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ETHNOBOTANIC CONTRIBUTION OF CAMEROON: ANTI-HYPERTENSIVE PLANTS INVENTORY IN THE NKOUNG –KHI DIVISION WEST REGION CAMEROON

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ABSTRACT

High blood pressure is a chronic affection closely linked to fatal complications and is spread over the whole world. However, tradi-therapists can cure them from their symptoms and complications. This study has been carried out in the Nkoung-khi Division of the Western Region of Cameroon in a bid to contribute to the ethnobotanic of Cameroon by making an inventory of the anti-hypertensive plants. Meanwhile, the main objective is to be able to treat patients suffering from the pathologies.

At the end of our surveys, we have interviewed 1OO people for a total of 23 anti-hypertensive plants belonging to 15 botanic families and to 19 species.

The evaluation of the results shows men are the most represented, followed by women. On the other hand, we notice that the most exploited family is that of the asteraceae, the most used part of the plant is the leaves, and decoction is the privileged preparation mode.

Given that the practical interest of our investigations is to put at the disposal of the public and at low costs effective products coming from local plants, it will be desirable to reinforce the integration of these species in agro forestry projects, and the reinforcement of their protection for a better participative management so as to raise and assure the maintenance of the potential of these species.

Key words: Ethnobotany, biodiversity,Cameroon , medicinal plants, Nkoung-khi

INTRODUCTION

Illnesses faced by human beings have been the focus of researchers for centuries (Koyeu, 2004). Among those illnesses which are pathologies we have obesity, diabetes and high blood pressure, whose prevalence is constantly increasing. This might come from the sedentary lifestyle which leads to illness and an important consumption of salt or even foods of high level of calories (Watkins, 1993; Koyeu, 2012).

According to the World Health Organization (WHO) high blood in the adult is arbitrarily defined by a systolic arterial pressure (SAP) greater than or equal to 140mm of Hg and or a diastolic arterial pressure greater than 90mm of Hg. These definitions are imperfect since blood pressure varies with age and sex (Issiaka, 2006).

The WHO has classified high blood pressure into three classes or grades:

- Grade I : HBP, SAP=140 -159 mm of Hg with DAP = 90-99mm of Hg
- Grade II: Moderate HBP, SAP, = 160-179mm of Hg with DAP= 100-109 mm of Hg.
- Grade III severe HBP, SAP >180 mm of Hg, DAP > 110mm of Hg.

HBP is highly spread over the world and generally affects adults. It's prevalence is estimated at 26.4% in developed countries (Nguelefack et al., 2007) and 20 to 25% in developing countries (Mbanya et al., 1998). However, 95% of high blood pressure constitute one of the cardiovascular risks, justifying the therapeutic treatment that can be related to natural, genetic, kidney, endocrinal, psychosocial (stress), environmental (noise, water), dietetic (weight taking) factors (Issiaka, 2006).

On the other hand, HBP constitutes one of the major causes of mortality within the two sexes. These complications call for a treatment that can prevent cardiovascular diseases in particular, vascular cerebral accidents and the infractus of the myocarde (Chamontin, 1997).

Studies have been able to show based on experiment that hypertension is caused by an excess of salt, excess of glucose, by a chronic infusion of angiotensine or in a genetic hypertension model in humans is closely associated to the accrued production of free radicals and particularly of the superoxide anion at the level of the wall vessels and in the cardiac muscle.

Oxidative stress is an aggressive type of cellular constituents, due to reactive oxygenated species (Wikipedia, 2006). The ignorance of plant species with curative virtues, the elevated cost of medicines leads us to the revalorization of traditional means of treatment. This necessity constitutes a realistic alternative to cut down the excesses of chemical civilization that are harmful to human beings and their environment nowadays (Pelt 1979).

Numerous works have been carried out in Cameroon in general and in the west in particular concerning the inventory of medicinal plants (local) amongst which are the following works:

Guendjo (1998), who worked on the study of plants with scaring effects in the area of Dschang,

Koyeu (2004) contributed to the inventory of medicinal plants in the Nkoung-Khi division (Western Cameroon).

