African Journal of Plant Science Vol. 7(1), pp. 21-34, January 2013
Available online at http://www.academicjournals.org/AJPS
DOI: 10.5897/AJPS12.111
ISSN 1996-0824 ©2013 Academic Journals

Full Length Research Paper

Ethnobotanical study of commonly used medicinal plants of the Takamanda Rainforest South West, Cameroon

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Accepted 15 November 2012

An ethnobotanical study was conducted around the periphery of the Takamanda National Park (TNP) Cameroon, through semi – structured questionnaires, interview, and field survey. The study aimed at recording traditional knowledge on the use of plants to cure common ailments and provide information towards the conservation of indigenous medicinal plants. Thirty-nine (39) plant species belonging to 26 plant families were reported to cure about 45 ailments in the (Ebinsi, Kajifu 1, Kajifu 2, Kekukesim and Takamanda) villages. 29 of the 39 species were common (mostly seen in the community) and ten of the 39 species were rare (uncommonly seen in the community). *Aframomum flavum*, *Garcinia kola* and *Elaeis guineensis* had the highest (100%) fidelity level (traditional healers who cited the same species to cure a particular ailment) while *Carpolobia alba* (40%) and *Alchornea cordifolia* (33%) had the least fidelity levels. Tree barks (25%) and leaves (21%) were the commonly used plant parts. Decoction (37.3%) and juice (18.6%) were the methods mostly used for the preparation of remedies. Treatments were administered orally (58%), the most frequently used route of administration, or topically, through enema, steam bath and inhalation. The importance of traditional medicines and indigenous knowledge should be encouraged, conserved and documented.

Key words: Enthnobotany, conservation, medicinal plants, ethnomedicines, Takamanda National Park.

INTRODUCTION

Forest ecosystems render services of industrial, pharmaceutical, cultural and socio-economic importance to humans contributing billions of dollars to the world economy (Mboh, 2001; WWF and IUCN, 1994; Hill, 1989). Man uses wild plants to supply medicine, crafts and cosmetics to rural and urban areas. In addition, wild plants are a source of income and employment particularly in the rural areas (Balick, 1996; Pascaline et al., 2011).

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World Health Organization estimates indicate that 80% of the population (mostly in developing countries) still relies on plant-based medicines for primary health care (Balick et al., 1996). Valuable herbal traditions found in developing countries are an important component of the cultural heritage of the world (Sofowora, 1982).

In the tropics alone, it has been estimated that 25000 plant species are used in traditional medicines (WWF and IUCN, 1994). Important herbal products are spices, herbal teas, functional food ingredients, medicinal raw materials, aromatic plants, essential oils and dietary supplements.

More than 25% of medicines used by humans are extracted from tropical plants (Yorek et al., 2008).

