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Medicinal Plants Used in the Treatment of Liver Diseases in Lubumbashi and Its Surroundings: An Ethnobotanical Survey

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Abstract

This study was carried out in Lubumbashi and surrounding areas, Haut-Katanga Province, Democratic Republic of the Congo, to identify medicinal plants used by traditional healers to treat liver diseases. Indeed, it appears that in Lubumbashi, as in most African regions, the population relies on plants to treat liver diseases. An ethnobotanical survey was achieved using a direct interview method based on a questionnaire. Data collection was based on the availability of traditional healers rather than their exhaustive presence at the survey sites. The plant species were deposited in the herbaria of INERA/KIPOPO and the Faculty of Agricultural Sciences at the University of Lubumbashi. 74 traditional practitioners (including 25 women) were interviewed. Among them, the predominant ethnic groups were the Luba and the Bemba. These traditional healers provided information on 78 plant species belonging to 38 families, among which the Fabaceae and Euphorbiaceae were predominant. These plants are used to treat approximately 98 different diseases, in addition to liver diseases. This survey identified 78 plant species used in the treatment of liver diseases in Lubumbashi and its surrounding areas. The Euphorbiaceae and Fabaceae families are the most frequently cited.

Keywords: liver diseases, ethnobotanical survey, traditional healers, medicinal plants, Lubumbashi

1. Introduction

The liver is one of the body's most important organs. Due to its anatomical location and physiological role, it acts as a filter between pathogens of all kinds originating from the digestive tract and the systemic circulation. However, this unique anatomical and immunological situation, along with the general detoxification functions it performs, makes this organ a prime target for toxins resulting from interactions between the host and xenobiotics such as medications and industrial products [1].

Unfortunately, the choice of treatments for liver diseases is controversial, as they involve conventional or synthetic therapies. Medications intended to treat conditions resulting from liver damage are inadequate and sometimes cause serious side effects. As a result, the incidence of liver diseases has neither decreased nor ceased; on the contrary, statistics suggest that it continues to rise[2].

Given this situation, turning to traditional medicine represents an important alternative. It could thus mark a major breakthrough in the discovery of new therapies for liver diseases, especially since the Democratic Republic of the Congo (DRC) possesses a wealth of plant biodiversity. Consequently, combining traditional therapeutic knowledge with scientific experimentation could lead to the discovery of promising new bioactive substances. These could form the basis for numerous medications for various diseases, including liver diseases, and would also help address the lack of scientific evidence often cited as a shortcoming of traditional medicine. Thus, the need to integrate traditional medicine into universal therapeutic practice and to standardize it compels researchers to objectively evaluate traditional practices through easily verifiable experiments[3].

The objective of this study is to contribute to the advancement of traditional Congolese medicine by expanding knowledge of the plants used in the treatment of liver diseases. To achieve this objective, an ethnobotanical survey was conducted.

2. Study Scope and Methods

The scope of our study is centered on the city of Lubumbashi, the capital of Haut-Katanga Province, located in the southern part of the Democratic Republic of the Congo. It is situated between 11°26' and 11°51' south latitude and between 27°12' and 27°40' east longitude. It has a tropical climate with two seasons (a dry season from April to November and a rainy season from November to March), with average rainfall of 1,228 mm and an average temperature of 20 °C. The city of Lubumbashi is crossed by several rivers, including the Kafubu, Karavia, Lubumbashi, Lwano, Naviundu, and Ruashi.[4].

This survey was conducted from November 2019 to May 2022 through face-to-face interviews based on a guided questionnaire. The questions and answers were exchanged in Swahili, the main vernacular language of the study area. Plant names were provided in the vernacular languages as they are known to the traditional healers interviewed[5].

It should be noted that data collection was based on the availability of traditional healers and not on their comprehensive presence at the study sites. It was conducted with the aim of identifying the plant species used by traditional healers in the treatment of liver diseases. Information on ethnobotanical knowledge also aimed to identify the parts of plant organs used (stem: ST, stem bark: SB, roots: RO, root bark: RB, leaves: LE), the indications or pathologies treated, the methods of preparation and route of administration, as well as the dosages for each plant[6].

The species were first identified in situ, with the assistance of local experts, and herbarium collections were established. These specimens were submitted to the herbariums at INERA Kipopo and the Faculty of Agricultural Sciences at the University of Lubumbashi, respectively, for identification.

Data on the respondents and the plants mentioned were recorded, and statistical analyses and graphs were generated using GraphPad Prism software[7].

3. Result

The table below provides information on traditional healers who have shared details about plants with hepatoprotective properties. It includes their tribe, age, and the source of their healing knowledge.

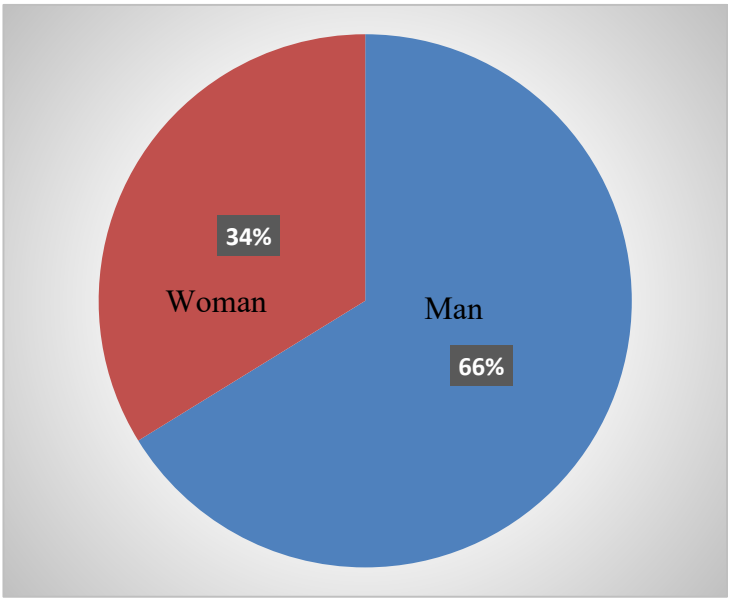
Table 1. Information about 74 traditional healers' identity and source of knowledge

