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Local uses of kapok (*Ceiba pentandra* Gaertn.) Tree from the Northern Part of Cameroon

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Abstract**—** *An investigation was carried out in the Adamawa, North and Far-North Regions, in order to gather information about the actual uses of Ceiba pentandra* Gaertn*. a fruit tree widely domesticated by the population in this part of Cameroon. Data were collected from a sample of 300 persons from different localities of these regions. The results showed that almost all parts of Ceiba are used in curing many diseases such as sexually transmitted illnesses (syphilis, gonococci), fever and skin or eyes infections. Men use these trees as antibiotic or aphrodisiac. Generally, leaves (55%), roots and bark (28%) are the most used part of the tree. Oil was extracted from the seeds. The fact that the local population masters the know-how of the methods of extracting traditional oil needs to be exploited. These results are important data for the valorization of this tree in Cameroon.*

Keywords**— *Ceiba pentandra* Gaertn., *extraction, oil, Northern Cameroon regions, uses*.**

I. INTRODUCTION

The northern part of Cameroon is full of many non-conventional oilseeds. More studies have been done on some of these oilseeds, especially shea tree [1, 2, 3]. Notwithstanding, little has done researched on the kapok (*Ceiba pentandra* Gaertn.), neem (*Melia azadirach L.* Inde), mahogany (*Khaya senegalensis*) and baobab (*Andasonia digitata*) trees. This motivated the researcher to take an interest in the non-conventional and neglected oilseeds of the northern part of Cameroon.

The first phase of the investigations was aimed at examining the fruits from the kapok tree, a species of the Bombaceae family which natural habitat is equatorial and tropical [4, 5]. It has a height of 40 to 60 m [6]. Its smooth trunk is covered with large conical spines and as time passes, it bears enormous thorny buttresses. Flowering occurs early in the year between January and February. The fruit is an elliptic, woody, pendulous capsule of 10 to 30 cm long. It opens with 5 valves and reveals a whitish cotton like fluff called kapok and brown seeds. The kapok tree is a multipurpose tree. It is used as food, medicine and source of income [4, 7, 8]. Its seeds produce 11 to 28% of oil [9, 10]. The main fatty acids are palmitic acid (10-16%), stearic acid (2-9%), oleic acid (49-53%) and linoleic acid (26-29%) [10]. Despite this richness, this oilseed has lost interest in the inhabitants of the northern regions of Cameroon. This loss of interest follows the exploitation and processing of conventional oilseeds in the region, including cotton and maize. Indeed, with the creation of "Société de Développement du Coton (SODECOTON)" in 1974, the local inhabitants almost diverted from the exploitation of this plant, especially of its fruits whose oil was an integral part of their diet.

To the best of our knowledge, previous studies on the kapok tree have been done mainly in other countries. These works centred on its barks [11], wood [4, 12], the kapok itself [13, 14], its oil [9, 10] or on leaves and seeds [8], have provided a lot of information about the constitution of the parts of the tree. The studies of [15] concerned the antimicrobial activities of the parts of the kapok tree. However, given the variability of the properties of species based on a natural environment, the objective of this work is to contribute to the growing knowledge of the local uses of kapok tree in the Grand North of Cameroon.

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II. MATERIAL AND METHODS

2.1. Preparation and administration of questionnaires

A questionnaire was drafted and administered in the three northern regions (Adamawa, North and Far-North). In each region, five localities were chosen (table 1). The choice of the localities was guided by local information and data from the preliminary survey, which point out that there exists an abundance of these trees in the said localities. A translator was engaged in case of any communication difficulties with local population. In each locality, about 20 persons were chosen at random and questioned.

The questionnaire included general information about respondent (name, age, gender, region, division and village), general knowledge of the tree (abundance areas in the village, period and harvesting technique, edibility, uses of different parts of the tree), processing of fruits and knowledge of oil (extraction technique, use and appreciation).

