile, for academic research purposes only. I am alert that our discussions will be recorded digitally. I take responsibility not to share any information from the group discussions to with people not included in the interview in order to maintain my confidentiality.

\_\_\_\_\_

**Signature** (Participant)

\_\_\_\_\_

Date

\_\_\_\_\_

**Signature** (Researcher)

\_\_\_\_\_

Date

## APPENDIX D: PUBLISHED MANUSCRIPT

South African Journal of Botany 122 (2019) 180–183



Contents lists available at ScienceDirect

South African Journal of Botany

journal homepage: [www.elsevier.com/locate/sajb](http://www.elsevier.com/locate/sajb)



# Indigenous fruit plants species of the Mapulana of Ehlanzeni district in Mpumalanga province, South Africa



S.P. Mashile\*, M.P. Tshisikhawe, N.A. Masevhe

Department of Botany, School of Mathematical and Natural Sciences, University of Venda, Private Bag X5050, Thohoyandou (B95), South Africa

### ARTICLE INFO

#### Article history:

Received 15 May 2018  
Received in revised form 16 August 2018  
Accepted 25 September 2018  
Available online 12 October 2018

#### Keywords:

Indigenous communities  
Indigenous knowledge systems  
Livelihood  
Dietary supplements  
Native  
Naturalized

### ABSTRACT

The indigenous communities around Africa and most parts of the world rely on indigenous knowledge systems in identification of edible indigenous foods that supplement their livelihood. This is a practice that has been there since time immemorial. Information on edible indigenous fruit plants was documented among the Mapulana through semi-structured interviews. Eighty-two informants were interviewed on their knowledge of edible indigenous fruit plants. Fifty-two fruit plants species were reported to be part of dietary supplements of the Mapulana. The species belonged to 26 plant families with Anacardiaceae and Rhamnaceae being the dominant families. Native and naturalized fruit species shared unequal preference within the communities, with native fruits being highly preferred than naturalized. The high preference of native fruit plants species shows the potential of unexplored product development. The development of products should be encouraged by the fact that the Mapulana are already cultivating some of these edible indigenous fruit plants in the backyards of their homesteads.

© 2018 The Authors. Published by Elsevier B.V. on behalf of SAAB. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

### 1. Introduction

In most African communities there are different perceptions and beliefs about indigenous fruits, which has affected the consumption and utilization of these plant species (van der Hoeven et al., 2013; Bvenura and Sivakumar, 2017). Recently people focus more on limited species, that are preferred as dietary supplements obtainable from naturalized species and resulted in less attention to native species (Grivetti and Ogle, 2000).

Ahmad and Pieroni (2016) stipulated that native fruit species have been used as an alternative of naturalized species, during dry periods and time of food crisis. However van der Hoeven et al. (2013) elaborates that people decisions to consume certain foods depends largely on the sensory traits such as smell, appearance, taste and texture. Shackleton et al. (2000) and Shumsky et al. (2014), further elaborated that native fruits were consumed because of the easy accessibility, availability, and taste or fun.

People's focus on naturalized species in these twenty-second century poses nutritional reliance on few species and decline of traditional knowledge. Important knowledge is therefore restricted to certain communities and decreases quite promptly due to its delicate nature (Ahmad and Pieroni, 2016; Grivetti and Ogle, 2000).

The study aimed to document indigenous fruit species used as food supplement by the Mapulana. The Mapulana are an indigenous

community who still rely on their indigenous knowledge system in supplementing their livelihood.

### 2. Material and methods

#### 2.1. Study area

The study was conducted in 15 villages located in Ehlanzeni district municipality (Table 1) within three local municipalities namely: Bushbuckridge (n = 10), Mbombela (n = 3) and Thaba Chweu (n = 2). Ehlanzeni district municipality is one of the three district municipalities of Mpumalanga Province of South Africa. It shares its borders with Mozambique and Swaziland. The district municipality comprises of five local municipalities namely: Bushbuckridge, Mbombela, Thaba Chweu, Nkomazi and Umjindi. (See Fig. 1.)

Most Mapulana, a tribe which speaks Sepulana, are found within these three local municipalities. This is an ignored tribe in the sense that its language is not included within the official languages of South Africa.

#### 2.2. Methodology

Semi-structured interviews were conducted with participants in this study. The interviews were conducted face to face with elderly people, community adults and youth. Snowball technique was used in sampling of participants, whereby participants identified others as referrals for participation in the study. All participants signed prior consent forms

\* Corresponding author.

E-mail address: [shalompabalelo@yahoo.com](mailto:shalompabalelo@yahoo.com) (S.P. Mashile).

**Table 1**  
The municipalities and villages surveyed.

Municipalities	Villages
Bushbuckridge	Bolla-Tau, Dingledale, Greenvalley, Boyelang, Moloro, Casteel, Acornhoek, Marie, Bushbuckridge, Shatale
Thaba Chweu	Matibidi, Hlabekisa and Leroro
Mbombela	Shabalala and Nyongani

to show their willingness to participate in the study. Plant specimens of species recorded during the interviews were collected, identified, validated using The Plant List database (<http://www.theplantlist.org/>, Accessed 25 May 2018) and deposited in the University of Venda, Department of Botany Herbarium. The University of Venda Research Ethics Committee cleared the project with ethics project number SMNS/17/BOT/01/0905.

Eighty two participants were identified in the study, and were able to list tree species utilized as fruits. The frequency index was calculated using a mathematical formula adapted from (Madikizela et al., 2012). The formula  $FI = FC/N \times 100$ , where FI is the frequency index, which expresses the percentage of frequency of listing a plant species by participants. FC is the number of participants who listed a particular plant species and N is the total number of participants.

### 3. Results and discussion

#### 3.1. Demography of informants

Eighty two participants were interviewed on wild edible fruits used by the Mapulana as indicated in Table 2.

Elders were more represented (56%) in the profile of informants than other age categories. Community adults respondents were second with 32%. Overall, females (83%) were participants who responded in large number as compared to males (17%). Most of the participants had at least attended secondary education.

**Table 2**  
Demographic structure of participants.

Parameter	Specification	Frequency	Percentage (%)
Gender	Male	14	17
	Female	68	83
Status	Youth (20–35)	10	12
	Community adult (36–59)	26	32
	Elder (60–99)	46	56
Education	None	15	18
	Primary	21	26
	Secondary	41	50
	Tertiary	5	6

#### 3.2. The Mapulana fruit plants species profile

The study listed a total of 52 fruit species consumed by Mapulana of Ehlanzeni district. The information presented in Table 3 depicts native and naturalized fruits species along with their frequency index, as well as consumption colors when ripe.

Of the 52 fruit species, 33 were native while 19 were naturalized species ranging from dwarf shrubs to trees. Twenty seven families were documented with Anacardiaceae ( $n = 5$ ) and Rhamnaceae ( $n = 4$ ) being the most dominant families. Native fruits species such as *Flueggea virosa* was highly preferred with citation frequency index (FI) of 48%, followed by *Ximenia caffra* and *Carissa edulis* with FI of 45%. *Vangueria infausta* had a citation index of 39% while *Lannea edulis* had 35%, followed by *Ficus sur* (28%), *Sclerocarya birrea* (26%), *Strychnos spinosa* and *Ximenia americana* with 20% each. In numerous villages around Bushbuckridge, Shackleton et al. (2000) reported that *C. edulis* was frequently consumed during fruiting seasons. Its high consumption level was followed by naturalized species like *Syzygium cumini* (43%), *Litchi chinensis* (40%), *Persea americana* (40%), *Mangifera indica* (39%) and *Psidium guajava* (34%). *Carica papaya*, *Musa acuminata* and *Prunus persica* citation was 23%. Reason for these preference is the fact that participants have cultivated some of these species in their homestead.

In Amuria district, Uganda, *Mangifera indica*, *Annona senegalensis* subsp. *senegalensis*, *Diospyros mespiliformis* and *Ficus sur* were some of the most preferred species recorded with frequency index ranging

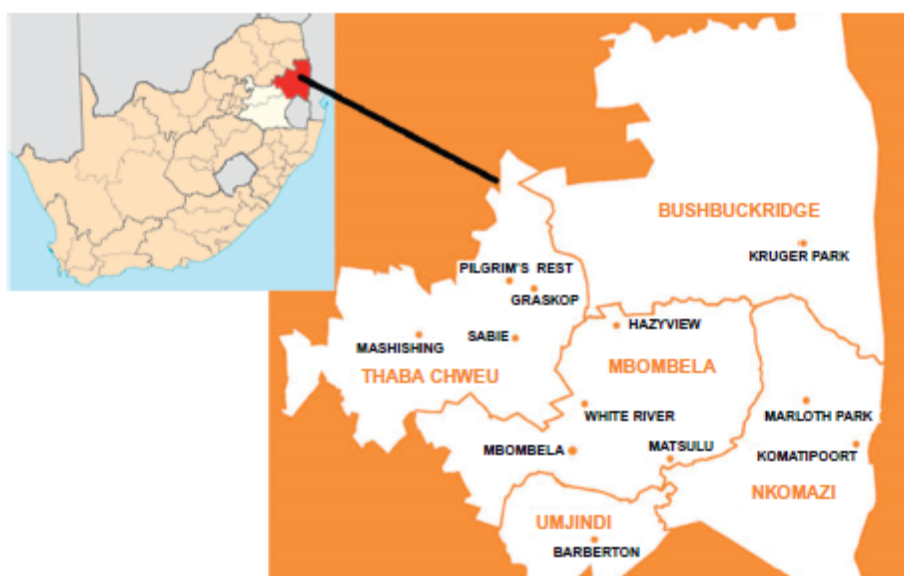


Fig. 1. Showing map of Ehlanzeni local municipalities as extracted from a South African map.