Site (commune)	TN	Tribe et genre	Age (years)	Sources (TN)
ANNEXE	16	Luba 2F, 4M	(55, 61, 86, 37, 66, 67)	Ancestral (3), spiritual (2), its healer (1)
		Bemba 1F, 1M	(37, 62)	Ancestral (2)
		Lamba 2M	(30, 58)	Personal research (1), spiritual (1)
		Hemba 1M	61	Ancestral
		Kusu 1F	45	Ancestral
		Sanga 1M	31	Ancestral
		Mbala 1M	45	Personal research
		Nande 1M	52	Personal research
		Tshokwe 1F	46	Ancestral
KAMALONDO	3	Luba 1F 2 M	(45, 27, 60)	Ancestral (1), spiritual (2)
KAMPEMBA	15	Luba 1F, 5M	(51, 38, 41, 60, 62, 72)	Ancestral (4), spiritual (2)
		Bemba 1F, 1M	(47, 52)	Ancestral (1), personal research (1)
		Hemba 1F, 1M	(50, 76)	Personal research (1), spiritual (1)
		Tshokwe 2F	(23, 52)	Ancestral (1), spiritual (1)
		Kabinda 1F	48	Ancestral
		Kusu 1F	78	Ancestral
		Tabwa 1M	54	Ancestral
KATUBA	14	Luba 1F, 2M	(63, 54, 62)	Ancestral (2), spiritual (1)
		Luba-kasai 3 M	(37, 43, 54)	Ancestral (3)
		Tabwa 2F, 1M	(36, 46, 52)	Ancestral (3)
		Bemba 1 F, 1M	(42, 60)	Ancestral (1), personal research (1)
		Hemba 1F	42	Ancestral
		Sanga 1F	50	Personal research
		Tshokwe 1F	47	Ancestral
KENYA	10	Luba 3M	(26, 45, 458)	Ancestral (2), spirituelle (1)
		Bemba 1F, 1M	(33, 52)	Ancestral (2)
		Hema 1F	75	Ancestral

		Luba-kasai 1M	56	Spiritual
		Rund 1M	46	Ancestral
		Zela 1M	38	Spiritual
		Zula 1M	34	His wife
LUBUMBASHI	5	Kuba 1M	40	Ancestral
		Luba 1M	39	Spiritual
		Luba-Kasai 1M	68	Ancestral
		Rund 1 F	59	Ancestral
		Zela 1M	34	Ancestral
RUASHI	11	Bemba 2M	(36, 50)	Ancestral (1), spirituelle (1)
		Lamba 2M	(40,50)	Ancestral (2)
		Hemba 2F	(28,43)	Ancestral (1), personal research (1)
		Kabinda 1M	48	Ancestral
		Kuba 1M	40	Ancestral
		Luba 1M	70	Ancestral
		Rund 1M	57	Ancestral
		Shi 1M	50	Ancestral

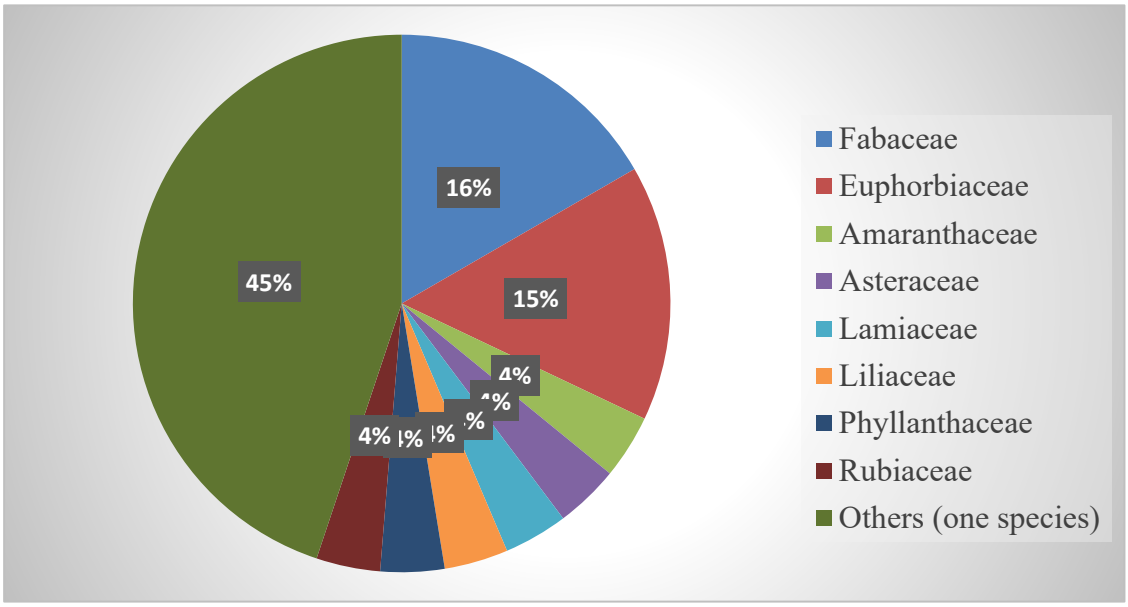
The ages of the 74 traditional practitioners surveyed (49 of whom were men) ranged from 23 to 49. The predominance of men in the practice of traditional medicine may be linked to the fact that, in our community, women—particularly married women—are not readily permitted to be approached by strangers[8].

