

Medicinal Plant Use and Trade Among the Samburu People in Maralal Town, Kenya

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Research

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Abstract

Background: The Samburu people have for the longest time used traditional knowledge on medicinal plants to treat diseases both in human and livestock due to the attributed belief of how effective they are. I set out to understand medicinal plant use and trade among the Samburu community in Maralal town. The objectives of this study were to; (1) identify and document the medicinal plants traded, (2) record the medicinal uses of identified plants, (3) document the parts of the plant used and methods of preparation.

Method: I conducted market surveys and held in-depth discussions with the traders on what plant parts were used and sold and where they collected and sourced their plants. I also joined collectors in the wild and collected samples for further identification.

Results: From the market surveys, a total of 24 plants species from 16 families were traded. Most of the plants were collected from Kirisia Forests Reserve and the arid shrublands within Samburu County. It was noted that *Myrsine africana* L., *Rotheca myricoides* (Hochst.) Steane & Mabb., *Rhamnus staddo* A.Rich., *Salvadora persica* L. and *Toddalia asiatica* (L.) Lam were the most popular species with buyers. Most of the plants were used to treat multiple ailments. Stomach related problems and respiratory disorders were some of the commonly treated ailments.

Conclusion: It is evident that use and trade of medicinal plant is an important economic activity in Maralal, however, overharvesting plants from the wild has contributed to some species like *Osyris lanceolata* Hochst. & Steud (East African sandalwood) and *M. africana* becoming rare and scarce hence the need to establish conservation measures and sustainable exploitation.

Introduction

Medicinal plants are an important ecosystem service in the provision of health care. Traditional knowledge on use of medicinal plants is actively practiced by many around the world. In Africa, communities use medicinal plants for prevention or treatment of diseases in both humans and livestock. To date, traditional knowledge on medicinal plants has traditional healers in sub-Saharan as key providers of healthcare (1) with about 80% of the population depending on it (2). Even with the availability of medical facilities such as hospitals, health centers, and clinics, the low cost of medicinal plants, its effectiveness, and availability have made it a preferred option especially by the rural population in Kenya (1). Ineffectiveness and dissatisfaction with conventional medicine have made the use of medicinal plants popular (3) especially in treating chronic diseases such as high blood pressure, diabetes, cancer, and hypertension (4). Others use medicinal plants to complement conventional medicine (5,6). In many African countries trade in medicinal plants form part of the informal economy contributing to the livelihood of the traders especially women (7–10). Interesting enough, when it comes to ethnobiological market studies very few or none at all have been carried out in the different parts of the world considering how simple it is (11). It is therefore important to study medicinal plants traded in local markets within a country to document and quantify traded products (12). This can provide estimates of species richness, highlight traded species that require urgent conservation action and especially those that have been overharvested (13). Traditional knowledge on medicinal plants not only shows a country's medicinal flora (8) but highlights the significance of traditional medicine on healthcare (14). Kenya has over 40 ethnic tribes each with its own unique culture and belief. Therefore, the knowledge and use of medicinal plants is different among the tribes. Most of the traditional knowledge on medicinal plants is orally passed down from one generation to next generation within the different tribes. Unfortunately, this important knowledge is quickly disappearing because most of the young generation now prefer white collars jobs in urban cities as alternative sources of income. In all the major urban markets in Kenya, there are traders selling or/and giving advice on medicinal plants products both as raw plant parts or/and readily available dosage that they have prepared themselves (15). Most of these medicinal products are traded as bitter liquid concoctions, bitter powders, sun dried roots, leaves, flowers and fruits. Quantity and quality controls are also questionable because most of the plant products are sold in open air markets where they are openly displayed and exposed to dust particles, they are stored and packed in recycled sacks, newspapers, plastic bottles, tins or bags which may affect the safety and hygiene of the medicine. Also, diagnosis concerns and uncertainty regarding dosage are some of the challenges associated with medicinal plants. In Kenya, there is no regulatory framework on medicinal plant use and trade, no detailed database on medicinal plants with most of the trade being informal and unregulated. There's also a lack of conservation effort of medicinal plants considering majority of the plant products are harvested from the wild. To recognize plant species that require conservation priorities, it is important to understand species traded and amounts sold (14) hence the need for market surveys. The objectives of this study were to; (1) identify and document the medicinal plants traded in Maralal town, (2) record the medicinal uses of identified plants, (3) document the parts of the plant used and methods of preparation.

