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Nutritional properties of "Bush Meals" from North Cameroon's Biodiversity

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ABSTRACT

With the aims at evaluating their biochemical content, a census of northern Cameroon's food from biodiversity was conducted and their nutritional composition screened. All samples were collected directly from local "families' reserve". Each item was described taking into account main ingredients, recipe and the method of preparation. The nutritional information was assessed by direct biochemical assessment of proximate composition and mineral evaluation. Data analysis of items and profiles were performed by the Food Processor software for window. Among the biodiversity foodstuffs found, 16 cereal and cereal products, 12 tubers, roots and their products, 17 meats, poultry, fish, insects and their products, 68 vegetable, fruits and their products items were recorded. Foods products from local biodiversity in the greatest demand in the area includes, main dishes or "Plats de base" (in French language), with Kissaar (Dactyloctenium, Cenchrus or Eragrostis seed grains, ground in thick porridge); zanina (Amorphophallus roots boiled), Ngibbi (Cenchrus seeds, pounded to porridge), jeda (Amorphophallus tubers, boiled)- Soup dishes or Sauce or accompaniment, including meat, fish, insects or poultry prepared with soup from a wide mix variety of vegetables leaves including many hot main dishes- Fruits and seeds among which the most frequent were jujube fruit.

Key words: Biodiversity, Bush meal, food composition, North Cameroon.

INTRODUCTION

Cameroon is often referred as Africa in miniature, due to its ecological diversity and rich biodiversity. This biodiversity is represent by about 9,000 plant species and over 40 globally threatened animal species [1]. This biological diversity can back up the country in the process of handing out food security and limiting expensive imports of some foodstuffs [2, 3]. In fact, main food source of the sudano sahelian zone of Northern part of Cameroon's population are from activities based on collecting and gathering crop products and occasional fishing [3]. In a context of a renewed interest of the international community towards the safeguarding of the biodiversity, several restrictions and laws related to the collection and the use of some species from biodiversity by local population were taken by Cameroonian government [2]. Unfortunately, the nutritional value of food from this biodiversity remains unknown. There is thus a need to know the nutrient content of foods from biodiversity that these populations are deprive on. The objective of this work is to investigate the nutritional properties of some Cameroonian's "bush meals" in order to supply data that will be useful for future improvement of the population's meal and for further research in the preservation of local biodiversity.

MATERIALS AND METHODS

2.1. Food items sampling: The food-sampling plan used providing aliquots of composited, homogenized samples that are representative of key foods from biodiversity consumed in the area were collected according to the sampling plan as proposed by Holden [4]. All food samples used in this study were collected directly from local "families' reserve". A modified sampling plan for food as described in detail by Pehrsson *et al.*, [5] were design.

2.2. Food description and nutrient content of foods items and dishes assessment: Each item and dishes were described taking into account main ingredients, recipe and the method of preparation of "bush meals". Their nutritional information was assessed by direct biochemical analysis as describe below.

2.3. Proximate composition: AOAC methods [6] were used: drying at 105°C for moisture (method 925.098); incineration at 550°C for ash (method 923.03); defeating in a soxhlet apparatus with 2:1 chloroform/methanol, for total fats (method 920.39C with minor modifications); and micro Kjeldahl for protein (Nx6.25) (method 960.52). Total carbohydrates were estimated by difference.

2.4. Mineral evaluation: Ca, Cu, Fe, Mg, Mn, Zn were determined by AAS method as describe by AACC [7], after mineralisation of all samples.

2.5. Data analysis: The analysis of items and profiles were performed by inserting collected data from SFFQ, and direct biochemical analysis data in the Food Processor software for window Version 8.1 and further analysis was completed by using excel 2007, and Splus 2000 for window 2001.

RESULTS AND DISCUSSION

3.1. Food description: Tables 1, 2, 3 and 4 give an overview of recorded item and dishes divided in Cereals and their products with 16 items (Table 1), tubers, roots and their products (Table 2) with 12 items, the group of meats, poultry, fish, insects and their products (Table 3) with 17 items, and finally the group of vegetable, fruits and their products (Table 4) with 68 items. We may notice that comparing to the latest compile Cameroon's foods from biodiversity [8,9], we record 52% of cereal and cereal products, 15% of tubers, roots and their products 45% meats, poultry, fish, insects and their products, 72% vegetable, fruits and their products are coming from northern part of the country. In fact populations are able to choose from following wide variety of outlets providing traditional "bush meals":

- Main dishes or *"Plats de base"*: sorghum, rice or maize meal hard porridge flavored with *Brachiaria Setaria or Dactyloctenium, Kissaar (Dactyloctenium, Cenchrus* or *Eragrostis* seed grains, ground in thick porridge); *zanina* (*Amorphophallus roots boiled*). *Ngibbi* (*Cenchrus seeds, pounded to* porridge), *jeda* (*Amorphophallus tubers, boiled)*. We also notice that "bush meals" are not named according to the main food item source, but according to the form of food. For example *gabruna or mu* is designed for *Cochlospermu or Anchomanes or Stylochiton* tuber boiled without any differentiation of the tuber specie. When the same items are *boiled or cooked and then pounded* it's named *gabura or ma*.