Koyeu(2007), who did some investigations concerning the inventory and chemical screening of some medicinal plants in the Nkoung-Khi (Western Cameroon).

The present bibliography does not mention a study of our type which has been carried out in the Nkong-Khi division, west region (Cameroon). This is what actually led us to achieve the present work.

MATERIALS AND METHODS

Study area

Bandjoun is located on one hand between the following longitudes; 10°22 East 10°36 East and on the other hand between latitudes 5°15 North and 5°28 North and at an altitude of about 1440m. The economic activity is essentially agriculture .The climate is of wet tropical type with two seasons; a dry season that goes from November to March and the rainy season that is from March to October. The annual average rainfall is 1600mm of rain distributed over 15-139 days and the annual average temperature is of 21°C.

Methodology of investigation

The choice of the field of study

Our choice had been based on the department of Nkoung-khi in the West Region of Cameroon. This department is made up of five villages Bandjoun, (Chief Town of the department) Bayangang, Batoufam, Bandrefam and Bangang- Foundji, which have been chosen according to certain kind of criteria among which: the knowing of the locality, the guides accompanying us on the field. Otherwise we have the floristic diversity and the ancestral practices in charged.

Ethnobotanical Investigations

They have been made effective by the end of June to February 2010 over the orientation of a healer and a herbalist, both living in the same locality in the aim of collecting a good number of medicinal plants which are frequently used in this department for the treatment of diabetes. It is in the same logique that the information we have gotten from these would be taken: the vernacular names, the mode of preparation and administration were mentioned on the list of investigation. The forms were put together with the pictures of the specimen harvested.

It is worth noting that the level of information increase from village to another village, and the pathologies treated were interpreted from time to time, because they were given in local language (vernacular one).

The collection of samples

After the filling of the investigation form, we have carefully collected with the help of punning scissors knives or a cutlass, fertile samples as complete as possible: in addition to leaves, fruits

and flowers. These samples have been passed, right there on the field of study, in newspapers in order to build up a herbarium which will be taken as achieves.

Identification of plants

After drying, the herbarium will be brought to the national herbarium of Cameroon, where identification will be carried out.

Botanic description of specimens

They have been made in the libraries of the national herbarium of Cameroon, in the Institute of Medical Research and Medicinal Plants Study.

Results and discussion

Table I: Mode of preparation, source and posology, vernacular names, frequency of appearance and other plants collected in the Nkoung-khi division as anti-hypertensive.

Families	Scientific names	Mode of use and source	Frequencies of appearance	Other uses	Vernecular name
Apocynaceae	*Rauwolfia Vomitori*	Infuse 2kg of R.*vomitoria* fresh barks in 4 litres of water or	1	For childhood febrifuge, it is advisable to add some maceration products to the bathing water. Crumple a sufficient quantity of	Kouoplan

	a Afzelo	raffia wine. Then let remain stagnant during 24 hours and drink 2 glasses per day. This preparation lowers the blood pressure it is tasteless in the mouth (healer)		leaves and let macerate in some water, then with the water, wash the patient morning and evening (Ake and others, 1978) The macerated product is used against stomach ache (Avarir, 1994).	Netacha
Asteraceae	*Bidens pilosa* Lin	Boil the leaves in some water drink two glasses per day and or take both with the result of the water in evening when going to bed. This preparation is causing much urination and lowers the blood pressure.	4	Sap of leaves used in local application against snake bites In Africa aqueous preparation of the entire plant for the healing of wounds, intercostals nenlgias, constipation, intestinal wounds and gastritis. Roots juice would treat malaria and would lover rhematic pains (Kuate, 1993)	King mghie
	Crassocephalum crepidioides	Harvest fresh leaves after the sunset or before 10 0'clock in the morning. Boil 3kg of		In the west region, people use leaves juices to ease headache and to calm gastric pains. People from the center region eat leaves as spinach. In the west Africa people use leaves	