Figure 1: Gender dominance in the practice of traditional medicine



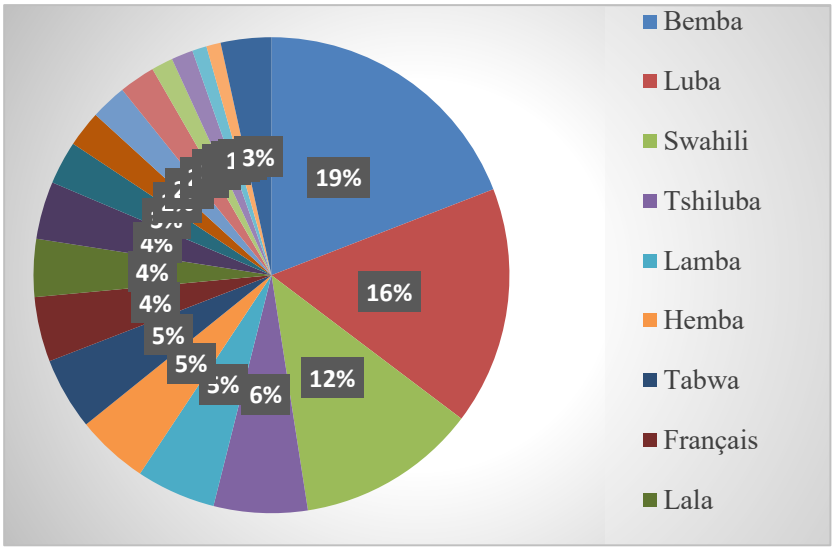
The figure below shows the distribution, by family, of plant species identified as having hepatoprotective properties.

Figure 2: Identification of recorded species



The information gathered from the 74 traditional healers consulted identified 78 plants belonging to 38 families, among which the Fabaceae (13/78) and Euphorbiaceae (12/78) were the most prevalent. The Amaranthaceae, Asteraceae, Lamiaceae, Liliaceae, Phyllanthaceae, and Rubiaceae were represented by three species each, while the Annonaceae, Bignoniaceae, Malvaceae, Loganiaceae, Poaceae, and Verbenaceae were represented by two species each. Indeed, this distribution of plant species across different families is consistent with research conducted in the former province of Katanga, which had highlighted the predominance of the Euphorbiaceae and Fabaceae[9].

Figure 3: Languages in which the plants are cited



We also found that these 78 plants had 203 different vernacular names across 24 languages. It is worth noting that half of the plants surveyed (39 plants) were identified by a Bemba name. Other languages were also used to name the plants: Luba (33 plants), Swahili (25 plants), Tshiluba (13 names), Lamba (11 names), Hemba and Tabwa (10 names), French (9 names), Lala and Mashi (8 names), Sanga (6 names), Kikongo, Rund, and Zela (5 names), Nande and Tshokwe (3 names), Lingala and Songye (2 names); all other remaining languages were represented by only a single vernacular name.

With regard to the Bemba and Luba languages, it should be noted that the situation is reversed compared to the corresponding tribes. Indeed, it was noted above that the Luba tribe was represented by 23 practitioners out of 74 (31.1%), while the Bemba tribe was represented by only 10 practitioners out of 74 (13.5%). This predominance of the Luba language in the naming of plants can be explained by the strong presence of the Luba people in the province of Haut-Katanga. Consequently, traditional medicinal knowledge appears to be most often transmitted in the Luba and Bemba languages[10].

The information provided for each plant species includes: family, common names, part used, conditions treated, as well as methods of preparation and administration. The ethnobotanical knowledge related to these plant species is listed in the table below.

Table 2: Ethnobotanical knowledge of the plant species inventoried

Scientific names (Family)	**Vernacular languages**	**UP**	**Pathologies or indications treated**	**Method of preparation and administration**	**Place (commune)**	**Ref.**
Acacia karro Hayne **(Fabaceae)**	Munga (luba), mungunga (hemba) and mutonge (sanga).	Leaves	Cirrhosis, cholera, wounds, panaris and lowers fever.	Decoction/per os	Annexe	TH27
Acacia polyacantha Willd. **(Fabaceae)**	Acacia (français) and kibombolwa (bemba).	Root bark	Cirrhosis, digestive disorder, internal hernia, appendicitis and typhoid fever.	Decoction/per os	Annexe	TH33
Achyranthes aspera Linn. **(Amaranthaceae)**	Tunkukululwe (bemba)	Whole plant	Cirrhosis, darters, anti-abortion, warts and cataracts.	Decoction/per os	Annexe, Kampemba	TH40, TH4, TH60
Albizia adianthifolia (Schumach.) Wight,	Kaunzila (sanga) or kapeta nsofu (bemba) and	Root bark, Leaves	Hepatopathies and spleen. Syphilis,	Infusion/ per os	Annexe, Kampemba,	TH34, TH46, TH59,

