Ethnobotanical survey of medicinal plant species used by communities around Mabira Central Forest Reserve, Uganda

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Abstract

Background: An ethnobotanical study of medicinal plants was carried out in 14 villages adjacent to Mabira Central Forest Reserve (CFR) in Central Uganda between August 2013 and March 2014.

Methods: Information was obtained through interviews using semi-structured questionnaires. Field excursions with traditional healers and herbal medicine collectors were carried out. Descriptive statistics were used to present the data. Fidelity ratios and Informant consensus agreements were calculated.

Results: A total of 190 plant species in 61 families and 152 genera were reported in the treatment of various health conditions. Family Fabaceae was dominant representing 14% of the plant species documented. Vernonia amygdalina was the preferred species for treating malaria. Leaves (68%) were the most frequently used parts in preparing herbal remedies. Decoctions (29%) and oral route (53%) of administration were commonly used method of herbal medicine preparation and administration respectively. Fifty-eight health conditions grouped in 25 categories were treated using medicinal plants. Informant consensus agreement was highest for blood system disorders (0.9) that included anaemia, hypertension and blood cleansing indicating homogeneity of informant’s knowledge about remedies used. Vernonia amygdalina and Erythrina abyssinica had 100% fidelity level for treatment of malaria and vomiting respectively.

Conclusion: The diversity of medicinal plant species used and the associated indigenous knowledge are of great value to the local community and their conservation and preservation is paramount. The therapeutic uses of the documented plants provides basic data for further research focused on pharmacological studies and conservation of the most important species.

Keywords: Ethnobotanical, Medicinal plants, Mabira CFR, Fidelity level, Health conditions

Background

The acceptance and use of herbal medicine is on the increase globally [1–3]. In Africa the situation is not different, over 80% of the population particularly in the developing countries depends directly on plants for their primary healthcare requirements [4, 5]. In the East African region countries such as Burundi [6] and Tanzania [7] that neighbour Uganda, the population using traditional medicine is also well above 80% particularly in the rural areas [6, 7]. Plants form an important part of health care especially for the rural poor in Uganda [8]. The Ugandan government has specifically up scaled the use of herbal medicine and is in the process of integrating it into the main health care system [9, 10]. The noted increased use of herbal medicine is as a result of the confirmed therapeutic evidence of the herbal remedies [11]. This has been enhanced by the consequences of limited access to modern health services in most developing countries including Uganda, high cost of modern medicine compared to the indigenous herbal medicines, wide socio-cultural acceptance of traditional medicine and the belief that natural products pose no risk [3, 4, 12, 13].

The increased preference of herbal medicine has consequently propelled the search for pharmaceutical remedies...
against different ailments from plants [14]. The medicines are collected from the wild and this has negatively impacted on the plant resource due to unsustainable exploitation rates as well as the health of many people who cannot afford orthodox medicine [15–17]. This makes documentation, sustainable utilisation as well as conservation essential [3, 18]. The first step in conservation is to document material traditionally used to treat an ailment [15, 16]. Previous studies have identified and documented numerous medicinal plants for treatment of various diseases in Uganda [1, 19] however these have been targeting specific ailments and are not detailed in shared use. A larger number of medicinal plants and indigenous uses have not yet been documented. The rich history of African cultures and their innovative utilisation of plants as a source of remedies have been passed down through generations largely by oral tradition [20]. This knowledge is gradually being lost [21] as the custodians die before passing on information to the younger generations. Besides the gradual loss of ethnobotanical knowledge due to lack of documentation, overharvesting of medicinal materials from their natural habitat has been one of the major threats of traditional medicine. In order to conserve wild plant species, there is need for reliable data on their distribution and level of use [22].

The documentation of indigenous knowledge through ethnobotanical studies is important in conservation and utilization of biological resources [23]. The identification of local names, scientific names and indigenous uses of plants not only preserves indigenous knowledge but also facilitates future research on safety and efficacy of medicinal plants in treatment of various ailments [24]. It is against this background that utilization of medicinal plants as a source of primary health care by communities adjacent to Mabira CFR is documented. This will ensure that traditional knowledge about use of these plants is conserved. It will also facilitate the discovery of new sources of drugs and promote sustainable use of medicinal plant resources in Uganda. In addition conservation of medicinal plants will add value to the recreational environment as well as health improvement through sustained ecosystems. This study aimed at collecting data on plant species used to treat different health conditions by communities adjacent to Mabira CFR.

Methods

Study area

The study area covered human settlement areas around Mabira CFR some of which were enclaves and others adjacent to the forest. Mabira CFR is located 20 km north of Lake Victoria shoreline immediately to the west of Victoria Nile. The forest reserve lies partly in Buikwe, Mukono and Kayunga districts and occupies an area of 306 km² with an altitudinal range of 1070 – 1340 m above sea level [25]. It is situated between latitude 0° 22’ and 0° 35’N and between longitude 32° 56’and 33° 02’E [26] (Fig. 1).

The forest reserve occupies gently undulating landscape characterised by numerous flat-topped hills (relics of the ancient African penneplain), and wide shallow valleys [27]. The topography is such that the land drains to the north, even though the reserve’s southern boundary lies only 13 km from the lakeshore. The underlying rocks are composed of micaceous schists and shales of the Buganda- Toro system with ridges of quartzite and amphibolite. The soils are generally ferralic sandy clay loams, with black waterlogged clays in the valley bottoms. The climate is tropical with two rainfall peaks from April to May and October to November ranging between 1,250 – 1,400 mm per annum. Annual mean temperature range, minimum: 16–17 ° C, maximum: 28–29 ° C. The vegetation of Mabira CFR was classified as “medium altitude moist semi-deciduous” [28].

Commercial use of the forest began when some parts were harvested in the early 1900’s and until 1988, intensive coffee/banana agricultural encroachment badly damaged parts of the forest. [27] About 21 % and 26 % of the reserve have been designated as strict nature reserve and buffer zone respectively and the forest in these areas is recovering following extensive plantings of native tree species.

The human population living in the forest enclaves was approximately 825,000 with a density of 200–230 people per Km² [29]. The local people are mainly of the Bantu ethnic group of the following tribes; Baganda, Banyarwanda, Basoga, Bagis, Bakiga, Banyankole, Bagwere and Batoro.

The reserve has tea and sugarcane plantations around. Some local people reside in settlements for labourers on the tea and sugarcane estates [30]. The extent of growing cash crops other than tea and sugar cane is limited by scarcity of land. However locals are engaged in cultivation of food crops mainly for subsistence consumption like maize, beans, bananas, ground nuts, sweet potatoes and vegetables. Livestock rearing is limited to a few households.

Ethical considerations

Ethical approval of the study was obtained from the Uganda National Council of Science and Technology (UNCST) under registration number SS 3368 after obtaining a research license from National forestry Authority (NFA).

Data collection

This was a field survey targeting custodians of Traditional Medicine used in treatment of diseases. Verbal
pre-informed consent was obtained from the participants before the interview. Interviews were conducted in Luganda, the local language in the area, using guided semi-structured questionnaires and a research assistant that was conversant with the local language.

Collection of data on medicinal plants used to treat different ailments in the study area was according to a slight modification of Martin’s procedure [31]. Purposive sampling was used to identify 14 out of 27 villages that heavily depend on the forest for primary health care through a Rapid Rural Appraisal (RRA) with village leaders. Heavy dependence was defined by village council leaders’ local experience i.e. based on the number of individuals who depend wholly on herbal medicine for livelihoods. The study included villages within 1–5Km from the forest. This is because distance from the forest influence people’s use of forest products. Before entering each of the villages, permission was sought from local leaders after explaining the aim of the study who gave us the name of the first key informant while the rest of the respondents were selected by snowball sampling technique. [32, 33] A total of 36 key informants were selected with at least two from each village and an additional eight knowledgeable herbalists recommended by the community members from Naluvule, Bukuku, Buwoola and Kalagala villages. The informants included primary collectors, vendors and traditional healers who are the custodians of indigenous knowledge on herbal medicines. Traditional healers are divided into two broad groups of herbalists who mainly use herbs while diviners also invoke ancestral spirits to guide them in their healing practice [34–36]. They provided information on plants and parts used, ailments treated, mode of preparation and administration, habit, source and availability of medicinal plants. Field excursions were conducted along forest trails taking traditional healers as guides and voucher specimens of cited medicinal plants were collected.

![Map of Mabira CFR showing the study villages. The figure shows location of Mabira CFR in Uganda and specifically highlights the sites of villages where ethnobotanical surveys of medicinal plants were carried out. The map displays demarcations of the administrative boundaries showing the major road network and the main physical features in the study area.](image)
Preference ranking
Preference ranking [31] of the 10 most available medicinal plant species and diseases commonly treated by each were shortlisted by the 12 key informants according to importance attached to the species as per frequency of use and effectiveness (number of days taken to healing in treating particular diseases successfully). The values assigned for each species across were summed up for all the informants to get an overall rank value. The species were then ranked in descending order with the species that had the highest total ranked first.

Plant identification and processing of Voucher specimens
Plant identification was partly carried out in the field based on field manuals for plant identification [37, 38]. Voucher specimens were collected and later identified at Makerere University Herbarium. Correctness of scientific names of species were also checked according to Tropicos: http://www.tropicos.org database accessed on 12/05/2015.

Data analysis
Descriptive statistics using frequencies and percentages were used to summarize data using Microsoft excel 2013. The ailments treated by the medicinal plants were classified into different categories [39].

Informant consensus agreement
The informant consensus factor (Fic) was calculated to indicate the homogeneity of information using the formula;

\[ F_{ic} = \frac{N_{ur} - N_{taxa}}{N_{ur} - 1} \]

Where \( N_{ur} \) = Number of use reports
\( N_{taxa} \) = Number of species in each use category. It estimates the relationship between the number of use reports (\( N_{ur} \)) minus the number of taxa used (\( N_{taxa} \)) and the number of use reports in each category minus one [40].