Table 1: *Number of interviews per area*

Region	Localities	Number of interviews
Adamawa	Mbé	20
	Meyganga	17
	Wack	21
	Tibati	18
	Ngaoundéré	22
North	Pitoa	21
	Dourbey	19
	Garoua	22
	Guider	20
	Sackdjié	20
Far North	Maroua	22
	Mora	18
	Mindif	18
	Mokolo	20
	Limani	22
Total	**15**	**300**

2.2. Data analysis and processing

The SPSS (Statistical Package Social Sciences version 16.0) software [16] was used for data analysis and processing.

III. RESULTS AND DISCUSSION

3.1. Location

In the Adamawa Region, it was reported that the kapok tree is abundant in the localities of Mbe, Wack and Sackdjie. In the North, these trees are found in Pitoa and Dourbey. As for the Far-North Region, these abound in the towns of Maroua and Mokolo. Generally, this tree is found throughout the three northern regions.

3.2 Different names of kapok tree

The results show that women are mostly involved in kapok tree exploitation. In the three regions, 89.2% of the population claim to know kapok tree. This proportion is predominantly female (about 60%). This is due to the fact that women are the most involved in fruit harvesting activities, especially activities involved in local oilseed farms. More than 52% of the inhabitants call the tree *Bantaïdjé*. This is so because Fulfulde is the commercial language to all the three regions under study. Several other names are given to this tree (fig. 1 to 9) according to local languages (table 2).

Table 2: *Local names of the kapok tree in the Grand North of Cameroon*

Country	Local languages	Names
Cameroon	Fulfulde	*Bantaïdjé/ Bantaï/biguelbantaï*
	Duru	*Doukdouk*
	Mundang	*koumi*
	Mbum	*Ta'amoul*
	Guidar	*Kosso'onbana*
	Falli	*Boudjou*
	Tupuri	*Mougna'h*
	Mafa	*Koukouwaï*
	Arab shoa	*Roum*
	Laka	*Bikora*
	Massa	*Gounoura*
	Guiziga	*Kilmbana*
	Hausa	*Rimi/ Dan rimi*
	Kanuri	*Toum*
Cameroon/Chad	Kablaï	*Mania*

Fig.1: *Trunk of an adult C. pentandra*

Fig.2: *Trunk of a young C. pentandra*

Fig.3: *Buttresses of a young C. pentandra*

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Fig.4 : *Leaves of C. pentandra*

Fig.5: *Flowers of C. pentandra*

Fig.6: *Fresh fruits of C. pentandra*

Fig.7: *Dried fruits of C. pentandra*

Fig.8 : *Kapok of C. pentandra*

Fig.9: *Seeds of C. pentandra*

3.3. Uses of different parts

The fruits of the kapok tree are harvested during the months of June and at the beginning of July. According to [17], this period is convenient after that of flowering as described by. Indeed, fruits cannot be harvested during this period. The fruits are therefore allowed for the dry season and they fall down by themselves. The inhabitants can then simply pick them up. But before the fruit, other parts are continually exploited for various purposes.

3.3.1. Leaves

They are the most used part of the plant (55%). The leaves are cherished vegetables for majority of inhabitants of Nigeria and of a small group of bordered Cameroonians in the Far-North. This use is marked among the Kanuri and the Hausa people in the dry seasons during which vegetables are scarce. Softened on fire, crushed and then mixed with palm oil, the young leaves are taken in decoction to resolve some heart problems. The Kanuri (Limani) and the Mundang (Mora) also use this decoction, but without this oil, to cure diarrhea. Crushed fresh leaves are used for wound dressing, bandaging of tumours or abscesses, and control of skin infections by the Tupuri of Mindif. A decoction of young leaves mixed with palm kernel oil is taken by women as antibiotics when they have just been delivered to the Duru, Fali and Mundang tribes in Mora (Far-North). Northern Fali use young flowers to treat gonorrhea and syphilis. These uses corroborate with those mentioned by [8, 18].

