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Ethnobotanic use Value Knowledge of *Carapa oreophila* in the Kilum Mountain Region Communities of Cameroon

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Abstract— *Carapa orephila, is a native species with versatile values traditionally exploited by the local population in Kilum Mountain forest area. This study focused on assessing local knowledge about the use of Carapa oreophila, Semi-structured ethnobotanical questionnaires were conducted among the ethnic groups Oku, Kom, Nso and the Borroro (Peul) in four localities of Kilum. Use values and Interviewee/resource assessment of stages of harvest among these ethnic groups and gender were evaluated. The Kruskal-Wallis test was used alongside with Stata to assess significant differences related to gender and ethnic groups. Results indicates that Carapa oreophila has a high use values as a multipurpose species. According to the consensus value for plant parts, the trunk (23.21%); branches (25.11%); fruits and seeds (9.84%); bark (9.84%); roots (9.84%); leaf (16.46%) and the gum (latex) 5.771%, were indicated with branches and trunk as the most significant. The use diversity values of Carapa oreophila showed a high proportion of domestic (UD=0.62) and therapeutic (UD=0.26) uses. The UD for these were higher for Oku and Kom (0.36 and 0.39) than Nso and the Borroro (0.16 and 0.07) ethnic groups. Comparative analysis between genders revealed that the highest UD for domestic uses (0.55) and therapeutic uses (0.24) were observed in men than women. Men of Oku and Kom had the highest level of knowledge regarding plant parts used, forms of use and the specific reasons for using Carapa oreophila. Given its multipurpose uses, we recommend the promotion and enhancement of Carapa oreophila through its domestication and seed oil production to provide significant socio-economic benefits to the local people. To this end, it is necessary to develop and implement strategies to support local communities to actively participate in the conservation and sustainable use of the species as part of the preservation of plant biodiversity lost.*

Keywords— ***Carapa oreophila, ethnobotany, consensus value.***

I. INTRODUCTION

In most developing countries, the bulk of the population is made of the rural poor, living below the threshold of poverty [1]. Sizeable proportions of its city-duelers live in shanty-towns and thus are not likely better off than their rural counterparts. They therefore both depend mainly on natural resources for subsistence and income generation [2], [3]. Given the population's natural low education levels engendered by their intrinsic poverty, they have no access to geologic natural resource and are rather confirmed to fauna and flora related natural resource. To these community, plants species from the flora play important communal, cultural, aesthetic and ethical roles, as a source of food, traditional drugs, construction, handicrafts, cosmetics, forage and income generation [4], [5], [6], [7], [8], [9], [10], [11], [12].

Recently, quantifying plants use and exploiting local knowledge through quantitative and qualitative ethnobotanical methodology have made it possible to perform useful comparisons between groups of informants [12], [13], [14] [15]. The link between biotic and cultural diversity evaluated as well as improved the knowledge on vegetation change and the relative importance of natural resources for the local population [8], [16], [17],[18]. The plants with high nutritional values have been surveyed and identified to possess medical and/or commercial potentials likely to contribute to improving the livelihood of local populations [19].

Although a large proportion of findings were focused on the comparative usefulness of more than one plants species [17],[20], [21], a handful of authors, especially from Africa and Latin America, were however interested

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on the usefulness of a single multi-purpose plant as observed from different community eg *Parkia biglobosa*, *Sclerocarya birrea*, *Carapa procera*, *Synsepalum dulcificum* [19],[22] [23], [24], [25]. Within the 2000s, *Carapa* has attracted scholars in a number of developing countries like Brazil, French Guiana, Guyana, Suriname, Mali, Senegal, Rwanda, Democratic Republic of Congo and Cameroon. Some authors have conducted their research by testing species delimitation in sympatric species complexes: the case of an African tropical tree, *Carapa spp*., molecular phylogenetics and evolution, a synoptic revision of Carapa, use values to communities of Kilum and lebialem [10], [26], [27], [28],[29], [30], [31]. Some studies have focused on some *Carapa spp* in Africa such as diversity of species, seed oil value chain, value chain analysis and some usefulness of *Carapa spp* mentioned in Cameroon [10], [30], [31], [32], [33] [34], [35] [36], [37] [38] [39]. These studies have ignored the usefulness of a multipurpose tree like *Carapa oreophila* which may be faced with over-harvesting pressure from the local population of the Kilum mountain forest. Thus, our study aims to assess the important uses of *Carapa oreophila* into use category and how the use-value varies between plant parts, harvest sites, different ethnic groups, and gender in the Kilum community forest reserve. The paper reviewed the stages of harvest of *C. oreophila* by applying the Interview/resource assessment method to consider the impact of community's actions on this plant species which makes up part of the Kilum mountain forest [20]. The objective is to create awareness towards the implementation of an improved sustainable management and conservation program for the species. Specifically, it comes to identify the exploited parts, assess the use categories and analyse the purpose of use of *Carapa oreophila* in the Kilum mountain forest communities.