Fic values are low if plants are chosen randomly or if informants do not exchange information about their use or disagree about the species used in treatment of an ailment category. The values are high (close to one) if the species are used by a large proportion of informants and there is a well-designed criterion in community or if information is exchanged between informants. Therefore the medicinal plants are presumed to be effective in treating a certain disease have higher Fic values [41].

Fidelity level (FL)
Fidelity Level [42] was calculated for each of the 10 preferred species for their popularity according to the key informants who cited them in the treatment of particular ailments. Fidelity Level (FL) = Ip/Iu x 100 %, where Ip is the number of informants who suggested the use of a species for the same major ailment, Iu is the total number of informants who mentioned the species for any use.

Results
Medicinal plant uses
The communities around Mabira CFR use diverse flora in treatment of various ailments and local people possess rich traditional knowledge on medicinal plants (Table 1). Both males and females used medicinal plants but males were dominant representing 70 % of the respondents. The age of the respondents ranged between 25–80 years. Generally 46 % of the respondents were below 50 years. A total of 190 plant species distributed in 61families and 152 genera were identified as used. Fabaceae contributed 27 species, followed by Asteraceae (17), Euphorbiaceae (13), Solanaceae (10) and Lamiaceae (9). Genera Solanum and Indigofera contributed five species each while Ficus, Vernonia, and Acacia contributed four species each.

Preferred medicinal plant species
Vernonia amygdalina was highly ranked and regarded most important in treatment of malaria in the study area. Table 2 shows ranking of the ten most important plant species according to key informants in decreasing order together with values assigned by each informant. The ten ailments treated by the preferred medicinal plants were mentioned by the key informants during the interviews.

Growth forms of Plants and parts used for medicinal purposes
Different plant parts of medicinal plants are used to make herbal preparations (Table 3). A high number of herbal medicine are made using leaves (77 %) and roots 40 %. Other parts of the plants are not commonly used. Regarding the 10 preferred medicinal plant species, the bark was predominantly used in seven species, followed by leaves (5) and least roots (3) (Table 3), although more than one part was used in some cases. For instance leaves, bark and root of Spathodea campanulata and leaves, roots and fruits of Tamarindus indica and Phytolaca dodecandra are used to prepare remedies. Herbs made up the highest proportion of medicinal plants species (41 %), followed by trees (28 %), shrubs (22 %), climbers and grasses (4 %).

Source of medicinal plants
Of the recorded medicinal plants, 56 % are from the forest, 14 % are cultivated 12 % grow in grasslands/woodlands and farmlands (18 %). The low incidence of medicinal plant gardens was attributed to the need to
| Table 1 Medicinal plants, their habit, parts used, ailments treated, habitat, method of preparation and administration |
|--------------------------------------------------|-----------------|-----------------|-----------------|-------------------------------------------------|
| Family, scientific name voucher No.              | Local name      | Habit Part used | Ailment          | Method of preparation and administration          |
| **ACANTHACEAE**                                  |                 |                 |                 |                                                 |
| Acanthus pubescens Engl. PT01                    | Matovu          | S R F           | Prolonged embryo in uterus | Decoction drunk                                   |
| Asystasia gangetica (L.) T. Anderson PT242       | Ttemba           | H F FL          | Reduce fever in children | Crush and bathe                                   |
| Justicia betonica L. PT22                        | Kwinini omuganda | H L FL          | Weakness in pregnancy | Crush in water and bathe                          |
| Justicia heterocarpa T. Anderson PT56            | Kalaaza          | H L F           | Bad odour in women | Pound add to water and wash private parts         |
| Thunbergia alata Sims PT28                       | Kasaamusamu      | C L FL          | False teeth      | Pound and smear at the point of emergence of false teeth |
| **ALLIACEAE**                                    |                 |                 |                 |                                                 |
| Allium sativum L. PT107                          | Katunguluccumu   | H B C           | Reduce heart beat Blood cleanser Bad breath StomatChache Constipation Snake bites Swollen rib cage | Chew and swallow Smear at the point of the bite Cut and smear |
| **ALOEACEA**                                     |                 |                 |                 |                                                 |
| Aloe vera (LJ) Burm.f. PT108                     | Kigagi           | H L C/F         | StomatChache Malaria | 1-3 leaves boiled, decoction drunk               |
| **AMARANTHACEAE**                                |                 |                 |                 |                                                 |
| Achyranthes aspera L. PT50                       | Mutassuka ikubo  | H L F/G         | Swollen body Delayed walking in children Itching body | Crush and tie on affected part                   |
| **PT50**                                         |                 |                 |                 |                                                 |
| Aerva lanata (L.) Juss. ex Schult PT73           | Lweza            | H W FL          | Body odour      | Pound add water and bathe                        |
| Amaranthus dubius Mart. ex. Thell. PT 109        | Doodoo           | H L FL          | Constipation Anemia | Steam and eat                                    |
| Amaranthus spinosus L. PT243                     | Doodoo owamagwa  | H L FL          | Fungal infections of the scalp | Pound with leaves of Cleome gynandra and smear on the scalp |
| Celosia trigyna L. PT110                         | Kakubaggiri      | H L FL          | Persistent headaches | Rub on the head or Pound, dry, make cuts on the sides of the head and smear |
| Psilotrichum elliottii Bak. PT14                 | Kanamukasa       | H L F           | Weakness in Pregnancy | Crush in cold water and bathe                   |
|                                                   |                 |                 |                 | Wounds Boil leaves and place on wound.           |

PT107 Blood cleanser Bad breath Stomachache Constipation | Smear at the point of the bite. Cut and smear

**Note:** The table lists various medicinal plants along with their scientific names, local names, habitats, parts used, ailments treated, and methods of preparation and administration. Each plant is associated with a specific family, scientific name, and voucher number.
| ANACARDIACEAE          | Medicinal plants, their habit, parts used, ailments treated, habitat, method of preparation and administration (Continued) |
|------------------------|------------------------------------------------------------------------------------------------------------------------|
| *Mangifera indica* L. | Muyembe T B C/F Cough in children Infertility in women Convulsions Decoction drunk Steaming |
| PT111                  |                                                                                                                        |
| *Pseudospondias microcarpa* (A. Rich.) Engl. | Muziru T B F/C Yellow fever Pound, decoction drunk R Diarrhoea |
| PT112                  |                                                                                                                        |
| *Rhus vulgaris* Meikle | Kakwansokwanso S L F Skin rash Crush, add water and bathe                                                                 |
| PT113                  |                                                                                                                        |
| APIACEAE               |                                                                                                                        |
| *Centella asiatica* (L.) Urb. | Mbutani H L F Ulcers Decoction drunk                                                                                   |
| PT52                   |                                                                                                                        |
| APOCYNACEAE            |                                                                                                                        |
| *Alstonia boonei* De Wild. | Mubajangalabi T B F Malaria Decoction drunk                                                                 |
| PT120                  |                                                                                                                        |
| APIACEAE               |                                                                                                                        |
| *Carissa edulis* (Forssk.) Vahl | Nyonza S R F Toothache Pound, boil and press on tooth                                                                |
| PT115                  |                                                                                                                        |
| ARISTOLOCHIACEAE       |                                                                                                                        |
| *Aristolochia elegans* | Nakasero V S W Malaria Steeped in water and drunk                                                                       |
| MastPT114              |                                                                                                                        |
| ASCLEPIADACEAE         |                                                                                                                        |
| *Mondia whitei* (Hook.f.) Skeels | Mulondo S R F/G Erectile dysfunction Low appetite in sickness Chewing                                                  |
| PT121                  |                                                                                                                        |
| ASTERACEAE             |                                                                                                                        |
| *Ageratum conyzoides* L. | Nnamirembe H L FL Weakness in pregnancy Crush and mix with water and bath | Weakness in pregnancy Crush and mix with water and drink |
| PT66                   |                                                                                                                        |
| *Bidens pilosa* L. PT116 | Ssere H L FL Wounds Fresh cuts Crush, Tie on wound and cut to stop bleeding                                            |
| *Cynara adolfi-fridericii* (Musch.) Wild PT117 | Ekarwa H L FL Eye infections Decoction drunk                                                                         |
| *Cynara sumatrensis* (Retz.) | Kafumbwe omusaja H L FL Ringworms Crush, add paraffin                                                               |
| E. Walker               |                                                                                                                        |
| PT07                   | Wounds Boil and steam the face                                                                                         |
| *Crotalaria citridifolia* (DC.) S. Moore PT26 | Kitonto H L FL Weakness in pregnancy Crushed in cold water and bathed                                                  |
| *Dicrocephala integrifolia* (L.F.) Kuntze | Buzza H L F Wounds Crush and Press on the wound or boil.                                                             |
| PT64                   | Boils Pain in fallopian tubes Pounded, dried, mixed with water & Drunk                                                 |
| *Erlangea tomentosa* (Oliv. & Hiern) S. Moore PT118 | Kisula H L G Toothache Crush & press on the tooth                                                                    |
| *Helichrysum* sp. Mill | Nakabululu H L G Centipede bites Crush, mix with salt & rub on the bitten area                                           |
| PT119                  |                                                                                                                        |
| *Melanthera scandens* (Schumach. & Thonn.) Roberty | Makaayi H L F Stomachache Malaria Decoction drunk                                                                     |
Table 1  Medicinal plants, their habit, parts used, ailments treated, habitat, method of preparation and administration (Continued)