Material And Methods

2.1. Study area

This study was carried out in Maralal town, Samburu County. It is one of the counties in the Northern drylands of Kenya with an estimated population of 310,327 (16). The county is about 21,000 km² of which 3,288 square Km (15.5% of the County land area) is under gazette forests, 170 Km² is under game reserves and a sanctuary while 1.8Km² is under surface water. Maralal town 1° 5' 10.9680" N and 36° 42' 1.2384" E.(Fig. 1) which is 350km from Nairobi is the administrative capital of Samburu county. The town settles at the foothills of Kirisia Hills. The Samburu people form the majority of the population, however, there are other notable communities such as Turkana, Borana, and Pokot. Economic activities revolve around livestock keeping mainly nomadic pastoralists who keep cattle, sheep, goats and camels.

3.2 Medicinal plant use by the Samburu

The Samburu are livestock keeping pastoralists living in Northern Kenya. They mainly keep cattle, goats, sheep and sometimes camels, and donkeys. Plant resources play an essential part in life for the Samburu by providing fodder for livestock, construction materials, food cultural practices and traditional

medicine. Like their relatives (Maasai) in Southern Kenya, The Samburu have for the longest time used medicinal plants that have been attributed by the belief of how effective traditional medicine is (17). Several other studies have documented the same (18–22)

3.2 The medicinal plant traders

A total of 33 traders were interviewed. Out of the 33 middle aged traders, only two were men. 90% of the traders were above 50 years old with the oldest being 68 years. The traders have collectors who supply them with the plants. Majority of the traders are from the Samburu ethnic group and a few from Turkana. Apart from medicinal plants, the traders also sold other items such as traditional Samburu knives and bead jewelry.

3.3 Market Surveys and plant collection

I conducted the market surveys in August 2019 and January 2020 in Maralal town. I purchased medicinal plants from the traders to be conversant with the most used and traded plant species. Traders were also interviewed on a voluntary basis. The interviews were conducted in Samburu language through a translator with a focus on species of plants traded, where the species were collected, cost of the plant product and mode of administration. Information on individual plant products sold, plant parts, uses, and preparation was also recorded. All traded plant parts were identified using local names (Samburu) which were later matched with the Latin names from literature. Most of the plant parts were sold as a single species or in a mixed liquid concoction used to treat specific ailment. The Plant List 2013 (<http://www.theplantlist.org/>) was used to spell all the Latin names. To further identify and confirm the medicinal uses of the traded plants, review of literature was done. I accompanied three collectors and collected twenty-two specimen samples of the traded plant apart from *Osyris lanceolata* Hochst. & Steud and “Lolpiyayo”. The plants were collected from the dry shrublands in Maralal, Wamba, and from Kirsia forest and deposited at the Herbarium, National Museums of Kenya. Due to legal restrictions and scarcity of *O. lanceolata* it was impossible to collect any samples. For “Lolpiyayo” none of the available collectors could identify the plant in the wild.