**Table 3**  
Fruits species consumed by Mapulana.

Local name	Scientific name	Voucher no.	Family	Frequency index (FI)	Plant status	Consumption color
Bolopi/Morubeila (Dirubeila)	<i>Morus alba</i> L.	SP 205	Moraceae	20	Naturalized	Black
Bothotlo/Bohwehlwe	<i>Searsia leptodictya</i> (Diels) T.S.Yi, Aj.Mill. & J.Wen	SP 260 & SP 304	Anacardiaceae	7	Native	Red
Mabelemabutjwa	<i>Lantana rugosa</i> Thunb.	SP 119	Verbenaceae	6	Naturalized	Red
Mmilo (Mabilo)	<i>Vangueria infausta</i> Burch.	SP 18	Rubiaceae	39	Native	Brown
Mmilo fasane (Mabilofasane)	<i>Vangueria pygmaea</i> Schltr.	SP 129	Rubiaceae	9	Native	Black
Mmola /Mphola (Diphola)	<i>Parinari curatellifolia</i> Planch. ex Benth.	SP 135	Chrysobalanaceae	16	Native	Brown
Mmolo fasane	<i>Parinari capensis</i> Harv.	SP 212	Chrysobalanaceae	2	Native	Brown
Mogo (Mago)	<i>Ficus sur</i> Forsk.	SP 139	Moraceae	28	Native	Red
Mogokgoma (Digokgoma)	<i>Berchemia discolor</i> (Klotzsch) Hemsl.	SP 1	Rhamnaceae	6	Native	Yellow
Mogotlo	<i>Trichilia dregeana</i> Sond.	SP 136	Meliaceae	2	Native	Yellow
Mogranata (Magranata)	<i>Punica granatum</i> L.	SP 91	Lythraceae	2	Naturalized	Red
Mograndela (Magrandela)	<i>Passiflora edulis</i> Sims	SP 233	Passifloraceae	6	Naturalized	Yellow
Mogwagwa (Magwagwa)	<i>Strychnos madagascariensis</i> Poit.	SP 95	Loganiaceae	18	Native	Yellow
Mokgoropo (Dikgoropo)	<i>Ptilostigma thonningii</i> (Schumach.) Milne-Redh.	SP 175	Fabaceae	1	Native	Brown
Mokotapeni (Makotapeni)	<i>Persea americana</i> Mill.	SP 141	Lauraceae	40	Naturalized	Brown
Mokumo	<i>Ficus thonningii</i> Blume	SP 88	Moraceae	2	Native	Red
Monamona (Manamona)	<i>Citrus sinensis</i> (L.) Osbeck	SP 181	Rutaceae	13	Naturalized	Yellow
Monarikisi (Manarikisi)	<i>Citrus reticulata</i> Blanco	SP 185	Rutaceae	2	Naturalized	Yellow
Moneyi (Dineyi)	<i>Berchemia zeyheri</i> (Sond.) Grubov	SP 188	Rhamnaceae	6	Native	Red
Mongaba (Mangaba)	<i>Psidium guajava</i> L.	SP 105	Myrtaceae	34	Naturalized	Yellow
Mongosi (Mangosi)	<i>Mangifera indica</i> L.	SP 180	Anacardiaceae	39	Naturalized	Yellow
Mooka	<i>Vachellia nilotica</i> (L.) (L.) P.J.H. Hurter & Mab. b.	SP 157	Fabaceae	2	Native	Yellow
Mopana (Dipana)	<i>Musa acuminata</i> Colla	SP 142	Musaceae	23	Naturalized	Yellow
Mopeta (Mapeta) Moperekisi (Maperikisi)	<i>Prunus persica</i> (L.) Batsch	SP 186	Rosaceae	23	Naturalized	Yellow
Mopharatshena (Dipharatshena)	<i>Grewia flavescens</i> Juss	SP 43	Malvaceae	2	Native	Brown
Mophopo (Mapopo)	<i>Carica papaya</i> L.	SP 7	Caricaceae	23	Naturalized	Yellow
Mophoti (Diphoti)/Mophiroku (Diphiroku)	<i>Lannea edulis</i> (Sond.) Engl.	SP 177	Anacardiaceae	35	Native	Black
Mopremo (Mapremo)	<i>Prunus domestica</i> L.	SP 195	Rosaceae	5	Naturalized	Red
Mopupudu (Dipupudu)	<i>Mimosaops zeyheri</i> Sond.	SP 192	Sapotaceae	9	Native	Yellow
Morula (Marula)	<i>Sclerocarya birrea</i> (A.Rich.) Hochst.	SP 103	Anacardiaceae	26	Native	Yellow
Morulanopsane (Marulanopsane)	<i>Lannea schweinfurthii</i> Engl.	SP 233	Anacardiaceae	1	Native	Yellow
Moshala (Mashala)	<i>Strychnos spinosa</i> Lam.	SP 258	Loganiaceae	20	Native	Yellow
Moswiri (Maswiri)	<i>Citrus limon</i> (L.) Osbeck	SP 184	Rutaceae	12	Naturalized	Yellow
Mothalo (Dithalo)/Mokgalo (Dikgalo)	<i>Ziziphus mucronata</i> Willd.	SP 17	Rhamnaceae	7	Native	Red
Mothalo fasane/Mokgalo fasane	<i>Ziziphus zeyheriana</i> Sond.	SP 282	Rhamnaceae	1	Native	Red
Mothokolo (Dithokolo)	<i>Carissa edulis</i> Vahl	SP 182	Apocynaceae	45	Native	Black
Motilwane	<i>Antidesma venosum</i> J.J.Sm.	SP 248	Phyllanthaceae	2	Native	Black
Motinibe (Ditiribe)	<i>Vitis vinifera</i> L.	SP 217	Vitaceae	16	Naturalized	Black
Motjhidi (Ditjhidi)	<i>Ximelia caffra</i> Sond.	SP 23	Oleaceae	45	Native	Red
Mothakola swifi	<i>Euclea crispata</i> (Thunb.) Gürke	SP 21	Ebenaceae	5	Native	Black
Mothakolane (Dithakolane)	<i>Euclea divinorum</i> Hiern	SP 19	Ebenaceae	6	Native	Black
Mothalabu (Dithalabu)/Motlhakwume (Dithakwume)	<i>Flueggea virosa</i> (Roxb. ex Willd.) Royle	SP 176	Phyllanthaceae	48	Native	White
Motlhajwa (Dithajwa)	<i>Litchi chinensis</i> Sonn.	SP 209	Sapindaceae	40	Naturalized	Red
Motlhajwa wa thaga (Dithajwa tsa thaga)	<i>Englerophytum magafalimontanum</i> (Sond.) T.D. Penn.	SP 133	Sapotaceae	2	Native	Red
Motlo (Ditlo)	<i>Syzygium cumini</i> (L.) Skeels	SP 3	Myrtaceae	43	Naturalized	Black
Motlo wa sekgowa (Ditlo wa sekgowa)	<i>Eriobotrya japonica</i> (Thunb.) Lindl.	SP 150	Rosaceae	5	Naturalized	Yellow
Motlo wa thaga (Ditlo tsa thaga)	<i>Syzygium cordatum</i> Hochst. ex Krauss	SP 71	Myrtaceae	2	Native	Deep purple
Motllepo (Matllepo)	<i>Annona senegalensis</i> Pers.	SP 76	Annonaceae	19	Native	Yellow
Motorofeya (Foyyiyiya)	<i>Opuntia ficus-indica</i> (L.) Mill.	SP 84	Cactaceae	9	Naturalized	Yellow
Motsadi (Ditsadi)/Mobapola (Dibapola)	<i>Ximelia americana</i> L.	SP 183	Oleaceae	20	Native	Orange
Motsere (Ditsere)	<i>Bridelia micrantha</i> (Hochst.) Baill.	SP 216	Phyllanthaceae	4	Native	Black
Motsoma (Ditsoma)	<i>Diospyros mespiliformis</i> Hochst. ex A.D.C.	SP 22	Ebenaceae	17	Native	Brown

Names in () are fruit names.

from high to low respectively. In addition *F. sur* was known to be consumed during famine (Ojele and Kakudidi, 2015). While in Agincourt Bushbuckridge, ranging from high to low FI, *S. birrea* subsp. *caffra* top the list, followed by *Strychnos madagascariensis*, *D. mespiliformis* and *S. spinosa* in ascending order of FI (Ndengejehe, 2007). With FI ranging sequentially from high to low, Raseth et al. (2013) recorded *S. birrea* subsp. *caffra*, *V. infausta*, *Carissa edulis* and *Flueggea virosa* subsp. *virosa* in a study conducted in Limpopo province of South Africa. Shackleton et al. (2000) also recorded *S. madagascariensis*, *S. birrea* subsp. *caffra*, *S. spinosa*, *V. infausta*, *Acacia senegalensis* and *D. mespiliformis* as native tree species that are known to be consumed in Bushbuckridge area.

The observed preference levels of fruits denotes that native and naturalized fruits are unequally preferred by the Mapulana. Numerous different native fruits species were listed mainly by elders and community adults and were unknown to the younger generation. Safety within the bushes and ability to recognize common native fruits was the main reason of youth neglecting native species. However, naturalized fruits are also commonly preferred and easily accessible these days as observed by Shackleton et al. (2000) and Shumsky et al. (2014). Mosina and Maroyi (2016) observed similar results in Capricorn district, Limpopo Province and further elaborated that their preference is due to people's deliberate introduction of naturalized species.