II. MATERIALS AND METHODS

Study area

This study was conducted from 2014–2016 in twelve communities within the forest area of Kilum, thus covering four prominent ethnic groups making its population for general surveys and in rural community groups for focus discussions with key informants. The dominant tribe is the Oku while the Nso and Kom are strangers who settled in the community and still keep ancestral links with their homeland. Originally transhumance cattle grazers, the Bororo (Peul) clan have witnessed an explosive growth in its population which led to a gradual sedentary grazing practice and a sharp increase in horizontal mobility of its labour. As a result, it has been common to see members of the clan involved more and more in non-beef related activities.

The Kilum Mountain forest is found on the Western plateau in the North West Region in the Bamenda Highland ranges, in Oku subdivision, on the South Western portion of Bui division. It is between Latitudes 6°5' to 6°15' North and 10°30' to 10°36' East stretching on 232 Km². The Kilum–Ijin forest from its origin had a surface area of 20,000 ha [40] and is the most significant remnant of Afromontane forest in West Africa (Figure 1). Deforestation has increased in the region over the last two decades, as a rapidly growing population has combined with declining economic conditions and decreasing soil fertility to increase the demand for new farmland. Despite the enomous pressure for new farmland, the mountain forest remains very important to the surrounding population.

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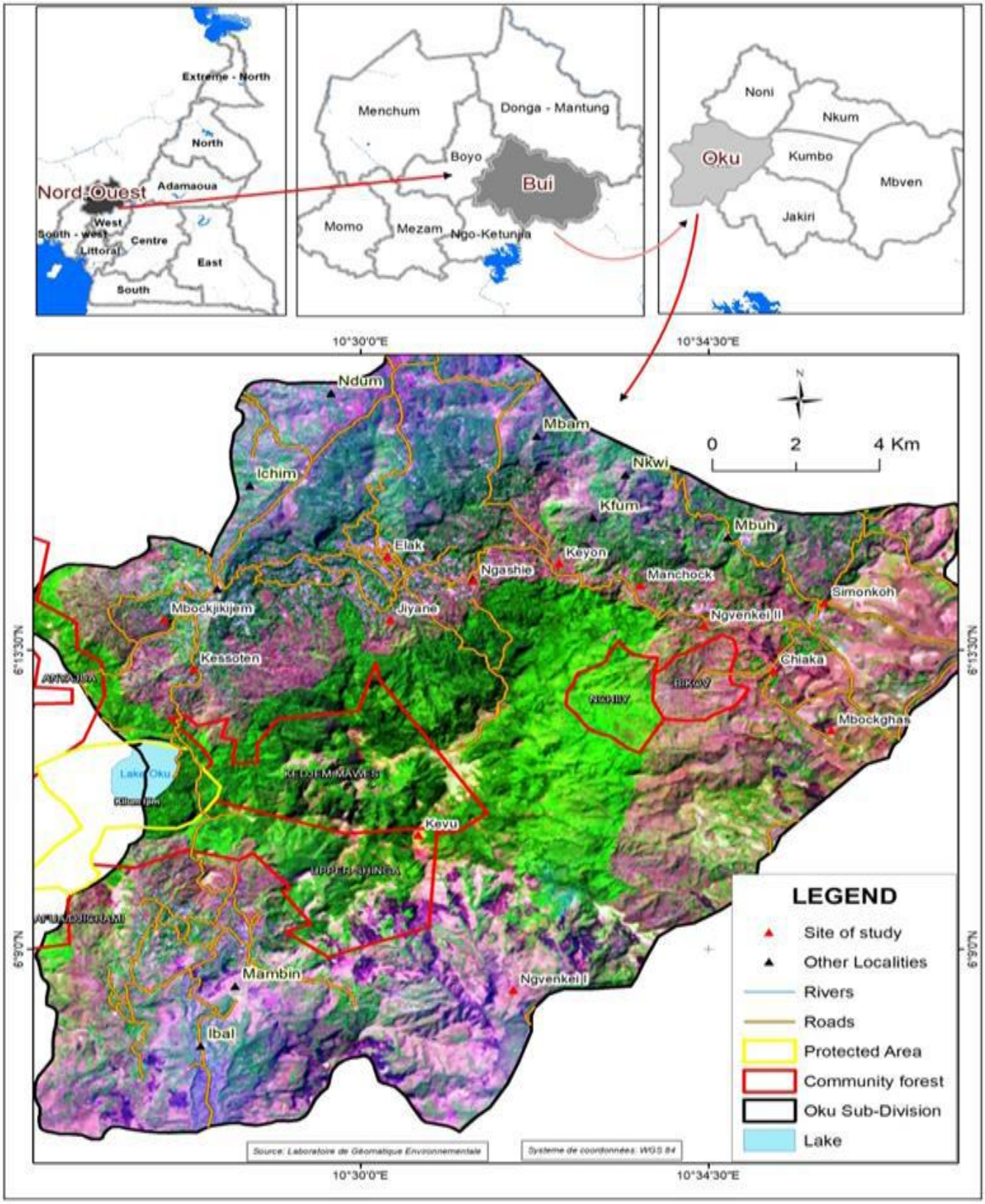