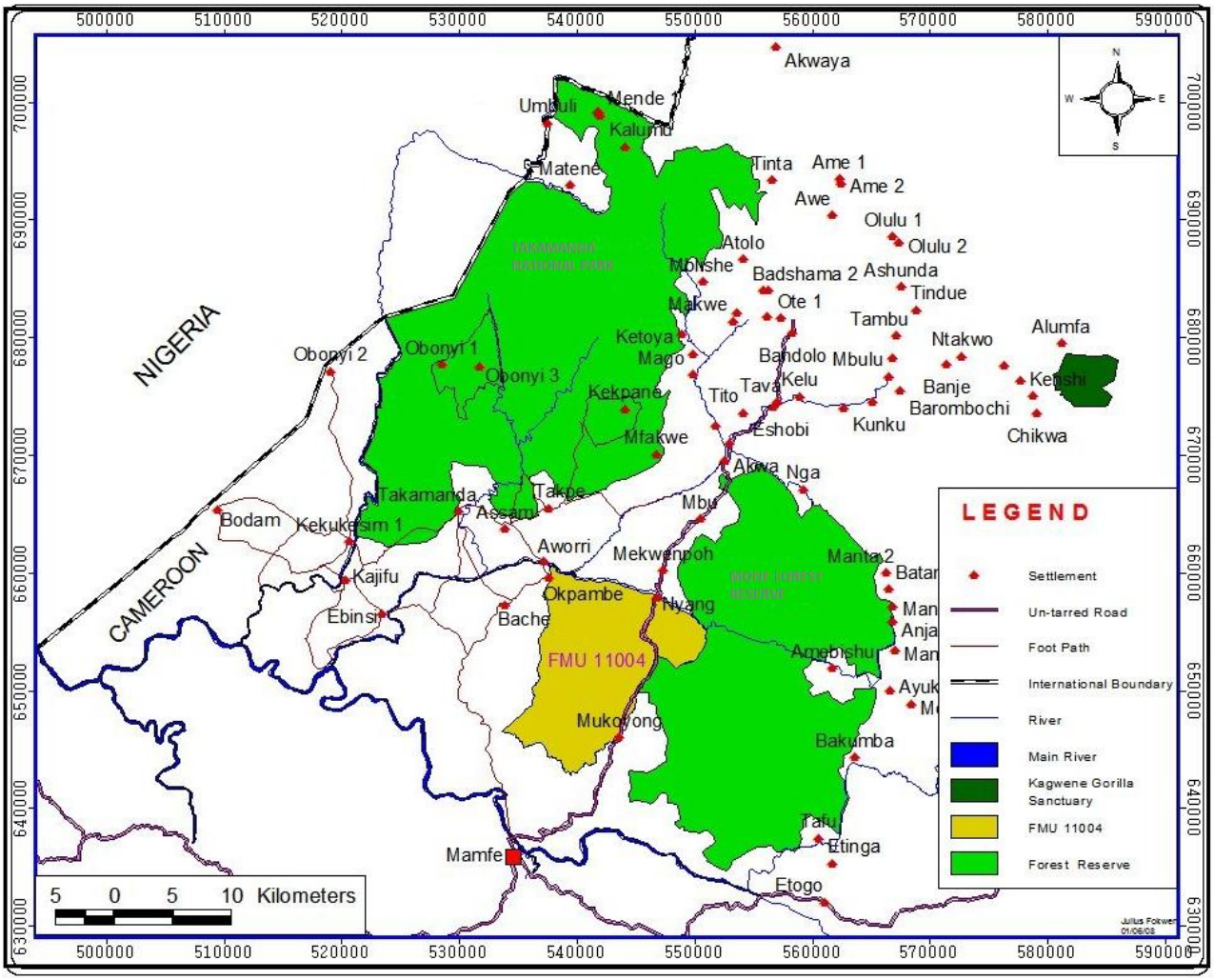

Figure 1. Map of study area.

Medicinal plant use is gaining much attention in Cameroon (Adjanohoun et al., 1996; Focho et al., 2010) where the plants are of essential need, especially in poor communities (Ebinsi, Kajifu 1, Kajifu 2, Kekukesim and Takamanda) where hospitals are absent or if present, lack the basic infrastructures and instruments to carry out simple operations. This is coupled with the distance from the villages of about 35 km to the hospital to obtain rapid medical attention; the roads which are muddy during the rainy season make movement to other part of the country difficult, risky and expensive for patients who need prompt primary health care; the villages are surrounded by big rivers with no bridges and some split into tributaries making accessibility into and out of the communities difficult (Figure 1).

Moreover, the difficult terrain has limited movements of health personnel to attend promptly to serious patients and refer major cases to reference hospitals within the regions. These limitations and others have forced the inhabitants to rely on the rich flora and great knowledge of folkloric medicines to treat the common ailments

The communities around the Takamanda rainforest have so far, relied on the rainforest to collect essential plants for the treatment of diseases. The enclaved nature of these villages in the rainforest has helped to maintain its biodiversity and has provided essential plant ingredients for the treatment of common ailments in the surrounding communities (Zapfact et al., 2001; Comiskey et al., 2003).

The rainforest plays many major roles in the communities and the nation as a whole in providing goods and services for livelihood support (Sunderland et al., 2003). The rainforest does not only provide timber, fuel wood, non timber forest products, bushmeat, and food for the household but equally provides a myriad of plants, used for the treatment of many common diseases

(Sunderland-Groves and Maisels, 2003).

Despite the fact that the rich biodiversity in the Takamanda rainforest helps in providing primary health care, the area has experienced illegal exploitation of timber, indiscriminate extraction of non timber forest products (NTFPs), poor farming methods and settlement encroachment, which have led to forest degradation, habitat fragmentation and micro climate modification (Sunderland et al., 2003). As a result of these pressures, most of the niches and microhabitats harbouring these species are at the verge of getting extinct while others are fast becoming locally endangered.

This study will be important in reinforcing conservation and sustainable management of plant species and most especially those of ethnobotanical values. This study will also be important in the protection of the endangered cross river gorilla (*Gorilla gorilla diehli*) which is endemic in the area as well as other vulnerable plants (*Garcina kola, Carpolobia lutea, Terminalia ivorensis, Melicia excelsa, Cylicodiscus gabunensis* and animal (*Pan troglodytes, Mandrillus leucophaeus, Loxodonta africana*) species.

The use of medicinal plants has widely been practiced amongst community members, but little information has been documented on the types of plant species used, availability of the species, location of the plant in question and the forms of application. This study was aimed at looking into the commonly used medicinal plants in the Takamanda communities in curing various ailments and the conservation as well as documentation of the various plant species used for curing diseases. The objectives of this study were: (1) to identify and document commonly used plant species of the Takamanda communities; (2) to record traditional knowledge on the use of these plants to cure different ailments; (3) to create general awareness among the local community for the conservation of indigenous medicinal plants and (4) to collect commonly used ethnobotanical plants of the area for proper identification and future reference.

MATERIALS AND METHODS

Location of study area

The Takamanda rainforest which embodies the Takamanda National park, Mone forest Reserve and Kagwene Gorilla Sanctuary is located in the South west region and part of the North West region of Cameroon. The park is part of the Guineo-Congolean forest, which encompasses approximately 2.8 million km^2 mostly below 600 m, except where Precambrian highlands such as the Jos Plateau of Nigeria and the Cameroon Highlands rise above 1000 m (Lawson, 1996). Takamanda rainforest ranges from 05°59'-06°21'N: 09°11-09°30'E. The rainforest is situated at the northernmost corner of the South West Region of Cameroon and partly in the northeast of the extensive Cross River Valley along the eastern border of Nigeria. Rainfall in this forest varies from 1500 to more than 10,000 mm per year, giving rise to a variety of vegetation floristic regions (White, 1983). These floristic regions are the low land forest which is dominated by *Afrostyras kamerunensis*, *Klainedoxa gabunensis* and *Irvingia gabunensis*; the secondary forest dominated by *Cieba pentandra*, *Albizia zygia* and *Musanga cecropioides*; the montane forest dominated by *Xylopia staudtii*, *Macaranga occidentalis* and *Bridelia grandis*; Grassland dominated by *Hyparrhenia diplondra*, *Setaria ancep* and *Loudetia camerunensis* (Comiskey et al., 2003).