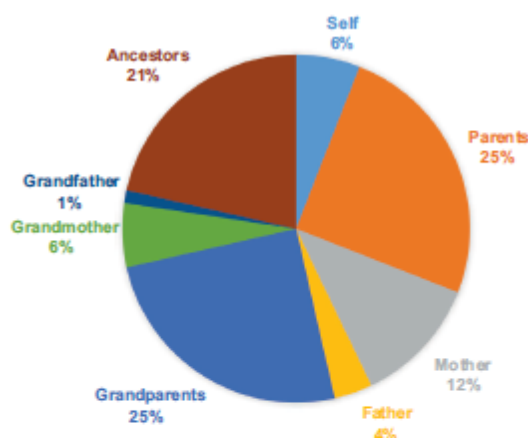


Fig. 2. Knowledge acquired from different custodians.

Table 3 also depicts the state of fruit colors when consumed by the Mapulana, whereby majority of the fruit species are consumed while yellow in color (37%). Fruits that are black or red when ripe were second and accounting for 23 and 21%, respectively. According to do Régo et al. (1999), yellow fruits have reduced levels of carotenoid pigments.

### 3.3. Knowledge transfer

The transfer of knowledge from generation to generation has been the way of life among the Mapulana. Information transferred is often accepted or rejected, due to its impact on the receiver. Native fruits have been part of the Mapulana dietary supplements for time immemorial. Participants from the study explained that knowledge of these nutritious fruits has been acquired mostly from parents and grandparents. Fig 2 depicts that parents and grandparents account to 25% of knowledge, while 21% is mainly ancestors. Traditional health practitioners also relay of fruits tree species for medicine. It is perceived that most plants used for medicine are edible and not poisonous. Mothers and grandmothers citation was higher as compared to fathers and grandfathers. In agreement with Ojelel and Kakudidi (2015) reported that adult women were well-informed on plants that are prepared while the adult males were familiar on those that are consumed as snacks. Mapulana who have not acquired knowledge from anyone had a citation of 6%.

The study has recorded elders to be more knowledgeable about fruits. In support of the study van der Hoeven et al. (2013) states that elders are the custodians of knowledge and they transfer their knowledge with such confidence so that it will not be lost through generations. Transfer of indigenous information within communities was mainly from parents to younger generation (Ahmad and Pieroni, 2016). Knowledge of these fruit species has remained with the elders and community adults group, due to the fact that the younger generation are less interested. However, Shackleton et al. (2000) as well as Ahmad and Pieroni (2016) observed in their studies that youth also enjoyed indigenous fruits.

### 3.4. Recorded utilization of indigenous fruits

Indigenous fruits uses varied from jam making to drinking beverages as documented by different sources. *Sclerocarya birrea* subsp. *caffra* is a known commercialized species used differently for making soaps, cooking oil and other different products (Shackleton et al., 2000).

Rampedi and Olivier (2016) documented numerous species used for beverage making. Some of the species recorded in their study are *Berchemia discolor*, *Englerophytum magalismontanum*, *Carissa edulis*, *Euclea divinorum*, *Ficus thonningii*, *Flueggea virosa*, *Opuntia ficus indica*, *Vangueria infausta*, *Ximenia caffra*, *Strychnos spinosa*, *Syzygium cumini*, *Annona senegalensis*, *Mimusops zeyheri*, *Trichilia emetica*, *Parinari curatellifolia* and *S. birrea* subsp. *caffra*. Mapulana use species such as *Strychnos madagascariensis* to make traditional dried fruits "Lekoma" whereby fruit pulps are sun dried and seeds removed. The dried pulp is then eaten as snack or grinded and consumed in powder form. *Mangifera indica*, *Prunus persica* and *Vangueria infausta* are also sun dried and eaten as snacks.

## 4. Conclusion

Preference of native and naturalized fruit species has proven that knowledge transfer is becoming reduced or limited between parents and the younger generation. However, elders still utilize native fruit species as part of their dietary supplements. The documentation of these native fruits will revive and raise the awareness of their utilization among the youth age category.

## Acknowledgments

National Research Foundation (Grant number 102082) is appreciated for providing funding for the study. Special thanks and appreciation is given to all study participants and village assistants. University of Venda is equally appreciated for providing necessary equipment, infrastructure and funding (Project number SMNS/17/BOT/01).

## References

- Ahmad, K., Pieroni, A., 2016. Folk knowledge of wild food plants among the tribal communities of Hahlt-e-Sulaiman Hills, North-West Pakistan. *Journal of Ethnobiology and Ethnomedicine* 12. <https://doi.org/10.1186/s13002-016-0090-2>.
- Bvenura, C., Sivakumar, D., 2017. The role of wild fruits and vegetables in delivering a balanced and healthy diet. *Food Research International* 99, 15–30. <https://doi.org/10.1016/j.foodres.2017.06.046>.
- do Régo, E.R., Finger, F.L., Casali, V.W.D., Cardoso, A.A., 1999. Inheritance of fruit color and pigment changes in a yellow tomato (*Lycopersicon esculentum* Mill.) mutant. *Genetics and Molecular Biology* 22, 101–104. <https://doi.org/10.1590/S1415-47571999000100019>.
- Grivetti, L., Ogle, B., 2000. Value of traditional foods in meeting macro- and micronutrient needs: the wild plant connection. *Nutrition Research Reviews* 13, 31–46.
- Madikizela, B., Ndhlala, A., Finnie, J.F., Van Staden, J., 2012. Ethnopharmacological study of plants from Pondoland used against diarrhoea. *Journal of Ethnopharmacology* 141, 61–71. <https://doi.org/10.1016/j.jep.2012.01.053>.
- Mossina, G.K.E., Maroyi, A., 2016. Edible plants of urban domestic gardens in the Capricorn District, Limpopo Province, South Africa. *Tropical Ecology* 57, 181–191.
- Ndengwe, H., 2007. Linking household wealth and resource use: A case study in the Agincourt rural district of South Africa. MSc dissertation. University of Witwatersrand, Johannesburg.
- Ojelel, S., Kakudidi, E.K., 2015. Wild edible plant species utilized by a subsistence farming community in Obalanga sub-county, Amuria district, Uganda. *Journal of Ethnobiology and Ethnomedicine* 11, 1–8.
- Rampedi, I., Olivier, J., 2016. Traditional beverages derived from wild food plant species in the Vhembe District, Limpopo Province in South Africa. *Ecology of Food and Nutrition* 52, 203–222. <https://doi.org/10.1080/03670244.2016.1170613>.
- Raethle, M., Semanya, S., Potgieter, M., Maroyi, A., 2013. The utilization and management of plant resources in rural areas of the Limpopo Province, South Africa. *Journal of Ethnobiology and Ethnomedicine* 9, 1–8.
- Shackleton, C., Dzeffox, C., Shackleton, S., Mathubela, F., 2000. The use of and trade in indigenous edible fruits in the Bushbuckridge savanna region, South Africa. *Ecology of Food and Nutrition* 39, 225–245. <https://doi.org/10.1080/03670244.2000.991616>.
- Shumsky, S.A., Hickey, G.M., Pelletier, B., Johns, T., 2014. Understanding the contribution of wild edible plants to rural social-ecological resilience in semi-arid Kenya. *Ecology and Society* 19.
- van der Hoeven, M., Osei, J., Greeff, M., Kruger, A., Faber, M., Smuts, C.M., 2013. Indigenous and traditional plants: South African parents' knowledge, perceptions and uses and their children's sensory acceptance. *Journal of Ethnobiology and Ethnomedicine* 9, 1–12.



## Fuelwood Profile of the Mapulana of Ehlanzeni district in Mpumalanga Province, South Africa

S.P. Mashile\*, M.P. Tshisikhawe and N.A. Masevhe

Department of Botany, School of Mathematical and Natural Sciences  
University of Venda, Thohoyandou 0950, South Africa

\*E-mail: shalompabalelo@yahoo.com

**Abstract:** African countries depend on fuelwood for their livelihood strategies and its scarcity has been on the rise with time. The increase of population size, unemployment and urbanization are among the reasons causing fuelwood scarcity. A semi-structured questionnaire was used of the elderly, community adults and youth through snow ball sampling to collect data. The study has identified sixteen tree species utilized as fuelwood and twenty-eight tree species utilized as alternative fuelwood. The family represented by most of the species is Fabaceae. The state of fuelwood species preference differed within the communities. The preference in utilization of naturalized over native species as fuelwood is motivated by the shortage of native fuelwood species within villages. The ignorance of community members on aspects of unsustainable harvesting and adherence to rules placed by traditional leaders has led to the destruction of vegetation around most of Mapulana villages. Villagers have therefore resulted in purchasing fuelwood for their livelihood.

**Keywords:** Ehlanzeni district, Mpumalanga, Tree species, Native, Naturalized

Globally the utilization of plants as fuelwood has sustained many communities, whereby a total of 54% of forests vegetation has been degraded (Martínez 2015, Hussain 2017). It is prevised that a large number of rural communities depend on fuelwood for their sustainability and greater amount of fuelwood is harvested (Cardoso et al 2012, Johnson and Bryden 2012, Hussain 2017). Johnson and Bryden (2012) further elaborated that the larger families the lower the fuelwood consumption as compare to a smaller family. Plant species utilized as fuelwood are mostly native as compared to naturalized species (Cardoso et al 2012, Cardoso et al 2017). Plant species preferred as fuelwood should have a low ash moisture and high calorific value (Martínez 2015, Sedai et al 2016, Bhatt et al 2017). Because high moisture and ash content reduce high heating value of fuelwood species (Sedai et al 2016).