Fig.1: Map of the Kilum Mountain Forest Area (Source: Laboratoire de Géometrique Environmentale)

Study species

The kilum forest is a biodiversity hotspot and habitat for many endemic plants and animal species [40]. There are different vegetation types in the forest ranging from fairly open forest above 2400 to 2500 meters. These species are made up of *Carapa oreophila*, *Zanthoxylum rubescens*,

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Cuviera longifolia, Entandrophragma angolense, Pouteria altissima, Garcinia smeathmannii, Symphonia globulifera, Newtonia camerunensis, Alangium chinense, Ficus spp., Chassalia laikomensis, Coffea liberica etc as well as some common fire resistant species such as *Albizia gummifera, Gnidia glauca, Bridelia speciosa and Croton macrostachyus.* The dominant and most exploited species is *C. oreophila* which has suffered pressure from human settlement, extensive cultivation, overgrazing and fires. This species is the focus of our study (Figure 2). *Carapa* is a tropical angiosperm (family meliaceae), found in Central North and South America and in Africa [32]. The genus was recognized since 1775 with 27 species names [27]. Today we can boasts of 3 species widely distributed in humid forest in western and central Africa. *Carapa oreophila* is the only species found in the Kilum forest reserve of the family Meliaceae [19], [27].

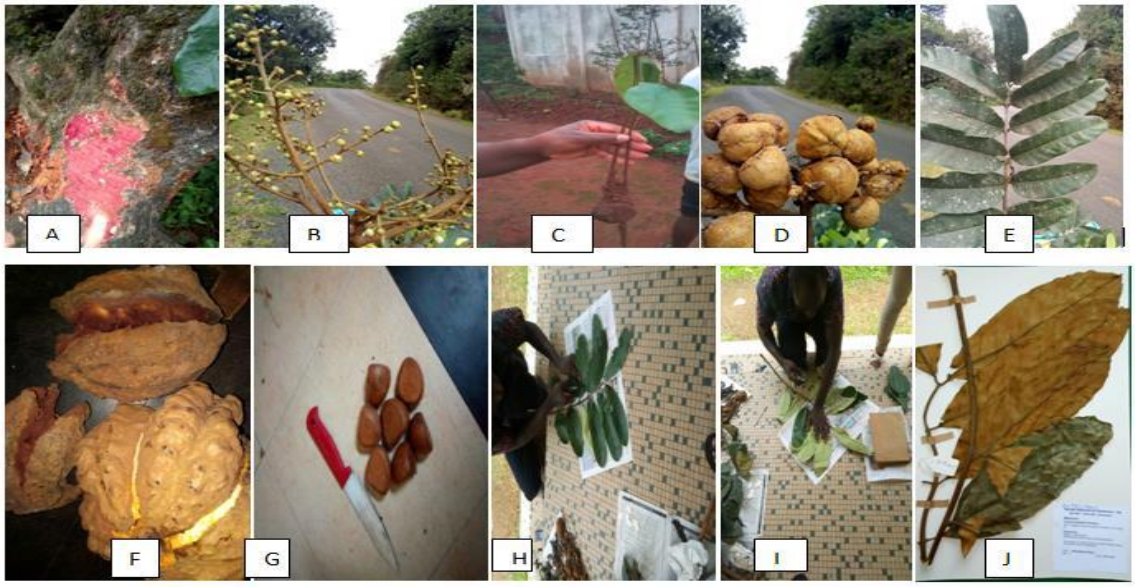

Fig.2: Carapa oreophila in the Kilum mountain forest
(a) Trunk; (b) Flowers; (c) Seedling; (d) Immature Fruits; and (e) Leaf (f) mature fruits (g) seeds (h) preparation of leaves (1) preparation of leaves for drying (j) dried sample of leaves

Ethnobotanical surveys

Data collection was performed with the aid of a semi structured ethnobotanical questionnaires as described by [17], [19]. Formal surveys were conducted on a total of 726 informants distributed in twelve communities of Kilum and chosen using snow-ball method. Moreover, focused-group discussions (of five persons per meeting) were carried out with key informants chosen in collaboration with village leaders. The choice of these localities was based on the presence of forest and local use of *Carapa oreophila* by local communities.