- Soup dishes or Sauce or accompaniment: These are mainly dishes including meat, fish or poultry prepared with soup from a wide mix variety of vegetables leaves and including many hot main course dishes with proteins and fat from mammal meat, insects and vegetables as well. A selection of many different vegetables and legumes; a selection of fresh fruits; dry fruits and vegetables, from wildlife source are available (Tables 2, 3, 4 and 5)

- Fruits and seeds (approximately half of the collected species) among which some can be regarded as semi domesticated are also available from wildlife: Among most frequent we have *jujube fruit* (*Zizyphus jujuba*), tamarin fruit (*Tamarindus indica*), *figues* fruits (*Ficus sycomorus, Ficus platyphilla*), the *date palm of the desert* (*Balanites aegyptiaca*), from which Muzey draw almond an edible oil [10] palm trees: *doum* (*Hyphaene thebaica*), which is mainly use in case of food shortage [10], and *the ronier* (*Borassus flabellifer*), whose fruits walls and germ are also use as food [11]. Other fruits sources from biodiversity recorded from North Cameroonian diet are Sclerocarya *birrea, Strychnos innocua, Celtis integrifolia, Vitex doniana, Diospyros mespiliformis, Capparis afzelii, Anogeissus leiocarpus, Detarium senegalensis, Parinaria curatellifolia, Annona senegalensis* (sore), Vitellaria *paradoxa* (karite), *Parkia biglobosa* (néré); *Cassia occidentalis, Corchorus olitorius, Leptadenia hastata, Amaranthus viridis, Cerathoteca sesamoides (*also use as spice for dishes).

- Trees leaves are also source of foods like those of *Balanites aegyptiaca, Hymenocardia acida*;
- Trees seeds, like the one used as "cereals" or just for flavoring dishes, we can point out Brachiaria, Eragrostis, Echinochloa, Setaria pallidifosca, *Dactyloctenium aegyptium,*
- Salt and Sodium source: We may also mention plants whose ashes are used to obtain salt by solifluction of vegetable, *sek gayna* (mon) or literally "salt of stems". Many graminaceous, empty pods and a particular plant, *Hygrophylla spinosa*, are used for this purpose [12].
- Flavorings and aromates: Masai tribe mainly mix with their sorghum, maize, rice or millet flour, some wild fruits like *Brachiaria xantolenca, Setaria pallidifosca, Dactyloctenium aegyptium*. These are also use either to ease

cooking or for flavoring purpose of some tubers like yam: *Dioscorea dumetorum*, arrowroot: *Tacca leontopetaloides*. This last one is also use as tuber, and is very appreciated and sold on local markets. It is also the case of the shoveler duck (*Cyperus esculentus*) and the bulbs of water lilies (*Nymphaea sp*).

Finally we wish to highlight "some groups of foods" as seen and classify by local populations: The "group of glide foods" (kolboto or woo) [13] (Cameroon 1993): These group of "glide foods" are lengthily cook in dishes sauces hence may lose a part of their vitamin value and nutrient content but they contribute to a consistency (Ti yelwe yelwe) "to eat consistent" as describe by Igor garine [10] which makes possible thick porridges ball to slip easily in the digestive track. This register of "glide foods", which is characteristic of many African countries, include many wild leaves: Cerathototeca sesamoides, *Corchorus olitorius*, *Leptadenia hastata*, *Cassia tora*, *Momordica charantia*,*Gynandropsis gynandra* and *Grewia mollis*

3.2. Food from biodiversity and international nutritional standards: According to this food list (Tables 1, 2, 3 and 4), meals available from local biodiversity met all the nutritional standards for a proper meal, as we have carbohydrates, lipids and protein sources (Cereals, tubers, vegetables, meat…etc) and vitamins and micronutrients sources (fruits, seed and their products).

15% of foods items from biodiversity are potential proteins sources of calories, while 30% and 52% are respectively potentials sources of fats and carbohydrates sources calories (Fig 1). These values are closed to the normal values recommended by the USRDA for a proper meal, which state that 17% of total calories may come from Protein, 55% from Carbohydrates and 28% from Fats [14]. However, carbohydrate (especially starchy foods) seems likely to be more present instead of Protein, and Fats.