The terrain is rolling in the lowland areas, but rises sharply to an altitude of 1,500 m in the northern part of the rainforest, where slopes are extremely steep. In general, the region has two distinct seasons with most rainfall occurring from April to November, peaking in July and August with a second peak in September. The total annual rainfall is probably similar to that of the Nigerian side of the border in the Okwangwo region up to 4,500 mm per year (World Wildlife Fund, 1990). The mean annual temperature is about 27°C. Normally, it is cooler in the rainy season than in the dry season (Comiskey et al., 2003). The estimated human population of the area is between 6 and 12 individuals per km^2 (Cosmiskey et al., 2003). These villages are entrances to the other villages and gate way to the major town Mamfe (Figure 1).

Data collection and analysis

This field study was conducted from February, 2011 to April, 2012. The five villages which were surveyed were Ebinsi, Kajifu 1, Kajifu 2, Kekukesim and Takamanda (Figure 1). They were chosen based on accessibility to the villages, proximity to the secondary forest and the Takamanda National Park where the communities tap their resources (Figure 1), size (population and land cover) and the wide usage of plants used by the communities (food, medicines, fodder, construction, etc).

Prior to the field survey consent was sought from the Regional Delegation of Forestry and Wildlife in the South West Region Delegation and the Park authorities of the Takamanda National Park. Series of visits were made to the different villages concerned and contacts established with the chiefs and traditional councils to solicit their help in the research. In each of the villages, a general meeting was convened during which the following issues were discussed: purpose of the study, approach to be adopted, local participation, and semi-structured interviews/discussions.

A total of 121 questionnaires were distributed in all five villages. Interviewees were chosen without distinction of gender after seeking the consent from each respondent. People from all age groups, except children below 18 years were interviewed on their knowledge about the uses of plants in treating common ailment in Takamanda rainforest. 30 traditional healers (21 men and 9 women), 30 elders (23 men and 7 women) and 61 villagers (38 men and 23 women) were selected in the five villages based on the following criteria: that they have been living in the region for more than 10 years, use plants as the main medicine or are identified as medicinal plant extractors and the number of patients received in a week. This information was verified by interviewing chiefs and quarter heads of the respective villages.

Given the undulating nature of the rainforest, a reconnaissance mission was undertaken during which eight transects of 10 x 500 m long and running north, northeast, east, southeast, south, southwest, west and northwest were established in each site (primary and secondary forests) radiating from a point approximating the centre of the site. Radiating transects traversed swamps, hilltops, mid slopes and valleys. Surveys were also carried out in the farm land and around the homes for plants used in treating diseases. The field team in each of the villages consisted of traditional healer, two guides having basic knowledge of the uses of plants in the study area, taxonomist, and the researcher. To determine the uses of the various species, the show –and-tell/

semi-structural method was used (Focho et al., 2010). A questionnaire was prepared to obtain information on local or common names, origin (National Park, secondary forest, fallowed land, farmland and home), availability ("rare or common") in the community based on the traditional healers, ailments and diseases treated, therapeutic effects, parts of plants used, methods of preparation, methods of administration, doses and duration of the treatment (Bele et al., 2011). For villagers, elderly persons and other traditional healers in the villages, photographs and fresh plant specimens from the field were presented and the questionnaires were filled with their responses.

All medicinal plants used by the traditional healers in treating diseases were collected, pressed and identified by the taxonomist to species level. Specimens which were not identified were sent to the Limbe botanical garden for identification. Voucher specimens of all the medicinal plants used were collected and deposited in the University of Buea Teaching Herbarium and the Limbe Botanical Garden Herbarium (SCA). The information of each traditional healer was checked, and compared with others from neighboring villages to verify the accuracy.

Data regarding plant uses were summarized as proposed by Cook (1995). The fidelity level (FL), the percentage of traditional healers claiming the use of a certain plant species for the same major purpose, was calculated for the most frequently reported diseases or ailments as: $FL\ (\%) = (Np / N) \times 100$, where Np is the number of informants that claim a use of a plant species to treat a particular disease, and N is the number of traditional healers that use the plants as a medicine to treat any given disease (Alexiades, 1996).

RESULTS

The ethnobotanical study of the communities around the Takamanda National Park (TNP) in South West region revealed the usage of 39 plant species belonging to 26 plant families. The 39 species were reported to cure about 45 ailments common in the five communities (Table 1).

Ten species (*Xylopia hypolampra*, *xylopia staudii*, *Antidesma laciniatum, Garcina mannii, Cylicodricus gabunensis*, *Milicia excelsa, Carpolobia alba, Baillonella toxisperma, Penianthus longifilfolius* and *Bryophyllum pinnatum*) of the 39 species (25.6%) were over harvested as they have multiple (medicinal plants, non timber forest products, timber and wood) uses in the communities. However, some of these species were found in the park (TNP) and were conserved from excessive exploitation by traditional healers (Table 1). 29 of the 39 species (74.4%) were abundant and could be found in the primary forest, secondary forest; farmland and around their homes (Table 1). The families with the highest species were Annonaceae, and Euphobiaceae having four species each. This was closely followed by Rubiaceae with three species (Table 1). The rest are represented by two species each (five families) and one species each (18 families).