Preceding the questionnaire administration, a meeting was held with Oku Fon and his advisors at the Fondom's palace to inform them of the purpose of our work. Informants were chosen randomly among those who have knowledge about *Carapa oreophila*. All informant and participant in focused-group discussion were informed of the objectives of the study in order to get their consent. The contact and address of those who agree were recorded in a survey logbook after the first interview for subsequent interviews. Seven separate interviews were conducted individually in the local language with each interview corresponding to a use-category. A pilot study was conducted to assess the maximum number of use-categories which was arrived at seven. The information collected during these investigations focused on general knowledge of *Carapa oreophila*, characteristics of the informants and the plant parts exploited the state of use, the form of use, reasons for use and the techniques of harvest. Similar to [19], a use category is understood to be a collection of all uses of the same nature according to the method of [2]. Table 1 shows the sample characteristics.

Table 1. Characteristics of the sample

Sample Characteristics			
Description	Measurement	Frequency	Proportion (%)
Ethnic	Bororo (peul)	54	7.44

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Groups	Kom	289	39.81
	Nso	119	16.39
	Oku	264	36.36
	Total	726	100.00
Sex	male	640	88.15
	female	86	11.85
	Total	726	100.00
Name of forest Site	Chiaka	288	39.67
	Nguvenkei 11	78	10.74
	Efvehmiih	714	35.54
	Ijim	102	14.05
	Total	726	100.00

Data analysis

In order to determine the distribution of knowledge and use of *Carapa oreophila* over ethnic groups, two classic parameters were calculated: Use diverstiy and use equitability. Moreover, we have derived a consensus value for plant part's harvest stage developed from [20] qualitative Interview/resource assessment method useful to measure the impact of harvest activities to the natural forest. Table 2 provides a detailed explanation of each index. Details on the indices used and their application can be found in past studies [19], [21], [41], [42], [43].

Furthermore, the normality and homogeneity of the indices calculated were subjected to non-parametric Kruskal-Wallis test, using Stata to assess significant differences related to gender and ethnic group.

III. RESULTS

Ethnobotanical knowledge of *Carapa oreophila*

Local names

To the Oku, *Carapa oreophila* is known as '*ebvin'*; to the Kom as 'evin' to the Nso 'Kijwun' and to the Peul as 'Ngorobai'. The etymologies of the vernacular expressions reveal the historic cultural attachment of the people to the plant. To the Oku and Kom, *'ebvin'* and '*evin*' echo the ability of the plant to catch fire and burn even in its fresh state after direct harvest from the forest. To the Nso '*Kijwun*' transcripts its malleability and suitability for carving xelophone poles, farm tool handles. To the Borrroro '*Ngorobai*' transmits the qualities of tenderness, straightness, weightless, rigidity, flexibility, comfort-ability and durability of staff obtained from the tree.

Plant parts exploited

The plant parts harvested from *C. oreophila* are: the trunk (23.21%); the branches (25.11%); the fruits and seeds (9.845%); the bark (9.845%); the roots (9.845%); the leaf (16.46%) and the gum (latex) 5.77%. Globally, branches and leafs have got the high consensus value for plant parts = (0.252 and 0.256 resp.), followed by trunk and bark. In terms of ethnic groups, Oku and Kom have got high concesus value for plant parts = (0.38 and 0.37 resp.) over the Peul and Nso who are migrant settlers. Gender wise, male present a high concensus value regardless of ethnic group or the plant part harvested, with men from Oku and Kom dominating the Nso at =(> 0.05) in trunk, branches, leaf, bark, fruits and seeds. The Peul are good at branches and leaf. While their females use branches for fuel wood and leaf for medicine or wrapping. Females from Oku and Kom have high coefficient compared to their Peul and Nso counterparts. These differences are significant at a threshold of (p=0.0167). Moreover, all the plant parts (except gum) are harvested and used in its fresh or wet state irrespective of the use categories and purpose for use.

Use categories

Uses were grouped into seven common broad social destinations or use categories (Figure 3): Domestic (32.38%); commercial (7.37%); Agricultural (14.37%); industrial (5.77%); Sociocultural (12.72%); handicraft (6.04%) and Therapeutic (21.35%). Use categories were higher with the domestic with all the seven plant part involved and six parts for therapeutic use. Industrial and handicraft use had just two plant parts.