The southern African countries like Swaziland, Angola, Namibia, Zimbabwe, Malawi, Lesotho and Zambia utilize 65.5% of fuelwood for their sustainability (Makonese et al 2017). In Botswana above 80 % of communities from rural, peri-urban and urban areas use fuelwood collected within communal land and around settlements (Joos-Vandewalle et al 2018). Although eighty-four percent of South Africans households are electrified, 11% still rely on fuelwood for cooking, while 12% use it for provision of heat. In Mpumalanga Province, 45% of communities still rely on fuelwood for cooking and heating (TRS 2012). The preference to utilization of plant species for fuelwood is

based on choice, regardless to its scarcity. Choice enabled communities to supplement or balance their livelihood strategies using preferred plant species with other types of fuel. In selection of firewood species factors such as nutritional crisis, socio-economic or cultural aspects of plants are well understood by the communities (Makonese et al 2017, Scheid et al 2018, Findlay and Twine 2018, Sole and Wagner 2018). In most countries the number of markets trading fuelwood are escalating despite the efforts of governments to electrify households (Puentes-Rodriguez et al 2017, Guild and Shackleton 2018). Demand for firewood as a results of increasing fuelwood markets result in loss of fuelwood conservation values or culture and biodiversity, vegetation depletion, soil erosion and deforestation (Kunwar et al 2018, Masunungure and Shackleton 2018).

Institutional rules and regulations employed by traditional leaders has indeed conserved tree species since time immemorial (Giannecchini et al 2007, Kurui et al 2016). Recently, over exploitation and harvesting of plant species has left the vegetation around most villages depleted. Decline of tree species used for fuelwood has been voiced in many villages around the Bushbuckridge municipality (Kirkland et al 2007, Giannecchini et al 2007). The latter was observed due to total dependence on tree species for fuelwood, cutting of live tree species, poverty, large population and high unemployment rate (Kirkland et al 2007, Giannecchini et al 2007, Findlay 2013). Shackleton and Shackleton (2004) reported that there is an average of

approximately 5.3 tonnes of fuelwood consumed per household per annum in South Africa. It is obvious that biodiversity within villages is gradually decreasing and resulting in no vegetation for the future generations. Although Mapulana are aware of municipal intervention through provision of electricity within the communities, it has been difficult to render cooperation in preserving the vegetation due to misinformation or ignorance. Lack of law enforcement and community misunderstanding can sometimes result in ecosystem degradation of wild plants (Shumsky et al 2014). The aim of the study was to investigate tree species used by Mapulana as fuelwood. Understanding the profile of preferred species may assist the authorities in management and monitoring of populations of such species.

### MATERIAL AND METHODS

The study was conducted in fifteen villages within three local municipalities namely: Bushbuckridge, Mbombela and ThabaChweu which falls within Ehlanzeni district at 25.39'46° S, 31.26'26° E on the north-eastern part of Mpumalanga Province of South Africa.

A semi-structured questionnaire was used to collect data. The interviews were face to face among participants comprised of elderly people, community adults and youths. Snowball technique based on referrals was used in getting participants, whereby participants identified others who can participate in study to be interviewed. The interviews focused on plants used as fuelwood, their alternatives in the absence

of preferred species, the rules regarding harvesting of fuelwood, and prohibited fuelwood species. All participants signed prior informed consent forms as a way of acknowledgement of understanding what the interviews were all about. Plant specimens collected for each plant species mentioned during the interviews were identified and deposited in the Department of Botany Herbarium at the University of Venda. For ethical compliance the research was approved and registered by the University of Venda Research Ethics Committee as project number SMNS/17/BOT/01/0905. The frequency index of preferred fuelwood species was calculated as  $FI = FC/N \times 100$  where FI denotes the frequency index, which expresses the percentage of frequency of listing a plant species by participants. FC is the number of participants who listed the plant species and N is the total number of participants (Madikizela et al 2012).

### RESULTS AND DISCUSSION

Sixty-eight participants were interviewed in the study and the demographic profile is given in Table 1.

**Utilization of fuelwood tree species:** Sixteen fuelwood species of which thirteen are native tree species while three are naturalized tree species (*Eucalyptus grandis*, *Pinus patula* and *Acacia cyclops*) were preferred fuelwood plants (Table 2). Chamier et al (2012) recorded similar naturalized species where some of the species demonstrated great impact on soil quality in South Africa. The increased litter or

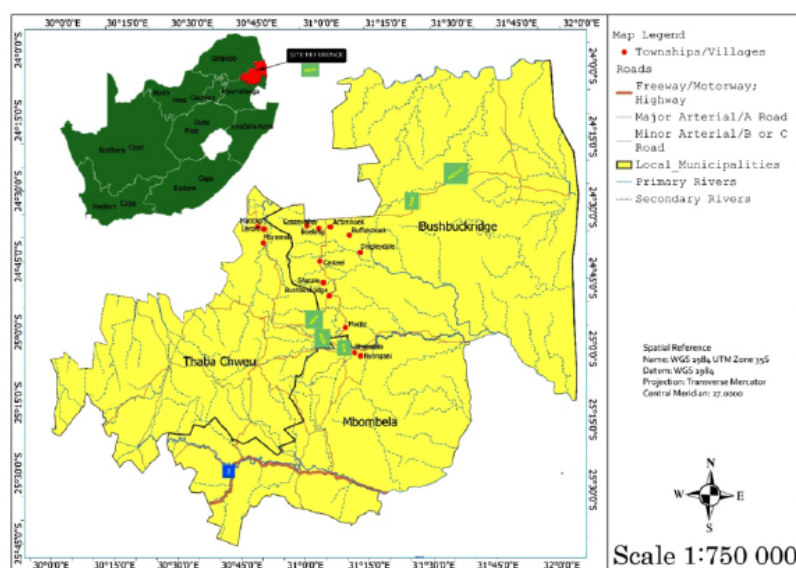


Fig. 1. Map of Ehlanzeni local municipalities of Mpumalanga Province in South Africa (study sites are marked with red dots)

**Table 1.** Demographic structure of participants

Parameter	Specification	Frequency	Percentage (%)
Gender	Male	10	15
	Female	58	85
Status	Youth (20-35)	9	10
	Community adult (36-59)	24	35
	Elder (60-99)	35	50
Education	None	12	18
	Primary	17	25
	Secondary	34	50
	Tertiary	5	7

biomass production changed the soil or litter chemistry and nitrogen fixation system. Even though naturalized tree species are used, preference of native species has not shifted and pressure on native species remains high as the utilization levels rise. Pressure from utilization and naturalized species result in the displacement of native species (Shackleton et al 2015). The villages where Mapulana people inhabit are surrounded by commercial farms of *Eucalyptus* and *Pinus* species (Shackleton 2000). Puentes-Rodriguez et al (2017) also observed thirteen preferred plant species depicting a limited number of plants species to be used in the future. Cardoso et al (2017) recorded 19 native species and three naturalized species.

In this study *Dichrostachys cinerea* sub sp. *africana* had the highest frequency index followed by *Senegalia ataxacantha*, *Peltophorum africanum* and *Combretum* spp.

(Table 2). *Dichrostachys cinerea* sub sp. *africana*, *P. africanum* and *Combretum imberbe* where the most preferred species due to their properties of dense wood and little smoke (Madubansi and Shackleton 2007, Maroyi and Rasethe 2015). Rules placed by the traditional authorities in the communities permits harvesting or pruning of dry thorny plant species for fuelwood irrespective of their edibility. These qualifies the preference of *D. cinerea* sub sp. *africana* and *S. ataxacantha*. *D. cinerea* sub sp. *africana* and *Terminalia sericea* again meet the criteria because they are reported to be some of the dominant species in bush encroachment (Stafford et al 2017). Plant species with large numbers of carbon content has great heating value, while high moisture and ash content reduces high heating value of fuelwood species (Sedai et al 2016). Species that produce low smoke or ash have high calorific value and durability (Martínez 2015).

The community members are aware of the environmental threats affecting biodiversity (Adam 2014). Mapulana people of Bushbuckridge agrees with Kirkland et al (2007) that there is depletion of bush in their area. Fields of natural vegetation within Mapulana communities has been turned into settlement areas filled with sprawling Reconstruction and Development Programme houses thereby resulting in communities purchasing fuelwood from the neighboring villages or farms. In Thaba Chweu, protected areas where fenced and the fencing was either stolen or removed. In Nigeria, communities believe that conservation of natural resources can be achieved only if the government

**Table 2.** Fuelwood tree species of Mapulana people

Local name	Scientific name	Family	Frequency index
Moreke	<i>Dichrostachys cinerea</i> (L.) Wight & Am. subsp. <i>africana</i> Brenan & Brummitt var. <i>africana</i>	Fabaceae	51
Mogamuse	<i>Eucalyptus grandis</i> W. Hill	Myrtaceae	31
Mogaletlwa (Legaletlwa)	<i>Senegalia ataxacantha</i> (DC.) Kyalangaliwa & Boatwr. *	Fabaceae	28
Mosehla	<i>Peltophorum africanum</i> Sond.	Fabaceae	21
Semoto / Mokgwelere / Modiba / Mokabe / Moduma	<i>Combretum imberbe</i> Wawra / <i>Combretum molle</i> R. Br. ex G. Don / <i>Combretum collinum</i> Fresen.	Combretaceae	21
Mopai	<i>Pinus patula</i> Schlttdl. & Cham. var. <i>patula</i> *	Pinaceae	16
Mogonono / Mososo	<i>Terminalia sericea</i> Burch. ex DC.	Combretaceae	15
Segoi / Semata / Senokomaro	<i>Zanthoxylum capense</i> (Thunb.) Harv.	Rutaceae	10
Sepalate / Morothomabela	<i>Albizia versicolor</i> Welw. Ex Oliv.	Fabaceae	10
Morotho	<i>Cussonia transvaalensis</i> Reyneke	Araliaceae	7
Mosabai / Mopayi	<i>Ficus glumosa</i> Delile	Moraceae	5
Moshiteshite	<i>Acacia cyclops</i> A. Cunn. ex G. Don*	Fabaceae	3
Sephashu se sekologo	<i>Gymnosporia buxifolia</i> (L.) Szyszyl.	Celastraceae	3
Mokomo	<i>Rauvolfia caffra</i> Sond.	Apocynaceae	3

Plant status- \* naturalized and the rest are native

can create more employment opportunities, resulting in public awareness and education that will assist the community in understanding the value of forests (Ifegbesan et al 2016).