(Mimosaceaeae)	sembe (luba).		gonorrhoea and sterility.			TH73
Aloe barbadensis Miller **(Liliaceae)**	Liposo (bemba), musula (luba, hemba), tshilombo (tshokwe), kikangala (tabwa) and kilambwa (sanga).	Leaves	Hepatopathies, sinusitis, dysentery, cancer, ascites, arterial tension, burns and ringworm.	Infusion/ per os Infusion/ local application	Kampemba	TH34
Amaranthus hybridus Linn. **(Amaranthaceae)**	Ibondwe (bemba)	Whole plant	Hepatitis	Decoction/per os	Ruashi	TH3
Amaranthus spinosus Linn. **(Amaranthaceae)**	Bokamiba (swahili)	Plante entière	Jaundice and digestive disorders.	Decoction/per os	Ruashi	TH41
Amorphorphallus abynicus **(Araceae)**	Bufwefwe bua mataba (luba)	Leaves	Jaundice and malaria.	Decoction/per os	Ruashi	TH41
Anblygonocarpus schweinfirthii Del. **(Fabaceae)**	Muyeye (luba) and mweyeye (hemba).	Root bark	Jaundice, malaria and intestinal worms.	Infusion/ per os	Katuba	TH58
Annona senegalensis Pers. **(Annonaceae)**	Mulolo (hemba, bemba) and moebe (swahili).	Stem bark Leaves	Hepatitis Cirrhosis and abdominal pain.	Decoction/per os Decoction/per os	Katuba, Ruashi, Lubumbashi	TH3, TH13, TH18, TH48, TH71
Antidesma vogelianum Müll. Arg., **(Euphorbiaceae)**	Kifovya, kifubia or djafobya (zela) and itompo (bemba, lamba, lala).	Whole plant	Cirrhosis and diabetes.	Decoction/per os	Kampemba	TH37
Aspargus officinalis L. **(Liliaceae)**	Mtego wa kuku (swahili) and kakoba makanga (bemba).	Stem, Rhizome, Root bark	Jaundice and haemorrhoids.	Decoction/per os	Annexe	TH27

Aspargus plumosus Baker **(Liliaceae)**	Kapala makanga or kakoba makanga (bemba) and atata ngwali (hemba).	Root bark	Cirrhosis, male strength and vision.	Infusion/ per os Maceration and filtration/eyes	Katuba	TH61
Asperula odorata L. **(Rubiaceae)**	Aspérule (français)	Whole plant	Jaundice	Decoction/per os	Kampemba	TH45
Balanites aegyptiaca L.C. **(Balanitaceae)**	Mutikapandeu (luba) and mubambangoma (bemba).	Root bark	External haemorrhoids and jaundice.	Decoction/per os	Kampemba	TH62
Bidens pilosa Beh. **(Asteraceae)**	Nsokontwe, kashisha (swahili), selentwike (luba) and kanunka (bemba).	Leaves, Flower	Jaundice, liver disorders, burns, wounds, angina and colic. Pneumonia, malaria, infections and intoxications.	Macération/per os Drying + decoction/ per os	Kampemba	TH43, TH67, TH72
Brachystesia boehmii Tauls. **(Fabaceae)**	Musanga (tabwa, hemba), musamba (bemba) and musamb (rund).	Stem	Cirrhosis, dysentery and gonorrhoea.	Decoction/per os	Annexe, Kampemba	TH22, TH37 TH47, TH74,
Bridelia duvineaudii **(Euphorbiaceae)**	Mwindu kikolokoto (kikongo) and kalambabwato (bemba).	Leaves	Liver disorders	Decoction/per os	Katuba	TH20, TH70 TH64, TH11
Bridelia micrantha **(Euphorbiaceae)**	Mukunta mpele (bemba), mukunku (rund), mlebezi	Root bark, Stem bark	Jaundice and typhoid fever.	Decoction/per os	Kampemba, Katuba	TH61, TH56, TH34, TH11

	(nyanja) and mkarati (swahili).					
Canarium schweinfurthii Engl. **(Burseraceae)**	Ubani (swahili) and encens (français)	Root bark, Stem	Jaundice, digestive disorder and internal hernia. Appendicitis and typhoid fever.	Decoction/per os Maceration/per os	Annexe	TH25 TH33
Canthium crassum (Schweinf.) Hiern, **(Rubiaeceae)**	Munkolonkolo (luba)	Leaves, Stem bark	Hepatopathies and diabetes.	Infusion/ per os	Katuba	TH44, TH65
Carica papaya L. **(Caricaceae)**	Kapyapya (luba), mpapayi (swahili) and papayer (français).	Root bark, Fruit	Hepatitis, cirrhosis, jaundice, Malaria and gonorrhoea. Cough, plague and dysentery.	Decoction/per os Decoction/per os	Annexe, Kampemba	TH40, TH18, TH64
*Cassia occidentalis*L. **(Fabaceae)**	Mutshaka tshaka (swahili), lukunda bajanyi (tshiluba) and mbaw-mbaw (kikongo).	Root bark	Hepatitis, diabetes, infertility, haemorrhoids, anaemia and headaches.	Decoction/per os	Annexe, Kampemba, Lubumbashi, Kenya, Ruashi	TH23, TH12, TH30, TH73, TH55
Cassia sieberiana L. **(Fabaceae)**	Kandungandunga (tshiluba) and mungunga (hemba).	Leaves	Hepatitis, eczema, ulcers and amoebiasis.	Infusion/ per os	Annexe	TH27
Cassine aethiopica Thunb. **(Celastraceae)**	Muntufita (lala, lamba) and kalume kamukuwe (bemba).	Leaves	Cirrhosis and jaundice.	Maceration/ per os	Kenya	TH36
Chlorophora excelsa	Molundu (kikongo)	Leaves, Stem	Liver disorders and	Decoction/per os Grinding	Annexe, Kenya,	TH9, TH13,

