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Origin, non-monetary benefits and perspectives of domestication of Non-Timber Forest Products in the Mifi Division of the West Region of Cameroon

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Abstract— *The objective of this study is to contribute towards the promotion of NTFPs from various origins by assessing their contribution in sustaining the livelihood of communities in Mifi Division and the domestication potential of some of the NTFP species. The study was carried out in the Mifi Division in the West Region of Cameroon. Respondent were drawn from a cross-section of exploiters and marketers. Data were collected through the administration of semi-structured questionnaires and interview guides as well as direct observations with actors including 65 wholesalers, 150 retailers and 120 households. Data analysis was carried out using Excel 2016 to generate tables and graphs, and ARCGIS 10.1 to generate the map of the areas of origin of NTFPs. Results revealed that 29 species are used in the Division but almost all (28 species) come from areas out of Mifi. Parts used for consumption consist of 36,84% fruits, 36.84% seeds, 10.52% leaves, 5.26% sap, 5.26% mushrooms and 5,26% rhizome while their use for medicinal purposes consist of 42,85% barks, 28.57% fruits, 14.28% seeds and 7.14% leaves and rhizome. In total, species are used as food (46.55%), medicine (36.2%), for construction and furniture (6.89%), packaging (6.89%) and cosmetics (3.44%). NTFPs are becoming increasingly rare, reason for the need of an effective domestication of the most used species. NTFPs mainly Garcinia kola and Tetrapleura tetraptera with higher assets and low constraints can potentially be domesticated in the Mifi Division in order to reduce overexploitation and promote sustainable management of NTFPs in the present context of climate change. There are many favorable conditions including, the need of small financial capital, the interest of inter-community groups and available workforce. Some constraints persist such as the lack of young plants, lack of technical assistance and financial support.*

Keywords— ***non-timber forest products, livelihood, species origin, domestication.***

I. INTRODUCTION

In the past decades, peer-reviewed (Anderson *et al*., 2006, Angelsen and Wunder, 2003; Bukula and Memani, 2006; FAO, 2006; Shackleton *etal*., 2006; Raik and Decker, 2007) worked on the link between poverty and forests in developing countries around the world. In Africa, it has been estimated that over two-thirds of the population rely on forest products (derived from a wide range of timber and non-timber forest products – NTFPs), either as a source of income or for subsistence (non-cash)(Arnold, 2002; Kaimowitz, 2003; CIFOR, 2005). Even though the non-income value of NTFPs to the local population is higher than the income value for many species, it has rarely been incorporated in a sustainable development scheme (CBD 2001).According to Endamana *et al*. (2016), NTFPs account for 35% and 39%,respectively of non-income benefit/value and 21% and 14% of income value among indigenous people and Bantu households in Cameroon. NTFPs play an important role in daily lives of indigenous people. They act as sources of food, medicine, construction material and fuelwood, as well as resources of spiritual and cultural significance (Aiyeloja and Ajewole, 2006; Hoare, 2007). They provide nutrients which are

usually absent in daily diets such as proteins, vitamins, starch, minerals and other compounds, thus preventing malnutrition (Johns and Sthapit, 2014; Shanley *et al*., 2015). They are used in the treatment of many illnesses such as typhoid, tooth pain, sexual weakness, waist pain, diarrhea, anemia, stomach ache, women infertility (Caspa *et al*., 2020) and recently locally used in the prevention or the fight against Covid-19.With its 2.8 million km^2 of diverse and rich forests, the Congo Basin offers one option for local populations to meet their daily livelihood needs (Endamana *et al*., 2016).

Cameroon as part of the Congo Basin, offers goods and services from various forest ecosystems which are vital for 80% of the local population and are of capital importance for the reduction of poverty (Bele *etal*., 2011). Non-Timber Forest Products (NTFPs) are of great importance among the products from these forest ecosystems. They include roots, seeds, nuts, barks, resins, feathers, bush meat, mushrooms, fruits, fibers and leaves (Nkwatoh *et al*., 2010; Shanley *et al*., 2015).

The West Region of Cameroon is known to be one of the most densely populated regions in the country with an average density of 125 inhabitants/km^2; the national average being just 16 hab./km^2 (Ndogmo, 2002). It is a savannah grassland zone where agriculture is the main source of income, but faces problems owing to pressure on land resulting from population growth. Thus, the promotion of NTFPs can be an accompanying measure to reduce the problems faced by agriculture. NTFPs play an indispensable role in this Region as they are used in the main traditional meals such as "Nkuih" and "yellow soup" and in some spiritual ceremonies. Contrary to many forest zones in Cameroon where NTFPs have been the subject of many studies such as Guedje (2002), Betti (2003); Eyong *et al*. (2006), Betti *et al*. (2013),Hirai (2014), Amang *et al*. (2015) Caspa *et al*. (2014, 2018); the grass field zones such as the West Region in general and the Mifi Division in particular; have been the subject of few and unpublished studies. Thus, there is a poor assessment of NTFPs in this part of the country.Given their importance to rural communities, local NTFP species in Cameroon deserve more attention to optimize the potential they represent. They are exposed to pressure from logging, slash and burn agriculture, population growth and mining. The consequences include deforestation and degradation of forest ecosystems, significant land use change and poor standards of living for rural populations (Ernst *et al*. 2010). Giving more impetus to NTFPs through their domestication, vulgarization, transformation and marketing will go a long way to stimulate the sector economically (PFBC, 2011). The objective of this study is therefore to contribute towards the promotion of NTFPs from various origins by determining their contribution to the livelihood of communities in Mifi Division and the domestication potential of some of the NTFP species.