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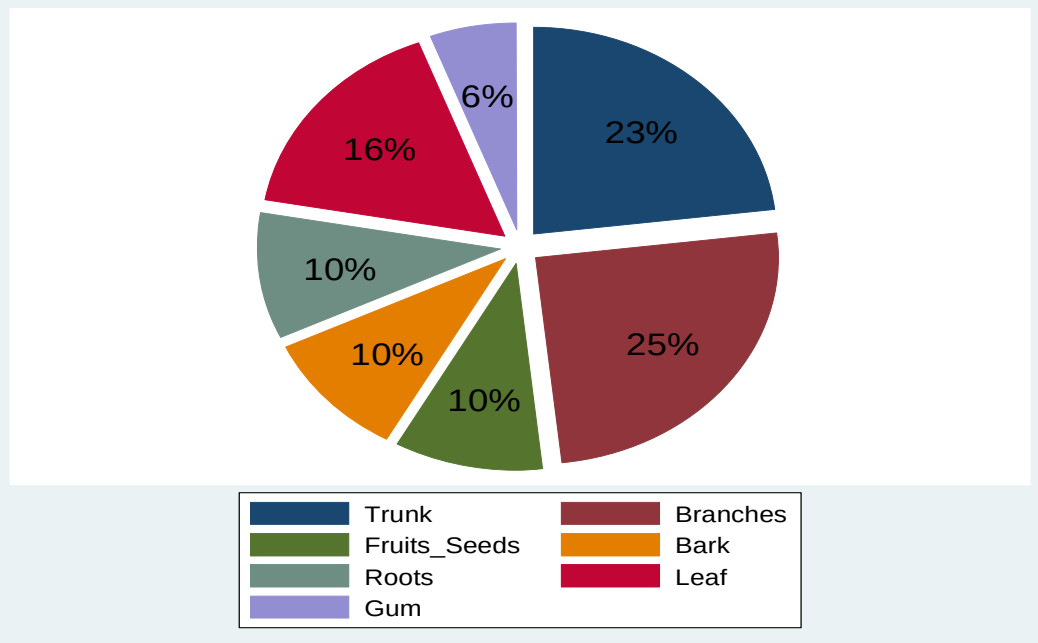

Fig.3: Percentage frequency of plant parts

Forms of uses

The study has identified fifteen use forms for the seven plant parts: (whole and split trunk /branches; whole fruit, bark, root, leaf, latex; fruit paste; powder (leaf /bark); oral; external; warm bath and liquid latex . The consensus value for the manner of usage is relatively high for the native tribes (Oku and Kom) compared to strangers (Borroro and Nso). This difference is significant at p = (0.0001) for trunk and branches used for commercial; domestic; handicraft; industrial; agricultural and socio-cultural use categories; and bark, root and leaf used for therapeutic use category. Gender wise, knowledge on use form is significantly different between men and women (p=0.0001), with men demonstrating a dominance for trunk and branches used for commercial; domestic; handicraft; industrial; agricultural and socio-cultural use categories; and bark, root and leaf used for therapeutic use category. Each plant part has at most two forms of use except for root which has a single form of use. Within use categories, domestic dominates with all 15 form of uses, followed by therapeutic (11 form of use), sociocultural and handicraft (7 form of use each), commercial and agricultural (5 form of use) and finally, industrial which has the least (3 form of use) as shown on figure 4.