**Alternative tree species utilized as fuelwood:** Mapulana communities resorted to the utilization of fruits tree species as fuelwood to curb scarcity or shortage, and collection is mainly done on communal lands, protected areas, neighboring farms and homesteads. Matsika et al (2013) observed three reasons that the communities of Athol and Welverdiend used to curb fuelwood shortages. They use electricity as an alternative, create fuelwood markets and also extend territory for fuelwood collection. Kirkland et al (2007) and Findlay (2013) however, reported that fuelwood shortage was caused by poverty, high unemployment rates, commercial gains and increased population size in some villages around Bushbuckridge municipality. Madubansi and Shackleton (2007) further elaborated that the preference of fuelwood species depends on the relative abundance or scarcity of specific species. Limited distribution of native species force communities to search for alternatives fuelwood (Kunwar et al 2018). The utilization of plant species used as fruits or spices or foliage trees through pruning is encouraged as alternative fuelwood (Cardoso et al 2017, Scheid et al 2018). Responding to fuelwood scarcity communities resolved to using transportation when collecting fuelwood, whereby large amounts of fuelwood is collected (Abdullahi and Oruonye 2009, Scheid et al 2018, Guild and Shackleton 2018) Preference of fuelwood species depended on quality of fuelwood collected (Joshi et al 2018)

Twenty-eight species used as fruits and fuel wood were identified (Table 3). Seventy-five percent (21 species) of the tree species are native while twenty-five percent (7 species) are naturalized species. Surprisingly fruit tree species listed by elders as non-wood are the preferred ones. *Parinari curatellifolia*, *Sclerocarya birrea* subsp. *Caffra* and *Trichilia dregeana* is used for fuelwood, Similar results were observed by Rasethe et al (2013) and Maroyi and Rasethe (2015), where *S. birrea* subsp. *caffra* was utilized as fruits and fuelwood. Rasethe et al (2013) further elaborated that despite its high utilization *S. birrea* subsp. *caffra* is a protected species in terms of National Forests Act of 1998 of South Africa. In central Argentina Martínez (2015) observed 75% of native and 25% naturalized plants species utilized for fuelwood.

*Persea americana* and *Psidium guajava* use were low in fuelwood only but higher on the second category of fruits and fuelwood, while for *Mangifera indica* the case was vice-

versa. Municipal interventions on aspects of biodiversity such as fencing of prohibited areas and removal of naturalized species would be more effective if communicated with community members. The removal of *P. guajava* in some parts of Mapulana communities has left a complaining respond due to miscommunication by traditional leaders. *Diospyros mespiliformis*, *Strychnos spinosa*, *Strychnos madagascariensis* and *Syzygium cumini* are utilized as fruits and fuelwood. *S. birrea* subsp. *caffra*, *S. spinosa*, *D. mespiliformis* and *S. madagascariensis* has been utilized as fuelwood in some villages around Bushbuckridge municipality (Madubansi and Shackleton 2007). The utilization of fruit tree species as fuelwood has been recorded from different countries. *Prunus persica* and *Morus alba* were used for fuelwood in Kashmir, India (Islam et al 2018). *Schinus molle* used for fuelwood by small number of South African households (Shackleton and Shackleton 2018). *Annona senegalensis* sub sp. *senegalensis* and *D. mespiliformis* are used fuelwood in northern Ghana (Jasaw et al 2017). In Burkina Faso, *D. mespiliformis* is one of the preferred tree species sold as fuelwood (Puentes-Rodriguez et al 2017).

**Rules and regulation of harvesting tree species:** In almost all villages harvesting of wild fruits trees for fuelwood is prohibited as these are classed as food (Fig 2). The harvesting of live trees for fuelwood is also forbidden. There has been a tradition to only collect dry or dead wood as fuelwood and fruits from the wild. According to village culture or tradition certain plant species cannot be harvested conjunctionally, these applies to wild fruits and fuelwood. Failure to comply with the rules will result with a heavy fine from the traditional office. Rankoana (2016) reported an amount of \$70.50 as the minimum applicable fine depending on the crime committed. indlay and Twine (2018) further elaborated that there is misunderstanding about the issue rules and regulation concerning harvesting of fuelwood within communities. Certainly, there are rule given by the traditional authorizes but it is not clear who is responsible for making sure the people adhere.

Forty four percent of participants are follow rules placed by the traditional leaders within their villages which are one's own village but not neighboring communities (Table 4). Traditional health practitioner (THP) are among the 44% specifying rules concerning medicinal tree species harvesting. THP are required to issue permits or certificates acquired from the traditional associations for collection of roots, leaves and barks from wild tree species. Unsustainable harvesting challenges have been created by THP assistants who are ill informed about conservation of the plants. THP assistants from neighboring villages tend to

uproot plant species. Bukuluki et al (2014) observed the same result in Uganda. Kurui et al (2016) explains how medicinal plants are conserved in Kenya. In disagreement with twenty nine percent of participants who strongly believe that there are no rules. Twenty seven percent of participants agree with the latter that there are no rules but were in the past. Reasons for this misconception is observed by responds received from traditional leaders when crime is reported, how members from other neighboring communities invade and harvest resources with no fear of punishment or fine as fines are subjected to certain village members but not all. Rasethe et al (2013) reported that rules were perceived not effective because of no compliancy by villagers of Limpopo. Shumsky et al (2014) observed that different

responds for use of wild plants and inability to understand policies stipulated by foresters has resulted in heavy penalties for community member of Kenya. In Nigeria traditional leaders determine the quantity of land a family can possess and the access these rights differs from men and women (Ifegbesan et al 2016). Findlay and Twine (2018) affirms that permits should be issued to everyone who wishes to harvest plants for fuelwood.

**Species prohibited in fuelwood collection:** Sixteen percent of participants which are mostly elders and traditional health practitioner, has listed 9 trees species which are not to be utilized as fuelwood (non-wood) (Table 5).

*Euclea acris* pa subsp. *crispa*, *Philenoptera violacea* and *Vangueria infausta* are the common species known to be

**Table 3.** Fruit tree species utilized by Mapulana people as alternative fuelwood

Common name	Scientific name	Family	Fuelwood only	Fuelwood + fruits
Mmilo	<i>Vangueria nfausta</i> Baker	Rubiaceae	-	5
Mmola / Mopola	<i>Parinari curatellifolia</i> Planch. Ex Benth.	Chrysobalanaceae	16	4
Motjhidi	<i>Ximenia caffra</i> Sond var. <i>caffra</i>	Olacaceae	-	1
Mogo	<i>Ficus sur</i> Forssk.	Moraceae	-	5
Mogotlho	<i>Trichilia dregeana</i> Sond.	Meliaceae	9	-
Mothakawume	<i>Flueggea virosa</i> (Roxb. ex Willd.) Voigt subsp. <i>virosa</i>	Phyllanthaceae	1	1
Mothakolane	<i>Euclea divinorum</i> Hiern	Ebenaceae	4	-
Motlhaswa	<i>Litchi chinensis</i> Sonn.*	Sapindaceae	-	3
Motlhaswawathaga	<i>Englerophytum magalismontanum</i> (Sond.) T.D. Penn.	Sapotaceae	1	-
Motlho	<i>Syzygium cumini</i> (L.) Skeels*	Myrtaceae	-	7
Mogwagwa	<i>Strychnos madagascariensis</i> Poir.	Strychnaceae	-	11
Mokotapeni	<i>Persea americana</i> Mill.*	Lauraceae	3	7
Mokumo	<i>Ficus thonningii</i> Blume	Moraceae	2	-
Monamona	<i>Citrus sinensis</i> Pers.*	Rutaceae	1	1
Moneyi	<i>Berchemia zeyheri</i> (Sond.) Grubov	Rhamnaceae	-	1
Mongaba	<i>Psidium mguajava</i> L.*	Myrtaceae	1	3
Mongosi	<i>Mangifera indica</i> L.*	Anacardiaceae	4	3
Mooka	<i>Vachellia nilotica</i> (L.) P.J.H. Hurter & Mabb. subsp. <i>Kraussiana</i> (Benth) Kyal. & Boatwr.	Fabaceae	1	1
Mopeta	<i>Prunus persica</i> (L.) Barsch*	Rosaceae	3	-
Morula	<i>Sclerocarya birrea</i> (A. Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro	Anacardiaceae	12	12
Moshala	<i>Strychnos spinosa</i> Lam. subsp. <i>spinosa</i>	Strychnaceae	-	11
Mothalo / Mokgalo	<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	Rhamnaceae	3	-
Mothokolo	<i>Carissa edulis</i> (Forssk.) Vahl	Apocynaceae	-	3
Motilwane	<i>Antidesma venosum</i> E. Mey. Ex Tul.	Phyllanthaceae	-	1
Motlepo	<i>Annona senegalensis</i> Pers. subsp. <i>senegalensis</i>	Annonaceae	-	4
Motsadi	<i>Ximenia americana</i> L. var. <i>americana</i>	Olacaceae	-	2
Motsere	<i>Bridelia micrantha</i> (Hochst.) Baill.	Phyllanthaceae	3	-
Motsoma	<i>Diospyros mespiliformis</i> Hochst. ex A.DC.	Ebenaceae	-	13