II. MATERIAL AND METHODS

2.1 Study area

Mifi division is the administrative head quarter of the West Region of Cameroon with its chief town being "Bafoussam". It covers an area of 40 200 ha (402 km^2) and it is geographically located between latitude 5° 28' N and longitude 10° 25' E (Figure 1).It is made up of three sub-divisions namely: Bafoussam I, Bafoussam II (Baleng) and Bafoussam III (Bamougoum).The climate is the Sudano-guinean type characterized by two seasons; one rainy season form mid-March to mid-November and one dry season from mid-November to mid-March. The average rainfall is 1871mm/year and the annual average temperature is 20°C. The soils fall into two main categories:ferrallitic averagely desaturated soils and poorly evolved (low proportion of lithosols and alluvial soils) (Faure, 1986). The vegetation is dominated by shrub savannah characterized by the presence of *Albizia gummifera* and *Carapa grandiflora*.

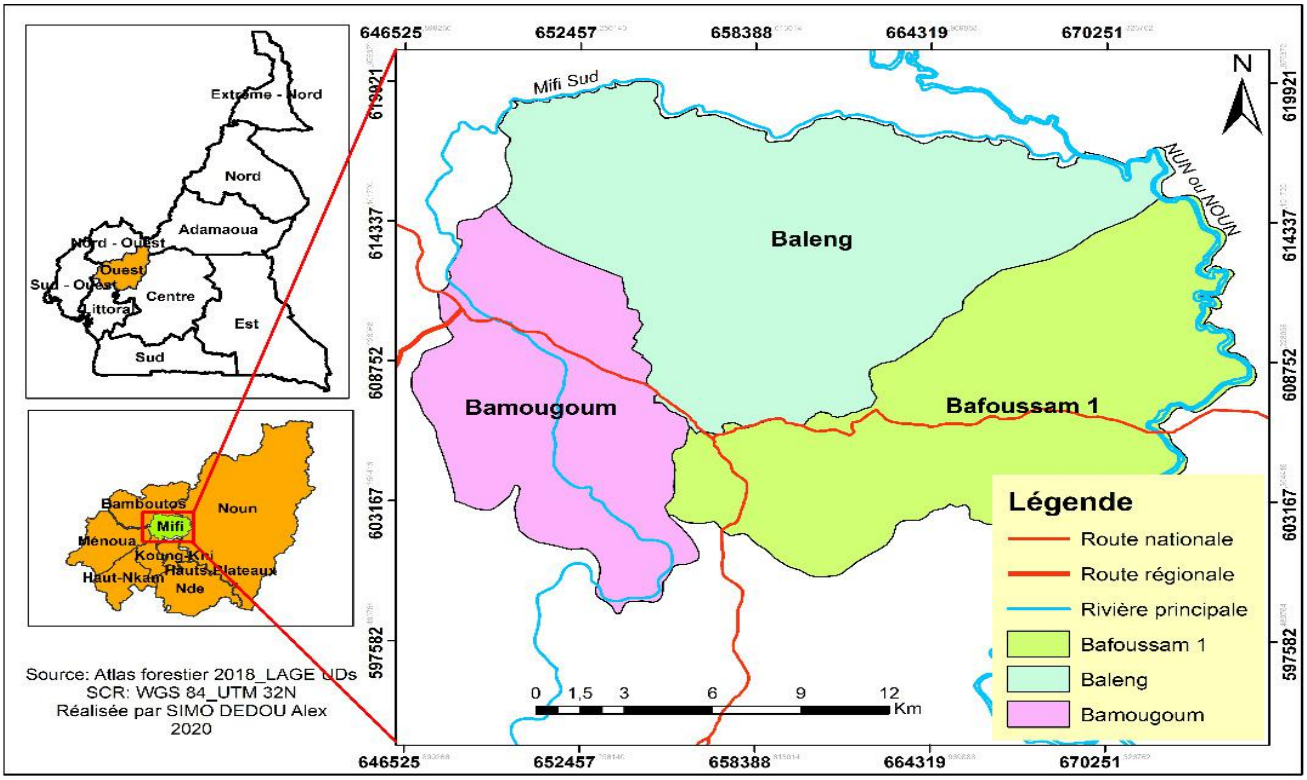

Fig. 1. Location map of the study area

2.2 Data collection technique

Data was collected through the administration of semi-structure questionnaires and interview guideas well as direct observations with different actors including 65 wholesalers, 150 retailers in five main markets (Market A, Market B, Market C, Cassablanca market and Socada market) of the Mifi Division and 120 households involving 60 in Bafoussam I, 40 in Bafoussam II and 20 in Bafoussam III.

2.3 Data analysis

Data analysis was carried out using Excel 2016 to generate tables and graphs,and ARCGIS 10.1. to generate the map showing the areas of origin of the NTFPs sold in the Mifi division.

III. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Socio-economic/demographic characteristics of respondents

Three hundred and fifty-five (355) people were interviewed as follows:80.6% women and 19.4% men. 25.62% of respondents were in the 15 to 35 years age bracket, 54.07% in the 36 to 55 years age bracket and 20.27% of respondents were over 56 years old. Respondents varied with respect to occupation and consisted of producers (representing 5.63 % of which 5% were women and 95% were men), wholesalers (representing 18.30% of which 58.4% were women and 41.6% were men), retailers (representing 42.25% of which 90% were women and 10% were men) and consumers (representing 33.80% of which 93.3% were women and 6.7% were men) (Fig. 2).

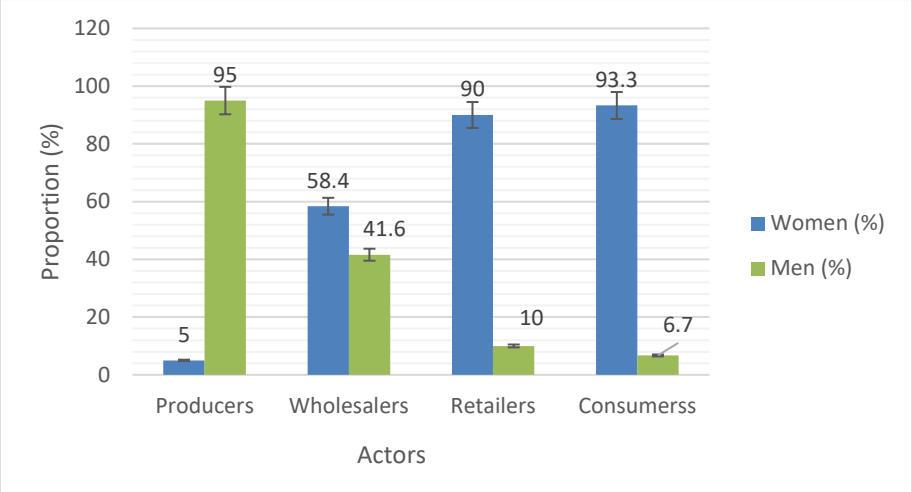

Fig. 2. demographic characteristics of respondents

3.1.2 Identification of NTFPs, state of use and frequency on markets

Twenty-nine (29) plant species belonging to 20 family were recorded including their local names, state of use and frequency of various products from these species on markets(Table 1).