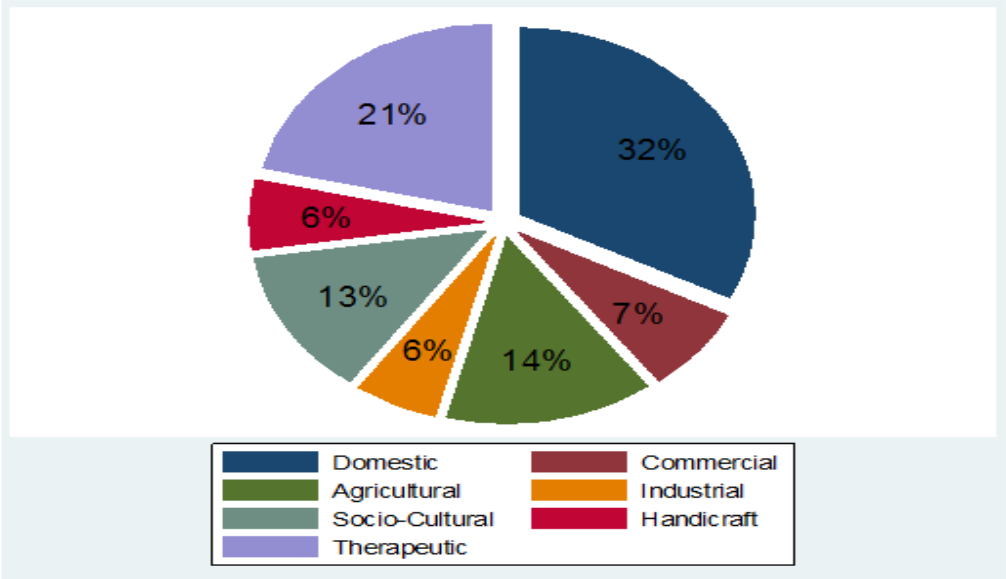

Fig.4: Percentage distribution of use categories

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Reasons of use

The purposes of use have been out listed to 24 reasons of use which ranges from improving livelihood in kind and in cash (Fuel wood and charcoal; Farm tools handle; Arts and music instrument; Carved poles, staff, benches, chairs and furniture; Roofing and Carpentry; Fencing; Fodder; For trapping; Manure/compost; Wrapping and packaging rodents; For mending a leak in container; Support for crops; Bridge construction; Wood presentation); but also the restoration of physical health (Animal disease; Cough; Fever; Typhoid; Syphilis; H.I.V; Bald head; Mystical problems; Kwashiorkor (Malnutrition) and Stinking heat (skin diseases). Table 2 summarizes the reasons of use into use categories and per plant part. Besides, it shows that men have significant high use fidelity index than women.

Table 2. Sociocultural value of Carapa oreophila to Kilum Mountain forest community

Part mostly used	State of use	Forms of use	Purposes	Use Fidelity (FL=n/N)	
				male	female
Trunk	Wet/dry	Whole/split	Fuel wood and charcoal	0.0867676	0.0115419
			Arts and music instrument	0.0082151	0.0002037
		Whole trunk	Carved poles, staff, benches, chairs and furniture	0.0148686	0.0020368
			Roofing and Carpentry	0.0023763	0.0001358
Branches	Wet/dry	Whole branch	Carved poles, staff, benches, chairs and furniture	0.0145292	0.0022405
			Roofing and Carpentry	0.0024442	0.0002037
			Farm tools handle	0.029262	0.0035305
			Fencing	0.0867676	0.0115419
			Kwashiorkor (Malnutrition)	0.1059814	0.0127639
fruits & seeds	Wet/dry	Whole paste	Bald head (Hairless head)	0.1213932	0.0154797
			Mystical problems	0.0906375	0.0112024
		Whole seed	Stinking heat (skin diseases)	0.122751	0.0152081
			Fodder	0.0306199	0.0038699
			For trapping	0.0433838	0.0057709
Bark, Root,		Whole	Cough	0.0611039	0.007604
			Fever	0.0902302	0.0114061
			Syphilis	0.0914522	0.0114061
Leaf			Fodder	0.0399891	0.0053636
			Wrapping and packaging rodents	0 .0433838	0.0057709
			Manure/compost	0.0399891	0.0053636
			Animal disease	0.12085	0.0154797
			Typhoid	0.0910449	0.0114061
			Component of H.I.V treatment	0.0304162	0.0038699
Gum	Dry	Whole latex	For mending a leak in container	0.0253921	0.0034626
Trunk Branches	Wet/dry	Whole/split	Fuel wood and charcoal	0.0344898	0.0008826
		Whole	Farm tools handle	0.0143934	0.0003395
		Whole	Carved poles, staff, benches, chairs and furniture	0.0169733	0.0002037
		Whole/split	Roofing and Carpentry	0.0078077	0.0001358
		Whole trunk	Arts and music instrument	0.0078077	0.0001358
Leaf	Fresh/wet	Whole	Wrapping and packaging rodents (Joint supplied)	0.020368	0.0004074
Trunk	Wet/dry	Whole	Fencing	0.0867676	0.0115419
Branches		Whole/split	Farm tools handle	0.0406681	0.0054315
			Support for crops	0.0604929	0.0085546
Leaf	Wet/dry	Whole	Manure/compost	0.0399891	0.0053636

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Trunk Branches	Wet/dry	Whole/split Whole	Roofing and Carpentry Bridge construction	0.027361 0.0253921	0.0035305 0.0034626
Trunk Branches	Wet/dry	Whole Whole/split	Arts & music instrument Wood presentation	0.0158191 0.0867676	0.0004074 0.0115419
Gum	Dry	Whole latex	For mending a leak in container	0.0253921	0.0034626
Trunk Branches	Wet/dry	Whole	Carved poles, staff, benches, chairs & furniture	0.0080793	0.0001358
			Farm tools handle	0.0193496	0.000611
			Roofing & Carpentry	0.0022405	0.0000679
		Whole trunk	Arts & music instrument	0.0168375	0.0002716
Branches[(1)] fruits & seeds' paste[(2)] Bark[(3)], Root[(4)], Leaf[(5)]	Wet/dry	Oral	Animal disease [(2)(3)(5)]	0.1211216	0.0154797
			Cough [(2)(3)]	0.0612397	0.007604
			Fever [(2)(3)(5)]	0.0904338	0.0114061
			Typhoid [(2)(3)(5)]	0.0912486	0.0114061
			Syphilis [(2)(3)]	0.0916559	0.0114061
			H.I.V [(2)(5)]	0.0304841	0.0038699
		External	Bald head [(2)(3)(4)(5)]	0 0154797	0.1216647
		Oral/External	Mystical problems [(2)(3)(5)]	0.0908412	0.0112024
			Kwashiorkor (Malnutrition) [(1)(2)(3)(5)]	0.1061851	0.0127639
		Warm bath	Stinking heat (skin diseases) [(2)(3)(4)(5)]	0.1230226	0.0152081

+ Fidelity level (FL) is calculated for the specific purposes of use of exploited plant parts following the formula of Friedman et al. (1986) : FL(%) = (N=/ N) * 100;),
Where n is the number of informants for a specific use, and N is the total number of informants.