Aframomum flavum, *Garcinia kola* and *Elaeis guinensis* had the highest fidelity (species which were mostly used by traditional healers to cure the same ailments) level (100%). *Annikia chlorantha* (90%), *Cylicodiscus gabunensis* (80%), *Musanga ceropioides* (75%) and *Occium gratisimum* (75%) closely followed. *Carpolobia alba* (40%) and *Alchornea cordifolia* (33%) had the least fidelity (species which were less used by traditional healers in the treatment of particular ailments) levels (Table 2).

Among the recorded species *Annikia chlorantha, Rauolfia vomitoria, Musanga ceropioides, Occium gratisimum, Cylicodiscus gabunensis, Pycnanthus angolensis, Elaeis guinensis, Morinda lucida, Garcinia kola, Garcina mannii* and *Aframomum flavum* were the most popular plants used in treatments of many diseases, for instance *Annikia chlorantha* (nine different usages), *Aframomum flavum* (seven different usages), *Elaeis guinensis* (six different usages) and *Garcinia kola* (5 different usages) (Table 1). Generally, these plants are distributed in the different ecological types of the area. The biggest threats to these medicinal plants are destruction of habitat by the poor farming methods practiced in the area (shifting cultivation and slash and burn), poachers from neighbouring countries who cut huge quantities of the plants indiscriminately (*Garcinia mannii, Cylicodricus gabunensis, Carpolobia alba*) making most of the plant species locally unavailable (Table 1). A series of sensitization meetings were held in villages on the importance of conservation and management of the forest against natives who used poor farming techniques and poachers who harvest extensively. Farming methods such as crop rotation and agro-forestry were encouraged.

All parts of various plant species are used in the traditional medication to cure different ailments. The barks of trees (25% citations) were the most used plant part in traditional medicine followed by the leaves (21% citations) and seeds (20.8% citations). The stems, fruits, saps, and roots were the least medicinally used plant parts (Figure 2).

Decoction (37.3% citation) and juice (18.6% citations) are the methods mostly used for the preparation of remedies. The methods of preparation that followed were infusion (17.3% citations), concoction (14.6% citations) and powder (12% citations) which were seldom employed (Figure 3). Some times local people also used other ingredients such as honey, sugar, salt, oil to prepare remedies, making them tasteful for consumption.

Treatments were administered orally, topically, or through enema, steam baths and inhalation. The oral route was the most frequently used route of administration (58% citations) followed by topical application (26% citations) (Figure 4).

DISCUSSION

Traditional healers from the region provided plant

Table 1. Local/common names, availability, plant part used disease treated and preparation and/ administration.

Family	Scientific name	Local/ common name	Availability	Part (s) used in medicine	Traditional uses	Diseases treated or other uses	Route of administration, preparation, dosage, duration of treatment
Acanthaceae	*Acanthus montanus* (Nees) T. Anders	Kabavong eking/ Bear's	common	Leaves and thongs	medicine	Abscess, pains, inflammation Bruises	Ext., whip 3-5 twigs with thorns on effected part every morning and evening for 2-3 day Ext., of grinded dry leaves every morning and evening for 2 days (Powder)
Acanthaceae	*Acanthus montanus* (Nees)T. Anders	Kabavong eking	common	leaves	medicine	spleen	O., drink one teacup two times a day for 10-15 days (Decoction)
Annonaceae	*Xylopia hypolampra* Mildbr	African pepper	rare	Bark/fruit	medicine	Pneumonia, child birth, stimulant	O., drink 3 teacup daily for 10-14 days (Decoction). O., chewed O., once a day for one week (juice)
Annonaceae	*xylopia staudii* Engl.and Diels	Bush pepper	rare	bark	Medicine/ construction of homes	Influenza/ headache	O., eaten 1-2 spoon with a glass of water (Powder)
Annonaceae	Monodora tenuifolia Benth		Common	root and bark	Medicine/ seed as spice in soup	toothache, dysentery and fever	O., chewed A., half a litter after every day for 7 days (enema)
Annonaceae	*Annikia chlorantha* (Oliv.) Setten and P.T. Maas	Cakelong	common	bark	medicine	sore, ulcers, malaria Tuberculosis, vomiting, jaundice and urinary tract infection, Rheumatism and fatigue	Ext., cleaning with cotton once every two days until yield (Topical) O., drink 2 teacup every day until recovery (Decoction) . O., 3 teacup taken until recovery (Infusion), O., drink 3 teacup daily for 10-15 days (Decoction) Ext., a bucket of hot bath daily until recovery (Decoction)

Table 1. Continued.

Apocynaceae	*Rauwolfia vomitoria* Afzel	Orchechekan elong/ serpent wood	common	leaves	medicine	Convulsion in children and yellow fever	Ext., wrapping (Infusion). O., drink half table spoon for 5- 10 days (orally)
Apocynaceae	*Rauwolfia vomitoria* Afzel	Orchechekan elong	common	leaves	medicine	Fever, malaria	Ext. place on the chest or forehead for 3-5 days (Infusion)
Apocynaceae	*Astonea boonei* De Wild	Uku	common	Stem	medicine	Malaria,	O., drink 3 teacup daily for 5- 7 days (Infusion).
				Sap		fever	O., drink 1 teaspoon 3 times a day
Burseraceae	*Dacryodes edulis* (G.Don.) H.J.Lam.	Oshu/ plum	common	Bark/ fruit	Medicine, fruits eaten by man and animals	Headache,	Ext., on cut surface once (Powder)
						fever, malaria	O., drink 2 teacup 3 times a day for 7-10 (Decoction)
Burseraceae	*Santiria trimera* Oliv	Kamum	common	bark	medicine	scabies	Ext., rub 2 time a day until recovery
Cecropiaceae	*Musanga ceropioides* R. Br	Okeve	common	Fruit	Medicine	Enhance birth, promote production of amniotic fluid, enhance	O., drink 2 tea cup every day 5 months to given birth (Decoction)
						contraction and relaxation of muscle during birth	O., drink 3 teacup 3 times a day a months to given birth (concoction)
Clusiaceae	*Harungana madagascariensis* Lam	Ntule	common	buds	medicines	Continuous menstruation flow, anti poison, potency, dysentery	O., chewed until recovery
Crassulaceae	*Bryophyllum pinnatum* Lam	Oduku	rare	leaves	medicine	Ear pain, ear leakage	Ext., with kernel oil 2 times a day until recovery (topically)
Euphorbiaceae	*Ricinodendron heudelotii* (Baillon) pax	Ngoge/ njansang	common	seeds	Medicine and condiment	appetizer	O., drinking until recovery.