3.3. Food composition:

-Proximate composition

The proximate compositions of some items from local biodiversity are given in Table 5. Cereals and cereals products are good sources of carbohydrates variating from 36.7% (Gamba grass, grains, raw) to 76% (African rice flour, hard porridge, cooked). Roots tubers and products also present some good source of carbohydrates, like the value of 74% recorded for raw sweetened Cyperus. In the group of vegetables-fruits-seed and their products, we have the best source of carbohydrate as the one of *raw dry ripe Dattes, fruit, and* Nere, ripe fruit, raw with a total carbohydrate of 80%.

The groups of Cereals and cereals products and Roots tubers and products seem to be the main sources of dietary fibres (Table 5). However the highest value were recorded for raw Nere, ripe fruit (20±5 g/100g)

Concerning proteins, the group of meat poultry-fish-insects and products seem to present the best source with values from 24.1% (Astrild, offal, grill, spicy, hot) to 75% *(Erinaceus*, meat, offal, salted, smoke). We have to point out the high protein value of Snake, meat 56% Protein and some insect foods like the Green grasshopper, salted fried dishes with 65%. This last group of grasshopper are really interesting as they're mainly available in case of major foods shortage especially when they're involve in cereals destruction. It's possible to harvest them and preserve them dried for the expected coming dough period; they're good source of proteins and minerals as well (Table 5).

Fat source are also mainly from the group of vegetables-fruits-seed and their products group and meat poultry-fish-insects and products groups. Some insect like *salted, grilled Termites*, present up to 54% of fats, while in the group of vegetables we have the dishes *Pistachio, dried seeds, paste, cassava leaves* presenting figures of 45.7% fat content.

All groups of foods are good source of minerals with some item like Fish, salted, sundry (22.8% ash) *Coratotheca* leaves cook with wild mushrooms, (15% ash). Most items from the group of vegetables-fruits-seed and their products are good sources of different minerals as shown in Table 5.

Table 1: Foods list of cereal and cereal products from North Cameroon's biodiversity, their methods of preparation and proposed tag name