3.3.2. Roots and barks

The barks are the second most used part of the tree (28%). However, among the Fali, in the North region, the roots are used as much as the barks. The Mundang of the North and Far-North regions, mix powdered roots and, dried and crushed barks with palm kernel oil and anointed on new-borns to drive out evil spirits. The barks and roots also have an aphrodisiac power. Indeed, the Fali men in the North and the Tupuri in the Far-North constantly chew the barks and roots to keep their manhood. These tribes also use the roots to cure dysentery. These therapeutic properties corroborate well those mentioned by [8].

3.3.3. Wood

In the three regions, *C. pentandra* wood is only used locally, for the manufacture of objects such as spatulas, mortars, musical instruments (drums), furniture, doors, and canoes. In the Far-North and Adamawa, about 65% of the population exploit the wood for the manufacture of utensils. Unlike in the Far-North and Adamawa regions, in the North region (Guider and Garoua), it is more solicited for the manufacture of canoes as mentioned by [12]. Generally, less than 7% of the respondents use it as firewood because it is a very bad wood that emits a lot of smoke when burned. This explains why it is more solicited as craftwork and industrial wood.

3.3.4. Kapok

Given that it cannot be hand-spun like cotton, kapok remains to the local inhabitants as a simple padding material used for the manufacture of cushions, pillows and handmade mattresses. It is the main padding material in all villages in the Grand North. More than 80% of the respondents say it is used for these purposes. The ashes of the kapok are used in the North by the Guidar (Guider) and the Fali (Garoua) people to treat cough. These ethnic groups take crushed mosses and mix them with palm kernel oil to cure syphilis and gonorrhea. This false cotton was used for a long time by the inhabitants (Fulani shepherds) of the North and the Far-North. A small sample of kapok placed on a so-called special stone and struck vigorously with a piece of iron for rubbing,

produces fire following a spark between the stone and the piece of iron. This traditional match has long been used by these shepherds, even in the rainy season due to the impermeable nature of the kapok.

3.3.5. Seeds

The seeds contained in the fruits of *C. pentandra* are also useful for the inhabitants. Roasted with salt, seeds are consumed as groundnuts (appetizers) by villagers, especially children in the North and Far-North. This use has already been reported by [19]. Once reduced in the North and Far-North regions, seed exploitation for oil production has almost disappeared with the creation of "SODECOTON". In the North, crushed seeds are used as feeds for livestock. This corroborates the statements of [20].

3.3.6. Traditional oil extraction techniques

The Mundang tribe of Mindif (Far-North) and Fali tribe of Garoua (North) each have a technique for extracting this oil. These processes differ only in a few steps. They have in common the use of local materials: pot, spatula, crushed stone or millstone and fine fabric. The operations of the processes are summarised in the collection of the fruits, the sorting, the roasting, the grinding of seeds, the mixing and the extraction proper.

3.3.6.1. Roasting

After picking up the fruits, the seeds are manually separated from the kapok. The roasting step helps to make the oil-producing cells to become fragile and prepares the extraction, while reducing the water content of the seeds. The seeds obtained are then roasted over low heat before being ground.

3.3.6.2. Pounding

This is the seed fragmentation step in order to facilitate subsequent operations. The seeds are crushed with two stones or crushed in a mortar using a pestle. The final product is relatively thin.

3.3.6.3. Kneading

This operation is very tedious, and requires a lot of muscular force from the operators. Water is added to the powder obtained and the mixture is kneaded. At this level, the difference lies in the amount of water added in each process. A small amount of water is added to have just a paste which will then be mixed for at least half an hour. Finally, the supernatant oil is collected with a hollow spatula (fig.11).

The extraction yield is low. Indeed, a mature tree produces 300 to 400 fruits, each containing 220 to 250 seeds, from which 1.5 to 2 litres of oil are extracted. This oil was used by the Mundang Fali, Massa and Laka tribes of the North and Far-North, mainly for massages and very little for fries and table oils. It also served as an antibiotic for wounds and injuries. This low use as table oil is indeed the one mentioned by [21].