Table 1. Continued.

Euphorbiaceae	*Euphorbia hirta* L.	Asthma weed/gastritis weed	common	Whole	Medicine	Dysentery, gastritis	Ext., chewing daily until recovery
Euphorbiaceae	*Alchornea cordifolia* (Schum andThonn) Muelll. Arg	ndoh	common	Dry leaves	medicine	Anemia, malaria, fever	O., drink two teacup a day until recovery.
Euphorbiaceae	*Antidesma laciniatum var laciniatum* Mull. Arg		rare	Stem	medicine	Cough	Ext., chewed regularly until recovery
Guttiferae	*Garcinia kola* Heckel	Ojey/ kola	Rare	seeds	Medicine and stimulant	Potency, stomachache, Gastritis, Constipation and appetizer	Ext., chewed regularly until recovery
Guttiferae	*Garcinia mannii* Heck	Kesia / chewing stick	Rare (over exploitation)	stem	medicine	Dental hygiene, sterility, potency, gums hardening	Ext., brushed and chewed regularly until recovery
Huaceae	*Afrostyrax kamerunensis* Perkins and Gilg	elu	common	Seeds and bark	Medicine and condiment	Appetizer, rheumatism, pain killer	O., drink a 3 teacup 3 times a day until recovery
Icacinenaceae	*Lasianthera africana* P.Beaux	Urdeda	common	stem	medicine	Dental hygiene	O., chewed and brushed daily.
Irvingiaceae	*Irvingia gabonensis* Wolfram/Alpha	bojep	common	seeds	Medicine and condiment	Obesity, weight loss	O., drink a bowlful 2 times a day until weight reduces (Decoction)
Irvingiaceae	*Irvingia wombolu* Verm	bojep	common	seeds	Medicine and condiment	Obesity, weight loss	O., drink a bowlful 2 times a day until weight reduces (Decoction)
Lamiaceae	*Ocimum gratissimum* L.	Kaja	common	leaves	medicine and spice	Headache, cough, common cold	Nasal inhalation taken 2 times a day until recovery
Melastomataceae	*Tristemma littorale* Benth	Kakikai	common	buds	medicine	snake bites, sent witches and wizards	O., chewed when attacked
Menispermaceae	*Penianthus longififolius* Miers	Kachi-effi	rare	roots	medicine	Scare away snakes	O., chewed regularly

Table 1. Continued.

Mimosaceae	*Cylicodiscus gabunensis* Harms	Kendem	rare	bark	Medicine/construction of bridges	Abscess	Ext., warm on fire and wrapped (Topical)
Mimosaceae	*Cylicodiscus gabunensis* Harms	Kendem	rare	barks	medicine, wood for construction	Malaria Internal abscess, fever	O., drink 2- 3 teacup a day for 7-15 days (Decoction) of bark is taken orally A., taken half a litter every morning until healed (Decoction)
Moraceace	*Milicia excelsa* (Welw) C.C. Berg	Nssand or Iroko	rare	roots	Medicine and timber	Rheumatism	Ext., applied on cut spots of disease daily (powder)
Myristicaceae	*Pycnanthus angolensis* (welw) warb	Urchang	Common	Sap and bark	medicinal, timber,	Dysentery, stomach disorder, and waist pain	O., drink 1 table spoon 3 times a day for 5-7days (decoction) of bark t O., drink 2 teacup daily for 7-15 days or A., taken before meals with half a litter every morning for 7 days (Enema)
Palmae	*Elaeis guinensis* Jacq	muyanga	common	seeds	Medicine, oil and palm wine	Fever, ear pain, stomach disorder, keep away witch and wizards	Ext., rub or drink until recovery.
Piperaceae	*Piper guineensis* Schum/ Thonn.	osun-ojie	common	seed, leaves	Medicine and condiment	Appetizer	O., drink a bowl or a cupful for one three days (concoction)
Poaceae	*Zea mays* L	Maize	common	Husks/seed	Medicine, drinks, food	Diuretic	O., drink 3 teacup three times a day 10-15 days.
Polygalaceae	*Carpolobia alba* G Don	Oke	rare (over exploitation)	Roots, leaves and stem	Medicines and stick for cows and bone fracture	Sterility and bone facture	O., chewed regularly. Ext., warm leaves on the fire and massage twice a week until recovery
Rubiaceae	*Massularia acuminata* (G.Don) Bullock ex Hoyle	odeng	common	stem and twigs	medicine	Dental hygiene	Ext., chewed daily

Table 1. Continued.