| PT   | Medicinal plant & Family | Habit | Parts Used | Ailments Treated | Habitat | Preparation & Administration |
|------|--------------------------|-------|------------|------------------|---------|------------------------------|
| PT65 | Yellow fever             | Body odour | Crushed in water & bathed |
| Microglossa angolensis Oliv. & Hiern | Kafuga nkande | S | L | F | Reduce menstrual flow |
|      |                          |        |            | Weakness in pregnancy |        |          |
|      |                          |        |            | Headache           |        |          |
| PT37 | Convulsions              | Crush and bathe the child |
| Sigesbeckia orientalis L. | Seziwundu | H | L | F | Fresh cuts |
|      |                          |        |            | Stomachaches       |        |          |
| PT122 |                         |        |            |                  |        |          |
| Sonchus oleraceus L. PT123 | Kakovu | H | L | FL | Scars |
| Tagetes minuta L. | Kawunyira | H | L | F,FL,G | Headache |
|      |                          |        |            |                  |        |          |
|      |                          |        |            |                  |        |          |
| PT124 |                         |        |            |                  |        |          |
| Vernonia amygdalina Delile | Mululuza | S | L | F | Malaria |
|      |                          |        |            |                  |        |          |
| PT76 |                          |        |            |                  |        |          |
| V. amygdalina Delile | Mululuza | S | L | F | Malaria |
|      |                          |        |            |                  |        |          |
| PT126 |                         |        |            |                  |        |          |
| Vernonia grantii Oliv. | Etwatwa | S | L | G | Flu |
|      |                          |        |            |                  |        |          |
| PT125 |                         |        |            |                  |        |          |
| V. grantii Oliv. | Etwatwa | S | L | G | Flu |
|      |                          |        |            |                  |        |          |
| PT101 |                         |        |            |                  |        |          |
| V. lasiopus O. Hoffm. | Kaluluza | S | L | F | Prolonged embryo in uterus |
|      |                          |        |            |                  |        |          |
| BALANITACEAE |                         |        |            |                  |        |          |
| Balanites aegyptiaca (L) Delile | Liggwa limu | T | L | G | Yellow fever |
|      |                          |        |            |                  |        |          |
| PT126 |                         |        |            |                  |        |          |
| Balanites wilsoniana Dawe & Sprague PT130 | Naliggwalimu | T | L | F | Cracks of soles of feet |
| BASELLACEAE |                         |        |            |                  |        |          |
| Basella alba L. | Nderema | H | L | F | Stomachache |
|      |                          |        |            |                  |        |          |
| PT128 |                         |        |            |                  |        |          |
| BIGNONIACEAE |                         |        |            |                  |        |          |
| Mussa |                         |        |            |                  |        |          |
| Medicinal plants | Habit | Parts used | Ailments treated | Habitat | Method of preparation and administration |
|------------------|-------|------------|------------------|---------|------------------------------------------|
| Kigelia africana (Lam.) Benth. | PT127 | L | High blood pressure | Decoction drunk |
| Markhama lutea (Benth.) K. Schum | Musambya | T FL F | Loss of appetite | Decoction drunk |
| | PT29 | L | Ear & eye infections in children | Decoction drunk |
| | Spathodea campanulata | Kifabakazi | T L F | Pregnancy care | Crush add water & bathe |
| | P. Beauv. | | | Increase vaginal fluids | Pound, decoction drunk |
| | PT131 | R | Infertility | Boil and bathe |
| | | | Skin infection | |
| | | | Hernia | Decoction drunk |
| Cardamine trichocarpa Hochst. Ex. Rich. | Mageregankoko | H L FL | Athletes foot | Burn and squeeze on the feet |
| | PT132 | | Ringworms | Boil and bathe |
| Canarium schweinfurthii Engl. PT133 | Muwafu | T B F | High blood pressure | Decoction drunk |
| | | | Diabetes | |
| | | | Cough | |
| Warburgia ugandensis Sprague PT136 | Banwegyira | T B F | Flu | Decoction drunk |
| | | | Cough | |
| Cannabis sativa L. | Njaga | H L C | Measles | Decoction drunk |
| | PT135 | | Body weakness | |
| Cleome gynandra L. | Jjobyo | H R FL | Ease delivery Fungal skin infections on head | Chew the roots |
| | PT134 | | | |
| Cleome monophylla L. | Kayobyo akasaja | H FL FL,W | Retained placenta | Mix in sheep dung and smear on the affected parts |
| | PT137 | | | |
| Carica papaya L. | Mapapali | H L C/F | Cough | Dry, pound, mix in water and drink |
| | PT138 | | Low immunity | |
| | | | Cracks on soles of feet | Scrub on the soles of feet |
| | | | Skin infection | |
| | | | Loss of memory | |
| | | | Measles | Pound add water and bathe |
| | | | Erectile dysfunction | Pound add water and drink |
| | | | Blocked fallopian tube | Decoction drunk |
| Elaeodendron buchananii Loes. | Mbaluka | T B F | Blocked fallopian tube | Decoction drunk |
| | | | Prostate cancer | |
| Medicinal plants, their habit, parts used, ailments treated, habitat, method of preparation and administration (Continued) |
|---------------------------------------------------------------|
| **PT121** | **Chenopodiaceae** | **Erectile dysfunction** |
| Chenopodium opulifolium Koch & Ziz. | Mwetango | H | L | FL | Oral wounds | Chew mixed with salt |
| Chenopodium procerum Hochst. ex Moq. PT37 | Mugoosola | H | L | FL | Weakness during pregnancy | Herbal bath |
| **PT83** | **Clusiaceae** | **Skin rash** |
| Psorospermum febrifugum Spach | Kanzironziro | S | L | W | Skin rash | Pound, dry, mix in Vaseline and smear |
| Garcinia buchananii Baker PT139 | Musali | T | R | F | Hurting bones | Pound add to tea |
| Harungana madagascariensis Lam. ex Poir. PT210 | Mulirira | S | B | F | Yellow fever | Pound add to water and bathe |
| **PT140** | **Combretaceae** | **Diabetes** |
| Combretum molle R. Br. G. Don | Ndagi | T | B | G | Cough | Decoction drunk |
| **PT03** | **Commelinaceae** | **Abortion** |
| Commelina benghalensis L. PT145 | Nnanda | H | L | F | Vaginal dryness | Pound, mix with water and wash private parts |
| **PT142** | **Convulvulaceae** | **Skin rash in babies** |
| Ipomoea batatas (L.) Lam. PT141 | Lumonde | C | T | C | Memory loss | Chew |
| Hewittia sublobata L. Kuntze | Musota taluma | C | V | F/G | Paronychia | Burn and pound and tie on the finger |
| **PT239** | **Crassulaceae** | **Headache** |
| Kalanchoe crenata (Andrews) Haw. PT143 | Kayondo akatono | H | L | FL | Healing umbilical cord wounds in babies | Place on fire & squeeze onto the cord |
| Kalanchoe glaucescens Britten PT142 | Kiyondo | H | L | FL/G | Cough | Crush and drink |
| | | | | | Break cords from new borns | Put the leaves on fire and squeeze on the cord |
| Family          | Common Name                      | Plant Name                        | Habit | Part Used | Ailment Treated                              | Preparation/Method                        |
|-----------------|----------------------------------|-----------------------------------|-------|-----------|---------------------------------------------|--------------------------------------------|
| **CUCURBITACEAE** |                                  |                                   |       |           |                                             |                                            |
| **Kedrostis foetidissima (Jacq.) Cogn.** | Zizi (kabaka wenva) | V W F | Measles in children | Mix with silver fish and boil and drink |
| PT205 | Loss of appetite | Boil and add to sauce |
| **Mormodica foetida** | Lujula (bombo) | V L F | Body odour | Pound, mix with water and bathe |
| PT144 |                                    |                                   |       |           |                                             |                                            |
| **DRACAENACEAE** |                                  |                                   |       |           |                                             |                                            |
| **Dracaena fragrans (L.) Ker. Gawl.** | Mulamura | S B F | Tooth ache | Chew and spit |
| PT149 | Rheumatism | Pound and drink |
| **Dracaena steudneri Engl.** | Kajolyenjovu | T L F | Cough | Burn the leaves and collect the ash add salt and lick |
| PT146 | Scars | Pound, mix with water and bathe |
| R | Snake bites | Pound and press on the bitten part |
| | Syphilis | Decoction drunk |
| | Skin infections | Pound mix with water and bathe |
| | Kidney stones | Pound decotction drunk |
| FL | To stop smoking and alcoholism | Pound, dry add little water and drop in a cigarette or alcohol |
| **EBENACEAE** |                                  |                                   |       |           |                                             |                                            |
| **Diospyros abyssinica (Hiern)** | Mpojja | T L F | Stomach upsets | Decoction drunk |
| PT147 |                                   |                                   |       |           |                                             |                                            |
| **EUPHOBIAACEAE** |                                  |                                   |       |           |                                             |                                            |
| **Acalypha bipartita Müll. Arg.** | Jerengesa | S L F | Constipation | Crush, add water and drink |
| PT148 |                                   |                                   |       |           |                                             |                                            |
| **Alchornea cardifolia (Schumach. & Thonn.) Müll. Arg.** | Luzibaziba | S L F | Shaking body | Crush and bathe |
| PT06 |                                   |                                   |       |           |                                             |                                            |
| **Crotton macrostachyus** | Musogasoga | T L & R F | One stuck by lightening | Pound add to water and bathe |
| Hochst. ex. Delile | V | Weakness in pregnancy | Tie in the waist |
| PT240 | T | Headache | Pound and smear on the bite snake bites |
| | | | |
| **Euphorbia hirta L.** | Kasandasanda | H S FL | Swollen eyes | Drop the sap in the affected eye. |
| PT150 | L | Joint pains | Pound, dry, mix with Vaseline and smear on the joints |
| **Euphorbia trigona** | Kakukulo | S L F | Yellow fever | Pound mix with ghee and maize flour and smear body |
| Haw. |                                   |                                   |       |           |                                             |                                            |
| PT151 |                                   |                                   |       |           |                                             |                                            |
| **Euphorbia tirucalli L.** | Lukoni/nkoni | T L & S C | Warts | Drop the sap on the wart |
| PT152 |                                   |                                   |       |           |                                             |                                            |
| **Flueggea virosa** | Lukandwa | S R F | Infertility in women | Pound add to water and bathe |
| (Roxb.ex Willd.) Royle. |                                   |                                   |       |           |                                             |                                            |
| PT17 |                                   |                                   |       |           |                                             |                                            |
| **Hymenocardia acida** | Nabaluka | T/S L W | Sinuses | Decoction drunk |
| Tul. |                                   |                                   |       |           |                                             |                                            |
| PT153 |                                   |                                   |       |           |                                             |                                            |
| **Jatropha curcas L.** | Kirowa | S L C | Tooth decay | Crush and drop sap on tooth |
| PT160 | Headache | Crush, add water & wash the head |
| Medicinal Plants | Habit, Parts Used | Ailments Treated | Method of Preparation and Administration |
|------------------|------------------|-----------------|------------------------------------------|
| *Margaritaria discoidea* (Baill.) G.L. Webster | Kamenyambazi | T B F | Weakness in pregnancy | Crush & Bathe in cold water |
| *Ricinus communis* L. | Nsogasoga | S L C,F | Weakness in pregnancy | Pound & add to water and bathe |
| *Tetrochidium didymostemon* (Baill.) Pax & K. Hoffm | Mukeljje | T L F | Ear infection | Crush & add drop in the ear |
| *Tragia benthamii* Baker | Kamyu | H R G | High blood pressure | Pound & dry and add to tea |
| | | | Erectile dysfunction | Chew |
| | | | Madness | Pound & cut in the head and smear |
| **FABACEAE** | Lusiti | C L W/FL | Low immunity | Decoction drunk |
| *Abrus precatorius* L. | Muwelogoma | T R | Worm infection | Chew & swallow |
| *Acacia constricta* Benth. | Muwelamanyo | T R FL | Diabetes | Decoction drunk |
| *Acacia hockii* De Wild. | Kasaana | T R W,G | Swollen joints and feet | Pound & boil with cows hooves and drink soup |
| *Acacia macrothyrsa* Harms | Muwologoma | T W | Hydrocele | |
| *Albizia coriaria* Welw. | Mugavu | T B F | Skin rash | Boil & bathe |
| *Albizia grandibracerea* | Nongo | T L F | Yellow fever, Anaemia | Pound, dry & mix with water & drink |
| *Crotalaria agathiflora* Schein. ex Engl. | Nakalimikamu | T L FL | Irregular menstrual periods | Decoction drunk |
| *Crotalaria natalitia* Meissn | Kijebjebe | S L FL | Low breast milk production | Mix leaves with fresh simsim, boiled & drunk |
| *Crotalaria spinosa* Hochst. | Kasambandege | H L FL | Weakness in pregnancy | Crush & mix in water and drink |
| | | | Skin itching | Crush in water and bathe |
| | | | Convolutions | Pound a few leaves mix with water & drink |
| | | | Prolonged embryo in uterus | |
| | | | Constipation | |
Table 1 Medicinal plants, their habit, parts used, ailments treated, habitat, method of preparation and administration (Continued)