(Moraceae)		bark	childbirth. Abscess and tumour.		Lubumbashi, Ruashi	TH17, TH54
Combretum micranthum L. **(Combretaceae)**	Diza (kiyanzi)	Leaves	Jaundice and cirrhosis.	Decoction/per os	Katuba, Kenya, Kampemba, Lubumbashi,	TH5, TH11, TH17, TH28, TH53
Crassocephallum Montuosum (S. Moore) Milne-Redh. **(Asteraceae)**	Ciphula (mashi) and Kisulanindi (nande).	Leaves, Stem bark	Liver disorders and diarrhoea. Urinary tract infection	Decoction/per os Drying and spraying	Annexe, Ruashi	TH27, TH31
Crassocephallum Vitellinum (Benth.) S. Moore **(Asteraceae)**	Nshungululu (mashi) and tondobila (rega)	Leaves	Cirrhosis, intoxication, haemorrhage and wounds.	Decoction/per os	Ruashi	TH23
Crossopteryx febrifuga **(Rubiaceae)**	Konsekonse (lamba, bemba), mutoba kongwe, pelapoli (tabwa) and mutotshi (tshiluba)	Leaves, Stem bark	Liver diseases, cough and diarrhoea. Toothache and abdominal pain.	Decoction/per os Maceration/ Rinsing the mouth	Annexe, Kenya, Ruashi	TH23, TH70, TH32, TH22
Cymbopongon cytratus Hiem. **(Poaceae)**	Kiyombomputu (luba)	Leaves	Cirrhosis and high blood pressure. Cough and fever.	Decoction/per os Decoction/per os	Ruashi	TH60
Dalbergia boehmi Taub. Subsp. **(Fabaceae)**	Tembo sula (luba) and katembwa muji (tshiluba)	Root bark	Cirrhosis and jaundice. Malaria and fever.	Maceration/ per os Maceration/	Kampemba, Ruashi	TH45, TH60
Diplorhynchus condylocarpon (Müll. Arg.) **(Apocynaceae)**	Mwenge (swahili, lamba, bemba), mubudi (luba)	Root bark, Leaves	Cirrhosis, nervous disorders, tuberculosis and	Drying and maceration Clean fresh leaves and	Kampemba	TH34

	and muud (rund).		respiratory disorders. Sexual strength, vision, luck and demonic disorders.	Infusion		
Dracaena steudneri Engl. **(Dracaenaceae)**	Mukonzi (nande, mashi) and mulapwa (zela).	Stem bark	Hepatitis, whooping cough, tooth decay, scabies, cancer, gonorrhoea, otitis and cystitis.	Decoction/per os	Ruashi	TH31
Droogmasia munamesis L. **(Fabaceae)**	Kalugalunga (luba), mununganung a (bemba) and mulundeni (lala).	Root bark	Appendicitis, cirrhosis and tuberculosis.	Infusion/ per os	Kenya	TH57
Eminia polyadenia Haumann **(Fabaceae)**	Munkoyo (swahili)	Root bark, Roots	Hepatopathies and haemorrhoids . Psychic disorders and lack of appetite.	Infusion/ per os Decoction/per os	Katuba, Ruashi	TH69, TH53
Erythrina abyssinica Lam **(Fabaceae)**	Kisungwa (bemba, lala, lamba, hemba) and kizugwa (zela).	Flower, Root bark, Stem bark	Hepatitis, jaundice, goitre and cataract. Tooth decay, asthenia, hernia, lumbago and dysmenorrhoe a.	Infusion/ per os Decoction/per os	Annexe, Katuba, Kenya, Kampemb a	TH44, TH22, TH18 TH57
Euphorbia hirta L.	Matshayambw a (tabwa),	Root bark,	Cirrhosis	Chewing	Katuba	TH63

(Euphorbiaceae)	maziba ya kalulu (swahili), butonvitonvi (bemba and tshiluba), kake (tshokwe) and buyonzi (kibangubangu).	Leaves				
Euphorbia tirucali L. **(Euphorbiaceae)**	Kanoka (bemba), lunsoga, ntulu or potenge (swahili) and Euphorbe (français).	Root bark, Stem	Cirrhosis and nervous disorder. Tuberculosis and respiratory disorders.	Drying and decoction Decoction/inhalation	Kampemba, Katuba	TH34 TH11
Harungana madagascariensis **(Clausiaceae)**	Kape (tabwa), mutumu ntumu (kikongo), mutondo lumasimasi (hemba) and kafifi (bemba).	Leaves, Stem bark, Leaves	Stimulation of the liver and stomach aches. Diabetes	Decoction/per os Decoction/per os	Kampemba, Kenya, Ruashi, Ruashi	TH24, TH56, TH13, TH16
Hypoestes triflora (Forssk.) Roemer & Schultes. (**Acanthaceae**)	Mageru (mashi) and pindula (swahili).	Leaves	Liver disorders, anaemia, dysentery, intestinal worms and AIDS.	Grinding and infusion/per os	Annexe	TH27
Jatropha curcas **(Euphorbiaceae)**	Ntondo dimba (luba) chitondomona ou chitondoma, kitondomono (bemba), mupulunga (kikongo), mbono (swahili),	Leaves, Root bark	Jaundice and gonorrhoea. Diabetes and constipation.	Decoction/per os Decoction/per os	Annexe	TH8

	ntondondimba (bemba) and kapuluayi (tshiluba).					
Khaya nyasica Stapf exBaker f **(Meliaceae)**	Mululu (bemba, luba) and muntonte (kaonde).	Root bark, Fruit Root bark, Stem bark	Cirrhosis and jaundice. Leprosy, diarrhoea and malaria. Dysmenorrhoea, syphilis and haemorrhoids. Wound	Decoction/per os Maceration/intimate bath Grinding of fresh leaves	Kampemba, Kenya	TH35, TH66
Kigelia aethiopum (Fenzl) Dandy. **(Bignoniaceae)**	Kinvungwe (tabwa, zela), mufungufungu (bemba) and kanfungwila (lala, lamba).	Stem bark, Root bark	Hepatopathies, hernia, diabetes and sterility.	Infusion/ per os	Kampemba	TH34
Leucas martinicensis Jacq. **(Lamiaceae)**	Kanyamafundo (mashi).	Leaves	Liver disorders, asthma, tuberculosis, cerebral malaria and diarrhoea. Panaris and wounds.	Decoction/per os Macération/ per os	Annexe, Ruashi	TH27, TH31 TH31
Maesopsis eminii **(Rhamnaceae)**	Ndungamutshi (tshiluba).	Leaves	Jaundice and male sterility.	Decoction/per os	Ruashi	TH21
Manihot esculenta Krantz **(Euphorbiaceae)**	Linyoko, manyoko (lingala), muhoko (swahili) and manioc (français).	Leaves	Hepatitis and vertigo.	Mash to extract 2 glasses of juice + ½ glass of banana latex and drink.	Katuba	TH19
Maprounea africana Müll. Arg. **(Euphorbiaceae**	Kavulamume (tabwa), kafulumume, mupasa or	Leaves	Cirrhosis and hepatitis.	Decoction/per os	Annexe, Kamalondo, Kampemb	TH2, TH28, TH43, TH55