Rubiaceae	*Morinda lucida* Benth	Ukuh	Common	sap	medicine	Poor lactation, gastritis, stomachache, chest burnt	O., drink 3 table spoon daily for 5-7 days
Rubiaceae	*Morinda lucida* Benth	Ukuh	common	Leaves, stomach disorder	medicine	Gastritis	O., drink 1 tea cup daily until relive (concoction)
Rubiaceae	*Scandens sp*	kaka-nyonyo	common	Whole	medicine	side pain	A., taken 1 time every morning for 10-15 days before meals (Enema)
Sapotaceae	*Baillonella toxisperma Pierre(Moabi)*	edjie	Rare	Seeds	Medicine, timber, and oil	anti poison	O., drink 1 teacup 3 times a day and report
Sterculiaceae	*Cola nitida* (Vent) Schott and Endl	Kola	common	seeds	Medicinal, stimulant and cultural rituals	Appetizer	O., chewed
Sterculiaceae	*Cola millenii* K. Schum.	Cola	common	leaves	Medicine and stimulant	Gonorrhea	O., drink 3 teacup 3 times a day for 15-20 days (Concoction)
Urticaceae	*Urera cordifolia* Engl.	Lilah	common	leaves	medicine	Dysentery	O., drink 2-4 litters a day for 5-7 days Drink
Zingiberaceae	*Aframomum flavum* Lock	Alligator pepper	common	seeds	medicine	Side pain	Ext., Chewed n apply regularly until recovery (Topical)

O, Oral administration; A, Anal administration; Ext, external uses.

remedies to humans and livestock health problems. Most traditional healers (75%) continue to use traditional systems of health care including medicinal plants alone or in combination with other ingredients, such as salt, sugar, honey, and oil in the treatment of diseases.

The present study has provided information of 39 species of plants used in the treatment of about 45 common ailments in the communities of the Takamanda rainforest of Cameroon. Most people continue to employ these plants for medicines alone or in combination with modern pharmaceuticals and other local uses for livelihood development (Focho et al., 2010). The different local uses include construction of houses and huts, construction of bridges, chewing stick, food, timbers and cattle stick. Many rivers flow through the villages in the Takamanda rainforest region and this explains why *Cylicodiscus gabunensis* is highly used for bridge construction based on its elastic property. Also, the huge demand for *Carpolobia alba* (Haussa stick) in Northern Nigeria (it has been used by the Fulani in pastoral farming) and *Milicia excelsa* and *Baillonella toxisperma* which, because of their resistance to termite action, have equally been used in the construction of plank houses and bridges has lead to over exploitation of these species.

These trees are multifunctional, they are cultivated as shed trees in their farms, cocoa plantation and also for their fruits (*Afrostyrax kamerunensis*, *Irvingia gabonensis*, *Irvingia wombolu*, *Ricinodendron heudelotii*, and *Dacryodes edulis*), or around their homes as ornamental for their fruits (*Elaeis guinensis, Cola nitida* and *Garcinia kola).*

Almost all traditional healers agreed that more medicinal plants were used in the past than the

Table 2. Most commonly used medicinal plants and their major uses with their fidelity level.

Family	Scientific name	Local or common name	Use	Fidelity level (%)
Annonaceae	*Annikia chlorantha* (Oliv.) Setten and P.T. Maas	Cakelong	sore, ulcers, malaria Tuberculosis, vomiting, jaundice and urinary tract infection, Rheumatism and fatigue	90
Apocynaceae	*Rauwolfia vomitoria* Afzel	Orchechekanelong	Convulsion in children and yellow fever	60
Cecropiaceae	*Musanga ceropioides* R. Br	Okeve	Enhance birth, promote production of amniotic fluid, enhance contraction and relaxation of muscles during birth	75
Euphorbiaceae	*Alchornea cordifolia* (Schum andThonn) Muelll. Arg	ndoh	Anemia, malaria, fever	33
Guttiferae	*Garcinia kola* Heckel	Ojey	Potency, stomachache, Gastritis, Constipation and appetizer	100
Guttiferae	*Garcinia mannii* Heck	Kesia	Dental hygiene, sterility, potency, gums hardening	57
Lamiaceae	*Ocimum gratissimum* L.	kaja	Headache ,cough, common cold, spice	75
Myristicaceae	*Pycnanthus angolensis* (welw) warb	Urchang	Dysentery, stomach disorder, and waist pain	60
Palmae	*Elaeis guinensis* Jacq	muyanga	Fever, ear pain, malaria, stomach disorder, keeps away witches and wizards	100
Polygalaceae	*Carpolobia alba* G Don	Oke	Sterility and bone fracture, sprain	40
Rubiaceae	*Morinda lucida* Benth	Ukuh	Poor lactation, gastritis, stomachache, chest burnt	50
Mimosaceae	*Cylicodiscus gabunensis* Harms	Kendem	Malaria, abscess, fever	80
Zingiberaceae	*Aframomum flavum* Lock	Alligator pepper	abscess, scabies headache, fever, malaria	100

present as a result of the continued deforestation and degradation (Sunderland et al., 2003) resulting in the local loss of some medicinal plants and the associated knowledge of their use. The rich knowledge of medicinal plant use has nearly disappeared because most of the specialized healers did not properly pass on their knowledge to the next generation and most of the youths are not patient or interested to learn from the elders and traditional herbalists (Zapfact et al., 2001).