Table 1: NTFPs sold in markets in Mifi division

Species	Family	Local name	State of use	Frequency on markets
Amaranthus spinosus	Amaranthaceae	Mefiedengee	Fresh	**
Mangifera indica	Anacardiaceae	Mango	Fresh	**
Monodora myristica	Annonaceae	Pepe	Dry	**
Xylopia aethiopica	Annonaceae	Siedo	Dry	***
Alstonia boonei	Apoxynaceae	Motif skin	Dry	*
Raphia farinifera	Arecaceae	Raphia	Sap	****
Canarium schweinfurthii	Burseraceae	Aele/black fruit	Fresh	*
Dacryodes edulis	Burseraceae	Swuob	Fresh	**
Garcinia kola	Clusiaceae	Bitter kola	Fresh	****
Garcinia lucida	Clusiaceae	Essok	Dry	*
Tetracera alnifolia	Dilleniaceae	Liane	Dry	**
Diospyros crassiflora	Ebenaceae	Ebene	Dry	*
Ricinodendron heudelotii	Euphrobiaceae	Njansang	Dry	****
Scorodophloeus zenkeri	Fabaceae	Arbre à ail/capré	Dry	**
Piptadeniustrum africanum	Fabaceae	Foumoko'o	Dry	*
Tetrapleura tetraptera	Fabaceae	Four sides	Dry	**
Megaphrynium macrostachyum	Maranthaceae	Kwo	Fresh	**
Marantochloa leucantha		Mefoladem	Fresh	**
Moringa oleifera	Moringaceae	Moringa	Fresh	**
Coula edulis	Olacaceae	Noisette	Fresh	**
Elaeis guineensis	Palmaceae	Mwer	Oil	***
Piper guineense	Piperaceae	Saphah	Dry	***

Pleurotus sp	Polyporaceae	Champignon	Dry	*
Talinum triangulare	Portulaceae	Watalif	Fresh	***
Baillonella toxisperma	Sapotaceae	Moabi	Dry	**
Zingiber officinale	Sapotaceae	Njinger	Fresh	***
Annona muracata	Sapotaceae	Corossol	Fresh	*
Afromomum danieli	Zingiberaceae	Nduduh	Oil	*
Afromonum citratum	Zingiberaceae	Mbongo	Dry	***

: Rare; **: Quite frequent on market; *: Present on market; ****: Often present on market*

Out of the 29 species recorded, 3 were often present: *Raphia farinifera*, *Garcinia kola*, *Ricinodendron heudelotii*; 6 were present: *Xylopia aethiopica*, *Elaeis guineensis*, *Piper guineense*, *Talinum triangulare*, *Zingiber officinale*, *Afromonum citratum*; 12 were quite frequent: *Amaranthus spinosus*, *Mangifera indica*, *Monodora myristica*, *Dacryodes edulis*, *Tetracera alnifolia*, *Scorodophloeus zenkeri*, *Tetrapleura tetraptera*, *Megaphrynium macrostachyum*, *Marantochloa leucantha*, *Moringa oleifera*, *Coula edulis*, *Baillonella toxisperma*;while 8 were rare such as *Alstonia boonei*, *Canarium schweinfurthii*, *Garcinia lucida*, *Diospyros crassiflora*, *Piptadeniustrum africanum*, *Pleurotus* sp., *Annona muracata*, *Afromomum danieli.*

3.1.2 Origin of NTFP sold in various markets in Mifi division

NTFPs species come from 12 Divisions of 6 Regions in Cameroon (Fig. 3) such as East (Haut-Nyong), West (Bamboutos, Ndé, Menoua, Mifi), le South-West (Fako), Centre (Lékié, Mbam-et-kim), Littoral (Moungo, Wouri) et le Nord-West (Lebialem, Mezam).Various species according to their region of origin are presented in table 2.

Table 2: Origins of NTFP species sold in markets in Mifi division

Regions	Divisions	NTFPs species
Centre	Lékié	*Tetrapleura tetraptera, Talinium triangulare, Baillonella toxisperma*
	Mbam-et-kim	*Monodora myristica, Xylopia aethiopica*
Littoral	Wouri	*Amaranthus spinosus, Alstonia boonei, Canarium scheinfurthii, Garcinia kola, Maranthochloa leucantha,*
	Moungo	*Elaeis guineensis, Tetracera alnifolia, Coula edulis, Piper guineensis*
West	Bamboutos	*Dacryodes edulis*
	Menoua	*Elaeis guineensis, Piper guineensis, Zingiber officinale, Annona muracata, Afromomum daneili, Afromomum citratum*
	Mifi	*Raphia farinifera*
	Ndé	*Megaphrynium macrostachyum*
South-West	Fako	*Mangifera indica,*
North-West	Lebialem	*Moringa oleifera, Pleurotus* sp.
	Mezam	*Diospyros crassiflora, Scorodophloeus zenkeri*
East	Haut-Nyong	*Garcinia lucida, Ricinodendron Heudelotii*