Local food Name/dishes	Ingredients	Methods of Preparation	Proposed long food name
Nyiiry boutalii/ couscous de Mais	Maize meal (*Zea mays*), *Brachiaria xantolenca* , Water	Maize meal is added to boiling water, do not stir. Cover the saucepan for 10 minutes. Stir with cutting movement to mix the dry maize meal with water. Replace the lid and allow cooking further over low heat for approximately 30 minutes. add *Brachiaria* powder slowly and stir till get a stiff porridge	*maize meal, hard porridge, cooked, Brachiaria flavored*
Nyiiry boutalii/kare, couscous de Mais	Maize meal (*Zea mays*), *Setaria pallidifosca*, Water	Maize meal is added to boiling water, do not stir. Cover the saucepan for 10 minutes. Stir with cutting movement to mix the dry maize meal with water. Replace the lid and allow cooking further over low heat for approximately 30 minutes. add *Setaria* powder slowly and stir till get a stiff porridge	*maize meal, hard porridge, cooked, Setaria flavored*
Nyiiry boutalii/ couscous de Mais	Maize meal (*Zea mays*), *Dactyloctenium aegyptium*, Water	Maize meal is added to boiling water, do not stir. Cover the saucepan for 10 minutes. Stir with cutting movement to mix the dry maize meal with water. Replace the lid and allow cooking further over low heat for approximately 30 minutes. add *Dactyloctenium* powder slowly and stir till get a stiff porridge	*maize meal, hard porridge, cooked, Dactyloctenium flavored*
dana naka/"riz de la grue couronnée"	Local rice flour (*Oriza barthii*), Water	Rice flour is added to boiling water and immediately stirs. If the obtained porridge is too soft, the flour is continuously add and stir till a hard and homogenic porridge is obtained, no further cooking time is necessary	Local rice flour, hard porridge, cooked
Nyiiry marorii/ couscous de riz	Rice flour (*Oryza sativa*), Water	Rice flour is added to boiling water and immediately stirs. If the obtained porridge is too soft, the flour is continuously add and stir till a hard and homogenic porridge is obtained, no further cooking time is necessary	rice flour, hard porridge, cooked
Nyiiry njigaari (or muskuwaari) / couscous de Sorgho/la boule	Sorghum flour (*Sorghum bicolor*), *Brachiaria xantolenca*, Water	Sorghum flour is added to boiling water, do not stir. Cover the saucepan for 10 minutes. Stir with cutting movement to mix the sorghum flour meal with water. Replace the lid and allow cooking further over low heat for approximately 30 minutes. add Brachiaria powder slowly and stir till get a stiff porridge	*Sorghum porridge, hard, cooked, Brachiaria flavored*
Nyiiry njigaari (or muskuwaari), souktarii / couscous de sorgho/la boule	Sorghum flour (*Sorghum bicolor*), *Setaria pallidifosca*, Water	Sorghum flour is added to boiling water, do not stir. Cover the saucepan for 10 minutes. Stir with cutting movement to mix the sorghum flour meal with water. Replace the lid and allow cooking further over low heat for approximately 30 minutes. add *Setaria* powder slowly and stir till get a stiff porridge	*Sorghum porridge, hard, cooked, Setaria flavored*
Nyiiry njigaari (or muskuwaari) / couscous de sorgho/la boule	Sorghum flour (*Sorghum bicolor*), *Dactyloctenium aegyptium*, Water	Sorghum flour is added to boiling water, do not stir. Cover the saucepan for 10 minutes. Stir with cutting movement to mix the sorghum flour meal with water. Replace the lid and allow cooking further over low heat for approximately 30 minutes. add *Dactyloctenium* powder slowly and stir till get a stiff porridge	*Sorghum porridge, hard, cooked, Dactyloctenium flavored*
Kissaar , Keech,/ chiendent, *Bamboo*	*Dactyloctenium aegyptium, Water*	-The rugose seed grains are eaten cooked into a thick porridge - The husked seeds are boiled in water to a thick mush. -Mixed with semi-ground *Phaseolus aconitifolius*, the grains are prepared into a dish called *Kissaar*, which is much relished. Also reported mixed with pearl millet, or sorghum for local bread-making; - seeds can also be ground into a flour to make *Kissar*, a thin local bread; or porridge	- *Dactyloctenium* seed grains, cooked, thick porridge - *Dactyloctenium, husked seeds, boiled* thick mush - *Dactyloctenium, cooked* with semi-ground *Phaseolus aconitifolius,* - kissar, *Dactyloctenium* seed grains, ground, thick porridge,
love grasses	*Eragrostis tremula*, Water, Vegetable oil	grains are ground into a flour to make *Kissar*, a thin local porridge	kissar ,*Eragrostis*, grains, ground, thick porridge
Sméné, Gamba grass	*Andropogon gayanus*, Water	grains are eaten raw or cooked	Gamba grass, grains, raw
Hungry Rice, Koribe.	*Aristida publifolia*, Water	Seeds of this wild grass are gathered by ants. They are dug out, sifted, powdered and made into porridge	*Hungry Rice* grains, ground, thick porridge
K 'arangiya or Ngibbi, Sandburgrass	*Cenchrus biflorus, Vegetable oil, Yeast, Milet, Sugar, Vegetable oil*	-Seeds are removed from husks by rubbing spikes between two pieces of leather then eaten raw. -. Seeds are pounded and eaten raw or made into porridge. - Seeds of *Cenchrus biflorus*, are eaten mixed with *pearl* millet for bread making.	*-Sandburgrass, seeds, raw* *-Sandburgrass, seeds, pounded,* porridge *-Sandburgrass, seeds, pearl* millet, bread

Table 2: Foods list of tubers, roots and their products from North Cameroon's biodiversity, their methods of preparation and proposed tag name