| Plant Name                          | Part Used | Preparation/Method                                      |
|-------------------------------------|-----------|---------------------------------------------------------|
| **Dichrostachys cinerea** Wight et. Arn. PT159 | S R G     | Hutch bark, Decoction in early stages of the condition drunk |
| **Erythrina abyssinica** Lam. PT167 | T B F/G   | Yellow fever, Decoction drunk, Pendant, add salt, put in a clean cloth and squeeze in the mouth |
| **Entada abyssinica** Steud. ex A. Rich. PT168 | T B W     | Body weakness, Boil in water and bathe when cold |
| **Indigofera arrecta** Hochst. A. Rich. PT169 | H L F     | Snake bites, Chew with salt, Crush & tie on affected part or wound |
| **Indigofera congesta** Welw.ex. Baker PT170 | H L G     | Malaria, Decoction drunk |
| **Indigofera drepanocarpa** Taub. PT171 | H S G     | Colic pains, Sap ingested |
| **Piptadeniastrum africanum** (Hook F.) Brenan PT59 | H S G     | Cough, Steam bathe |
| **Rhychosia hirta** (Andr.) Meikle & Verdc. PT172 | H R G     | Herpes zoster, Crush and smear on affected parts |
| **Senna absus** (L.) Roxb. PT173 | H S L F   | Prolonged embryo in uterus, Malaria, Pound add water and drink, Decoction drunk |
| **Senna didymobotrya** (Fresen.) H.S. Irwin & Barneby PT174 | H S L F   | Change sex of children, Pound, decoction drunk |
| **Sesbania sesban** (L.) Merr. PT175 | S R F     | High blood pressure, Diabetes |
| **Tamarindus indica** L. PT176     | T R W/F   | Convulsions, Steam the face |
| **Vigna unguiculata** L. PT177     | H L F/G   | Sore throat, Add salt and chew, Decoction drunk |
| **Dovyalis macrocalyx** (Oliv. J. Warb) PT178 | S L F     | Wounds, Crush & tie on wound |
| **Coleus latifolius** Hochst. Ex. Benth. PT38 | H L G     | Vaginal dryness, Steam and insert in birth canal |
| Plant Name | Common Name | Type | Name of the Part | Condition | Preparation Method |
|------------|-------------|------|------------------|-----------|--------------------|
| Clerodendrum myricoides (Hochst.) R. Br. Vatke PT55 | Kikonge | T | R | G | Stomachache | Pound add water and drink |
| Hoslania opposita Vahl PT89 | Kamunye | H | L | F,G | Painful uterus | Decoction drunk |
| | | | | | Stomach cleanser | |
| | | | | | Malaria | |
| | | | | | Fresh cuts | |
| | | | | | Skin rash | |
| Leonotis nepetifolia (L.) R Br. PT174 | Kifumufum | H | L | F | Abdominal pain | Decoction drunk |
| | | | | | Kidney stones | |
| | | | | | Body pains(muscles) | |
| Mentha Sp. PT175 | Nabugira | H | L | F | Body odour | Crush in water and bathe |
| Ocimium basilicum L. PT82 | Kakubansiri | H | L | F,W | Stomachache | Crush and smear |
| | | | | | Pain during pregnancy | |
| | | | | | Prevent miscarriage | |
| | | | | | Insect bites | |
| Ocimium gratissum L. PT176 | Mujaja | H | L | FL | Stomachache | Decoction drunk/boiled in tea and drunk |
| | | | | | Bad breath | Squeeze leaves in cold water and bathe |
| Plectranthus barbartus Andr. PT57 | Kibwankulata | H | L | F | Wounds | Crush and tie on wound |
| Tetradenia riparia (Hochst.) Codd PT178 | Kyewamala | T | L | C | Cough | Crush, mix with water and drink |
| | | | | | Stomachache | Squeeze the leaves and drop in ear or eye |
| | | | | | Eye & ear infections | |
| | | | | | Weakness in pregnancy | Pound mix in water and bathe |

**LAURACEAE**

| Plant Name | Common Name | Type | Name of the Part | Condition | Preparation Method |
|------------|-------------|------|------------------|-----------|--------------------|
| Persea americana Mill. PT179 | Avacado pear | T | B | C/F | Cough | Decoction drunk |

**LOGANIACEAE**

| Plant Name | Common Name | Type | Name of the Part | Condition | Preparation Method |
|------------|-------------|------|------------------|-----------|--------------------|
| Strychnos innocua Del. PT181 | Muyondo | S | L | W | Athletes foot | Heat on fire & press on affected area |
| | | | | | Tooth decay/pain | Boil and mix with salt and press on tooth |