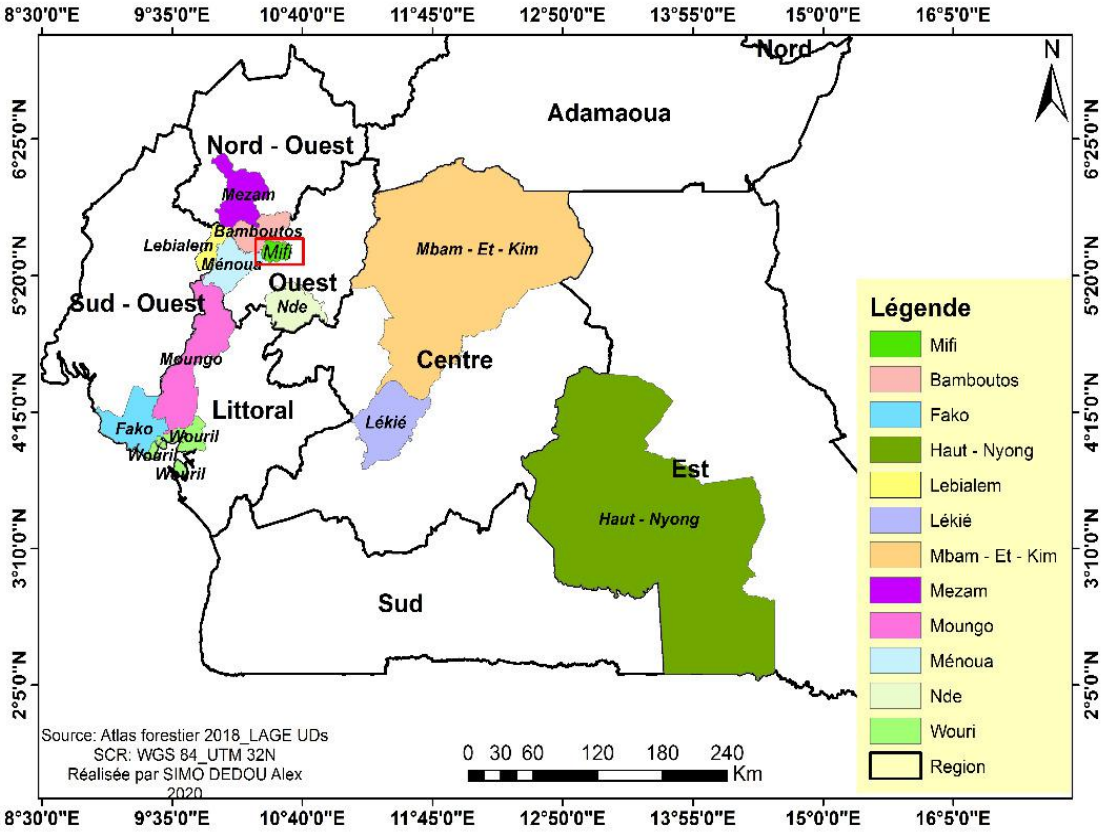

Fig. 3. Region of species origin

The arrow in fig. 3 shows the various regions of origin of NTFPs. The 12 divisions with various colors are those involved in NTFP trade.

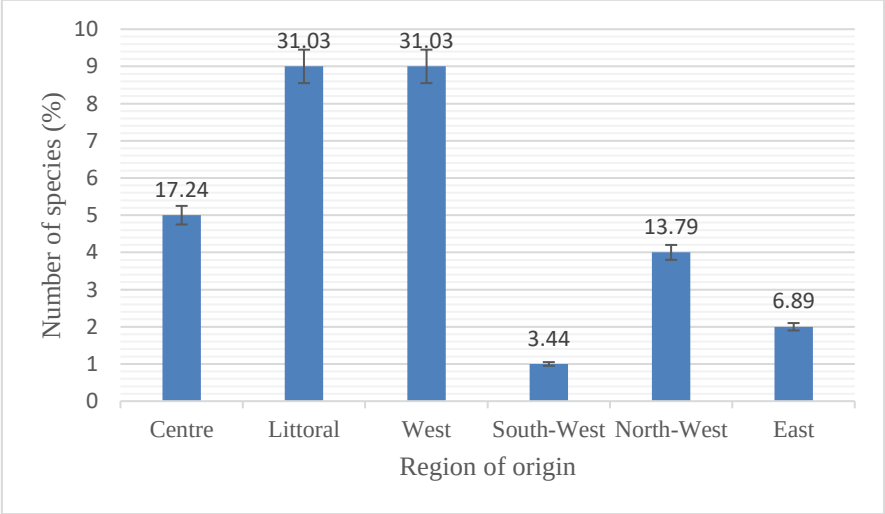

Fig.4. Origin of NTFP species

Figure 4 shows that the species are mostly from the Littoral and West regions with 31.03%, followed by the center region with 17.24% and the North-west (13.79%). Few are from the East (6.89%) and South-West (3.44%) regions.

3.1.3 NTFP Suses and parts used

NTFPs are used for nutrition, medicine, construction and furniture, cosmetics and packaging (Table 3)

Table 3. NTFPuse

Species	Uses
Amaranthus spinosus	Direct consumption
Mangifera indica	Direct consumption (fruit) and treatment of typhoid and malaria
Monodora myristica	Direct consumption
Xylopia aethiopica	Direct consumption
Alstonia boonei	Malaria treatment, typhoid, asthma and diarrhea
Raphia farinifera	Alcohol Drink (sap) andConstruction of thatch houses and furniture production (branches)
Elaeis guineensis	Production of nutrition oil (seed's back) and rubbing oil (nut)
Canarium schweinfurthii	Consumption
Dacryodes edulis	Direct consumption
Garcinia kola	Additive in palm wine (bark) and direct consumption (seed)
Garcinia lucida	Medicine
Tetracera alnifolia	Artisanal
Diospyros crassiflora	Bacteria's infections
Ricinodendron heudelotii	Ingredient for many sauces and for Asthma
Scorodophloeus zenkeri	Medicine
Piptadeniustrum africanum	Treatment of sexual weakness, tooth pain and rheumatism
Tetrapleura tetraptera	Consumption and malaria treatment
Megaphrynium macrostachyum	For packaging
Marantochloa leucantha	For packaging
Moringa oleifera	Treatment of sexual weakness, skin affections anemia and lower back pain
Coula edulis	Direct consumption
Piper guineense	Ingredient in many different types of soup
Pleurotus sp.	Consumption
Talinum triangulare	Consumption
Baillonella toxisperma	Production of oil (seed) and treatment of infertility in women, tooth and lower back pain (back).
Zingiber officinale	Ingredient of many sauces and in various medicines
Annona muracata	Consumption
Afromomum danieli	Ingredient for several traditional

	medicines
Afromonum citratum	Ingredient for several traditional medicines

Table 3 shows that many products can be used to treat the same illness. Most of them are used for consumption and for the treatment of illnesses.

