

## **Ethnopharmacological Study on Medicinal Plants Used to Treat Infectious Diseases in the Rungwe District, Tanzania**

**Sheila M. Maregesi, Rogers Mwakalukwa**

Department of Pharmacognosy, School of Pharmacy,  
Muhimbili University of Health and Allied Sciences,  
Dar es Salaam, Tanzania  
*smaregesi@hotmail.com*

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**Abstract:** *An ethnopharmacological survey was conducted in two villages of Rungwe district, Mbeya Region, Tanzania. In this area, the use of plants for the treatment of various diseases is still very high, especially infectious diseases which are endemic in the tropical countries and leading cause of morbidity and mortality. Information was obtained from one traditional healer and two other experienced persons, having some knowledge on medicinal plants. A total of twenty plants were reported for use in the treatment of various infectious conditions and were documented during the field study. These plants belong to 18 genera and 11 families of which Asteraceae was the most represented. Amongst uses of various phytoorgans, leaves ranked highest, the most used method of preparation being decoction (57%). The most frequently mentioned route of administration was oral. The plants recorded for treating chronic infectious conditions amounted to 38%. It was found out that, people in this area commonly use medicinal plants with trust they have built on the curative outcome witnessed. However, this creates a further work to test for the antimicrobial activity and standardization of herbal preparation if these plants proven to be safe.*

**Keywords:** *Ethnopharmacology; Medicinal plants; Traditional medicine; Infectious diseases; Rungwe, Tanzan*

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### **1. INTRODUCTION**

The utilization of plants in the treatment of human diseases is a common practice in many developing countries including Tanzania [1]. Plants have been sources of drugs employed in modern medicine, either by providing pure compounds, starting materials for partial synthesis of useful compounds or models for synthesis of new drugs [2]. In many tropical developing countries, there is an enormous use of plants for treatment of infectious diseases including malaria which is the leading cause of mortality and morbidity in the region with approximately 243 million people likely to develop symptomatic malaria annually [3].

Despite the big wealth of medicinal plants in Tanzania, very little has been achieved regarding the documentation and evaluation for biological activity. Unsorted ethnomedical surveys that have been carried out are such as those done over two decades [4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14]. Targeting specific disease/condition a few ethnopharmacological surveys had been conducted in Tanzania [15, 16, 17, 18 and 19]. Disease based documentation of plants followed by screening of selected bioactivity avails plants qualifying for the bioguided isolation to identify bioactive compounds and standardization of herbal products. Thus, we are reporting on a similar study conducted in Ikuti and Makandana wards located in Rungwe district, Mbeya region of South Eastern Tanzania (Fig. 1). This place is rich in culture with high use and practice of traditional medicine due to knowledge sharing within local tribes (Nyakyusa and Kinga) and those from a neighboring country (Malawi). Interviewing people in such a society you are likely to get impressive accounts of herbal therapies that are used to treat various diseases/conditions.

This study is part of the continuing efforts to identify plant genetic resources of Tanzania that can be mainstreamed into the health services in treatment of diseases in Tanzania and beyond. Furthermore, worldwide useful documented plants will be exposed researchers to carry out scientific studies in the area of drug discovery. The wild plants found useful could be cultivated, sold and contribute to economic improvement and poverty alleviation at large.