[1] <http://www.kenya-information-guide.com/samburu-county.html>

Results

4.2 Medicinal plants trade and use

From the market surveys, 24 plant species from 16 families were traded (Table 1). 15 of the 24 plants were collected from Kirsia Forest Reserve (Table 2), while the other nine were collected from the arid shrublands near Maralal and Wamba towns. Five species were popular with buyers according to the traders *Myrsine africana* L. (Seketet), *Rothea myricoides* (Hochst.) Steane & Mabb. (Lmakutikuti), *Rhamnus staddo* A.Rich. (Lkukulai), *Salvadora persica* L. (Sekotei) and *Toddalia asiatica* (L.) Lam. (Leparmunyo). Apart from its medicinal values, *S. persica* was popular for dental cleanliness as a toothbrush. Most of the plants were used to treat more than one ailment. Those used to treat sexually transmitted diseases such as *R. myricoides* were listed as the strongest and most dangerous. Four of the traded plants *Ajuga remota* Benth, *Zanthoxylum chalybeum* Engl., *Cissus rotundifolia* Vahl and *Cissus quadrangularis* L were also used to treat diseases in livestock. *Osyris lanceolata* Hochst. & Steud was one of the traded species and due to overharvesting, it has become rare to find in the wild. The species is currently listed as illegal to harvest or trade any part, in Kenya, however, the traders didn't seem to know this. To portion the quantity of product to sell, a 100 grams recycled tin was used to measure seeds, small pieces of bark, and roots (Picture 1). The price was standard at \$0.45 per 100 grams for most of the traded parts. A bundle of barks or stems (Picture 2 and Picture 3) was sold at \$1. Most of the medicinal plants traded were in dry form mainly roots, barks, leaves, and seeds. Also, a cold bitter decoction of eight plant species mixed and boiled together was sold by a few traders. The decoction was known by the local name as “Lekeek isiet” and was made using *R. prinoides*, *T. asiatica*, *R. staddo*, *R. myricoides*, *M. africana*, *U. massaica*, *C. spinarum* and *Croton megalocarpus* Hutch.

Table 1

Medicinal plant species traded in Maralal town: Latin and local names, parts used, treatment, documented uses and pharmacology activities.

Voucher Number	Family	Latin name	Local name	Part used	Treatment	Documented traditional uses	Reported pharmacological activity	Habit
MSM20/24	Anacardiaceae	<i>Rhus natalensis</i>	Lmisigiyo	Root, Bark	Boiled decoction is used to treat cold and flu in children	Treat respiratory disorders and Malaria (5)	Antibacterial and antifungal compounds from root bark (24).	Tree
MSM19/10	Apocynaceae	<i>Carissa spinarum</i> L.	Lamuraia	Root	Root decoction treats arthritis, rheumatism	Treats theileriosis, helminthosis, rheumatism, malaria tuberculosis, Salmonellosis (19) STDs, epilepsy, malaria, arthritis (25)	Antioxidant activity (Mundaragi and Thangadurai, 2018)	Shrub
MSM20/21	Canellaceae	<i>Warburgia ugandensis</i> Sprague	Sokoni	Bark	Bark decoction treats pneumonia, chest pains	Treats chest pains (17)	Stem bark extracts show antibacterial activity (27)	Tree
MSM19/15	Capparaceae	<i>Maerua endlichii</i> Gilg & Bened	Lnyiriman Longososi	Root, Bark	Bark decoction for cleaning the stomach through diarrhoea	Treatment against nematodes in sheep (28),	No reported activity	Shrub
MSM20/16	Ebenaceae	<i>Euclea divinorum</i> Hiern	Lchingei	Bark	Bark decoction treats malaria, constipation, stomachache	Pounded and applied as an antivenom (29)	Antifungal and antioxidant activity (30), antinociceptive effects (31)	Shrub
MSM19/6	Euphorbiaceae	<i>Croton dichogamus</i> Pax	Lakirding'ai	Root, Bark,	Decoction used for common cold, cough	Headaches (32)	Anti-inflammatory, antimalarial or anti-plasmodial Activities (33)	Shrub
MSM20/22		<i>Euphoria candelabrum</i> <i>Trémaux ex Kotschy</i>	Mpopong'i	Leaves	Decoction is used to treat chest pains; it also cleans the stomach through diarrhea	Treats STIs and wounds (19), treats warts and tuberculosis (34)	No reported activity	Tree
MSM19/9	Lamiaceae	<i>Ajuga integrifolia</i> Buch.-Ham	Lmenang'i	Whole plant	Decoction in soup for stomachache, malaria, stops diarrhoea	Malaria, boils (35)	Antiplasmodial properties (36) (36,37)	Herb
MSM19/1		<i>Rothea myricoides</i> (Hochst.) Steane & Mabb.	Lmakutikuti	Root	Root decoction treats chronic STDs, pneumonia, malaria, fertility in women	Malaria, asthma and gonorrhoea (38), (39)	Antimutagenicity properties (40)	Tree
MSM19/4	Leguminosae	<i>Acacia nilotica</i> (L.) Delile	Lkiloriti	Bark	Hot bark decoction treats indigestion, pneumonia, stomachache, painful joints, gonorrhoea, and coughs	Treat stomachache after birth (17,21), skin wounds (41) retained placenta (42)	Presence of tannins, saponins, flavonoids (43)	Tree