The parts used are skin, leaves, fruits, rhizomes, seeds, nuts and sap. They are used as medicine, food and for artisanal and cultural purposes. Table 4 gives a summary of the usesand the parts used.

Table 4. List of species according to the categories of uses

Species	**Parts used**	**Categories of uses**				
		Nutrition plant	**Medical plant**	**Construction and furniture**	**Cosmetic plant**	**Packaging pant**
Amaranthus spinosus	Leave	+				
Mangifera indica	Fruit and back	+	+			
Monodora myristica	Seed	+				
Xylopia aethiopica	Fruit	+				
Alstonia boonei	Back		+			
Raphia farinifera	Sap and branches	+		+		
Elaeis guineensis	Seed	+			+	
Canarium schweinfurthii	Fruit	+				
Dacryodes edulis	Fruit	+				
Garcinia kola	Back and seed	+				
Garcinia lucida	Back		+			
Tetracera alnifolia	Stem			+		
Diospyros crassiflora	Back		+			
Ricinodendron heudelotii	Fruit	+	+			
Scorodophloeus zenkeri	Fruit		+			
Piptadeniustrum africanum	Back		+			
Tetrapleura tetraptera	Fruit	+	+			
Megaphrynium macrostachyum	Leave					+
Marantochloa leucantha	Leave					+
Moringa oleifera	Seed and Leave		+			
Coula edulis	Seed	+				
Piper guineense	Seed	+				
Pleurotus sp;	Sporophore	+				
Talinum triangulare	Leave	+				
Baillonella toxisperma	Seed and Back	+	+			

Zingiber officinale	Rhizome	+	+
Annona muracata	Fruit	+	
Afromomum danieli	Fruit		+
Afromonum citratum	Fruit		+

+ = presence

Out of the 29 species recorded, 11 were strictly used for nutrition:*Amaranthus spinosus*, *Monodora myristica*, *Xylopia aethiopica*, *Canarium schweinfurthii*, *Coula edulis*, *Garcinia kola*, *Coula edulis*, *Piper guineense*, *Pleurotus* sp., *Talinum triangulare* and *Annona muracata*; while 8 were strictly medicinal:*Alstonia boonei*, *Garcinia lucida*, *Diospyros crassiflora*, *Scorodophloeus zenkeri*, *Piptadeniustrum africanum*, *Moringa oleifera*, *Afromomum danieli* and *Afromonum citratum*. 5 species were used for both nutrition and medicine:*Mangifera indica*, *Ricinodendron heudelotii*, *Tetrapleura tetraptera*, *Baillonella toxisperma* and *Zingiber officinale*. 5 species have particular uses: *Elaeis guineensis* is used to produce robbing oil mostly use on babies' skin; *Raphia farinifera* and *Tetracera alnifolia* are used for construction and furniture while *Megaphrynium macrostachyum* and *Marantochloa leucantha* are used for packaging.

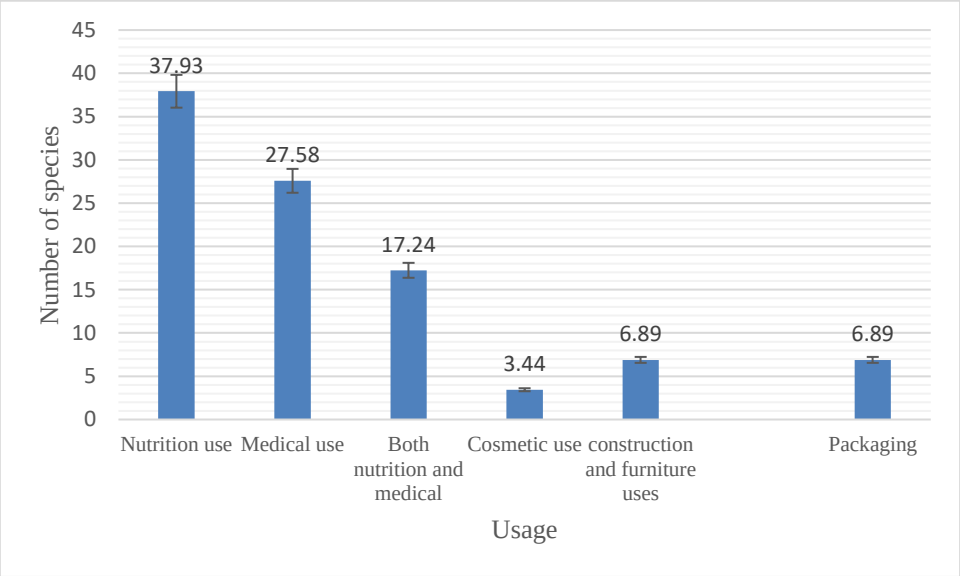

Fig.5. Species according to categories of use

Fig.5 shows that 37.93% of species were strictly used for nutrition; 27.58% were strictly used for medicinal purposes; 17.24% were used for both nutrition and medicine; 6.89% were each used for construction and furniture and for packaging; 3.44% were used for cosmetic purpose.