	(Beth) S. Moore	fresh leaves preliminarily cut up in 10 litters of water during 60 minutes. Put in infusion within a time of 12 hours then decant. Drink a glass in the morning and one other in the evening before going to bed for 10 days. Check your blood pressure and repeat the treatment after 10days of resting. The blood pressure will be as normal as it used to be. (Herbalist and healer)	2	juices in eyes in order to stop the action of cilaire (Koyeu, 2007).	Fela vu
	Crassocephalum rebens (Juss) S. Moore	Boil C. *rubens* leaves until they get cooked. After, cool then down squeeze the leaves and gather the juice, and take a glass every morning and eat vegetables from time to time. The blood pressure will be lowered (Others) Crush the leaves	8	In Senegal after delivery women eat a lot of leaves as a light laxative. Thanks to its pleasant perfume C.*rubens* is used to prepare aromatic bath for children under a certain age (Child). Leaves used in cataplasm on burns or rubbed on the forehead to treat migraine. The juice of these leaves also help at treating Filariose (Kuate 1993).	Felap vu

		preliminarily dried and consume the powder you will obtain from time to time. This preparation lowers the blood pressure (Healer)			
	Laggera Pterodonta Sch. Bip	Make a decoction of 5 handfuls of fresh leaves in 2 litters of water. Let infusion during 6 hours. Drink a glass every morning. This preparation treats arterial hypertension (Healer)	2	In the west region, the decoction of these leaves is intended to treat stomach ache and ease persistent nausea. In Gabon, the leaves are smoked in replacement of tobacco (Kuate 1993).	Depakoun
	Taraxacum officinale weber	Get juice out of leaves and roots and then drink from time to time. This preparation lowers the blood pressure. (Others)	2		Ntentieuh

Begoniaceae	*Begonia Oxyloba* Welw et Hook *Canarium Schweinfurhu* Eng.	The mode of use is the same to the one of *C. crepidioides* (Herbalist Boil 4kg of fresh barks of *C.schweinfuthu* preliminarily cut into small piece in 10 litters of raffia wine during 60 minutes. Infuse during 12 hours, and then decant keep on controlling your blood pressure. Repeat with the same treatment after 10 days of resting. Alternate that way during a period of 2 months. This preparation is very efficient for arterial hypertension and its complications (Healer)	3 4	Rape fruits are eaten and are very appreciated in Bamileke region.	Lalon Be
Cesalpiniaceae	*Cassia alata* L.	Boil the leaves and the barks of *C. alata* with equal quantity, drink three glasses per day while controlling the blood pressure (healer)	3 3	Use a cataplasm against fungi Boil with other plants in the process of healing yellow fever.	Mbabmfu

		Take a handful of *C. alata* leaves, in addition to two papaya leaves and four lemon fruits. Crush the mixture in order to have the fruit jelly. Let this fruit jelly in infusion during 15 minutes. Drink it like warm three times a day you will urinate many times than ever while sweating a lot. It also lowers the blood pressure (healer)			
Cucurbitaceae	*Citrullus lanaus* (Tachum berg) Mansfeild.	Crush the fresh leaves of water melon fruit very well then infuse the result. Drink three glasses three times per day while eating rape fruits if possible. You will urinate a lot and it lowers the blood pressure (Patient)	3	Fruits consumed as dessert and well valued (appreciated)	Poue dock
Euphorbiaceae	*Euphorbia hirta* Linn	Triturate the whole plant in some water. Drink the juice two times per day. Eat the leaves and the stalks	4	The soaked product is used against stomach ache.	Mabeumo

		preliminarily washed with some water, once you feel yourself attack by dizzy spell like headache, tiredness or trachycardia (patient others)			
Lamiaceae	*Ocimum graticimum*	Boil the leaves in some water drink two glasses per day and or take both with the result of the water in evening when going to bed. This preparation ease patient suffering from nerves and consequently lowers the blood pressure (Healer)	4	The leaves are used as condiments	Macepo
Liliaceae	*Aleo verra* L.	Introduce a kg of fresh *Aloe verra* leaves to two litters of water or raffia wine, let sojourn at least 24 hours. Drink two glasses per day during the meal. This preparation lowers the blood pressure and it is very tasteless when drinking. Control your blood pressure during	8	The soaked leaves are used for the treatment of stomach ache and gastric ulcer. The leaves are used in unction against rheumatism The soaked leaves are also used as abortive for pregnancy	Aloe