Voucher Number	Family	Latin name	Local name	Part used	Treatment	Documented traditional uses	Reported pharmacological activity	Habit
MSM19/14		<i>Acacia oerfota</i> (Forssk.) Schweinf.	Ldepe	Bark	Bark decoction treats cough, gonorrhoea, stomachache and jaundice	STDs, postpartum tonic, facilitate lactation, rejuvenation (5) athrlistis and STDs (42)	Antifungal activity from Root bark extracts (44)	Shrub
MSM19/5		<i>Entada leptostachya</i> Harms	Ldalampoi	Bark	Root decoction treats bone diseases, gout	Tuberculosis and cough (35), boils and abscesses (45)	barks had the highest antioxidant activity (46)	Climb
MSM20/18	<i>Lythraceae</i>	<i>Lawsonia inermis</i> L.	Lgiriari	Root	Root decoction to treat stomachache, gallstones, induce diarrhea	Treats fibroids (47), Elephantiasis (42)	Antioxidant activity (48)	Shrub
MSM19/3	<i>Primulaceae</i>	<i>Myrsine africana</i> L.	Seketet	Seeds	Decoction of ground seeds for deworming, stomach pains, common colds	Bone and joint pain, kidney disease, gonorrhoea, women's health (49), STDs (32)	Anthelmintic efficacy (28)	Shrub
MSM19/2	<i>Rhamnaceae</i>	<i>Rhamnus prinooides</i> L.	Lkinyil	Root	Root decoction treats common cold, fever, pneumonia, Malaria	STDs, back and joint aches, arthritis, aids in digestion, tonic (5,50)	Antimalarial activity (51)	Shrub
MSM19/8		<i>Rhamnus staddo</i> A.Rich.	Lkukulai	Root, Bark	Root decoction treats malaria, fever, common colds, cleans the blood	STDs, flu/cold (52),	antiplasmodial activities (53)	Shrub
MSM19/12	<i>Rutaceae</i>	<i>Toddalia asiatica</i> (L.) Lam.	Leparmunyo	Root	Root decoction used for common cold, pneumonia and malaria especially in children	Treats malaria (6)	Potential antidiabetic and antioxidant properties to treat diabetes (54) shows antiinflammatoy activities (55)	Climb
MSM19/11		<i>Zanthoxylum chalybeum</i> Engl	Loisuki	Seeds	Hot decoction treats throat problems and tonsils	Treatment of malaria (56)	Antiplasmodial activity from the leaves (57)	Shrub
MSM19/13	<i>Salvadoraceae</i>	<i>Salvadora Persica</i> L.	Sokotei	Root, Bark	Root decoction to treat stomach pain, a paste is made to treat toothache	Eye infections, worms, malaria, stomach ache, constipation, tonic, cold, teeth hygiene, respiratory infections (5),	Extract possesses dose dependent anti-inflammatory (58), antimicrobial agent (59)	Shrub
Voucher Number	Family	Latin name	Local name	Part used	Treatment	Documented traditional uses	Reported pharmacological activity	Habit