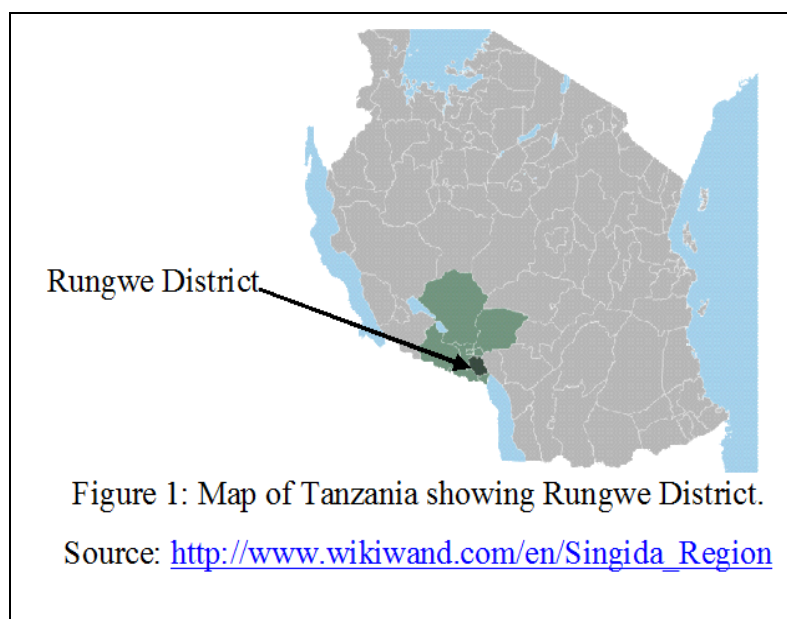
## 2. METHODOLOGY

### 2.1. Interview and Data Recording

The ethnopharmacology survey was carried out, in Ikuti and Makandana wards located in Rungwe district for a period of 10 days in June, 2014. Three informants involved in this study. The survey started with collection of information about useful medicinal plants was obtain by face to face interview with informants in their homes using semi-structured questionnaire to guide them as well as recording the data. Later, accompanied by informants one at a time, we went to the field to collect plant materials for preparation of herbaria of the voucher specimens. The national language (Kiswahili) and where necessary local dialects were used to ease informants in order to deliver the correct information with ease.

### 2.2 Description of the Study Site

Ikuti and Makandana are wards in Rungwe district which lies about 58 km South of the city of Mbeya, at an elevation of around 1,500 m in the highland Rungwe District of southern Tanzania and located at 9°15'0" S, 33°40'0" E (**Figure 1**). Like the rest of the Rungwe district, Makandana and Ikuti wards have good rainfall and vegetation cover that provides abundant resources for traditional medicines.



### 2.3 Identification of Plants Collected

All plant specimens collected were sent to the Department of Botany, University of Dar es Salaam for identification. They were identified by Mr. Frank Mbago, at the Herbarium unit of the Botany department, University of Dar es Salaam by comparison with voucher specimen. Voucher specimens are deposited in Pharmacognosy Department of Muhimbili University of Health and Allied Sciences.

## 3 RESULTS

### 3.1. Source of Information

The study afforded to interview 3 informants aged  $\leq 50$  years of whom one was a traditional healer and the other two were family members. They gained knowledge of useful medicinal plants, from their parents /relatives.

### 3.2. Collected Plant Species: Diversity and Phytoorgan Proportions

Despite the limited period of this study, a total of 20 plant species belonging to 18 genera and 11 plant families were recorded. The family Asteraceae comprised the largest portion i.e. 25%. Other families had less than 3 plant species associated with the treatment of the diseases documented. The most frequently used plant parts were leaves, constituting 62%, followed by roots (19%), barks (9.5%) and others (like fruits both root and bark or whole herb etc) constituting 9.5%.

### 3.3. Mentioned Diseases

The most frequently mentioned ailments included chronic wounds, boils, and malaria which are treated by 38% of the mentioned plants. Several plants were mentioned for treatment of a particular ailment by different informants, e.g. *Jatropha curcas*, *Emilia discifolia*, *Emilia coccinea* and *Vernonia glabra* are used against boils. Most of the recorded plants have more than one therapeutic applications e.g. *Plectranthus sylvestris* used in the treatment of wounds and stomachache and *Vernonia glabra* used in treatment of fever and the management of menopausal symptoms. Due to that, a few non infectious diseases/conditions are herein mentioned.

#### 3.3.1 Route of Administration and Dosage

Most drug preparations are taken orally (76%). Factors determining the dosage depend on various factors including patient age and severity of the infection. In most cases, the use of a given drug preparation was continued up to at least five days after a symptomatic relief was achieved, especially in the case for oral dosage forms, to make sure that the infection was cleared.

### 3.4. Support on Therapeutic Claims

Data collected in this study is supported by previous reports in journal articles [8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19 and many more], as well as in books [14, 20 and 21]. Reliability of the collected data is based on same information reported in other countries as indicated in cited papers in Table 1.

## 4. DISCUSSION

All informants interviewed were aged  $\leq 50$  years; this is contrary with the finding of research conducted in Bukoba, Tanzania [19], whereby the researcher found that 73% of the informants were aged more than 50 years old. The fact that most respondents in that study were aged above 50 years implied that the legacy of the use of traditional medicines to manage various infections is in danger of being irrevocably lost. However, in the present study, informants were less than 50 years old, hence addressing the challenge of age as raised by previous researcher(s). Also, the result of the present study addressed that, the long term belief on elderly people as the main custodians of traditional knowledge is not necessarily true. The middle-aged informants were knowledgeable, conversant and confident on what they know for the service and products they offer to their clients. This observation was interesting in consideration to solve the existing challenge of the knowledge gap between the elderly and the young generation when it comes to traditional medicine.

The study revealed that, leaves were the most used phytoorgan that is in agreement with previous study done in Bunda district [18] although contrary with the findings of research conducted New Dabaga Ulongambi Forest Reserve, Tanzania reporting roots as the most used [22]. Consumption of leaves is a good practice (environmental friendly) reducing the rate of plant species destruction/extinction, it enhances the sustainable management of plants, provided that, only an appreciable amount of leaves is harvested [23].