Plant status- \* naturalized and the rest are native

**Table 4.** Responds on adhering to rulesen forced by traditional leaders within villages

Parameter	Percentage %
Non-wood	16
Rules in immediate villages	44
No rules	29
No rules, but were in the past	27

**Table 5.** Species forbidden to be utilized as fuelwood

Species Name	Frequency Index
Mmilo ( <i>Vangueria infausta</i> Baker)	36
Mogo ( <i>Ficus sur</i> Forssk.)	27
Motjhidi ( <i>Ximenia caffra</i> Sond var. <i>caffra</i> )	27
Mothakola swifi ( <i>Euclea crispa</i> (Thunb.) Gurke subsp. <i>crispa</i> )	45
Motlho ( <i>Syzygium cumini</i> (L.) Skeels)	9
Mokomo <i>Rauvolfia caffra</i> Sond.	9
Mophata ( <i>Philenoptera violacea</i> (Klotzsch) Schrire)	45
Mothalo / Mokgalo <i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	18
Motllepo ( <i>Annona senegalensis</i> Pers. subsp. <i>senegalensis</i> )	9

forbidden. Giannecchini et al (2007) observed the harvesting live trees species prohibition in some villages around Bushbuckridge municipality. Kirkland et al (2007) and Prinsloo (2014) reported the utilization of wild fruits trees species for fuelwood. The control over this issues has deteriorated from the traditional leaders due to the democratic change or political status of community members (Kirkland et al 2007, Shumsky et al 2014). It has been assumed that there are no more rules. Elderly people have revealed the latter as one of the causes of overexploitation of natural resources. Other reasons where large population size, high unemployment rates, faded respect for traditional leaders and behavioral life style of the younger generation. Findlay and Twine (2018) address that the faded respect is due to nepotism, corruption, bribery and traditional authorizes fearing for their lives.

### CONCLUSION

Mapulana utilize few tree species as fuelwood. In supplementing these species fruit species are utilized as alternative fuelwood. As stipulated from the current study, that every community has rules to protect the biodiversity, but not adhered to. Mapulana require environmental awareness

education on aspects of saving the biodiversity. Municipal intervention on aspects of biodiversity would be more effective if communicated with the communities in overall, which in turn will assist in vegetation protection.

### ACKNOWLEDGMENTS

National Research Foundation (Grant number 102082) is appreciated for providing funding for the study. Special thanks and appreciation is given to all study participants and village assistants. University of Venda is equally appreciated for providing necessary equipment, infrastructure and funding (Project number SMNS/17/BOT/01).

### REFERENCES

- Abdullahi J and Oruonye E D 2009. Fuelwood trading and livelihood sustainability: A case study of Damaturu Metropolis, Yobe State, Nigeria. *Ikhogho* 7(3): 34-43.
- Adam YO 2014. Local knowledge on trees utilization and their existing threats in Rashad district of Nuba local knowledge on trees utilization and their existing threats in Rashad district of Nuba. *Journal of Forest and Environmental Science* 30(4): 342-350.
- Bhatt BP, Lemtur M, Changkija S and Sarkar B 2017. Fuelwood characteristics of important trees and shrubs of Eastern Himalaya. *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects* 39(1): 47-50.
- Bukuluki P, Luwangula R and Walakira EJ 2014. Harvesting of medicinal plants in Uganda: Practices, conservation and implications for sustainability of supplies. *International Journal of Medicinal Plant Research* 3(1): 1-10.
- Cardoso MB, Hayd A and Lozada M 2017. Niche breadth and redundancy: Useful indices to analyse fuelwood use in rural communities. *Journal of Arid Environments* 145: 52-59.
- Cardoso MB, Ladio AH and Lozada M 2012. The use of firewood in a Mapuche community in a semi-arid region of Patagonia, Argentina. *Biomass and Bioenergy* 46: 155-164.
- Chamier J, Schachtschneider K, Maitre DC, Ashton, PJ and van Wilgen BW 2012. Impacts of invasive alien plants on water quality , with particular emphasis on South Africa. *Water SA* 38(2): 345-356.
- Findlay S 2013. *Clearing the Confusion: The roles of local formal institutions in regulating firewood harvesting in Bushbuckridge, South Africa*. M.Sc. dissertation, University of Witwatersr and, Johannesburg.
- Findlay S and Twine, W 2018. Chiefs in a democracy: A case study of the 'new' systems of regulating firewood harvesting in post-apartheid South Africa. *Land* 7(1): 35.
- Giannecchini M, Twine W and Vogel C 2007. Land-cover change and human-environment interactions in a rural cultural landscape in South Africa. *The Geographical Journal* 173(1): 26-42.
- Guild J and Shackleton CM 2018. Informal urban fuelwood markets in South Africa in the context of socio-economic change. *Energy Policy* 117: 136-41.
- Hussain A 2017. Fuelwood consumption patterns by semi-nomadic pastoralist community and its implication on conservation of Corbett Tiger. *Energy, Ecology and Environment* 2(1): 49-59.
- Ifegbesan AP, Annegarn HJ, Pendlebury S and Ramped IT 2016. Gender relationships in forest resource utilization and conservation in Nigeria: implications for environmental sustainability. *Gender and Behaviour* 14(1): 6996-7010.
- Islam MA, Sofi PA, Bhat GM, Wani AA, Gatoo AA and Malik AR 2018. The determinants of fuel wood exploitation for household energy security in Kashmir Himalaya, India. *Journal of*

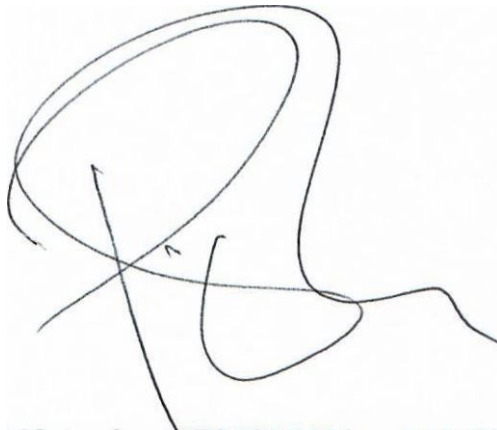
- Pharmacognosy and Phytochemistry* 7(2): 3548-3554.
- Jasaw GS, Saito O, Gasparatos A, Shoyama K, Boafa YA and Takeuchi K 2017. Ecosystem services trade-offs from high fuelwood use for traditional shea butter processing in semi-arid Ghana. *Ecosystem Services* 27: 127-138.
- Johnson NG and Bryden KM 2012. Factors affecting fuelwood consumption in household cookstoves in an isolated rural West African village. *Energy* 46(1): 310-321.
- Joos-Vandewalle S, Wynberg R and Alexander KA 2018. Dependencies on natural resources in transitioning urban centers of northern Botswana. *Ecosystem Services* 30: 342-349.
- Joshi BC, Rawal RS, Sekar KC and Tewari A 2018. Assessment of fuelwood resource preference in representative watershed of west Himalaya, India: conservation and management implications. *Environment, Development and Sustainability* 17: 231-238.
- Kirkland T, Hunter LM and Twine W 2007. "The Bush is No More": Insights on institutional change and natural resource availability in rural South Africa. *Society and Natural Resources* 20(4): 337-350.
- Kunwar RM, Evans A, Mainali J, Ansari AS, Rimal B and Bussmann RW 2018. Change in forest and vegetation cover influencing distribution and uses of plants in the Kailash Sacred. *Environment, Development and Sustainability*.
- Kurui CM, Kiptui M, Chelang'a, JK and Omondi P 2016. Traditional Controls of Harvesting and Conserving Medicinal Plants in Keiyo South Sub-Country, Kenya. *International Journal of Humanities and Social Science* 6(11): 54-63.
- Madikizela B, Ndhala A, Finnie JF and Van Staden J 2012. Ethnopharmacological study of plants from Pondoland used against diarrhoea. *Journal of Ethnopharmacology* 141(1): 61-71.
- Madubansi M and Shackleton CM 2007. Changes in fuelwood use and selection following electrification in the Bushbuckridge lowveld, South Africa. *Journal of Environmental Management* 83: 416-426.
- Makonese T, Ifegbesan AP and Rampedi IT 2017. Household cooking fuel use patterns and determinants across southern Africa: Evidence from the demographic and health survey data. *Energy and Environment* 29(1): 29-48.
- Maroyi A and Rasethe MT 2015. Comparative use patterns of plant resources in rural areas of South Africa and Zimbabwe. *International Journal of Experimental Botany* 84: 288-297.
- Martinez GJ 2015. Cultural patterns of firewood use as a tool for conservation: A study of multiple perceptions in a semi-arid region of Cordoba, Central Argentina. *Journal of Arid Environments* 121: 84-99.
- Masunungure C and Shackleton SE 2018. Exploring long-term livelihood and landscape change in two semi-arid sites in southern Africa: Drivers and consequences for social-ecological vulnerability. *Land* 7(2): 8-16.
- Matsika R, Erasmus BFN and Twine WC 2013. Double jeopardy. The dichotomy of fuelwood use in rural South Africa. *Energy Policy* 52: 716-725.
- Prinsloo OS 2014. *The relative influences of gradients in rainfall and landscape position on woody vegetation composition and structure in communal rangelands in Bushbuckridge, Mpumalanga Province*. M.Sc. dissertation, University of Witwatersrand, Johannesburg.
- Puentes-Rodriguez Y, Torssonon P, Ramcilovik-Suominen S and Pitkanen S 2017. Fuelwood value chain analysis in Cassou and Ouagadougou, Burkina Faso: From production to consumption. *Energy for Sustainable Development* 41: 14-23.
- Rankoana SA 2016. Sustainable use and management of indigenous plant resources: A case of Mantheding community in Limpopo province, South Africa. *Sustainability* 8: 1-13.
- Rasethe M, Semanya S, Potgieter M and Maroyi A 2013. The utilization and management of plant resources in rural areas of the Limpopo Province, South Africa. *Journal of Ethnobiology and Ethnomedicine* 9: 1-8.
- Scheid A, Hafner J, Hoffmann H, Kächele H, Sieber S and Rybak C 2018. Fuelwood scarcity and its adaptation measures: an assessment of coping strategies applied by small-scale farmers in Dodoma region, Tanzania. *Environmental Research Letters* 13.
- Sedai P, Kalita D and Deka D 2016. Environmental Effects Assessment of the fuel wood of India: A case study based on fuel characteristics of some indigenous species of Arunachal Pradesh. *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects* 38(7): 891-897.
- Shackleton RT, Le Maitre DC, van Wilgen BW and Richardson DM 2015. Use of non-timber forest products from invasive alien Prosopis species (mesquite) and native trees in South Africa: implications for management. *Forest Ecosystems* 2: 1-11.
- Shackleton C and Shackleton S 2004. The importance of non-timber forest products in rural livelihood security and as safety nets: a review of evidence from South Africa. *South African Journal of Science* 100: 658-664.
- Shackleton CM 2000. Comparison of plant diversity in protected and communal lands in the Bushbuckridge lowveld savanna, South Africa. *Biological Conservation* 94: 273-285.
- Shackleton SE and Shackleton RT 2018. Local knowledge regarding ecosystem services and disservices from invasive alien plants in the arid Kalahari, South Africa. *Journal of Arid Environments* 159: 22-33.
- Shumsky S, Hickey GM, Johns T, Pelletier B and Galaty J 2014. Land Use Policy Institutional factors affecting wild edible plant (WEP) harvest and consumption in semi-arid Kenya.
- Sole T and Wagner C 2018. Understanding domestic fuel use practices in an urban township. *Building Research and Information* 46(2): 220-230.
- Stafford W, Birch C, Etter H, Blanchard R, Mudavanhu S, Angelstam P, Blignaut J, Ferreira L and Marais C 2017. The economics of landscape restoration: benefits of controlling bush encroachment and invasive plant species in South Africa and Namibia. *Ecosystem Services* 1-10.
- TRS 2012. *A survey of energy-related behaviour and perceptions in South Africa*. The Residential Sector, Department of Energy, Republic of South Africa.