The fidelity level (FL) calculated for each of the medicinal plants ties with the frequency of the plants given by the respective traditional healers. Considering the plants that were used, *Aframomum flavum*, *Garcinia kola* and *Elaeis guinensis* had the highest fidelity level (100%) followed by *Annikia chlorantha* (90%) based on the fact that the medicinal plants occurred most frequent in the preparation of most of the remedies given by the informants. The least fidelity levels were recorded for *Carpolobia alba* (40%) and *Alchornea cordifolia* (33%) mainly in the treatments of bone fracture and anemia.

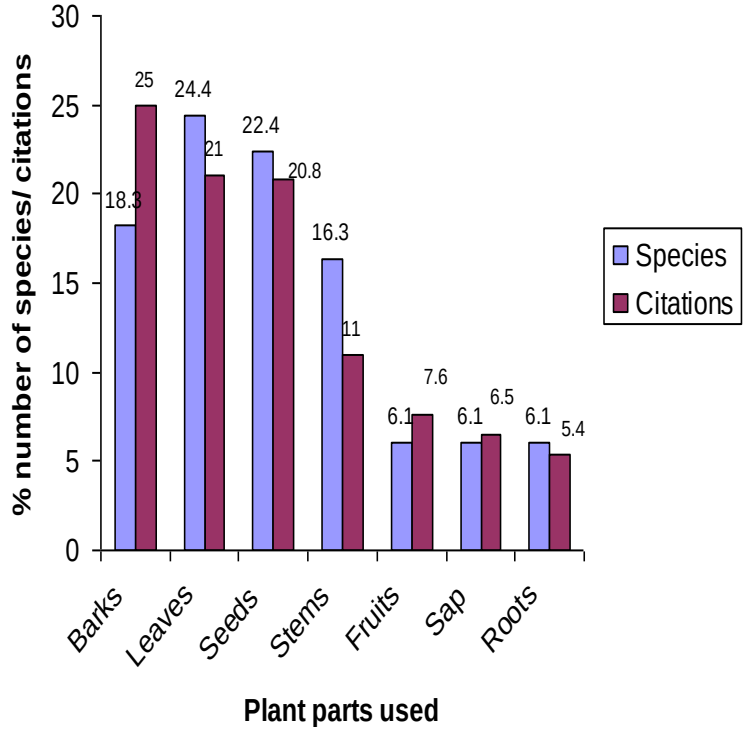

Figure 2. Parts of plants used as medicine.

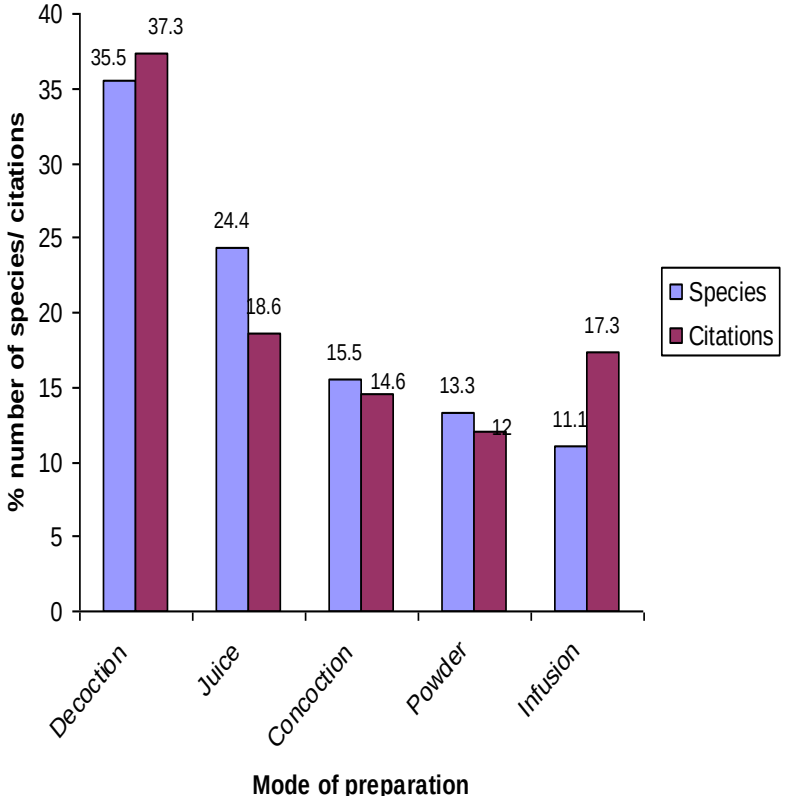

Figure 3. Modes of preparation.

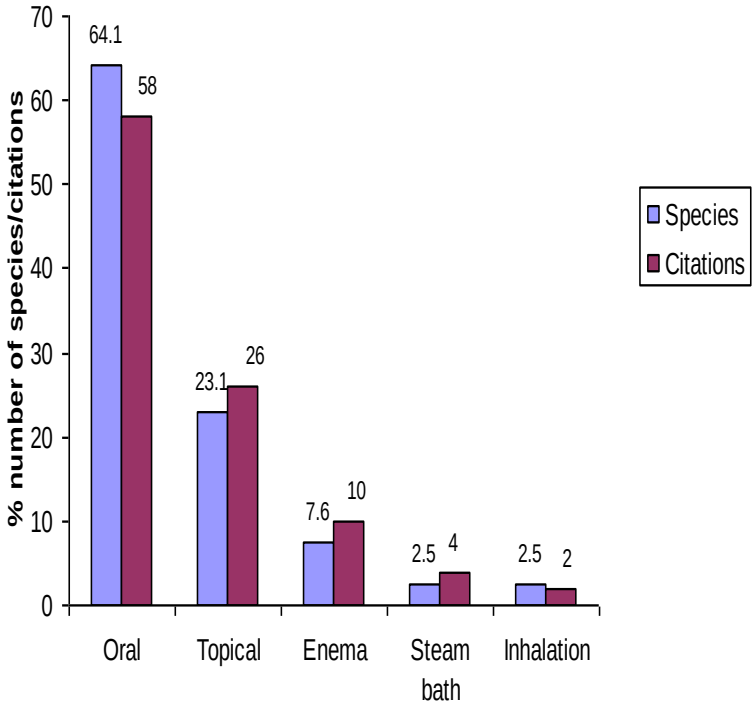

Figure 4. Modes of administration.