**Table1.** Medicinal plants used in Ikuti and Makandana wards, Rungwe District

Botanical Name (Fam), [Voucher Number]	Vernacular Name	Plant part	Use(s)	Method of Preparation/administration	Support of claims from the literature
<i>Anona senegalensis</i> (ANNONACEAE) [OK 1913]	Kinyele	Roots	Wounds	Peeled dry/fresh roots, are either boiled with water or made into powder and taken with tea	Leaves were reported to have anti-bacterial activity [24] and antihelminthic activity [25]. Seeds were exhibited antiparasitic and cytotoxic activity [26].
<i>Ageratum conyzoides</i> (COMPOSITAE) [OK 1906]	-	Leaves	Cure wounds and burns Antidysentery	Fresh leaves are applied topically on wounds and burns Leaves are boiled with water and taken orally to treat dysentery	Plant was reported for treatment of pneumonia and commonly used to cure wounds and burns in Central Africa [27]. The whole plant is used as an antidyseric in Reunion [28].

<i>Emilia coccinea</i> (COMPOSITAE) [OK 1916]		Leaves	Wounds Diarrhea	The leaves squeezed and the exudates are applied to wounds	Antimicrobial and antidiarrhea activity [29] and anti-ulcer activity [30] have been reported.
<i>Emilia discifolia</i> (COMPOSITAE) [OK 1918]	Lyulalyula	Leaves	Wounds	The leaves are squeezed and the exudates are applied to wounds as iodine tincture	Leaves exhibited antimalarial activity [31] as well as antifungal and antibacterial activity [32].
<i>Launaea cornuta</i> (COMPOSITAE) [OK 1907]	Mchungu	Leaves Roots	Fever Chronic Wounds.	Fresh leaves with their exudates are rubbed near the wound with only exudates dropped on the wound. Roots are boiled with water and extract is drunk for fever treatment.	The plant had shown antimalarial activity [33] and antidiabetic activity [34].
<i>Vernonia glabra</i> (steetz) Vatke (COMPOSITAE) [OK 1917]	-	Leaves	Wound Infections, Pneumonia, Stomach ailments.	Fresh leaves boiled with water and the extract is taken orally by patient	Used for the same purpose in Malawi [35]. The leaves are reported to possess antimicrobial activity [36 and 37].
<i>Momordica foetida</i> Schumacher. (CUCURBITACEAE) [OK 1919]	Nkungukufwa	Leaves	Wound infections, Malaria.	Fresh leaves boiled with water and the extract is applied to the wound	Leaves possess the antimalarial activity [38 and 39].
<i>Jatropha curcas</i> L. (EUPHORBIACEAE) [OK 1911]	Jhantrofa	Latex Leaves	Chronic wound infections. Fever.	The latex, used as raw, is used for wound infections. The leaves are crushed and boiled with water for treatment of fever	The stem bark extract possess antimicrobial activity [40].
<i>Phyllanthus nummularifolius</i> Poir. (EUPHORBIACEAE) [OK 1921]	Mwasopo	Leaves	Oral candidiasis. Fungal nails.	Boiling fresh leaves in water	Leaves are reported to have antidiarrhea and antihypertensive activity [41].
<i>Plectranthus sylvestris</i> Gurke (LABIATAE) [OK 1920]	Molomolo	Leaves	Stomachache and Diarrhoea, Wound Infections.	Fresh leaves are crushed and mixed with cold water or boiled with water and the extract is drunk	No information on <i>P. sylvestris</i> , but on its related plant species ( <i>P. barbatus</i> ) – See below.
<i>Plectranthus barbatus</i> (LABIATAE) [OK 1912]	-	Leaves Roots	Malaria Gastric ulcer	Roots are boiled with the bark of a powder made from pounding roots taken with tea	Leaves reported to have anti-ulcer, antibacterial and antifungal activities [42, 43 and 60].
<i>Anthocleista schweinfurthii</i> Gilg (LOGANIACEAE) [OK 1917]	Mkuyu	Bark	Boils.	The stem bark decoction is taken orally.	It is used as an antimicrobial herb in Democratic Republic of Congo [44].
<i>Ficus sur</i> Forssk. (MORACEAE) [OK 1922]	-	Bark	Sexually Transmitted Diseases, Chest Infections, Boils.	The stem bark decoction is taken orally	The related species medically are useful including <i>Ficus capensis</i> reported to treat diarrhea, dysentery, sexually transmitted disease, chest ailments, tuberculosis, leprosy, convulsions, anaemia and wound infections [45 and 46] in Nigeria and <i>Ficus sycomorus</i> reported treat vaginal infections, jaundice, boils and peptic ulcers Tanzania [18].
<i>Erythrina abyssinica</i> DC. [PAPILIONACEAE] [OK 1914]	Kisebhe	Leaves, Roots	Dysentery and Malaria.	The leaves/root are dried and ground into a powder. The powder is then given to the patient to lick. Sometimes fresh roots are boiled with water and the extract is taken by the patient	Its root and stem barks are reported to exhibit antiplasmodial activity [47 and 48].
<i>Tephrosia vogelii</i> Hook. F (PAPILIONACEAE) [OK 1905]	Mwanzi	Leaves	Anthelmithic	Extract of fresh/dry leaves after boiling with water is taken	It has shown that <i>T. vogelii</i> has anthelmithic activity in goats [49]. Seeds and fruits are moderately toxic to human, but highly toxic to aquatic animals like fish [50].