)	mutumbwa (bemba), kazembezembe (luba) and kafulama (tshiluba).				a, Kenya	
Monotes katangensis De Wild. **(Dipterocarpaceae)**	Mutshi ya bimpampa (swahili) and kimpampa (bemba, lala, lamba).	Fruit	Jaundice and malaria.	Chewing	Annexe	TH27
Moringa Oleifera Lam. **(Moringaceae)**	Maringa (luba) and mti maria (swahili).	Leaves, Stem bark, Fruit	Cancer, haemorrhoids and constipation. Liver disorders, spleen, ulcers, AIDS and gingivitis. Wounds and joint pain.	Infusion/ per os Decoction/per os Infusion/ per os	Lubumbashi, Ruashi	TH10, TH61
Nasturtium officinale L. **(Brassicaceae)**	Lujinji lw'elwishi (mashi) and nzahula (tshiluba).	Leaves	Liver disorders, diabetes, kidney stones, food poisoning and boosting immunity (HIV/AIDS).	Grinding and decoction/ per os	Annexe, Katuba	TH27, TH14
Ocinum gratissimu L. **(Rutaceae)**	Yemba lubwitshi (tshiluba)	Leaves	Jaundice, cold and cough.	Decoction/per os	Annexe	TH2
Olea europaea **(Oleaceae)**	Olivier (français)	Fruit	Cirrhosis of the liver and appendicitis.	Olive oil plus Cypressus sp powder, add Elais guineensis oil and eat	Kamalondo	TH72
Paullinia pinnata **(Sapindaceae)**	Chifui (rund) and lubulu tuku (sanga,	Leaves	Jaundice and hepatitis.	Decoction/per os	Kampemba, Katuba, Kenya,	TH24, TH5, TH29,

	luba).					TH63
Phaseolus vulgaris **(Fabaceae)**	Mupundu (tabwa), malagi (swahili), haricot (français), makunde (tshokwe) and pondu (lingala).	Leaves	Liver diseases and anaemia.	Decoction/per os	Annexe, Kenya, Kenya	TH35, TH1, TH54, TH57, TH60
Phyllanthus muellerianus (Kuntze) Exell **(Phyllanthaceae)**	Lweya manfume, mulembalemba (luba), musambafwa or mupetwalupe (bemba) and luhega mafumu (hemba).	Stem bark Root bark	Cirrhosis, toothache and heart disease. Malaria and fever.	Decoction/per os Decoction/per os	Annexe, Kampemba	TH25, TH62
Phyllantus nuriri L. **(Phyllanthaceae)**	Uruhesa (kinyarwanda) kahungahunga (tshiluba) and kapondo (songye).	Whole plant	Jaundice, hepatitis, cough and furuncle.	Decoction/per os	Annexe	TH33
Piper umbellatum L. **(Piperaceae)**	Dilombolombo (tshiluba)	Leaves	Jaundice	Decoction/per os	Annexe	TH27
Pseudolachnostylis maprouneifolia Pax **(Euphorbiaceae)**	Mbulu (luba), musangali ou musalya (bemba) and musangati (swahili).	Root bark	Jaundice and early abortions.	Decoction/per os, drying and grinding	Kampemba, Katuba	TH26, TH66
Psidium guajava L. **(Myrtaceae)**	Mapela (swahili), dipela (luba) and goyavier (french).	Leaves	Cirrhosis, jaundice, fever, anaemia and stomach aches.	Decoction/per os	Annexe, Katuba, Ruashi	TH22, TH39, TH51, TH16

Pterocarpus pentorius Welw. **(Fabaceae)**	Kakula (tabwa)	Root bark	Cancer and hepatitis.	Decoction/per os and Infusion/ per os	Annexe, atuba	TH61 TH22
Rhynchosia insignis O. Hoffm. **(Euphorbiaceae)**	Kailunge (sanga)	Root	Liver disorders	Infusion/ per os	Annexe, Kampemba	TH6, TH15
Ricinus comminus **(Euphorbiaceae)**	Botono (tshiluba), kaselesele (bemba and luba).	Stem bark	Jaundice, diarrhoea and malaria.	Decoction/per os	Kampemba	TH7
Rubia cordifolia L. **(Rubiaceae)**	Lukerabatuzi (mashi) and lumakiriri (nande).	Leaves	Colic, hypotension, sterility, sexual impotence and scabies.	Piloting and decoction	Annexe	TH27
Sarothamnus scoparius (L.) Wimmer ex-Koch **(Fabaceae)**	Génétier (french)	Flower	Jaundice	Infusion/ per os	Annexe	TH27
Securinega virosa **(Euphorbiaceae)**	Kasansubwanga (bemba, luba) and luzwela (rund).	Leaves	Liver, kidney and bladder disorders and hypertension.	Decoction/per os	Annexe, Kenya, Lubumbashi	TH9, TH16, TH30, TH50
Sida rhombifolia L. **(Malvaceae)**	Kikomba (lamba, luba, tshiluba).	Root bark, Stem bark, Leaves	Cirrhosis and sexual strength. Glaucoma, hypertension, furuncle and gonorrhoea. Panaris	Macération/ per os Shredding of fresh leaves	Annexe	TH33
Solanum nigrum **(Solanaceae)**	Mutete (swahili)	Fruit	Hepatitis, jaundice, diabetes, haemorrhoids, sexual	Cooking Cleaning	Annexe, Kampemba, Katuba	TH27, TH33, TH37 TH38