These ailments were known by traditional specialists for the respective ailments and dosage and remedies were not known by most of the traditional healers (Table 2).

Traditional medicine is very popular with rural dwellers particularly in the villages around the Takamanda National Park (TNP) where accessibility to other parts of the country is very difficult (Sunderland et al., 2003). Traditional medications are generally the first resource for rural households (Azeke, 2002; Asase et al., 2005) where people only turn to orthodox medicine when it fails to treat the disease (Bele et al., 2011; Focho et al., 2010). This continued reliance of many local populations on traditional medicines is partly attributable to economic circumstances, which place modern health facilities, services and pharmaceuticals out of the reach of the majority of the poor population who depend mostly on forest products for their livelihoods support (Sunderland et al., 2003). However, it is also widely attributable to native beliefs and strong trust enjoyed by herbalists who have gained the confidence of community members since the days of old. These findings are in line with that of Bele et al. (2011) who studied the Ethnobotanical plants of the Annonaceae in Mount Cameroon.

Tree barks (25% citations) were the most used plant parts, followed by the leaves (21% citations) and seeds (20.8% citations) while the stems, fruits, sap and roots were least used plant parts (Figure 2). The high utilization of barks leaves and seeds can probably be due to the availability and accessibility of the plant parts for the herbalist to extract. These plant parts have been mentioned to be over exploited in traditional medicines (Lin, 2005; Focho et al., 2009a; Focho et al., 2009; Sajem and Gosai, 2010; Focho et al., 2010; Bele et al., 2011). The high use of seeds may be attributed to the desire to conserve the species, since over harvesting of the leaves or barks can kill the plants. Here, the mature fruits or seeds are collected and used while the barks and the leaves are maintained. This suggestion agrees with the works of Lin (2005) and Focho et al. (2010) on the uses of plant parts to cure common ailments.

Based on the different modes of preparation of medicines, decoction (37.3% citations) was highly used while powder (12% citations) mode of preparation was the least used (Figure 3). The frequent practice of this method of preparation by most traditional healers may be due to the fact that boiling the ingredients will definitely kill some unwanted microbes present in the content of the remedy. Also, heat may probably facilitate the extraction of the active ingredient in the plant part which is an important item in the remedy. This finding corroborates studies carried out by Ugulu et al. (2009) on quantitative Ethnobotanical investigation of medicinal plants.

The modes of application of remedies are mostly internal or external. Internal application is through oral route or by inhaling vapour from decoctions, concoctions and infusion. These modes of application are common for the preparation of remedies of cough, malaria, obesity, yellow fever, sterility and birth enhancement. External

(plant part is crushed, sometimes warmed on the fire and applied on the skin), and rubbing (plant parts are crushed mixed with water and or oil and rubbed on the skin) modes of application are mostly used in the preparation of remedies for side pain, headache, sprains, abscess, ulcers, wounds and scabies (Tables 1 and 2).

This study also confirmed and reinforces some of the ethnobotanical uses of plants mentioned by Zapfact et al. (2001) and Sunderland et al. (2003). Nevertheless, the study also recorded plant species which were mentioned in previous research but have multiple ethnobotanical uses which have not been known or recorded by previous researchers. Some of these species include: *Annikia chlorantha*, *Aframomum flavum, Elaeis guineensis, Garcinia mannii* and *Garcinia kola* (Table 1). Other new species recorded with ethnobotanical uses include *Melicia excelsa* (Iroko) which is threatened by habitat loss and over exploitation. It is used in the treatment of rheumatisms. It is also used as timber as well as in drum and pestle making (Table 1). *Cylicodiscus gabunensis* is another species which have been used extensively in the communities in bridge construction based on it elastic property and in the treatment of internal abscess (Table 1).

Conclusion

Ethnobotanical medicines help in the treatments of most common ailments in the Takamanda rainforest. This study shows that most of the species recorded are of significant ethnobotanical importance which is paramount for conservation and documentation based on the degradation for agriculture. Conservation of medicinal plants will in the other hand protecting the endangered plant and animals in the rainforest. Virtually, most of the inhabitants of the communities rely on medicinal plants in the treatment of most common diseases since the states of the roads are bad and the distance to the nearest hospital is also too far to obtain rapid medical attention for critical patients. The reliance of the communities on these resources and the fast deforestation and degradation of the landscape need consideration. It is proposed that the conservation and proper management of this biodiversity hot spot should be encourage salvaging the vital habitats for these threatened plants and animal species.

ACKNOWLEDGEMENTS

The authors are very grateful to the Forests, Resources and People (FOREP) for the partial funding of research work, to the authorities of the Takamanda National Park, and to all the traditional healers of the research area who were willing to share their precious knowledge to the team of researchers. We would like to acknowledge the contribution of Elias Ndive, Betafu Maurice and Felix Akon of the Limbe Botanical Garden (SCA) for the specimen identification.

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