**MALVACEAE**

| Plant Name | Common Name | Type | Name of the Part | Condition | Preparation Method |
|------------|-------------|------|------------------|-----------|--------------------|
| Abutilon mauritianum(Jacq.) Medik. PT42 | Kifuula | H | L | W | Change sex of children | Squeeze in water and drink before getting pregnant |
| Hibiscus acetosella Welw. Ex Fic PT23 | Musaayi | S | L | FL | Anaemia | Decoction drunk |
| Sida alba L. PT182 | Keyeyo | H | L | W | Fractures | Pound, smear on swollen body with or without Vaseline |
| Sida cuneifolia Roxb. PTS3 | Kakumirizi | H | L | FL | Fractures | Crush and Press on the affected area |
| | | | | | Swollen body | |
| | | | | | Pain the fallopian tubes | Decoction drunk |
| | | | | | Fever | herbal bathe |
| Sida rhambolofia L. PT09 MELASTOMATACEE | Luvunvu | S | R | F | Lack of breast milk | Boil with silver fish and drink |
| Musesemya | H | L | F | | Pound, dry and add to sauce |
| Table 1 Medicinal plants, their habit, parts used, ailments treated, habitat, method of preparation and administration (Continued) |
|---------------------------------------------------------------|
| **Tristemma maritiana** A. Juss. PT97                        |
| **MINESPARMAEAE**                                            |
| Cissampelos mucronata A. Rich. PT63                          |
| Kavaramgome S L G Enable one to eat meat or fish             |
| Backache                                                    |
| Snake bites,                                                |
| Swollen legs                                                |
| R                                                           |
| Stomachache                                                |
| Pound, add to water & bathe                                 |
| **MORACEAE**                                                 |
| **Antiaris toxicaria** Lesch. PT183                         |
| Kilundu T L F Headache                                      |
| Weakness in pregnancy                                       |
| Crush in water and bathe                                    |
| **Ficus cyathistipula** Warb. PT99                          |
| Mubembe S L F High blood pressure Decoction drunk           |
| **Ficus dawei** Hutch. PT184                                |
| Muwo T B F Breast cancer Decoction drunk                    |
| Wounds                                                      |
| **Ficus mucuso** Welw. ex Ficalho PT186                      |
| Kabalira T L F Swollen eyes Pound, burn and press on the eye |
| **Ficus natalensis** Hochst. PT187                          |
| Mutuba T B F Gonorrhea Decoction drunk                      |
| **Milicia excelsa** (Welw.) C.C. Berg PT188                  |
| Muvule T B F Skin rash Boil and bathe                       |
| S                                                          |
| Burns                                                       |
| Fresh cuts                                                  |
| **Myrianthus arboreus** P. Beav. PT195                      |
| Mugango S R F Control pregnancy Tie on the waist            |
| **MUSACEAE**                                                 |
| **Musa paradisiaca** L. var paradisiaca** PT190             |
| Kitooke ekiganda H FL C Prolonged embryo in uterus           |
| R                                                           |
| S                                                           |
| **Musa paradisiaca** L. var sapientum PT191                 |
| Gonja H F C Neck pain Tie the fiber in the neck and waist    |
| **MIOCRACEAE**                                               |
| **Morella kandtiana** (Engl.) Verdic & Polhill PT192         |
| Mukikimbo S R F Stomachache Crush in cold water and drink   |
| **MYRTACEAE**                                                |
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| **Table 1** Medicinal plants, their habit, parts used, ailments treated, habitat, method of preparation and administration (Continued) |
|---|
| **Callistemon citrinus** (Curtis) Skeels | Mwambala zitonya | T | L | C | Pain in the Fallopian tubes | Decoction drunk |
| **Eucalyptus sp** | Kalituuni | T | B | C | Cough | Decoction drunk |
| **Psidium guajava** L. PT200 | Mupeera | T | L | C | Cough | Decoction drunk |
| **Syzgium cordatum** Hochst. PT194 | Kanzironziro | T | L | C/F | Skin rash | Crush and mix in Vaseline and smear |
| **Maesa lanceolata** G. Don | Kiwondowondo | T | R | F | Ulcers, Diarrhoea | Decoction drunk |
| **Oxalis corniculata** L. | Kajjampuni | H | L | FL | Wounds | Squeeze and drop juice on wounds. |
| **Passiflora edulis** Sims | Katunda | C | FR | C/F | Weakness in sickness | Squeeze juice, add water and drink |
| **Phyllanthus guineensis** Pax | Mutulika | L | F | Measles | Crushed in water and bathed |
| **Plantago palmata** Hookf. | Bukumbu | H | R | F | Skin rash in children | Crush in water and bathe |
| **Arundinaria alpina** K. Schum. | Mabanda | G | R | F | Fainting/Epilepsy | Pound and bathe |
| **Cymbopogon citratus** (DC) Stapf PT199 | Kisubi | G | R | G | Pain in fallopian tubes | Decoction drunk |
| **Cymbopogon nardus** (L.) Rendle PT91 | Kiteme | G | R | G | Eye infection | Pound, dry add to eyes |
| **Cynodon dactylon** (L.) Pers. PT44 | Kalandalugo | G | S | G | Prolonged embryo in uterus | Decoction drunk |
| | Lumbugu | G | W | G | Convulsions | Cut boil and steam |
| Table 1 Medicinal plants, their habit, parts used, ailments treated, habitat, method of preparation and administration (Continued) |
| --- |
| **Digitaria abyssinica (A. Rich.) Stapf** |
| PT202 | L | Flu | Decoction drunk |
| **Imperata cylindrica (L.) P. Beauv. PT203** |
| Lusenke | G | R & L | Snake bites | Chew roots and tie leaves at the site of the bite |
| **Pennisetum purpureum Schumach. PT204** |
| Kisagazi | G | L | F | Penile erection in baby boys | Crush in water and wash the penis |
| **POLYGONACEAE** |
| *Rumex abyssinicus Jacq.* PT135 |
| Muleretu | H | R | G | Erectile dysfunction | Chewing |
| *Oxygonum sinuatum (Meissn.) Dammer PT67* |
| Kafumita bagenge | H | L | FL | Low appetite after sickness | Pound and tie around the affected finger |
| **PORTULACACEAE** |
| *Portulaca oleracea L.* PT207 |
| Ssezira | H | L | FL | Irregular menstrual periods, Stomachache | Decoction drunk |
| **PRIMULACEAE** |
| *Primula sieboldii E. Morren PT208* |
| Muyuki | H | B | F | Tonsillitis, Ulcers | Decoction drunk |
| **RHAMNACEAE** |
| *Maesopsis eminii Engl. PT209* |
| Musizi | T | R | F | Syphilis | Decoction drunk |
| **ROSACEAE** |
| *Prunus africana (Hook.f.) Kalkman PT220* |
| Ngwabuzito | T | L | F | Fainting, Prostate cancer | Decoction drunk |
| *Rubus pinnatus willd PT238* |
| Nkenene | S | FR | F | Energy booster | Eat fresh |
| *Rubus rigidus Sm PT79* |
| Kawule | S | R | F | Stomach upsets | Decoction drunk |
| **RUBIACEAE** |
| *Coffea eugenioides S. Moore PT221* |
| Mwanyi | S | FR | F | Erectile dysfunction | Roast and chew |
| *Mitragyna stipulosa Kuntze PT230* |
| Nzigu | T | L | F | Erectile dysfunction, Heart burn | Chew |
| *Rubia cordifolia L. PT25* |
| Kasarabakesi | C | L | F | Cough, Prostate cancer | Pound with onions, add salt & Lick |
| *Vangueria apiculata K. Schum. PT222* |
| Matugunda | S | R | F | High blood pressure | Decoction drunk |
| Table 1 Medicinal plants, their habit, parts used, ailments treated, habitat, method of preparation and administration (Continued) |
|---------------------------------------------------------------|
| **RUTACEAE**                                                   |
| *Citropsis articulata* Swingle & Kellerm. PT223               |
| Katimbolo S L F                                              |
| Impotence                                                    |
| Decoction drunk                                              |
|                                                            |
| *Citrus limon* (L.) Osbeck. PT229                            |
| Nimawa T FR C/F                                              |
| High blood pressure                                         |
| Cough                                                       |
| Blotting                                                    |
| Skin rash/pimples                                           |
| Add to water and wash the affected parts                    |
| Chop, decoction drunk                                        |
|                                                            |
| *Citrus sinensis* (L.) Osbeck PT228                          |
| Muchungwa S L C/F                                            |
| Bad breath                                                  |
| Chew                                                       |
|                                                            |
| *Teclea nobilis* Del. PT227                                  |
| Nzo T L F                                                    |
| Body cleanser                                               |
| Boil with *afromomum* and drink                              |
|                                                            |
| *Zanthoxylum chalybeum* Engl. PT224                          |
| Ntale ya ddungu T R F/W                                      |
| Cervical cancer                                             |
| Stomachs                                                   |
| Cough                                                      |
| Decoction drunk                                            |
|                                                            |
| **SAPINDACEAE**                                              |
| *Blighia unijugata* Baker PT29                               |
| Mukuzanyana T B F                                           |
| Cervical cancer, Fibroids                                    |
| Decoction drunk                                            |
|                                                            |
| **SOLANACEAE**                                               |
| *Capsicum frutescens* L. PT225                               |
| Kamulali H FR C/F                                            |
| Hernia, Pancreas                                            |
| Swallow the fruits                                          |
| Prostate cancer                                             |
| Eat in food                                                |
| Erectile dysfunction                                        |
| Pound, add water and drink                                  |
|                                                            |
| *Datura stramonium* L. PT226                                 |
| Kituratura H R FL                                           |
| Failure to walk in children                                 |
| Pound roots, put under fire and press the feet of the child |
|                                                            |
| *Lycoperscon esculentum* (L.) H. Karst PT226                 |
| Nyanya H L FL                                               |
| Skin infections                                            |
| Herbal bathe                                               |
|                                                            |
| *Nicotiana tobaccomm* L. TP232                               |
| Taaba H L C/FL                                              |
| Snake bites                                                |
| Chew and vomit venom                                         |
| Paronychia                                                 |
| Tie on the affected finger.                                 |
|                                                            |
| *Physalis peruviana* L. PT236                                |
| Ntuturu enene H L F                                         |
| Fainting                                                    |
| Smear whole body                                            |
|                                                            |
| *Solanum anguivi* Hook PT237                                 |
| Katunkuma H FR C/F                                          |
| Measles                                                    |
| Pound ripe fruits, smear whole body                         |
| High blood pressure                                         |
| Boil, pound and dry, add to food                            |
| Weakness during sickness                                    |
| Steam and eat as a vegetable                                |
| Blood cleanser                                             |
|                                                            |
| *Solanum dasyphyllum* Schumach. & Thonn. PT41                |
| Ntengontengo S FR FL                                         |
| "Elongation of the labia minora"                           |
| Roast in fire, peel of the outer parts, use endocarp.       |
| Warts                                                      |
| Boil and place on the wart.                                 |
| Immobility in babies                                       |
| Place in fire and place on the child’s feet                 |
| Swollen stomach                                            |
| Decoction drunk                                            |
|                                                            |
| *Solanum incanum* L. PT49                                   |
| Katengo ntengo H R FL                                       |
| Erectile dysfunction                                       |
| Chew                                                             |
| Swollen testicles                                           |
| Pound, add water and drink                                  |
maintain secrecy of traditional knowledge and the argument that cultivated medicinal plants are less potent compared to plants collected from the wild and therefore the latter are preferred. Medicinal plant species from the forest were mostly members of Fabaceae (40 %) and Euphorbiaceae (54 %) while species from family Asteraceae were dominant in grasslands (25 %) and fallow (44 %). Most of the medicinal plants grown in home gardens are introduced species and have not been domesticated. These include: Callistemon citrinus, Capsicum frutescens, Moringa oleifera, plus fruit tree species that are also medicinal such as Mangifera indica, Persea americana, Carica papaya and Psidium guajava. Fifty percent of medicinal plant users who harvest for commercial purposes collect plants form the forest.