		the treatment (healer) Crush *Aloe verra* leaves preliminary dried. Take a spoonful in a glass of water, day and night. The blood pressure will lower the preparation is advised against those suffering from stomach ache. Stop the treatment once your blood pressure is normal (Healer)			
Lorantha ceae Malvace ae	*Globimet ula braunii* *Hibiscus sabdariff a* L.	Boil the youngest leaves of the mistletoe in some water let infuse during some hours, decant and drink the juice you obtain in a glass of tea two times per day while controlling your blood pressure. This preparation is advised against pregnancy in order to avoid abortion. (Others). The mode of use is the same with the (Crepidioides mode)	4 5		Essan

		(Herbalist).			
Rutaceae	*Citrus grandis* (L.) osb.	Drink half of a glass of grape fruits every morning (Patient)	5	The grains that have been crushed are mined to other ingredients for the treatment of stomach ache Fruit used as desert	Pamplemoussi
Solanaceae	*Solanum aethiopicum* L.	Crush ripe fruit preliminarily dried. Make an infusion of the powder you obtain in a glass of water and drink every morning. This preparation heals the blood pressure (healer)	6	Fruits used as traditional dishes in bamileke region	Guedjo
	Solanum Nigrum L.	Boil the leaves in some water, let it cool, filter, and squeeze to extract the juice. Take a glass in the morning and another in the evening while eating vegetables from time to time. Control your blood pressure and stop drinking the juice three days after the blood pressure returns to normal. (Patient, others)	6	The leaves are eaten in Cameroon as vegetables (Dongo 1990)	Djap la
	Solanum Tuberosum L.	Crush and squeeze the tubercles to extract the juice. Drink a quarter of	10	Vegetables when eating raw would heal stomach aches.	Ntom

		a glass every morning. The blood pressure will lower (Others).			
Verbenaceae	*Lantana camara* L.	The decoction of the leaves is used to treat arterial hypertension. Drink a lukewarm glass two times per day morning and evening (Others)	5	The infusion of flowers is used as syrup against cold. The infusion of the decoction of the stalk foliage is indicated to treat cold and dyspepsia. The plant is considered as treating all.	
Zingiberaceae	*Aframomum danielli*	Crush the barks, well dried consume every morning as tea in order of one spoonful in a cup (healer)	5		Djedim
	Aframomum melegueta	Crush ripe fruit preliminarily dried. Make an infusion of the powder you obtain in a glass of water and drink every morning. This preparation heals the blood pressure (healer)	6		Tchoue

We have realized our investigation close to 100 persons of two different senses divided into three age groups occupied with diverse activities. The tables resume the repartition of the investigations respectively according to sex, age and profession.

Table I: repartition of the investigated according to sex.

Sex	People ignoring antihypertensive plants	People refusing to propose plants	People who have proposed plants	Total
Male	4 4%	14 14%	40 70%	58 58%
Female	6 6%	8 8%	28 28%	42 42%
Total	10 5%	22 22%	68 68%	100 100%

As a result from this table among 100 people who have been investigated, 58 are men and 42 are women. Among men 4 do not know hypertensive plants, 14 have refused to give us their propositions and 40 have freely accepted to propose us anti-hypertensive plants.

Among women, 6 are not aware of the plants with anti hypertensive effects, 8 have refused to give useful informations about hypertensive plants that they are supposed to know while 28 have proposed us anti- hypertensive plants.

Table II: Repartition of the investigation according to age

Age	People ignoring antihypertensive plants	People refusing to propose plants	People who have proposed plants	Total
Youths	4 4%	0 0%	0 0%	4 4%
Adults	4 4%	12 12%	60 60%	76 76%
Old men	2	10	8	20

	2%	10%	8%	20%
Total	10 10%	22 22%	68 68%	100 100%

Through this table, it is noticeable that we have realized our investigation close to 4 youths, 76 adults and 20 old men. None of the youths investigated had knowledge of anti-hypertensive plants. Among adults, 4 were not aware of hypertensive plants, 12 were informed but did not propose us and 60 have affectively proposed us anti- hypertensive plants. Concerning old men, 2 were not aware of anti-hypertensive plants, 10 have refused to propose and 8 have proposed.