Parts used

The parts used consisted of fruits (30.3%), seeds (21.21%), barks (21.21%), leaves (15.15%), saps (3.03%), stems (3.03%), rhizomes (3.03%), branches (3.03%) and mushrooms (3.03%) (Fig. 6).

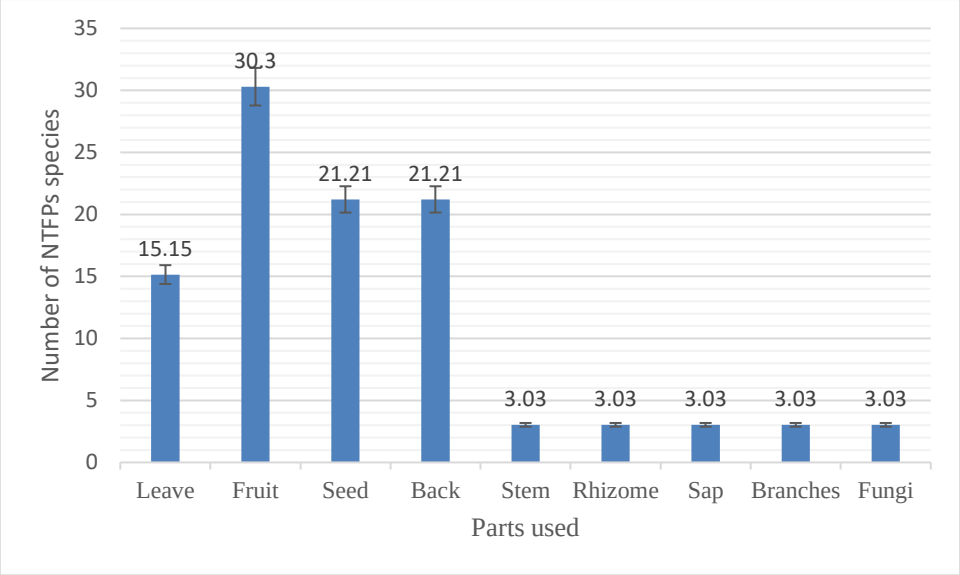

Fig.6. Parts of NTFP species used

Parts used for both medicine and consumption

The parts of NTFPs used for consumption purposes were fruits and seeds (36.84%), leaves (10.52%), sap, mushrooms and rhizome (5.26%) while the parts of NTFPs used for medicinal purposes were barks (42.85%), fruits (28.57%), seeds (14.28%) and leaves and rhizome (7.14%) (Fig. 7).

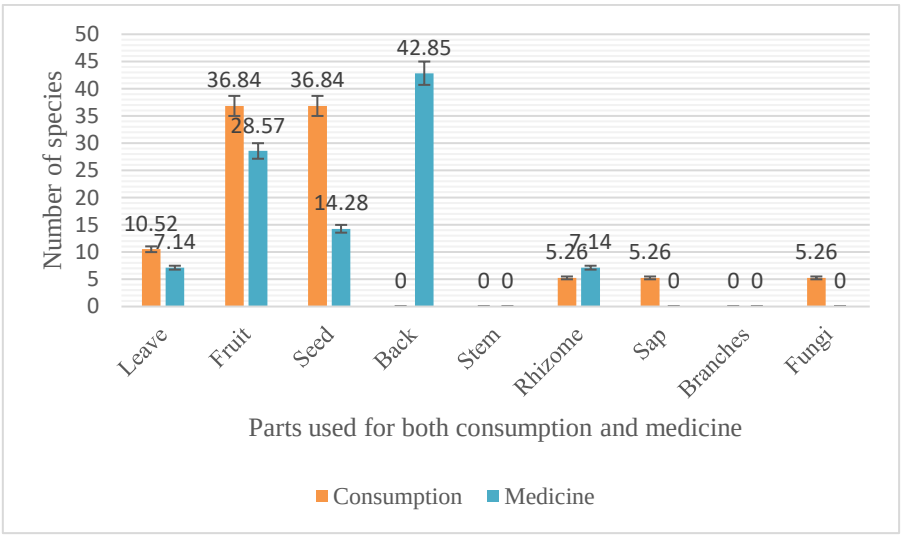

Fig. 7. Parts used for consumption and medicinal purposes

Frequency of various illnesses

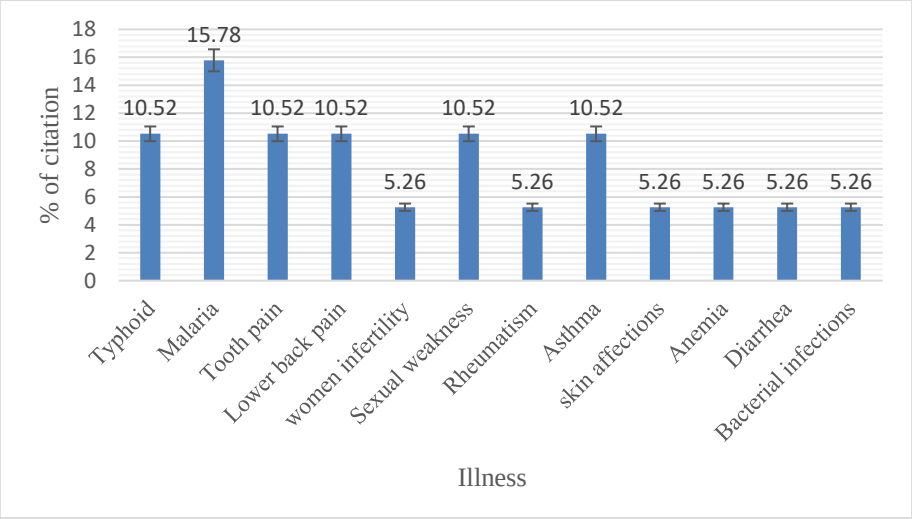

Fig.8. Recurrent illnesses treated through the use of NTFPs in the study site

Fig.8 shows that malaria is the most recurrent illness in the division, but luckily can be treated using 15.78 % of species of NTFPs. 10.52% of species are used for the treatment of typhoid, tooth pain, lower back pain, sexual weakness and asthma. 5.26% of species are used for the treatment of women infertility, rheumatism, skin affections, anemia, diarrhea and bacterial infections.