Methods of preparation and administration
The medicinal plants for treatment of different ailments were prepared and administered using various methods. Decoction was commonly used (29 %), followed by

Table 1 Medicinal plants, their habit, parts used, ailments treated, habitat, method of preparation and administration (Continued)

| Family | Genus | Species | Habit | Parts used | Ailments treated | Habitat | Method of Preparation and Administration |
|--------|-------|---------|-------|------------|------------------|---------|------------------------------------------|

For example:

**Solanum micranthum** (Schidl.)
- **Habit**: Forest
- **Parts used**: Leaves, Flowers
- **Ailments treated**: Headache, Bed wetting
- **Method of Preparation and Administration**: Pound leaves, mix in water and drink

**Solanum nigrum** L.
- **Habit**: Forest
- **Parts used**: Leaves
- **Ailments treated**: Low immunity, Pain in fallopian tubes
- **Method of Preparation and Administration**: Prepare as vegetable

**Lantana trifolia** L.
- **Habit**: Forest
- **Parts used**: Leaves, Flowers
- **Ailments treated**: Prolapsed rectum, Ring worms
- **Method of Preparation and Administration**: Pound and place on affected part

**Privet labelliformis** (Mold.) R. Fernand
- **Habit**: Forest
- **Parts used**: Sap
- **Ailments treated**: Wounds
- **Method of Preparation and Administration**: Release the sap onto the wound

**Cyphostemma adenocaule** (A. Rich) Willd & Drummond
- **Habit**: Forest
- **Parts used**: Whole plant
- **Ailments treated**: Body odour, Constipation
- **Method of Preparation and Administration**: Crush in water and bathe

**Afromomum angustifolium** (Sonnerat) K. Schum.
- **Habit**: Forest
- **Parts used**: Roots
- **Ailments treated**: Hiccup
- **Method of Preparation and Administration**: Dry, pound, decoction drunk

**Zingiber officinale** Roscoe
- **Habit**: Farm land
- **Parts used**: Whole plant
- **Ailments treated**: Cough, Backache
- **Method of Preparation and Administration**: Chew and swallow or boil in tea, Boil the fruit and drink

Key: Parts used: R roots, L Leaves, FFl Flowers, W whole plant, B Bark, Fr Fruit, T Tuber, S Sap, V Vine ; Habit: S Shrub, T Tree, H herb, C Climber, G grass; Habitat: F forest, FL farmland, C cultivated, W woodland, G grassland
crushing and mixing with water (24 %), use of fresh crushed material (14 %) and burning (9 %) (Fig. 2). In the current study, additives used in herbal medicine preparation included silver fish, ash, salt, alcohol, tea and onions. Salt was used in remedies against toothache and oral wounds where it is believed to kill germs. For external application vaseline, paraffin and ghee were used to reduce friction during application of the remedy.

Different routes were used in administration of herbal preparations. Oral route contributed 61 % of the total species, followed by herbal bath (28 %), rubbing leaves on affected parts (14 %) and inhalation of smoke (5 %). The least used route of herbal administration was steam bath (2 %).

Ailments treated by medicinal plants
The 58 health conditions recorded were grouped into 25 categories of which gynecological conditions, digestive disorders and skin infections featured prominently (Table 4). The number of species used to treat different ailments are summarized in Table 4.

Species treated a wide range of ailments varying from one to six per plant. Species that treated the highest number of ailments were *Balanites aegyptiaca*, *Carica papaya*, *Dracaena steudneri* that were used in management of six health conditions each. On the other hand *Allium sativum*, *Cissampelos macronata*, *Kalanchoe crenata*, *Lantana trifolia*, *Solanum anguvi*, *Tagetes minuta* and *Vernonia lasiopus* were each used in management of five health conditions. Taxonomic analysis revealed that members of family Fabaceae were used to treat the highest percentage (28 %) of ailments. This was followed by Solanaceae (24 %), Asteraceae and Euphorbiaceae (19 %) each, Anarcardiaceae, Balanitaceae and Rutaceae 14 % each, Anacardiaceae, Moraceae, Poaceae, Bignoniaceae 12 % each while families Alliaceae, Caricaceae, Dracaenaceae, Lamiaceae, Minespermaceae, Rosaceae, Rubiaceae, Verbenaceae and Zingiberaceae 10 % each and the rest treated less than 10 %.

Informant consensus agreement (Fic)
This technique is designed to highlight species that have healing potential for specific major purposes. The relative importance of each plant species in treatment of different ailments as categorized in Table 5 was analysed using the Factor Informant Consensus (Fic) [41]. Fic values range from 0–1 where values close to one (1) indicate a high rate of informant consensus on a plant.

Table 2: Rank values assigned by each informant for each of the 10 preferred medicinal plants

| Medicinal plant species | Plant parts used | Key ailments treated | Key informants (n = 12) | value/120 | Rank |
|-------------------------|------------------|----------------------|------------------------|----------|------|
| *Vernonia amygdalina*    | Leaves, Roots    | Malaria, Convulsions, stomachache | 10 10 10 10 10 10 10 10 10 120 | 1<sup>st</sup> |
| *Mormodica foetida*     | Leaves           | Body odour           | 8 9 9 9 8 7 8 7 6 7 8 95 | 2<sup>nd</sup> |
| *Warbugia ugandensis*   | Bark             | Cough, flue          | 5 8 7 7 8 9 9 6 5 7 9 89 | 3<sup>rd</sup> |
| *Prunus africana*       | Leaves, Bark     | Fainting, prostate cancer | 9 5 8 8 7 7 8 4 9 8 7 88 | 4<sup>th</sup> |
| *Piptadeniastrum africana* | Leaves, Bark | Cough               | 7 7 6 6 5 4 5 7 8 9 5 6 75 | 5<sup>th</sup> |
| *Erythrina abyssinica*  | Bark             | Yellow fever, convulsions, anaemia, infertility hiccup, stop vomiting | 6 6 5 4 6 6 6 9 6 5 2 5 66 | 6<sup>th</sup> |
| *Albizia corriaria*     | Bark             | Cough, swollen rectum, skin rash | 1 4 4 5 4 5 4 5 4 6 4 50 | 7<sup>th</sup> |
| *Spathodea campanulata* | Leaves, Bark, roots | Pregnancy care, infertility, skin infections, hernia | 4 3 3 1 3 2 3 3 2 1 4 3 32 | 8<sup>th</sup> |
| *Mondia whitei*         | Roots            | Stimulate sexual potency, energy booster | 2 1 2 3 1 3 2 1 3 3 | 9<sup>th</sup> |
| *Alstonia boonei*       | Bark             | Malaria              | 3 2 1 2 2 1 1 2 1 2 1 2 | 10<sup>th</sup> |

Key scores in the table indicate ranks given to medicinal plants based on their efficacy and availability by informants. Highest number (10) for medicinal plant which informants thought most effective in treating ailments and available and the lowest (1) for the least effective and rare. The criterion for considering key ailments was all ailments that were mentioned by informants during interviews.

Table 3: Plant parts used for medicinal purposes

| Plant part used | No. of plants species (n = 190) | % use |
|-----------------|---------------------------------|-------|
| Leaves          | 147                             | 77.4  |
| Roots           | 75                              | 39.5  |
| Bark            | 31                              | 16.3  |
| Fruit           | 17                              | 8.9   |
| Flowers         | 6                                | 3.2   |
| Whole plant     | 8                               | 4.2   |
| Branches        | 4                               | 2.1   |
| Sap             | 6                                | 3.2   |

The figures are inclusive of each other.

The 58 health conditions recorded were grouped into 25 categories of which gynecological conditions, digestive conditions, dermatological conditions, mental and neuropsychiatric conditions, gastro-intestinal conditions, cardiovascular conditions and endocrine conditions featured prominently (Table 4). The number of species used to treat different ailments are summarized in Table 4.
species used against an illness category. $F_{ic}$ values close to zero (0) mean low degree of agreement among the informants about the use of a plant species for treatment of a particular ailment. $F_{ic}$ for different ailment categories was calculated to test for homogeneity or consistency of informants’ knowledge about a particular remedy for an ailment category. $F_{ic}$ indicated which plants are widely used and thus merit further pharmacological and phytochemical studies. The highest $F_{ic}$ (0.9) was scored for blood system disorders. The important plants used for anaemia were *Amaranthus dubius* and *Hibiscus acetosella* while those for high blood pressure included *Oxalis corniculata*, *Canarium schweinfurthi*, *Sesbania sesban*, *Vangueria apiculata*, *Citrus limon* and *Solanum anguivi*. Seven ailment categories had $F_{ic}$ of zero (0) since each respondent reported a different species used for the same ailment (Table 5).

**Fidelity Levels (FL) of preferred plant species**

For each of the 10 most preferred plant species a fidelity level (Table 6) was calculated to quantify their importance to treat a major ailment [42]. It was calculated based on the number of users of a given plant species to treat a major ailment. FL shows the proportion in percentage of informants claiming the use of a plant species for the same major ailment to the total number of informants who mention the plant for any use. FL = ($I_p$/$I_u$) x 100 where $I_p$ = Number of informants who suggested the use of a species for the same major purpose (therapeutic use), ($I_u$) = Total number of informants who mentioned the plant species for any use.