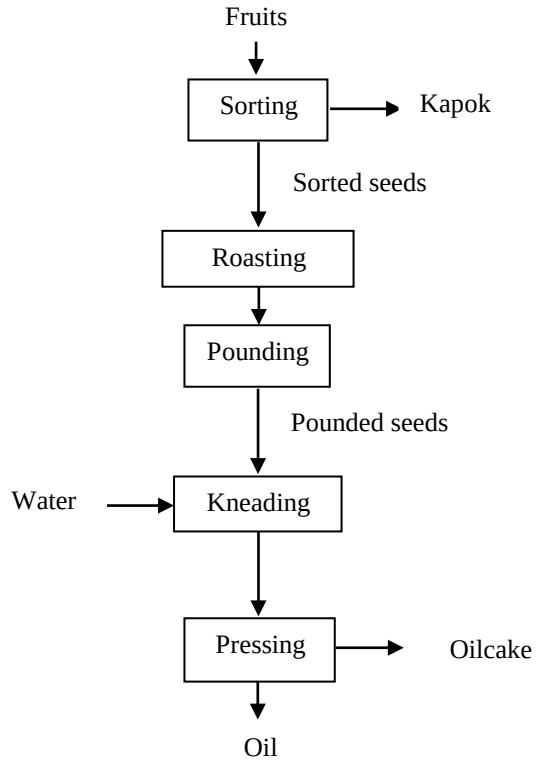

Fig.10: *Extraction process of C. pentandra oil in Garoua in the North Region*

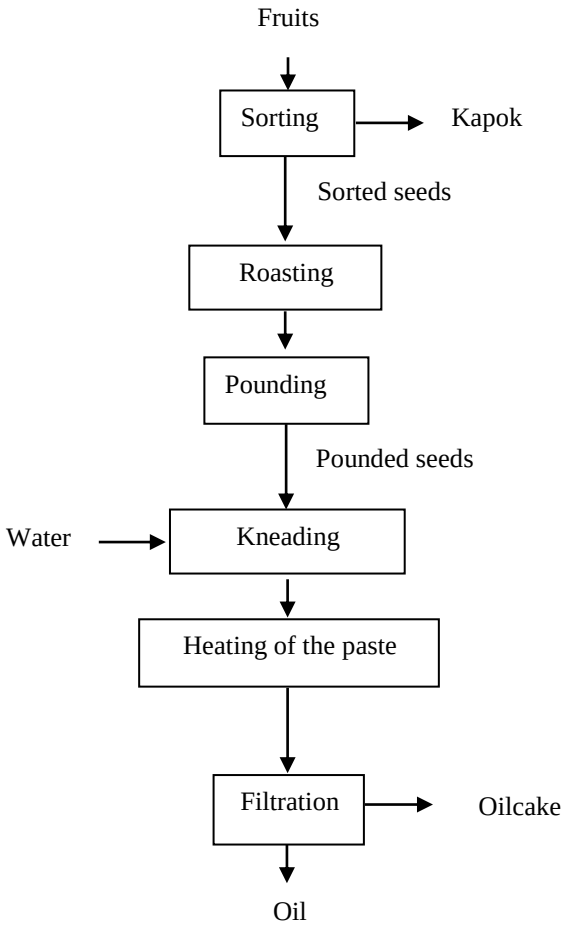

Fig.11: *Extraction process of C. pentandra oil in Mindif in the Far-North Region*

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IV. CONCLUSION

The investigations carried out in the three northern regions of Cameroon and on a sample of 300 people showed observing that the local inhabitants are quite aware of the existence and different use of the kapok tree. It has multiples uses and all parts of the tree are exploited. Leaves, roots, barks, wood, seeds and oil are used for food, craft and medicinal purposes. However, the leaves (55%), roots and barks (28%) constitute the most solicited parts. In spite of the little interest it brings today, the kapok tree has a strong therapeutic, food and industrial potential that can contribute to the economic development of Cameroon in general and in particular to the localities in which it is grown.

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