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<i>Rumex usambarensis</i> (Dammer) Dammer (POLYGONACEAE) [OK 1909]	Msemwasemwa	Leaves	Wound infections, Diarrhea.	Fresh leaves decoction is applied to the wound and its extract is taken for diarrhea	Roots treat bilharzia [7]. Leaves treat diabetes [12], stomach pain and cough. The whole plant against smallpox [20]. Young stem against peptic ulcers, diarrhoea and vomiting [51]. The shoot and leaf juice are used for treatment of haemorrhoids and tonsillitis respectively [18]. Effective against skin conditions and confirmed to possess antidiarrhea activity [52].
<i>Breonadia salicina</i> (Vahl) H&W (RUBIACEAE) [OK 1915]	Ngwina	Leaves Bark	Boils. Infectious wounds.	Leaves crushed and used when fresh. Bark may be used when dry or fresh.	Reported to have antimicrobial and antidiarrheal activity [53].
<i>Rubus cordifolia</i> L. (RUBIACEAE) [OK 1904]	Wino	Leaves and Fruits	Dysentery	Fruits are chewed when fresh. The extract of fresh or dry leaves usually prepared by boiling with water.	The related species <i>R. ellipticus</i> , is traditionally used for wound healing, dysentery, antimicrobial, gastralgia, antifertility, analgesic and antiepileptic as well as to cure diabetes, ulcers and inflammatory disorders [54]. Its leaves are chewed to treat stomach pain in Nepal [55].
<i>Heteromopha trifoliata</i> (H.L. Mondl) E & Z. (UMBELLIFERAE) [OK 1908]	-	Leaves	Boils	Leaves juice taken orally, both fresh and dry leaves (mainly fresh)	Possess antibacterial and antifungal [56, 57 and 58].
<i>Steganotaenia araliacea</i> Hochst. (UMBELLIFERAE) [OK 1910]	-	Bark	Peptic ulcer, Sore throat, Animal bites.	The stem bark is used whether fresh or dry, where it is boiled in water and the decoction is drunk to treat sore throat and peptic ulcers	Used as antivenin in Kenya [59].

**5. CONCLUSION AND RECOMMENDATION**

Most of the plants reported in this study are also used in other African countries where traditional medicine still contributes to health care services. Multi-reporting of plant for a particular disease indicates the medicinal potential of these plants. Nobody could be willing to use medicine(s) that do not offer healing result (s). Thus, people in studied societies benefit from the curative effects from plants in their crude drug forms as per their preparation methods. Scientific studies could lead to isolation of active principles or compounds that can serve as templates for the synthesis of modern drugs, or preparation of standardized herbal products.

Since all plants recorded in this study are sourced from the wildness, to address conservation, there is a need to train herbal practitioners on the appropriate propagation techniques of these plant species for sustainable utilization, so as to prevent harvesting from the natural habitat which endangers several plant species due to over-collection.

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**AUTHORS' BIOGRAPHY**

**Sheila M. Maregesi**, is a Senior Lecturer and Head of Pharmacognosy Department at the School of Pharmacy of Muhimbili University of Health and Allied Sciences. A holder of Ph. D. (Pharmacognosy) from University of Antwerp, Belgium, Mastes in Pharmaceuticaal Sciences (Distiction) from University of Gent, Belgium and Bsc (Hons) (Chemistry and Botany) from University of Dar es Salaam. Areas of research interest is documentation of medicinal/wild edible plants and phytochemical studies, biological testing/proximate analysis.

**Rogers Mwakalukwa**, is an Assistant lecturer in Pharmacognosy Department at the School of Pharmacy of Muhimbili University of Health and Allied Sciences. A holder of MPharm (Pharmacognosy) and B.Pharm (Hons) from Muhimbili University of Health and Allied Sciences. Areas of research interest is documentation of medicinal/wild edible plants and phytochemical studies, biological testing/proximate analysis.