			weakness and migraine.			
Spathodea campanulata Beauv. **(Bignoniaceae)**	Cifulafula (mashi) and musawe (swahili, luba).	Stem bark, Leaves	Cirrhosis, jaundice, liver disorders, diabetes, ulcers, asthenia, abscesses, amoebiasis and sterility.	Decoction/per os	Annexe	TH33
Strychnos innocua **(Loganiaceae)**	Mekome (luba) and kakomekome (bemba).	Root bark	Cirrhosis	Decoction/per os	Annexe	TH40
Strychnos spinosa Lam. **(Loganiaceae)**	Mukoke (luba) and sansa (songye).	Leaves, Flower	Jaundice, Diabetes	Decoction/per os Decoction/per os	Ruashi, kenya	TH42 TH32
Tapinanthus erianthus (Sprague) Danser. **(Loranthaceae)**	Tentami (zela)	Leaves	Cirrhosis and airway clearance.	Drying	Ruashi	TH4, TH60
Thespesia garckeana F. Hoffm. **(Malvaceae)**	Mukole (bemba, lala, lamba, luba) and makole (swahili).	Root bark, Fruit	Jaundice, asthma, rheumatism and gastritis. Malaria	Decoction/per os Cleaning	Annexe	TH34 & TH46
Uapaca kirkiana **(Phyllanthaceae)**	Masuku (bemba, swahili)	Leaves	Hepatitis, amoebiasis and STDs.	Decoction/per os	Annexe, Kamalondo, Lubumbashi, Kampemba	TH49, TH52, TH68 & TH6
Vitex madiensis Ol. **(Lamiaceae)**	Mufutu kinka (bemba, lamba), mukinka (luba, bemba) and mufutu (hemba).	Leaves	Diabetes and liver disease.	Decoction/per os	Kenya, Katuba,	TH59, TH73, TH2, TH11 & TH68
Vitex mombasae	Kapopotwe	Stem	Cirrhosis,	Decoction/per os	Kampemb	TH34

Vatke. **(Lamiaceae)**	(bemba) and kankika (sanga, luba).	bark, Root bark	jaundice and diarrhoea.		a	
Xylopia aethiopica (Dunal) A. Rich. **(Annonaceae)**	Njilu (luba)	Leaves, Stem bark	Jaundice and madness.	Infusion/ per os	Kampemba	TH18
Zea mays L. **(Poaceae)**	Amataba (bemba, lala, lamba, luba), maïs (français), miebele (luba) and muhindi (swahili).	Leaves	Jaundice, cancer, hernia, diabetes and infertility.	Decoction/per os	Annex	TH22

The conditions or symptoms treated by the 78 plants can be divided into two groups: those directly related to the liver, and other conditions.

4. Discussions and Comments

Liver-related conditions were referred to as “liver diseases” without further specification, such as liver cirrhosis, hepatitis, or jaundice. Among these conditions, jaundice was the most frequently cited (35.49%), followed by cirrhosis (29.03%) and liver diseases (20.43%). Hepatitis was mentioned by only 15.05% of respondents[11].

The distribution of citation frequencies for liver-related conditions and indications helps to explain the difficulty traditional healers face in diagnosing liver diseases. As with most conditions, they rely primarily on symptoms. For example, it was easy to diagnose jaundice, as it is accompanied by yellowing of the eyes and skin; cirrhosis, on the other hand, is accompanied by weight loss and generally results from alcoholism[12].

In addition to liver diseases, 91 other conditions were listed as treatable by one or more of the 78 plant species identified. Among these indications, diabetes and malaria (11 mentions: 4.80%) were the most frequently cited. They are followed by hemorrhoids (8 mentions: 3.49%), gonorrhea (7 mentions: 3.06%), diarrhea, dysentery, fever, wounds, and cough, which are treated by 6 plants each (2.62%), as well as anemia, asthenia, asthma, hernia, hypertension, and infertility, treated by 5 plants each (2.18%). All other diseases are treated by fewer than 5 plants, and 41 of them are treated by a single plant each.

Eight parts of plants are used in the preparation of medicinal recipes. Among these, leaves and root bark were the most commonly used, accounting for 36.94% and 27.03% of mentions, respectively. Leaves are, in fact, the most easily accessible parts, and they are what most plants are identified by[13]. The fact that root bark is more widely used could be explained by the fact that these parts are not significantly affected by the seasons. Since they are underground, roots are available during both the dry season and the rainy season.

Medicinal preparations are made by grinding, decoction, infusion, maceration, and drying; decoction is the most commonly used method (64.29%)[14]. This is followed by infusion (16.33%) and maceration

(7.14%). Grinding and drying are each used in only 6.12% of cases. In our opinion, decoction would allow for rapid extraction of the active ingredients. Indeed, according to traditional practitioners, boiling should not last too long "for fear of altering the remedy." It is also well established that prolonged boiling leads to the denaturation of the active ingredient[15].

In addition, six methods of administering medicinal preparations were reported: bathing, ingestion, smoking, inhalation, chewing, and massage. Among these, ingestion was the primary method of administration (91.21%), with daily consumption generally ranging from two to three glasses per day. This is the most common method of administration among traditional practitioners, regardless of the medicine's taste.[16].