TableIIIV: Repartition of the investigated according to profession

Profession	People ignoring anti-hypertensive plants	People refusing to propose plants	People who have proposed plants	Total
Herbalist	0 0%	6 6%	14 14%	20 20%
Healers	0 0%	8 8%	12 12%	20 20%
Patient from arterial hypertension	4 4%	0 0%	16 16%	20 20%
Others	6 6%	8 8%	26 26%	40 40%
Total	10 10%	22 22%	68 68%	100 100%

20 herbalists, 20 healers, 20 people suffering from arterial hypertension and 20 other people have accepted to be investigated. All the herbalists had already used and seen the use of anti- hypertensive plants, while 4 of the patients and 6 of other people were not aware of anti- hypertensive plants, 6 of the herbalist, 8 of the healers and 8 of other people have refused

to help us, 14 of the herbalists 12 of the healers 16 of the patients and 26 other people have effectively proposed anti-hypertensive plants.

As a whole, we notice that among 100 people investigated 10 were not aware of anti-hypertensive plants, 22 have refused to propose and 68 have gently accepted to show us plants responsible of the healing arterial hypertension.

Moreover, we easily remark that women without any knowledge of anti-hypertensive plants are superior to men. This can be explained by the fact that men are generally those who inherit in most families. In fact during our investigations, ancestral transmission seemed to be the most frequent mode of acquiring knowledge, most considered than the others. None of the youths investigated knew about anti- hypertensive plants. This could be due to the fact that fewer of them have been investigated or maybe because they are not touched by arterial hypertension. Thus according to Guedon, (1979) blood pressure increases with age and consequently young people do not care about it, furthermore, it is known that most of the them do not believe in traditional medicine.

The higher proportion of the investigated is well aware of plants, 90% maybe because our investigation was oriented towards people supposing to deal with traditional pharmacopeia. In fact, informal discussions with peasants have oriented us to notice.

Those who work in pharmacopeia

This proportion can also express the importance that the population of the Nkoung-khi division gives to traditional medicine. This can also be taken as one of the consequences of the precariousness of the incomes of this population.

On the other hand, a good number of the people we approached, 22 have refused to propose the plants while evoking many reasons:

-Cultural reasons: the use of certain plants necessitates an initiation;

-Spiritual reasons: certain plants are acquired through visions and to use them one must communicate with the spirits

-Ethical reasons: The investigated person is not sure about what we are going to do with the plants (Dough the plants will be well used?);

-Economic reasons: the preservation of their secrets, they take it as a way to earn their living (some even live on their plants).

Let us notice that the last two reasons can be verified, because it is the researcher who convinced the investigated peoples with favorable propositions.

The two first reasons are probably linked to ignorance. Concerning the plants of these first groups, we notice that the family of the Asteraceae (18 plants) is the most represented family, this tendency is similar to the one obtained by Keubou (1993) who, studying the medicinal plants of Foto has proved that the Asteraceae were the most used. This tendency can also be justified by the large number of Asteraceae existing in the vegetal kingdom. In fact, the Asteracease form more than 20,000 species for 1150 types (Kuiate 19993). Close to the Asteracease, we find the Solanaceae 15 species. Furthermore, we notice that some plants returned many times throughout the investigation with their modes of use more or less similar. This frequency of appearance can be proved by their effectiveness. We talk of *Aloe verra* proposed by 8 persons and *C.rubens* 8 persons. This presumption of the effectiveness linked to the frequency does not mistrust the one of the others which appears only one time during the investigation.