Voucher Number	Family	Latin name	Local name	Part used	Treatment	Documented traditional uses	Reported pharmacological activity	Habit
MSM19/7	<i>Santalaceae</i>	<i>Osyris lanceolata</i> Hochst. & Steud.	Losiesia	Bark	Bark decoction cleans stomach after childbirth, stops diarrhoea in children	Treats cancer (60), asthma and sore throat (32)	Antioxidants properties (61,62)	Tree
MSM20/19	<i>Urticaceae</i>	<i>Urtica massaica</i> Mildbr.	Sapai	Leaves	Boiled and the decoction is used to treat stomachache	Stomachache (5)	Antimicrobial activities (63)	Herb
MSM20/20	<i>Vitaceae</i>	<i>Cissus rotundifolia</i> Vahl	Raraiti	Root	Root decoction treats chest problems	Stomachache (20)	Anti-inflammatory potency (64)	Climb
MSM20/23		<i>Cissus quadrangulari</i> L	Sukurtuti	Root, Leaves	Boiled roots treat chest pains. Crushed leaves given to sick calves	Upper respiratory problems (65)	Antibacterial activity (66), antibacterial and antimicrobial activity (67)	Climb
MSM20/17			Lolpiyayo	Root, Bark	It is crushed into a powder and sniffed to cure headaches.	Malaria and colds (65)		N/A

STDs = Sexually transmitted diseases, KFR = Kirisia Forest Reserve

Y - Yes, N - No

Table 2
Medicinal plants collected from Kirisia Forest Reserve

Voucher Number	Family	Latin name	Local name
MSM20/24	<i>Anacardiaceae</i>	<i>Rhus natalensis</i>	Lmisigiyoi
MSM19/10	<i>Apocynaceae</i>	<i>Carissa spinarum</i> L.	Lamuraia
MSM20/21	<i>Canellaceae</i>	<i>Warburgia ugandensis</i> Sprague	Sokoni
MSM20/16	<i>Ebenaceae</i>	<i>Euclea divinorum</i> Hiern	Lchingei
MSM19/6	<i>Euphorbiaceae</i>	<i>Croton dichogamus</i> Pax	Lakirding'ai
MSM20/22		<i>Eurphoria candelabrum</i> <i>Trémaux ex Kotschy</i>	Mpopong'i
MSM19/9	<i>Lamiaceae</i>	<i>Ajuga integrifolia</i> Buch.-Ham	Lmenang'i
MSM19/1		<i>Rothea myricoides</i> (Hochst.) Steane & Mabb.	Lmakutikuti
MSM19/3	<i>Primulaceae</i>	<i>Myrsine africana</i> L.	Seketet
MSM19/2	<i>Rhamnaceae</i>	<i>Rhamnus prinoidea</i> L.	Lkinyil
MSM19/8		<i>Rhamnus staddo</i> A.Rich.	Lkukulai
MSM19/12	<i>Rutaceae</i>	<i>Toddalia asiatica</i> (L.) Lam.	Leparmunyo
MSM19/11		<i>Zanthoxylum chalybeum</i> Engl	Loisuki
MSM19/7	<i>Santalaceae</i>	<i>Osyris lanceolata</i> Hochst. & Steud.	Losiesia
MSM20/19	<i>Urticaceae</i>	<i>Urtica massaica</i> Mildbr.	Sapai

Multiple plant parts either single or mixed together were the most sold plant parts at 29% followed by roots and barks at 25% and leaves at 9% respectively. Data from the growth habit of the traded plants shows that, shrubs were the highest with 11 species (48%), followed by trees 5 (26%) climbers 4 (17%) and herbs 2 (9%) as shown in (Fig. 2).

The family with most species was Leguminosae (3), Lamiaceae (2), Rhamnaceae (2), and Rutaceae (2) other families were represented by one species. The plants are prepared by first boiling them and consumed as either a cold or hot decoction mixed with either tea, soup or milk. Mostly administered orally apart from "Lolpiyayo" which is sniffed after crushing the dried bark into a powder.