Received 28 February, 2019; Accepted 24 March, 2019

## APPENDIX E: LETTER FROM EDITOR

7 March, 2019

This is to certify that I, **Dr P Kaburise**, of the English Department, University of Venda, have proofread the research report entitled - **THE ETHNOBOTANICAL INVESTIGATION OF THE MAPULANA OF EHLANZENI DISTRICT MUNICIPALITY, MPUMALANGA PROVINCE, SOUTH AFRICA** - by **Shalom Pabalelo Mashile (11565014)**. I have indicated some amendments which the student has undertaken to effect, before the final report is submitted.



**Dr P Kaburise (0794927451)**

---

**Dr P Kaburise: BA (Hons) University of Ghana (Legon, Ghana); MEd University of East Anglia (Cambridge/East Anglia, United Kingdom); Cert. English Second Language Teaching, (Wellington, New Zealand); PhD University of Pretoria (South Africa)**

## APPENDIX F: PICTURES OF MAJORITY OF PLANT SPECIES UTILIZED



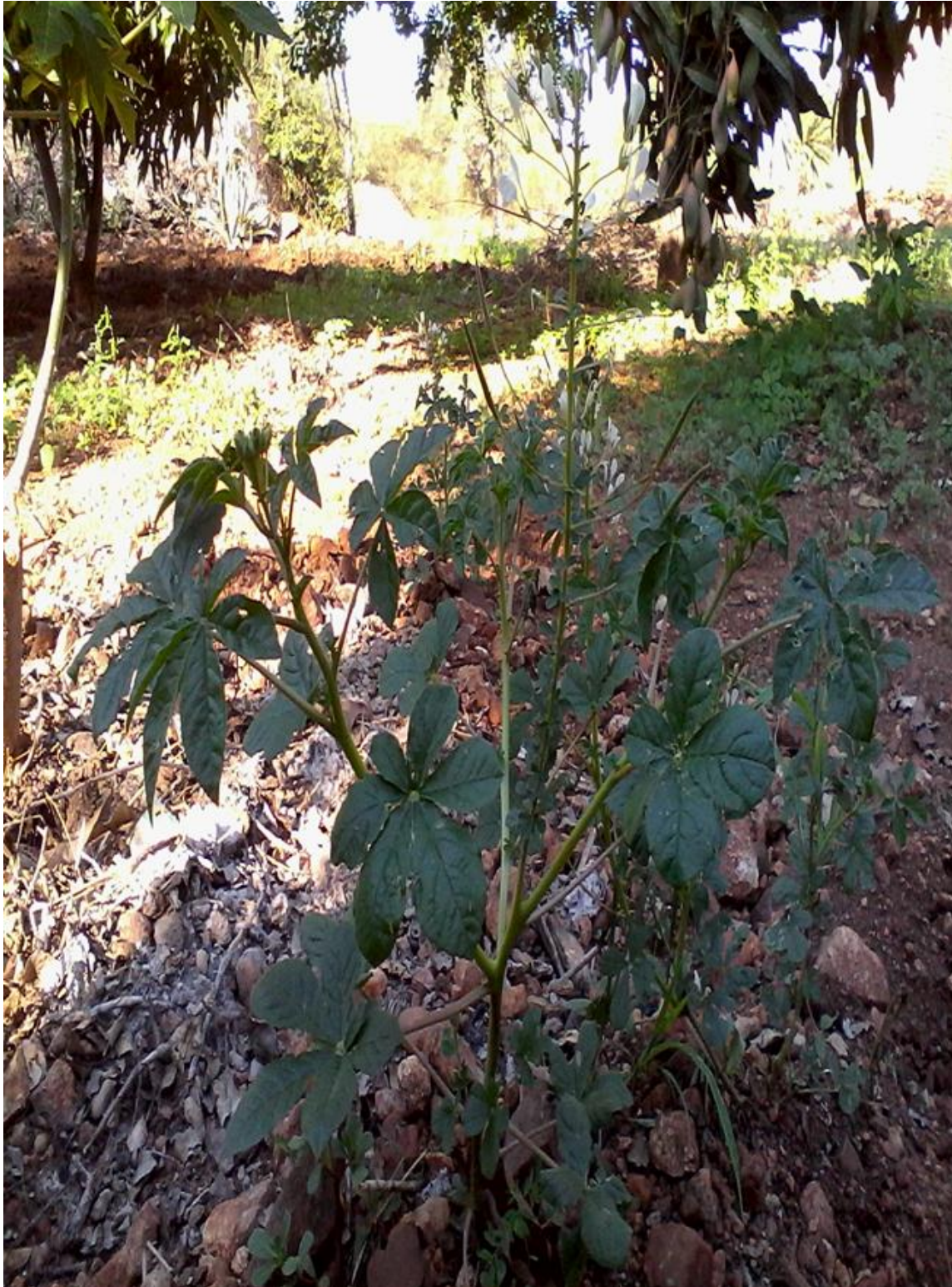
SP 1 Mogokgoma - *Berchemia discolor* (Klotzsch) Hemsl.



SP 2 Moringa - *Moringa oleifera* Lam.



**SP 3** Motlho - *Syzygium cumini* (L.) Skeels



SP 4 Lerotho - *Cleome gynandra* L.



SP 7 Mophopho - *Carica papaya* L.