In fact, according to the investigated persons, all the plants proposed are effective. Only the biological test carefully realized can confirm the effectiveness of one or the other plant. In the literature review, we have revealed that some anti-hypertensive plants act either as diuretique, by increasing urinary secretion of sodium and water or by easing nerves through one action on the sympatric nervous system or as by acting on the vessels (Safar and Roland 1981).

It has been also revealed that anti-hypertensive plants contain saponosides alkaloids potassium salt, versnonin which confer to them anti- hypertensive properties.

It is then logical to think that the species of the collected plants throughout our investigation might contain some types of substances as recommended by Sofar and Roland (1981).

In most cases, the leaves are the parts used. This aspect can be linked to the fact that it is within this organ that photosynthesis is realized leading to the formation of sugars. After the photosynthesis they are generally transformed into primary and secondary metabolic

substances like saponosides, alkaloids, tannins mucilage which most often the active principles of plants have well known anti- hypertensive properties (Touzard and al., 1986). It is therefore more likely that these substances are widely found in plants. Furthermore, according to Schneider (1988) chlorophyll existing in all green plants (autotroph plants) stimulates the work of the heart to a vasodilator effect increases the diurese and aims at lowering the blood pressure. Besides, leaves, backs, roots and fruits are also used.

Some people we met during our investigations advised us to harvest the plants at night with reasons that the spirits would have got the time to bless the plants with curative substance. In fact, these last ones are probably products of secondary metabolism. Generally, it is the result we extract from the plants more than the whole plants themselves that are used. These extracts are obtained via many processes such as decoction, concoction, infusion, maceration and triturating. However, it is worth noting that reality what is given is powder from plants.

The modes of preparation vary according to plants. Preparation can be administered because of its simplicity and or of its effectiveness with any scientific verification of all the plants we have collected, some without considering their anti-hypertensive properties are used for other means:

-As food: *c. rubens* and *S. nigrum* are consumed as vegetables.

-As medicine: *Aloe verra* is also used as healing and abortive

We cannot remain indifferent vis-à-vis to the subjective character of certain prescriptions mentioned in this document. In fact, it is very difficult to appreciate a handful while in most of the cases the length of the treatment is not specified; this is because it depends on the evolution of the illness at the beginning of the treatment. One more time, only well organized biological tests can enable us to put in the disposition of the public precised preparations and prescriptions.

Conclusion

The general objective of our work was the collection of maximum plants used in the Nkoung-khi department (West Region Cameroon) with anti -hypertensive effects in order to

participate to the program of research of medical plants of Cameroon. However, we have proceeded to an investigation on the field close to healers, herbalist, midwives and people suffering from these diseases in order to collect plants able to treat them.

A brief bibliography glance has permitted to situate the problem, also to see the causes, the consequences, and their actual mode of treatment by modern medicines and by medicinal plants. Moreover, the investigations proceeded on the field have permitted to interview 100 persons as follows.

- 23 anti-hypertensive plants belonging to 15 families and 19 species, 7 of these plants have already been tested scientifically and their anti-hypertensive properties have also been demonstrated the components of the two others (*Globimetula braunii* and *Aloe verra*) are known for their anti-hypertensive action are still to be demonstrated. Meanwhile, *A.verra,,Crassocephalum crepidiodes, C rubens., G. braunii, C.medica,, S.tuberosum* and *Lantana camara.* has interested us very much. Their high frequency of appearance throughout the investigation let presage certain effectiveness.

In this work, we have not described plants but we have carefully given the scientific name of each plant and adding to that we have also given their equivalent (vernacular names), families, mode of preparation, posology and the other uses of the plants are also mentioned.

The results presented above constitute only a small part of the wide project of medicinal plants of Cameroon as a whole and plants with anti-hypertensive effects of the Nkoung-khi Division (West Cameroon) in particular. Tests of confirmation will be envisaged in a nearest future in order to verify the effectiveness of these plants. But we can already as Sofowora (1996) affirm the importance of the African pharmacopeia which is “rich and diversified”.

Efforts need to be done in order to improve this work. That is;

- Find adequate methods permitting to facilitate a best cooperation between traditional doctors and students.
- Conduct other studies on the regional or even national scale in order to collect all the useful plants
- Create gardens of medicinal plants
- Conduct biological tests in order to confirm the effectiveness of the plants listed on the inventory.