It should also be noted that, of the 78 plants listed, many have been identified in the literature as having hepatoprotective or antioxidant properties, as demonstrated by scientific studies[17]. This is the case with Samaké Savio et al. in their study: «ETUDE ETHNOBOTANIQUE ET SCREENING PHYTOCHIMIQUE DE PLANTES ORNEMENTALES À USAGE THERAPEUTIQUE DU DISTRICT DE BAMAKO, MALI»[18]; and Bastien PETIT's doctoral dissertation on: "Harnessing the Potential of Glycosylated Natural Products for Health and the Environment: From the Diagnosis of Autoimmune Diseases to Crop Protection"[19].

This demonstrates that the plants used to treat liver diseases in Lubumbashi are also used elsewhere. Furthermore, the fact that these plant species are grouped together suggests their effectiveness in treating the indicated conditions. Indeed, the reliability of this data is reinforced when the same plants are independently recommended by at least two traditional practitioners from different locations for the treatment of the same condition[20].

5. Conclusion

An ethnobotanical survey was conducted among seventy-four traditional healers (including 25 women) in Lubumbashi and the surrounding area. The ages of the traditional healers ranged from 23 to 86 years, with the majority between 40 and 59 years old. They learned the art of healing primarily through family transmission. Their information enabled the identification of 78 plant species from 36 families, among which the Fabaceae and Euphorbiaceae families predominated. The 78 plant species identified were used to treat 4 liver diseases (cirrhosis, hepatitis, jaundice, and unspecified liver diseases) and 91 other diseases. Leaves and root bark were the most commonly used parts, while decoction and drink were the most common methods of preparation and route of administration, respectively.

6. References

1. M. Marin, "Mdr/mxr," 2005.
2. N. D. E. S. Maladies, "NON-INVASIF DES MALADIES ASSOCIATION FRANÇAISE POUR L ' ÉTUDE DU FOIE," 2020.
3. A. Siallou and A. Prisca, "Étude ethnomédicinales des plantes utilisées dans le traitement de quelques maladies du foie dans la sous- préfecture de Bengassou (Centre- Est de la Côte d ' Ivoire)," pp. 33–54, 2024, doi: 10.19044/esipreprint.6.2024.p33.
4. "pub_071_03.pdf."
5. K. Muya *et al.*, "Article original Pharmacognosie Survol ethnobotanique de quelques plantes utilisées contre la schistosomiase urogénitale à Lubumbashi et environs," 2014, doi: 10.1007/s10298-014-0877-z.

6. A. Siallou, A. Prisca, K. Donthy, K. Richard, and L. De Agro-valorisation, "Étude ethnomédicinale des plantes utilisées dans le traitement de quelques maladies du foie dans la sous-préfecture de Bengassou (Centre- Est de la Côte d ' Ivoire)," pp. 195–215, 2024, doi: 10.19044/esj.2024.v20n18p195.
7. H. Motulsky, "Statistics Guide".
8. R. Médicale *et al.*, "Médecine d ' Afrique Noire Facteurs associés à l ' utilisation des méthodes contraceptives à longue durée d ' action et permanentes dans la vile de Lubumbashi , RD Congo," no. June 2015, 2017.
9. Y. U. Sikuzani, K. Muteya, S. Langunu, E. Alipade, and M. Kankumbi, "périurbaine de la ville de Lubumbashi (RD Congo)," pp. 1–13, 2020.
10. F. N. Ndaye, "Analyse du Marché des Plantes Médicinales dans la Région de Lubumbashi : Acteurs et Enjeux Socio-Economiques Analysis of the Medicinal Plants Market in the Lubumbashi Region : Actors and Socio-Economic Issues," pp. 456–483, 2024, doi: 10.19044/esipreprint.2.2024.p456.
11. D. Diallo, D. Cjs, K. Diallo, O. Sow, D. Nb, and D. Sylla, "Étiologies , Évolution et Pronostic de la Cirrhose de l ' Adulte à l ' Hôpital National Donka CHU de Conakry Hospital of Conakry," vol. 24, no. October, pp. 55–59, 2023.
12. L. E. S. Maladies and D. U. Foie, "Jaunisse (ictère)," vol. 1.
13. F. N. Bakwaye, C. Termote, K. Kibungu, and P. Van Damme, "Identification et importance locale des plantes médicinales utilisées dans la région de Mbanza-Ngungu , République démocratique du Congo IDENTIFICATION ET IMPORTANCE LOCALE IDENTIFICATION AND LOCAL IMPORTANCE OF MEDICINAL PLANTS," vol. 316, no. 2, pp. 63–78, 2013.
14. J. Nicolas, "LES PLANTES POUR SE SOIGNER".
15. E. Donz, "d ' émulsions sèches , lors de leur réhydratation dans l ' eau To cite this version :," 2021.
16. M. Lafaurie, "et formes pharmaceutiques," pp. 19–25, doi: 10.1016/B978-2-294-77420-1.00004-1.
17. *No Title*.
18. T. Issiaka, D. Nouhoum, and S. Rokia, "ISSN : 2320-5407 Manuscript Info Abstract ISSN : 2320-5407 Introduction : - Matériel Et Méthodes : -," vol. 8, no. 08, pp. 251–262, 2020, doi: 10.21474/IJAR01/11487.
19. B. Petit, "Valorisation des produits naturels glycosylés pour la santé et l ' environnement : du diagnostic de maladies auto-immunes à la protection des cultures To cite this version : HAL Id : tel-03252466 Bastien PETIT l ' environnement : du diagnostic de maladies," 2021.
20. M. M. James *et al.*, "Enquête ethnobotanique sur les plantes médicinales utilisées dans le traitement des mycoses humaines à Lubumbashi et ses environs (RD Congo)." pp. 21838–21851, 2025.