**SP 8** Mobanana - *Musa acuminata* Colla



SP 9 Kgopa - *Aloe marlothii* A.Berger



**SP 10** Legalane - *Aloe zebrina* Baker



**SP 12** Lekgwathane - *Cucumis zeyheri* Sond.



**SP 14** Monawa - *Vigna unguiculata* (L.) Walp.



**SP 15** Theepe - *Amaranthus hybridus* L.



**SP 17** Mothalo - *Ziziphus mucronata* Willd. subsp. *Mucronata*



**SP 18** Mmilo - *Vangueria infausta* Baker



**SP 19** Motlhakolane - *Euclea divinorum* Hiern



**SP 21** Motlhakola swifi - *Euclea crispa* (Thunb.) Gurke subsp. *Crispa*



**SP 23** Motjhidi - *Ximenia caffra* Sond var. *caffra*



**SP 24** Mosetlha - *Peltophorum africanum* Sond.



**SP 26** Mososo - *Terminalia sericea* Burch. ex DC.



**SP 88** Mokumo - *Ficus thonningii* Blume



**SP 22** Motsoma - *Diospyros mespiliformis* Hochst. ex A.DC.



**SP 11** Dithoke - *Cucurbita maxima* Dechesne



**SP 31** Mphata - *Philenoptera violacea* (Klotzsch) Schrire



**SP 33** Semoto - *Combretum imberbe* Wawra



**SP 34** *Cissus cactiformis* Gilg



**SP 35** Mpharatshena - *Grewia flavescens* Juss



**SP 39** Mokgokoko - *Bridelia mollis* Hutch.



**SP 40** Moshekamolapo - *Gomphocarpus fruticosus* (L.) Spreng.



**SP 41** Motatabaloyi - *Abrus precatorius* L. subsp. *Africanus*



**SP 42** Mofetlhala - *Bauhinia galpinii* N.E.Br



**SP 44** Motlhakawume - *Flueggea virosa* (Roxb. ex Willd.) Voigt subsp. *Virosa*



**SP 46** Lesegi - *Cyperus latifolius* Poir.



**SP 47** Lenogane - *Senna occidentalis* (L.) Link



**SP 52** Sefashu - *Gymnosporia senegalensis* (Lam.) Loes.



**SP 53** Makgobata - *Fallopi convolvulus* (L.) Holub



**SP 54** Motsoma - *Diospyros lycioides* Desf.



**SP 56** Spalate - *Albizia versicolor* Welw. ex Oliv.



**SP 58 Segoi** *Zanthoxylum capense* (Thunb.) Harv.



**SP 59** Mothobesetsane - *Castanospermum austral* A.Cunn. & C.Fraser



**SP 60** Monopi - *Schotia brachypetala* Sond.



**SP 61** Mogwagwa - *Strychnos madagascariensis* Poir



**SP 62** Monepenepe - *Cassia abbreviata* Oliv. subsp. *beareana* (Holmes) Brenan



**SP 63** *Conostomium natalense* (Hochst.) Bremek. var. *natalense*



**SP 64** *Sida acuta* Burm.f. subsp. *Acuta*



**SP 65** Malala a kwaele - *Dicerocaryum eriocarpum* (Decne.) Abels



**SP 66** Moseemane - *Vachellia karroo* (Hayne) Banfi & Glasso



**SP 67** Modimotsane wo mogolo - *Hypoxis hemerocallidea* Fisch., C.A.Mey. & Ave-Lall



**SP 69** Mokgakgwa - *Cyphostemma woodii* (Gilg & M.Brandt) Desc.



**SP 71** Motlho wa tlhaga - *Syzygium cordatum* Hochst. ex C.Krauss subsp. *cordatum*



**SP 73** Motlhemaphogo - *Clematis brachiata* Thunb.



**SP 75** Lebipo - *Cocculus hirsutus* (L.) Diels



**SP 76 Motllepo - *Annona senegalensis* Pers. subsp. *Senegalensis***



**SP 77** Modimotsane wo monyana - *Hypoxis rigidula* Baker var. *rigidula*



**SP 79** Letladiane - *Agapanthus africanus* (L.) Hoffmanns. subsp. *Africanus*



**SP 80** Moshukutjwane - *Lippia javanica* (Burm.f.) Spreng



**SP 82** Mabelemabutjwa - *Lantana rugosa* Thunb.



**SP 96** Sethuse - *Ledebouria revoulute* (L.f.) Jessop



**SP 84** Foyyiya - *Opuntia ficus-indica* (L.) Mill.



**SP 85** *Guilleminea densa* (Willd. ex Roem. & Schult.)



**SP 86** Mokhura - *Ricinus communis* L.



**SP 89** Serokolo - *Siphonochilus aethiopicus* (Schweinf.) B.L.Burt



**SP 91** Mogranata - *Punica granatum* L.



**SP 92** Konofolo - *Allium sativum* L.



**SP 94** Mophophoshatlha - *Cussonia transvaalensis* Reyneke



**SP 101** Khanya kude - *Vachellia xanthophloea* (Benth.) P.J.H.Hurter



SP 102 Lenganangana - *Artemisia afra* Jacq. ex Willd. var. *afra*



**SP 103** Morula - *Sclerocarya birrea* (A.Rich.) Hochst. subsp. *caffra* (Sond.) Kokwaro



**SP 105** Mongaba - *Psidium guajava* L.



**SP 109** Mogaletlwa - *Acacia ataxacantha* DC.



**SP 111** Phedikakato - *Steganotaenia araliacea* Hochst. var. *araliacea*



SP 112 *Albuca seineri* (Engl. & K.Krause) J.C.Manning & Goldblatt



**SP 113** Sebabo - *Cyphostemma cirrhosum* (Thunb.) Desc. ex Wild & R.B.Drumm.  
subsp. *Cirrhosum*



**SP 114** Mogamose - *Eucalyptus grandis* W.Hill



**SP 115** *Mothibela tladi* - *Kalanchoe beharensis* Drake



**SP 116** Moreke - *Dichrostachys cinerea* (L.) Wight & Arn. subsp. *africana* Brenan & Brummitt var. *africana*



**SP 117** Motlhakolane - *Euclea divinorum* Hiern



**SP 125** Leaka – *Cassytha filiformis* L.



**SP 129** Mmilofasane - *Vangueria pygmaea* Schltr.



**SP 130** *Adenia digitata* (Harv.) Engl.



**SP 132** Semoto - *Combretum molle* R.Br. ex G.Don



**SP 133** Motlhatjwa wa tlhaga - *Englerophytum magalismontanum* (Sond.) T.D.Penn.



**SP 134** Lekgwara - *Cyperus latifolius* Poir



**SP 135** Mmola - *Parinari curatellifolia* Planch. ex Benth.



SP 136 Mogotlho - *Trichilia dregeana* Sond.



**SP 137** Mothokolopudi - *Rhoicissus tridentate* (L.f.) Wild & R.B.Drumm.



**SP 139** Mogo - *Ficus sur* Forssk.



**SP 140** *Leonotis ocymifolia* (Burm.f.) Iwarsson



**SP 141** Mokotapeni - *Persea americana* Mill.



**SP 143** Leghushe - *Corchorus olitorius* L.



**SP 144** Nkaka - *Momordica balsamina* L.



SP 148 *Nerium oleander* L.



**SP 149** *Carpobrotus edulis* (L.) L.Bolus subsp. *edulis*



SP 150 Motlho wa sekgowa - *Eriobotrya japonica* (Thunb.) Lindl.



**SP 152** Nkhutsega - *Momordica foetida* Schumach



**SP 153** Komashatlha - *Adenia gummifera* (Harv.) Harms var. *gummifera*



**SP 154** Lebatsabatsa - *Datura stramonium* L.



**SP 157** Mooka - *Acacia nilotica* (L.) Willd. ex Delile



**SP 159** Tholwane - *Solanum campylacanthum* Hochst. ex A.Rich. subsp. *panduriforme* (Drège ex Dunal) J.Samuels



**SP 161** Sepepetlane - *Cotyledon orbiculata* L. var. *orbiculata*



**SP 162** Roselinah - *Cinnamomum camphora* (L.) J.Presl



**SP 163** Sehonehone - *Philenoptera violacea* (Klotzsch) Schrire



**SP 164** *Adenium multiflorum* Klotzsch



**SP 166** Sefagama - *Ansellia africana* Lindl.



**SP 168** *Crassula obovata* Haw. var. *obovata*



**SP 169** Tsebe ya tlou - *Kalanchoe luciae* Raym.-Hamet subsp. *Luciae*



**SP 171** Mokgoshi - *Sasevieria hyacinthoides* (L.) Druce



**SP 172** Mokomo - *Rauvolfia caffra* Sond.



**SP 173** Mokorola kgogo - *Senna petersiana* (Bolle) Lock



**SP 174** Motombhula - *Manihot esculenta* Crantz



**SP 175** Mokgoropo - *Piliostigma thonningii* (Schumach.) Milne-Redh.



**SP 177** Mophiroku - *Lannea edulis* (Sond.) Engl. var. *edulis*



**SP 181** Monamona - *Citrus sinensis* Pers.



**SP 182** Mothokolo - *Carissa edulis* (Forssk.) Vahl



**SP 183** Motsadi - *Ximenia americana* L. var. *americana*



**SP 188** Moneyi - *Berchemia zeyheri* (Sond.) Grubov



**SP 195** Mopremi - *Prunus domestica* L.



**SP 198** Lerokwa - *Cleome monophylla* L.



**SP 201** Mopatilane - *Tylosema fassoglense* (Schweinf.) Torre & Hillc



**SP 202** Lehondo - *Sonchus oleraceus* L.



**SP 205** Bolopi - *Morus alba* L. var. *alba*



**SP 207** Thotho - *Solanum nigrum* L.



SP 212 Mmolafasane - *Parinari capensis* Harv. subsp. *Capensis*



**SP 214 Mashuping - *Chenopodium album* L.**



SP 216 Motsere - *Bridelia micrantha* (Hochst.) Bail



**SP 238** Segabja - *Ipomoea oblongata* E.Mey. ex Choisy



**SP 239** Sekeketjane - *Centella asiatica* (L.) Urb.



**SP 248** Motilwane - *Antidesma venosum* E.Mey. ex Tul.



**SP 267** Moshitja - *Bidens pilosa* L.



**SP 278** Ntshukelane - *Eriosema psoraleoides* (Lam.) G.Don



**SP 280** Mmoyo - *Acalypha petiolaris* Hochst. ex C.Krauss



SP 282 Mathalofasane - *Ziziphus zeyheriana* Sond.



SP 293 Modutu - *Phoenix reclinata* Jacq.



**SP 297** Motlhomoni - *Breonadia salicina* (Vahl) Hepper & J.R.I.Wood



**SP 302** Ngakhosa - *Galinsogo parviflora* Cav



**SP 303** Dikgare - *Ipomoea batatas* (L.) Lam



**SP 304a** Bohlwehlwe - *Searsia leptodictya* (Diels) T.S.Yi, A.J.Mill. & J.Wen



**SP 304b** Bohlwehlwe - *Searsia glauca* (Thunb.) Moffett



SP 314 Moshimane wadi pudi - *Dicoma zeyheri* Sond



**SP 318** Morulanopsana - *Lannea schweinfurthii* (Engl.) Engl. var. *stuhlmannii* (Engl.)  
Kokwaro