Table 6 shows high fidelity levels of greater than 50 % for seven plant species which highlights the importance of these species in treatment of the mentioned diseases in the study area. *Vernonia amygdalina* and *Erythrina abyssinica* had a fidelity level of 100 % in treatment of malaria and vomiting respectively. High FL levels for these species indicated their outstanding preference for treating malaria and vomiting.

**Discussion**

**Characteristics of respondents**

Most of the respondents were men with an average age of 52 years. African belief is that traditional healers should be male [43–45]. A high proportion of key informants being male of 50 years and above is in line with studies in Rwanda [46, 47]. Old people (aged 51–80 years) in society have more knowledge on medicinal plants and their uses due to long direct contact with plant resources. In contrast, younger people have little interest in traditional medicine in general and there appears to be a risk of knowledge loss if nothing is done to motivate them. Younger people are exposed to modern education and hence not interested in learning and practicing ethnomedicinal wisdom that would perpetuate indigenous knowledge. Differences in medicinal plants knowledge among age groups was also reported in other studies [48, 49] in Ethiopia.

**Diversity of medicinal plants**

The high number of species documented indicates that the study area has diverse flora used in treatment of various ailments and rich traditional knowledge on medicinal plants in the community. This makes Mabira CFR an important source of herbal medicine for the
rural communities since more than half of the mentioned medicinal plants were harvested from the forest. High utilisation of medicinal plant species from forests has been reported among the Bakonjo and Bamba in Mt. Rwenzori and Semiliki forest areas in Bundibugyo, Western Uganda [50, 51].

Families Fabaceae, Asteraceae, Euphorbiaceae, Lamiaceae, and Solanaceae are widely reported in herbal preparations in different parts of Uganda [1, 8, 19, 52, 53] and their widespread use could be attributed to their wide range of bioactive compounds. Asteraceae is reported to have a large number of bioactive compounds [54, 55] thus contributing to the high utilisation rates of members of the family for medicinal purposes.

A majority of plant species documented treated more than one condition. The use of one plant to treat several ailments is probably attributed to presence of many metabolites in one particular plant and also the fact that the same molecule can be active against different pathogens. In other instances a combination of plants were used in preparation of a herbal remedy against a certain ailment which illustrates the synergistic effects of such plants. As an example *Amaranthus spinosus* and *Cleome gynandra* leaves were used against fungal infections of the scalp, *Balanites aegyptica* roots are mixed with leaves of *Citrus limon* against diarrhoea. On the other hand some remedies were monotherapies based on preparations from a single plant. Such plants could be palatable, nontoxic and highly effective against ailments they are used to treat based on experience of users.

Most of the medicinal plant species collected and identified in the study area were also medically used in

### Table 4 Ailment categories treated by different medicinal plants

| Ailment categories                | Specific conditions                                                                 | No. of species used (n = 190) | % of total species |
|----------------------------------|--------------------------------------------------------------------------------------|------------------------------|-------------------|
| Gynaecological issues            | Heavy menstrual flows, weakness during pregnancy, increasing vaginal fluids, uterine cleansing, family planning and induction of labour. | 58                           | 30.5              |
| Digestive disorders              | stomachaches, blotting, ulcers, constipation, diarhrea, weight loss                 | 54                           | 28.4              |
| Skin infections                  | Wounds, warts, skin rash, acne, pimples and athletes foot.                           | 47                           | 24.7              |
| Malaria & other infections       | Malaria, yellow fever, measles, toothache, ear & eye infections                    | 43                           | 22.6              |
| Respiratory tract infections     | Flue, sinuses, sore throat, cough, tuberculosis                                     | 34                           | 17.9              |
| Arthritis & inflammation         | Swollen body parts, hydrocele elephantiasis, hernia, boils                          | 23                           | 12.1              |
| Neurological & nervous system disorders | Convulsions, epilepsy, fainting                                                 | 17                           | 8.9               |
| Erectile dysfunction & Impotence | Male sexual vitality                                                                | 13                           | 6.8               |
| Childcare                        | Swollen rib cage, failure to walk, umbilical cord treatment, false teeth, colic pains | 12                           | 6.3               |
| Poisonous animal bites           | Snake and centipede bites                                                           | 12                           | 6.3               |
| Hypertension                     | Control of heart beat                                                               | 11                           | 5.8               |
| Immune & energy boosting         | Low appetite, nausea                                                               | 10                           | 5.3               |
| Painful body parts               | Neck, sternum pain,                                                                | 10                           | 5.3               |
| Body odour                       | Bad breath,                                                                        | 9                            | 4.7               |
| Headaches & Fatigues             | Migraines                                                                          | 6                            | 3.2               |
| Diabetes                         |                                                                                     | 6                            | 3.2               |
| Cancer                           | Prostate, skin, breast and cervical cancer                                         | 6                            | 3.2               |
| Blood system disorders           | Blood cleansing, anaemia,                                                           | 5                            | 2.6               |
| Muscular skeletal problems       | Back ache, joint pains, Rheumatism, shaking body, fractures                       | 4                            | 2.1               |
| STDs & Venerereal diseases       | Gonorrhrea, syphilis                                                               | 4                            | 2.1               |
| Abnormalities                    | Hunchback                                                                          | 3                            | 1.5               |
| Hiccups                          |                                                                                     | 3                            | 1.5               |
| Psychiatric disorders            | Madness, memory loss, night mares                                                   | 2                            | 1.1               |
| Bedwetting                       |                                                                                     | 1                            | 0.5               |
| Stop smoking                     |                                                                                     | 1                            | 0.5               |
other areas of Uganda [1, 19, 56] and other parts of Africa [57] to treat the same or different ailments. The use of the same plant species for similar or different ethnomedicinal uses in different countries is a reliable indication of the bioactivity potential of the documented plant species [58]. Of the 190 medicinal plant species identified in the current study, 34 species were identified earlier in Iganga Eastern Uganda [59], 82 species in Mukono and Mabira forest areas [60], 22 species in Western Uganda [1], 40 species in Mpigi [52] and 30 species in Oyam Northern Uganda [8]. A comparison of ethnomedicinal uses of some plant species used in Mabira CFR communities with other parts of Uganda and in other countries is presented in Table 7. Bioactivity studies previously conducted on some of the identified plant species collaborate their ethnobotanical uses. For instance Capsicum frutescens is used in management of different cancers – an activity attributed to presence of capsaicin which possesses antimutagenic and anticarcinogenic activities [61]. Also Prunus africana has been found to possess anti-inflammatory and antioxidative activities and compounds like cytotoxic phenolics and beta sitostenone, n-docosanol [62] which are important in management of cancer. The ethnomedicinal reports of the same plant species across geographical regions and different cultural groups is indicative of the medicinal properties of the species.

### Plant parts used

The use of leaves to make herbal medicine preparations followed by roots and barks is a common practice in many communities in Uganda as reported in Mukono [60], Sango bay in Southern Uganda [16], Western Uganda [1], communities around Kibale National Park [63], Mpigi [52] and other countries like Kenya [64], Ethiopia [65] and Bolivia [66]. The high utilisation rates of leaves could be attributed to the ease with which they can be obtained in large quantities compared to other plant parts. Leaves are the main photosynthetic organ in plants and considered to be a key component of the natural pharmacy for synthesis of constituents particularly those that are more pharmacologically active against diseases [67]. The preference of leaves to other plant parts is thus thought to be due to accumulation of active ingrediants like tannins and other alkaloids [67]. In contrast, in Oyam district of Northern Uganda, roots were the common plant parts used in herbal medicine preparations and the other parts were underutilized [8]. However, as noted [68] a clear relationship exists between the parts of the plant collected, or the collection method and the impact on the harvested plant. Collection of the bark and root is damaging and makes species vulnerable to overexploitation. Harvesting the bark in large quantities can destroy the plant because the protective role of the bark to the plant will be curtailed. On the other hand uprooting plants especially in case of herbs and shrubs causes total destruction of the plant. Debarking and uprooting of medicinal plant species negatively affects the sustainability of the species in use. For species like Spathodea campanulata,
Tamarindus indica and Phytolaca dodecandra in which more than one parts is used; sustainability would probably be achieved if the harvesting of bark and root is avoided and harvesting of leaves which is less destructive is promoted. The use of leaves is less destructive if small quantities are collected but not so if large quantities are harvested. As noted [69], overharvesting of leaves can lead to deterioration of medicinal plants since removal of leaves limits the transformation of vegetative to reproductive development such as flower production and seed/fruit development which in turn limits the natural regeneration of plants. Harvesting of roots on the other hand is more destructive as it often involves uprooting whole plants which consequently affects regeneration for sustainable use.

Herbal preparations made from more than two plant parts of the same plant such as the bark and roots of Psedospondias microcarpa, leaves, bark and roots of Spathodea camapnulata and the leaves, roots and vines of Croton macrostachyus (Table 1) may endanger the species unless mechanisms for sustainable utilisation are put in place. Many studies have showed that leaves of different plants possess bioactive ingredients against different diseases and pathogens [69–72]. Since harvesting of leaves is less destructive than harvesting roots or barks, it is necessary to test leaves for efficacy against different ailments in plants where roots and barks are mostly harvested to minimize dangers of overexploitation. As an example the leaves of Vernonia amygdalina have been found to be effective against malaria [73] and thus the harvesting of roots of this species can be avoided.