3.1.5 The domestication potential of certain NTFPs

Investigations carried out on the field enabled us to define tree evaluation axis by order of importance including the necessity of domestication, the assets present and constraints. Table5 presents different reactions of persons sampled according to the evaluation axis.

Table 5 shows that there is a real necessity of domesticating certain species of NTFPs including *Garcinia kola*, *G. lucida*, *Monadora myristica*, *Tetrapleura tetraptera* and *Ricinodendron heudelotii;* since most of them are highly used as food, and medicine and are becoming rare on markets thus the high prizes. There are many facilities including, the need of small capital, high interest of inter-community groups and available workforce. Some constraints persist such as the lack of young plants, lack of technical assistance and financial support.

Table 5:The domestication potential of certain NTFPs in the Mifi division

NTFP	Necessity of domestication			Facilities				Difficulties	
	High economical value	Becoming more and more expensive on markets due to the increasing scarcity	Very usefulin medicine	Workforce available	Limited capital needed	Inter-community groups interested	Lack of young plants	Lack of technical assistance	Lack of financial support
Garcinia kola	+	+		+	+	+		+	+
Garcinia lucida	+	+	+	+	+	+	+	+	+
Monodora myristica		+		+	+	+	+	+	+

Tetrapleura tetraptera		+		+	+	+		+	+
Ricinodendron heudelotii	+	+		+		+	+	+	+

+ = presence

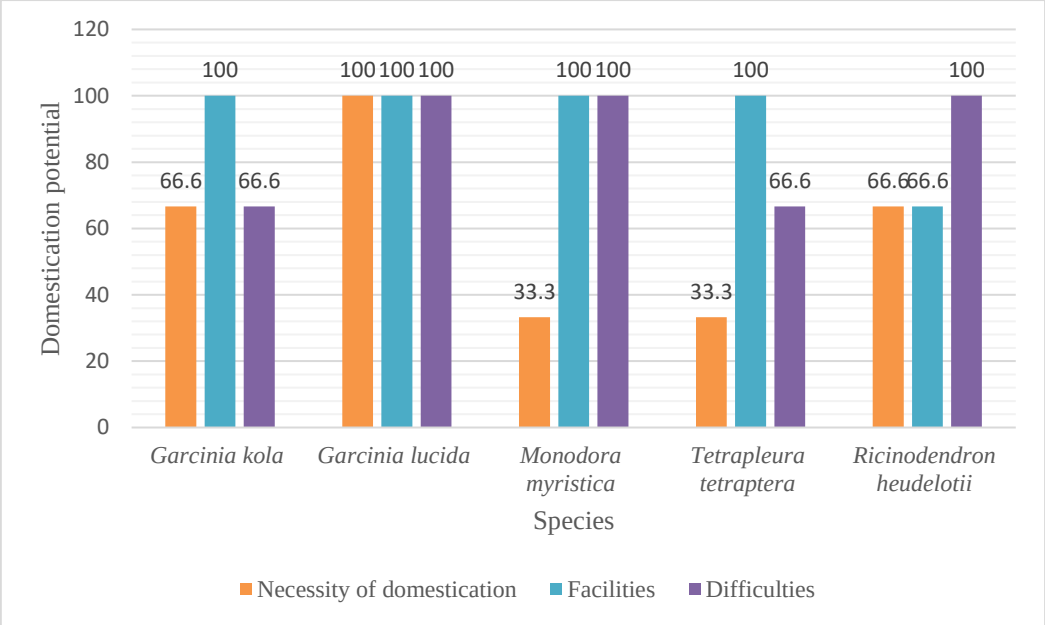

Fig.9: Domestication potential of NTFP species

Fig.9 shows that *Garcinia kola* and *Tetrapleura tetraptera* with facilities higher than difficulties, are the potential NTFPs that can easily be domesticated in the Mifi Division. For the others, there is an equal numberof facilities and difficulties.

IV. DISCUSSION

The findings of this research showed that NTFPs are of great importance to local communities in the Mifi division and across the Central African sub-region where this importance has been widely documented as mentioned by FAO (1995) and Ingram and Schure (2010). Every stratum of the community including women, men, youths and the elderly; participates in NTFP trade. Caspa *et al*. (2020) indicates that it is probably because NTFPs are freely collected, and as a matter of habit as people in most forest communities have been used to gathering these products from the forest over the years. This goes in line with Ngansop *et al*. (2017) and Hirai (2014) who mentioned that indigenous people in forest communities in South-East Cameroon gather NTFPs for their daily food supply as well as for medicinal purposes.

More women were sampled (80.6%) in this study than men (19.4%), both in households and markets since they do not delay as men on farms, they were usually present at home and they were more involved in wholesaling activities (58.4%) and in retailing (90%) than men (41.6% wholesaling and 10% retailing). According to Arnold (1995) women rely more frequently than men on forest products activities for the generation of income. The slight margin between the percentage of women and men in wholesaling is probably due to the increase of the monetary value of most NTFPs, so, men now participate. But from the results of the investigation from both, men (95%) were more involved in harvesting than women (5%) since the only NTFP with origins from villages of the Mifi division was the sap and the branches of *Raphia farinifera* (table 2) (Mifi being a grass field area like the entire west region, where forest is practically absent, covered by few sacred forests most out of bounds to uninitiated villagers) respectively used as alcoholic drink and for the confection of furniture and houses, and the fact the activity tend to be cultural specific. Rico (1998) mentioned that gender plays a key role in the degree to which rural Africans depend on NTFPs as women's and men's rights, responsibilities, and expectations within the milieu of natural resources tend to be culturally specific