Interviewee-resource assessment

Interviewees acknowledged that they felt all sizes of the plant, from 0-20 cm diameter, 20-40 cm and above 40 cm of diameter trees. This is why logs of large diameter are often split to have sizable fuel wood to transport on head. Informants also admitted that they harvested branches of all sizes, from 0-5 cm of diameter, 5-10 cm and above 10 cm of diameter. Moreover, barks are harvested at all stages from very thin to very thick bark. Likewise, tender roots of reasonable diameter are fetched at depth as far as beyond 30 cm for mature tree, threatening the stability of the plant. Furthermore, leaf with breadth of 5cm and more are all harvested for wrapping and medicinal purposes. Finally the seeds are used whole, crush into paste for medicine (Table 3).

Table 3: Local knowledge on harvest stages of plant parts

	Consensus value for Plant Parts' harvest stages														
	Trunk			**Branches**			**Seeds**	**Bark**		**Root**				**Leaf**	
	0cm ≤ Trunk Diameter < 20cm	**20cm≤ Trunk Diameter < 40cm**	**Trunk Diameter ≥ 40cm**	**0cm ≤ Branch Diameter < 5cm**	**5cm ≤ Branch Diameter < 10cm**	**Branch Diameter ≥ 10cm**	**Whole fruit & seeds**	**0mm ≤ Bark Thickness < 10mm**	**Bark Thickness ≥ 10mm**	**0cm ≤ Root Depth < 30cm**	**Root Depth ≥ 30cm**	**0cm ≤ Root Length < 20cm**	**Root Length ≥ 20cm**	**Leaf Breadth < 5cm**	**Leaf Breadth ≥ 5cm**
Trunk	**1**	**2**	**3**	-	-	-	-	-	-	-	-	-	-	-	-
Branches	-	-	-	**1**	**2**	**3**	-	-	-	-	-	-	-	-	-
Fruits_Seeds	-	-	-	-	-	-	**1**	-	-	-	-	-	-	-	-
Bark	-	-	-	-	-	-	-	**1**	**2**	-	-	-	-	-	-
Roots	-	-	-	-	-	-	-	-	-	**1**	**2**	**1**	**2**	-	-

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Leaf	-	-	-	-	-	-	-	-	-	-	-	-	-	**1**	**2**	
Gum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

1, 2, 3, represent different values of plant part sizes assigned at harvesting stage. 1= small sizes, 2= moderate sizes and 3= large sizes.

Harvest stage/size of trunk: Trees of 0-20 cm diameter, 20-40 cm and above 40 cm of diameter are fell to harvest the trunk. From a Consensus value for Plant Parts' harvest stages for all sizes, it reveals that human action leave no room for natural replacement. Men have significantly higher (p= 0.0266) concensus harvest stage (0.901) than women (0.098). Besides, there are significant differences in consensus value for harvest size (p= 0.0270) between the indigenes (Kom = 0.382; Oku = 0 .364 resp.) and the strangers tribes (Nso = 0.173; Borroro = 0.080). This is because besides using the trunk for domestic purposes, the indigenes also participates actively in its commercialization for fuel wood and carving, the Nso is solely for carvings while the Borroro is only for domestic.

Harvest stage/size of branch: All sizes of the branch were harvested, from 0-5 cm of diameter, 5-10 cm and above 10 cm of diameter with a consensus value for all sizes. Men with (= 0.9073554) outdo women (= 0.092) in the consensus value at p=0 0.021, while the indigenes (Kom = 0.38; Oku = 0.37 resp.) also dominate the strangers (Nso = 0.16; Borroro = 0.08) at p=0.031.

Harvest stage/size of tree barks: The bark is indiscriminately harvested regardless of its thickness, although thicker barks are preferred for its high concentration of inherent substances prized for its medicinal values.. Here, male with a consensus value of (= 0.8886316) outdo females with (=0.1113684) at p= 0.0001, while indigenes (Kom =0 .3859301; Oku = 0 .3739111 resp.) beat strangers (Nso = 0 .1689271; Borroro = 0 .0712317) at p= 0.0363.