Discussion

Based on the market surveys, the use of medicinal plants to manage and treat different ailments is a sought-after option in Maralal. The traders sold their products every day in the open market, they have a designated area donated by the County government of Samburu. None of the traders had any formal certification or license to trade. All the twenty-four traded plants are native to Kenya. Only one plant “Lolpiyayo” could not be identified by neither its English name nor its scientific name. Five of the traded species are among the most popular and commercially important medicinal plants in sub-Saharan African; *Acacia nilotica* (L.) Delile, *C. spinarum*, *R. prinoides*, *T. asiatica* and *S. Persica* (68). Compared to other studies in Kenya, the number of traded plants in Maralal was relatively low (3,49,69). Some of the traded plants were similar to those traded in Marsabit such as *Carissa spinarum* L., *Croton dichogamus* Pax, *Myrsine africana* L. and *Rotheca myricoides* (Hochst.) Steane & Mabb. (49). Another five species recorded from our market surveys have previously been recorded in a similar study done in two urban cities *A. integrifolia*, *C. spinarum*, *M. africana* L., *R. prinoides*, and *Warburgia ugandensis* Sprague (3). “Lekeek isiet” the cold decoction made from eight plants species was used to treat Malaria and Pneumonia. Seven of the eight species used to make “Lekeek isiet” were among those traded in the market apart from *C. megalocarpus*. Roots and barks were the most traded parts similar to Marsabit and Moyale (49) due to their long shelf life (70) while leaves were the least used parts. The majority of the traded plants were used to treat malaria, common coughs, stomachaches/pains, women’s health problems, and STIs. It was noted that *R. myricodes* was one of the strongest and most dangerous plants that only a specialist can administer because it can lead to death if wrongly used. Most of the traders prescribed the medicinal plants to customers based on symptoms of the illness. The traders did not collect the plants themselves, they had collectors who supplied them with the products. It was noted that plant species traded depended on their supply and availability from the wild. This is supported by the fact that during the first market survey (August 2019), only fifteen species were available in the market. During the second survey (January 2020), nine additional species were available while four species from the first survey were not available in the market. This indicates that it is likely that more than twenty-four plants are traded based on supply and availability considering some species are collected as far as shrublands in Baragoi (102 Kms) and Wamba (107 Kms) from Maralal town. None of the traded plants is listed under IUCN as endangered; however, the traders stated that some of the plants were becoming rare to find mostly due to deforestation, anthropogenic activities (19) and drought. Overharvesting was noted as the major factor contributing to the decline especially for plants with high demand and where roots and barks were harvested. This was the case with *O. lanceolate* which the traders stated that it had become rare to find both in the shrublands and in Kirisia forest Reserve. Apart from its medicinal qualities, the species is exploited for its essential oils used in the perfume industry. The popularity and increase in demand for the *R. myricodes* and *M. africana* threaten populations in the wild with the species becoming scarce hence the need for sustainable extraction and management. Increase in market demand and overharvesting of medicinal plants from the wild threatens with loss of biodiversity (49,71). Local extinction of species such as *Olea europaea* L. and *Rhamnus prinoides* L. have been reported in Loitoktok (69). The traders stated that the knowledge was orally passed down generations; however, the majority of the traders lacked apprentices because the younger generation opted for alternative livelihoods in urban cities. This leads to the loss of traditional knowledge on medicinal plants because the mastery is not passed down or shared. Additionally, the use of traditional knowledge on medicinal plants use faces threats from the allopathic healthcare sector because the former is not formally recognized in Kenya (69). Since the trade is informal, it is difficult to get any figures on estimates of how much plant product is traded in term of quantity for any given period. None of the interviewed traders kept any records of their sales.

Conclusion

This study highlights the importance of medicinal plants as the basis of traditional medicine. A total of 24 species from 16 families were recorded from the market surveys. Trade of medicinal plants is an important source of income for many both in the rural and urban areas in Kenya. Unfortunately, most of the trade in Kenyan markets is undocumented hence little is known on the conservation status of most traded species. Therefore, there is a need to develop a complete database of medicinal plant species that are used in Kenya. This will guide in conservation efforts especially for overharvested species such as *O. lanceolate*, *R. myricoides*, and *M. africana*. Assessing the current population status of important medicinal plants in the wild will aid in the establishment of conservation measures as well as sustainable exploitation. Since the trade is informal, it was difficult to get any figures on how much plant product is traded.

Declarations

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Ethics approval and consent to participate

Permission was granted by the local authorities and the people interviewed before undertaking the study.

Consent for publication

The people interviewed were made aware that the information collected could be made public.

Competing interests

The author declares no competing interests.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on request.