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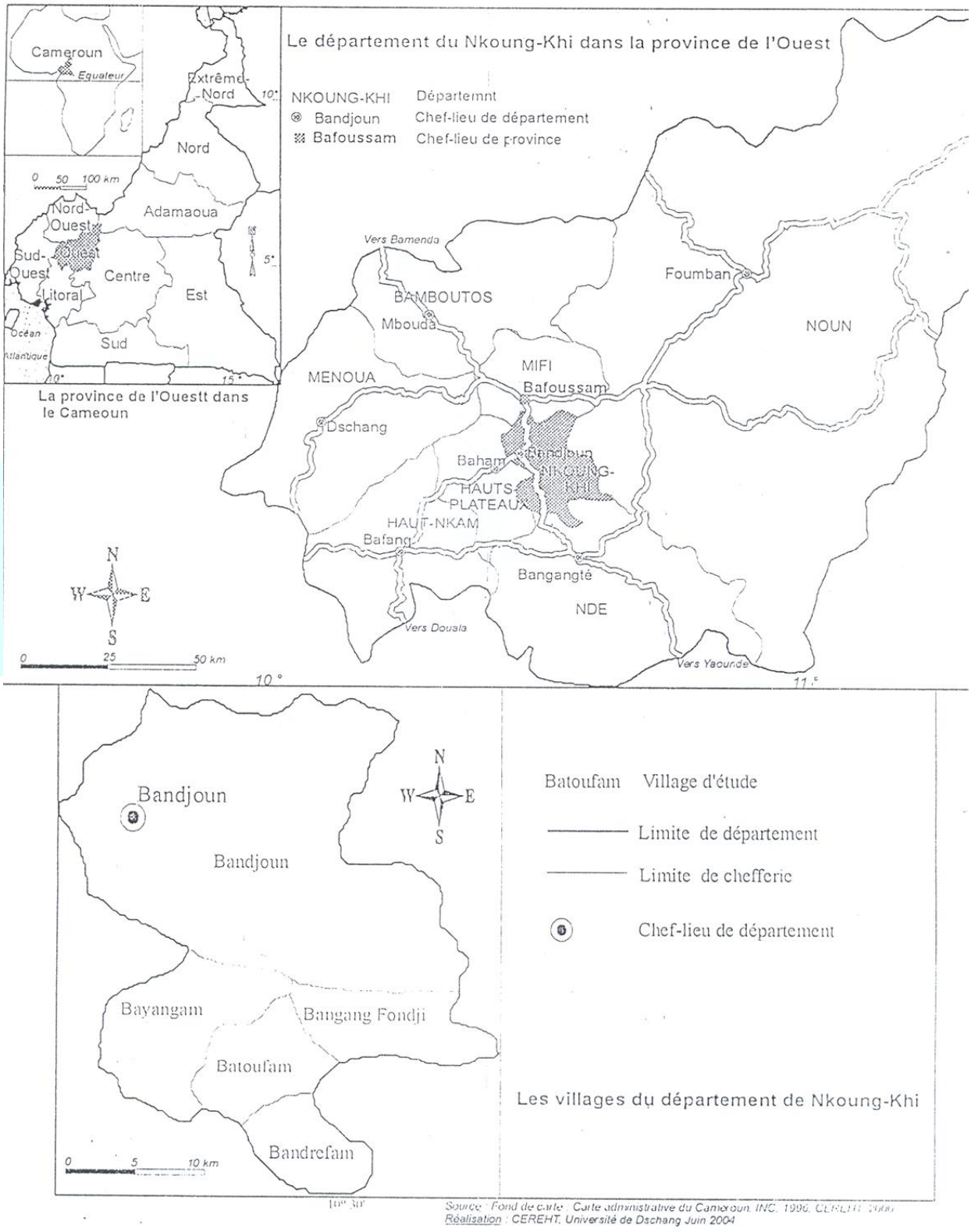
Localisation of the study site



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