Harvest stage/size of root: The tender roots have great medicinal virtues and those of reasonable diameters are fetched at depth as far as beyond 30 cm for mature tree in several pieces of varied length. While the difference between males (=0.8878258) females (=0.1121742) is not statistically significant (p= 0.6540), the dissimilarities between indigene (Kom = 0.3886506; Oku = 0 .3724843) and non-indigenes in local knowledge (Nso = 0 .1682613; Borroro = 0 .0706038) are statistically significant at p= 0.0001.

Harvest stage/size of leaf: Leaves are harvested in all sizes from the tender leaves for medicine and as fodder. Larger breadth leaves were used as wrappings for parceling roasted rodents by hunters. They are widely harvested green fresh. Group discussions have revealed that some informants have planted the tree in their farms to increase humus and soil fertitily from the death leaves.

IV. DISCUSSION

This study reveals from Kilum community, the use value knowledge of *Carapa oreophila*. The parts (leaves, branches, trunk, bark, roots and the fruits) are useful for at most more than one purpose with high use diversity values. These results are similar to those of [19] and [29] on *Carapa procera*. Branches and leaves have high use diversity which is contrary to [19], [28], [29] on *Carapa Procera*. The studies of [22] on *Parkia biglobosa* showed that the nuts (seeds) were the dominantly exploited plant part. We have also observed significantly great dissimilarities in use diversity with respect to gender and ethnic groups which differ from the results of [44] on baobab tree and those of [19] who both observed no difference between gender and admitted differences among ethnic group.

High use category, were observed in domestic and therapeutic use which partly corroborates with the results of [19] and [29] on *Carapa procera*, whose users showed knowledge in comestic and therapeutic properties. This indicates that, contrary to *Carapa procera* users, *Carapa oreophila* users are neither acquainted with the possible cosmetic properties of the plant nor its phytosanitary properties for crop protection. In harmony with the results of [19], [28], [29] on *Carapa procera*, we have observed significant difference between gender and among ethnic group in therapeutic uses. While a community's favorite use category defines their importance attached to a given species [17], the economic and financial landscape of the community can switch importance to other use categories simultaneously [45]. This is the case with the people of Kilum forest area where fuel wood business has steadily rise to higher and higher peak with the price of a bundle of 60 kg sold by the producer at 1500–2000 FCFA (2.29 – 3.05 Euros). Unlike in [19], the people have no knowledge about the virtues of the oil.

Twenty-four reasons for use of this plant species were revealed in this study which globally satisfies immediate household needs and income generation activities to improve livelihood concerns of individuals in the Kilum forest reserve community. Many other authors have reported on the medicinal properties of *Carapa* [10], [19] [28], [29], [31]. This study presents common targeted

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diseases of animals and humans such as skin diseases and witchcraft related ailments (magico-mystics) treated using *Carapa oreophila* in the Kilum forest reserve. The indigenes have an idea of the use of the oil to treatment diseases using the seed paste or any plant part except for trunk and gum. Globally, Ethnic and gender difference in local knowledge on *Carapa oreophila* were significantly similar to those of [19], [23].

As a reserve but somewhat open community forest, the plant is virtually harvested at all stages and in any size without considering the natural replacement rate of the plant species in forest. This is regardless of the plant part harvested among ethnic groups – the indigene harvest more than the strangers in the community with a males dominating harvesting habit. Fruits and gum are done in a sustainable manner because they do not endanger the life of the plant. Neverhtless, the harvesting of the other plant parts severely endangers the species biodiversity due to over-exploitation in all forms and sizes. This enhances the degradation and subsequent estinction of this plant in the forest if care is not taken. The effect is that this multipurpose plant and its forest are fast disappearing from this open forest reserve of Kilum [46].

V. CONCLUSION

This study has brought to the lamp light, the local knowledge, use value, the unrecognized products and multipurpose uses of *Carapa oreophila* by the Kilum forest reserve community. An examination of use diversity reveals the importance of the plant by way of use categories as a multipurpose plant. Local knowledge are diversified and differ among ethnic groups and gender with indigenous people (Oku and Kom) having high value in used plant parts and use form over stranger communities (Nso and Borroro). The domestic and therapeutic categories have proven to be the most important use categories to the people of Kilum mountain forest showing that therapeutic uses of the species also offer opportunities for pharmacological research to help communities to improve healthcare services. Sad to say that despite this handful of advantages presented by the plant, the unsustainable harvesting and poor techniques threatens its existence and the impact of its disappearance is already felt by the population.

For the immediate future, we recommend the promotion and enhancement of *Carapa oreophila* through domestication and seed oil production to provide significant socio-economic benefits to local people. To this end, it is necessary to implement strategies to support local communities to actively participate in the conservation and sustainable use of the species as part of the preservation of plant biodiversity.

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