Plate 1. Man extracting the sap of Raphia farinifera

Plate 2. Young man in the forest to learn the extraction techniques

Women were more involved (93.3%) in consumption than men (6.7%) probably because they are responsible for the preparation of food for the entire family. A higher proportion of respondents (representing 54.07% for the 36 to 55 years age bracket and 25.62% for the 15 to 35 years age bracket) fall within the middle age group and the youthful population probably because they include young newly-married women without capital as mentioned by Schreckenberg (2004), they still have physical strength, and their lives depend on the income from this trade. Tinko *et al*. (2010) highlights that some of the most pressing needs that can be met by selling forest products include:

- the payment of school fees (Adebisi 2004, Campbell *et al*., 2002, Sunderlin *et al*., 2005);
- funding investments in consumptive activities (such as new clothes, school uniforms, gifts, pots, and pans) (Campbell *et al*., 2002, Schreckenberg 2004);
- dealing with medical emergencies as they arise (Sunderland et al., 2004; Sunderlin *et al*., 2005) or meeting medicinal needs (Arnold and Perez 2001);
- supplementing diets during particular seasons of the year or during shortfalls (Angelsen and Wunder 2003, Arnold and Perez 2001);
- using profits for participating in family ceremonies (Adebisi 2004); and
- using incomes in productive activities (such as building a storage hut, purchasing a new goat or agricultural stocks for later resale (Schreckenberg 2004) or purchasing agricultural inputs (Sunderlin *et al*., 2005).

The large proportion (20.27%) of respondents of 56 years old and above, made up of the elderly is because the trade of NTFPs is an occupation after retirement (with less physical strength) as indicated by Schreckenberg (2004) that in Benin, shea nuts (*Vitellaria paradoxa* C.F. Gaertner) are particularly important for those with few other incomes generating options, including the elderly (often widows and those without the physical strength necessary to engage in other activities).

Findings of the study revealed that 29 NTFP species belonging to 20 families of plant origin are sold in various markets of the Mifi Division. Since the only NTFP harvested in Mifi is *Raphia farinifera*, the division find itself as a junction with products coming from different areas. These NTFPs come from 5 regions away from Mifi which can explain the dry state (good conditioning for them to last longer) of most products in the markets. Three species were often present in markets: *Raphia farinifera*, *Garcinia kola*, *Ricinodendron heudelotii*. This is probably because they are used for cultural purposes (the palm wine (sap) of *Raphia farinifera* and the back of *Garcinia kola*, an additive in palm wine (bark); seed for direct consumption and branches for construction of thatch houses and furniture production); present in all cultural ceremonies (marriages, funerals, initiation feasts…). Nguenang (2010) revealed that *Garcinia kola* (the bark) is overexploited, therefore posing problems of sustainability.

The high use of species for nutrition and medicine (37.93% of species strictly used for nutrition; 27.58% strictly used for medicine and 17.24% used for both nutrition and medicine) is because of poverty. For example, Hospital bills are too high, so people rely on these NTFPs, free of charges or cheaper. Oksanen *et al*. (2003) indicates that both women and children, often from the poorest households, can obtain a major source of their subsistence from a diverse set of forest products.

The most used parts consist of fruits (30.3%), seeds (21.21%), barks (21.21%), and leaves (15.15%) probably because they are easy to collect and conserve and contain the active ingredients for different ailments. Products like

mushrooms are less used (3.03%) because they depend on seasons.

The high number (15,78 %) of NTFPs used for the treatment of malaria and of 10,52% of species for typhoid, tooth pain, lower back pain, sexual weakness and asthma which are the most recurrent ailments in the division, is probably because most of them are mixed in various ways to cure these ailments or are part of the numerous plant mixtures used to cure them. It is estimated that 80% of the world's population primarily uses traditional medicines for their primary health care (FAO, 1997).

The real necessity of domesticating certain species of NTFPs including *Garcinia kola*, *G. lucida*, *Monadora myristica*, *Tetrapleura tetraptera* and *Ricinodendron heudelotii*; is because of their importance in sustaining the livelihood of communities and the scarcity that causes the increase in their prize on markets since they come from far where these NTFPs are over-exploited. Peters (1996) reported that commercial harvesting of NTFPs has a number of negative impacts, including a gradual reduction in the vigor of harvested plants, decreasing rates of seedling establishment of harvested species, potential disruption of local animal populations and nutrient loss from harvested material. Guedje (2002) observed that stripping of the bark of *Garcinia lucida*, which is used as palm wine additive, resulted in a 74 % mortality rate. Difficulties such as the lack of young plants, lack of technical assistance and financial means, in domesticating species persist. The latter is the most important. Angelsen and Wunder (2003) note there is solid empirical evidence regarding the positive link between rural poverty and NTFP dependence. The poor are more resource dependent than the rich and usually derive a greater share of their overall needs from forest products and activities (Arnold and Townson 1998, Cavendish 2000, Sander and Zeller 2007). Sander and Zeller (2007) categorized 477 households into three poverty classes: 'poorest', 'less poor', and 'better-off'. The latter generated about 50% more cash-income than the poorest and 90% of the poorest households collected firewood, compared to only 80.2% and 76.8% of the less poor and better-off households, respectively.

V. CONCLUSION

The study confirmed that NTFPs contribute significantly in sustaining the livelihood of communities in the Mifi division of the West Region, Cameroon. They are mainly used as food and medicine. Almost all the NTFPs sold in various markets come from other origins (except the wine from *Raphia farinifera* harvested in the Mifi Division). With the increase in the prize of some of them due totheir scarcity, there is a necessity of domesticating species, in other to reduce overexploitation and promote sustainable management of NTFPs in this context of climate change.

RECOMMENDATIONS

The sector of NTFPs of the Mifi Division depends on import from different other Regions in Cameroon. There is a crucial need in organizing common initiative groups in the Division to valorize NTFPs by domestication of the most used species which are now part of the people's culture, socioeconomic live.The culture of mushrooms can also be an alternative for food supply which can reduce pressure on other NTFPs.

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COMPETING INTEREST

The authors declare no conflicts of interest regarding the publication of this paper.

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