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Figures

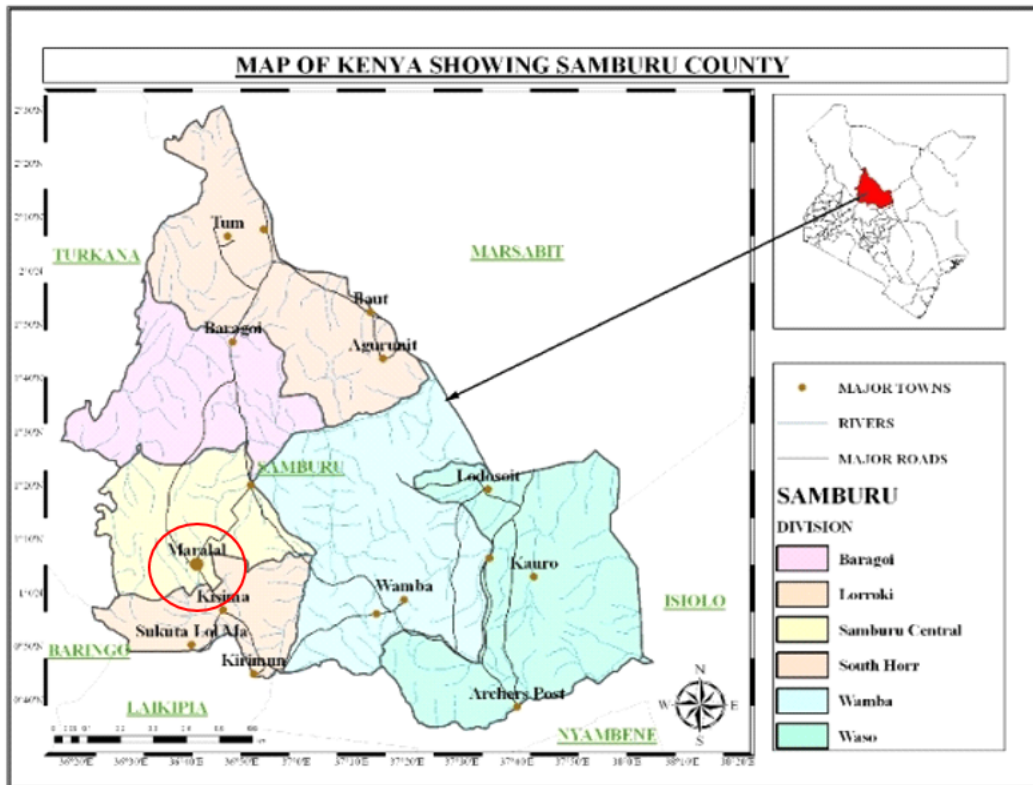


Figure 1
 Map of a study area in Samburu County (23) Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.

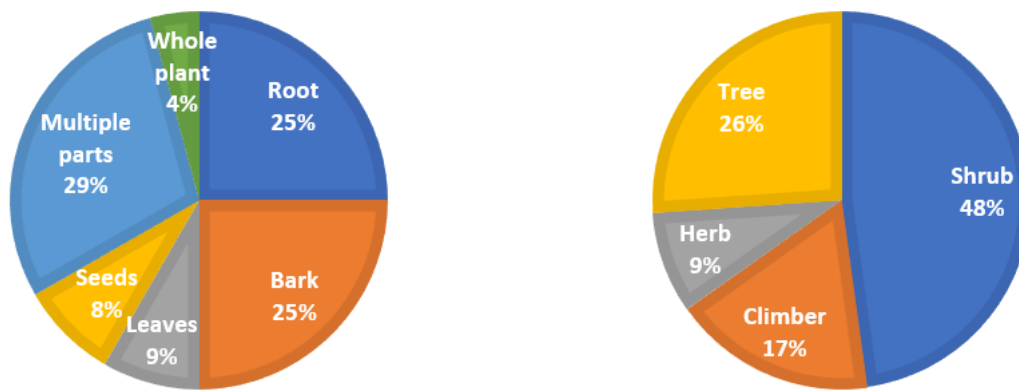


Figure 2
 Plant parts traded (left) and growth habit (right)

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