Table 7 Relevant literature on previous ethnomedical uses of some medicinal plant species in the current study

| Medicinal plant species | Ailments treated in current study | Previous reports of ethnomedical uses | Country of previous use |
|-------------------------|-----------------------------------|---------------------------------------|-------------------------|
| Vernonia amygdalina     | Malaria                           | Malaria                               | Uganda [63, 101], Ghana [98], Cameroon [102], Democratic Republic of Congo(DRC) [103], Rwanda [104], Nigeria [105] |
| Ageratum conyzoides     | Uterine pains, helminth infections | Splenomegaly, colic pains, wounds     | Uganda [1] |
| Vernonia lasiopus       | Malaria, stomachaches             | Skin allergy, constipation            | Uganda [1] |
| Cleome gynandra         | Prolonged labour                  | Convulsions, diphtheria, toothaches, peptic ulcers, vomiting | Uganda [1, 19] |
| Aloe vera               | Malaria                           | Wounds                                | Kenya [96] |
| Prunus africana         | Enlarged prostate                 | Prostate and breast cancers, Hypertension | Kenya [96, 109] |
| Capsicum frutescens     | Prostate cancer                   | Throat, breast and squamous cell carcinoma | Kenya [109] |
| Amaranthus spinosus     | Scalp fungal infections           | Haemorrhoids                          | Nigeria [57] |
| Mangifera indica        | Cough, infertility, convulsions   | Haemorrhoids                          | Nigeria [57] |

Habit of medicinal plant species

Herbs were the most common plant life forms used for medicinal purposes. Harvesting of herbs that are in most cases annual is an indicator that collection of medicinal plants from the forest is not a big threat to conservation. This could be attributed to their abundance throughout the year as reported previously in Uganda [15, 19, 53, 63] although shrubs were reported to be commonly used in northern Uganda [12] and in Ethiopia [74]. The popularity of herbs as a source of herbal therapies is often attributed to their high pharmacologically active ingredients as compared to woody plants [8]. Shrubs are preferred due to their availability all year round since they are relatively drought resistant and are not affected by seasonal variations [65].

Source of medicinal plants

Traditional healers interviewed lacked medicinal plant gardens and collected medicinal plants from the forest. A similar trend was reported in Zimbabwe [75] but cultivated plants have been used from ancient times such as in Iran and various studies have confirmed potency of chemical constituents in them [14]. However, commercial collectors require large volumes which put pressure on the plant population. Consequently, overexploitation may lead to disappearance of many species of economic
value and other uses pausing challenges to their conservation in Uganda’s forests [76] and the African continent as a whole [77].

Herbal medicine preparation and administration
The main route of herbal medicine administration was oral. This mode of administration is commonly used in many herbal remedies as reported elsewhere [8, 78, 79]. The choice of oral administration may be related to the use of some solvents or additives such as water and food that are commonly believed to serve as a vehicle to transport the remedies. The additives enhance extraction of bioactive molecules during remedy preparation. The additives are also important to minimize discomfort, improve taste and reduce adverse effects such as vomiting and diarrhoea. [80] Decoctions were cited as the most common method of preparation of herbal remedies. Boiling is effective in extracting plant materials and at the same time preserves the herbal remedies for a longer period compared to cold extraction. However, both decoctions and cold extracts do not offer long shelf life for the preparations [81]. As such users continuously harvest medicinal plants which puts them under a lot of pressure that may lead to overexploitation.

Health conditions treated
Herbal therapies are still preferred in primary health care in Uganda [79] and the world [4]. The use of many herbal remedies for treatment of different ailments has been reported in other studies in Uganda [1, 53] and other countries like India [82] and Ethiopia [65]. Thus the diversity of medicinal plants used meet the varied health care needs of communities of Mabira CFR since many people cannot afford conventional treatment due to wide spread poverty. The high frequency in treatment of gynaecological conditions, digestive disorders and skin infections indicate high prevalence of these ailment categories in the study area. Other ailment categories were not commonly treated implying their low prevalence or limited traditional knowledge in the use of medicinal plants to treat them.

Informant consensus agreement
Blood system disorders had the highest informant consensus value (Fic =0.9). High Fic values are obtained when only one or a few plant species are reported to be used by a high proportion of informants to treat a particular ailment whereas low Fic values indicate that informants disagree over which plant to use [83]. The high Fic for blood system disorders indicates agreement among respondents on the different plant species used to manage them as well as their significance. Within this category the main condition treated was hypertension (high blood pressure). The prevalence of hypertension was confirmed in a third of adults in Mukono district [84]. The respondents attributed this to age and obesity. A study on screening of bioactive constituents of Solanum anguivi fruits which was mentioned as one of the remedies against high blood pressure revealed a lot of bioactive phytochemicals which include alkaloids, flavonoids, tannins, saponins, triterpenoids and phenols. The phenols have the ability to retard lipid oxidation in oils and fatty foods [85] thereby reducing cardiovascular diseases. The low Fic value of zero (0) in the following ailment categories: painful body parts, Childcare, muscular skeletal pains, abnormalities, body odour, psychiatric disorders and poisonous animal bites imply lack of agreement in the plant species used in treatment of such ailments. Fic values close to zero that are indicative of low informant agreement [86] could be attributed to use of same species for many ailments in the community.

Fidelity level
Vernonia amygdalina had a fidelity level of 100 % and ranked highest in the treatment of malaria as had been documented in other parts of Uganda [56, 63]. Its leaf extract has been confirmed for having good antimalarial effects [87, 88] and through in vitro studies [88, 89]. Vernonia amygdalina contains steroid glycosides, sesquiterpene and lactones which are active against Plasmodium falciparum [90, 91]. This species has also been found to be clinically effective for the treatment of malaria patients [92]. In human trials, extracts of Vernonia amygdalina reduced parastaemia by 32 % [93]. Although Vernonia amygdalina is effective for malaria treatment, it can induce labour in pregnant women [1] thus causing miscarriages and therefore should be avoided by them. Species with high fidelity level [94] such as Vernonia amygdalina for malaria and Erythrina abyssinica for vomiting indicates that these species two were considered of great cultural significance. Erythrina abyssinica too has a wide range of use varying from treatment of malaria [95], syphilis [16], tuberculosis [52] to amoebiasis [19] in Uganda. In Kenya E. abyssinica is used to treat mumps [96], respiratory tract infections in Mexico [97] and febrile illness in Ethiopia [49]. Its usage for different ailments is possibly due to a wide range of bioactive compounds [95].

Besides malaria, V. amygdalina has been used in Uganda to treat various diseases. A decoction from its roots and leaves is used to treat syphilis, ulcers, liver problems [1], its stem bark is used to treat tuberculosis [52] and its roots are used to treat cough, abdominal pain, wounds, hernia and headache [8]. The use of V. amygdalina leaves was reported to treat haemorrhoids [57] in Nigeria, malaria [98] in Ghana and in Ethiopia against bloating, dandruff and impotence [49]. The 100 % choice by key informants of using V. amygdalina
and *E. abyssinica* for treatment of malaria and vomiting is an indicator of the healing potential of these plant species [99]. These results point to the great potential of *V. amygdalina* and *E. abyssinica* for use as sources of new drugs for treatment against malaria and vomiting.

Other species that were preferred in this study were also medicinally important in other areas against the same or different ailments. The use of the same species in different areas against the same ailment confirms the confidence users have in herbal remedies. *Momordica foetida* was used in Uganda to treat sexually transmitted infections and abdominal pain [8], cough [56] and its roots were effective against erectile dysfunction [3]. The stem bark of *Warburgia ugandensis* was effective against tuberculosis in Mpigi while both its roots and bark treated erectile dysfunction in Western Uganda [3]. However, leaves of the same plant were used in Kenya to treat common cold and sore throat [96]. *Alstonia boonei* treated haemorrhoids in Nigeria [57]. The wide spread reporting on the use of these medicinal plants by different communities in different localities could be attributed to different cultural groups which could validate medicinal properties of these species and confirms the confidence users have in the remedies.

The low citation of *Prunus africana* against prostate cancer reflects lack of awareness about the symptoms of the disease, the facts that it is specific to men of a specific age category, the fact that not all men get prostate cancer and that diagnosis of prostate cancer is not done. It also indicates limited sharing of knowledge about the disease in the study area.

According to [100], plant species with high fidelity level values are considered potential candidates for further pharmacological investigations and deserve priority attention.

Results from computations of *F*<sub>c</sub> and FL do not collaborate each other since they measure different values but also the diseases treated were grouped in categories and no single disease was considered alone in the *F*<sub>c</sub> calculations. This is due to the different formulae used to calculate the two values. FL was calculated based on consensus among informants for use of plant species to treat different diseases in an ailment category. However, FL values corroborated well with ranking of preferred species.

**Conclusions**

The study shows that Mabira CFR harbours a wide diversity of plant species used as remedies for several ailments. Such plants are very useful especially to people who cannot afford modern medical care and in cases where access to modern health facilities is not easy. Knowledge and use of herbal medicine for treatment of various ailments among the local people is still part of their life and culture and this calls for preservation of the integrity of the forest and indigenous knowledge of herbal medicine use. The documented plants have potential of being used in drug development.

**Ethics and approval of the study**

Ethical approval of the study was obtained from the Uganda National Council of Science and Technology (UNCST) under registration number SS 3368 after obtaining a research license from National Forestry Authority (NFA).

**Consent for publication**

Not applicable.

**Abbreviations**

CFR: Central Forest Reserve; FL: Fidelity level; *F*<sub>c</sub>: Informant Consensus factor; NFA: National Forestry Authority; RRA: Rapid Rural Appraisal; UNCST: Uganda National Council of Science and Technology.

**Competing interests**

The authors declare that they have no competing interests.

**Author’s contributions**

PT conceptualized the study, designed the methods, conducted the ethnobotanical survey, analysed the data and drafted the manuscript. EKK and BM conceptualized the idea of this manuscript and participated in reviewing the manuscript. JM, MK, PM and JK reviewed the manuscript. All authors read and approved the final manuscript.

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