Local food Name/dishes	Ingredients	Methods of Preparation	Proposed long food name
Arrowroot	*Tacca leontopetaloides*	The fleshes of the tubers are grated in the interior asperities of a pottery made for this purpose and which expresses the juice. This juice is then filters and lets dry to recover starch wish is use for human consumption.	*Tacca, starch, raw, juice*
Tac'haa/ Arrowroot alcoholic drink	*Tacca leontopetaloides*	The extracted juice is filters and let fermented for tree to fourth days.	*Tacca, fermented sour drink*
Tchuf /Chufa	*Cyperus rotondus*	The tuber of *Cyperus rotondus* are generally soaked in water then mixed with a sweet. They're also used to make cakes for wedding.	*Cyperus, raw, sweetened*
zanina	*Amorphophallus aphyllus*	The tubers of *Amorphophallus* must be boiled for long time with sheets of *Cissus adenocaudalis*, and can be consumed after changing the cooking water at least three times	*Amorphophallus, boiled*
	Stylochiton warneckii	Stylochiton roots are peeled, washed and boiled for about 15 minutes then eaten hot.	*Stylochiton, boiled*
Jeda, Blume	*Anchomanes difformis*	These tubers are treated as that of *Amorphophallus* but are lengthily boiled with sheets of *Hymenocardia acida* in place of *Cissus adenocaudalis*, and the tubers can be consumed only after changed the water of cooking at least three times with these sheets	*jeda, boiled*
gabura (ma)	*Cochlospermum planchonii*	Regarded as poison by Koma tribe, when it is collected, they sing by beseeching it not to bring death. In Muzey tribe, a special ceremony is applied for the cooking process: the whole tribe accompanies a very old woman a "*cata man mana ki fatiya*", (woman whose word is finished) and they make her unearth the first root. The villagers make in the same way, then prepares the tuber. The old woman will eats the first and thus symbolically takes on her the yowna (the poison) of the root. Each morning during the hunger, some tubers are given to her to consume. At the end of the famine she is supposed to die. An old lady of the canton of Leo in North Cameroon had conformed to this ritual during the 1985 famine.	*Cochlospermum, raw* *Cochlospermum, boiled* *Cochlospermum, cooked, pounded*
Souchets, Tiger-nut, flatsedge	*Cyperus esculentus, Cyperus rotondus*	The fleshes of the tubers are grated in the interior asperities of a pottery made for this purpose and which expresses the juice. This juice is then filters and lets dry to recover starch wish is use for human consumption.	*Souchet, starch, raw*
Bulbes de nénuphars	*Nymphaea sp*	The fresh roots are washed then boiled for about 15 then rewashed and peeled before consumption	*Nymphea, roots, boiled*

Table 3: Foods list of meats, poultry, fish, insects and their products from North Cameroon's biodiversity, their methods of preparation and proposed tag name

Local food Name/dishes	Ingredients	Methods of Preparation	Proposed long food name
Tcholli bee tchita/ sossor/ astrild bird	*Estrilda sp, Capscium frutescens, Mixed spices, salt*	The birds feathers are removed, the bird is eviscerate, coat with spices mixture, salted and peppered, then skewered and grill on charcoal	Astrild, offal, grill, spicy, hot
Tcholli bee tchita/ sossor/ bengalis	*Udagenthuss bengalus, Capscium frutescens, Mixed spices, salt*		Bengalis, offal, grill, spicy, hot
Tcholli bee tchita/ sossor/ tisserands	*Ploceus sp, Capscium frutescens, Mixed spices, salt*		Tisserans, offal, spices, grill, hot
Varan de terre boucane	*Varanus exanthematicus*	A mixt part of the meat is salted and smoke	Varanus, meat, offal, salted, smoke
le hérisson boucane	*Erinaceus albiventris*		*Erinaceus*, meat, offal, salted, smoke
Le Cephalophe,/Yellow-backed duiker/ Antilope fumée a l'huile arachide	*Cephalophus sylvicultor, Arachis hypogaea, Capscium frutescens, salt*	Smoked antelope meat is cooked in groundnuts oil, salt and hot pepper	Antelope, smoked, cooked in groundnut oil, hot
Le Cephalophe,/Yellow-backed duiker/ Antilope fumée au pistache / kora bia nê saka môo gala	*Cephalophus sylvicultor, Solanum. Sp, Capscium frutescens, Alium cepa, salt*	Smoked antelope meat is cooked with pumpkin seed butter, salt, onion, and hot pepper.	Antelope, smoked, cooked with pumpkin seed, savory onion, salt, hot pepper
Phacochère fume/ Wild pig	*Potamochoerus porcus, Capscium frutescens, Alium cepa, salt*	Smoked wild pig meat is boiled, then fry in maize oil. The boiled water is added with salt, onion, and hot pepper.	wild pig, smoked cooked in maize oil, salt, onion, and hot pepper
Water chevrotain	*Hyemoschus aquatius*	A mix part of the meat is salted and smoke	Chevrotain, smoked, salted

Crevettes séchées a l'huile d'arachide/	*Pandalus borealis, Arachis hypogaea*	Shrimp is buy already dried then rehydrate under cold running water, salted and fried.	Shrimps, dried, groundnut oil, fried
Silures séchés/Kora Zoro	*Siluris glanis or Silurus silurus* (Wulff, 1765)	Fresh fish are eviscerate, salted and sundry	Fish, salted, sundry
Silures séchés à l'huile d'arachide	*Siluris glanis, Arachis hypogaea*	Sundry fish are cooked with groundnut oil, salt, onion, and hot pepper	Fish, salted cooked in groundnuts oil, salt, onion, and hot pepper
Serpent python fumé aux graines de (gak) / Kora Gok	*Python sebae, Solanum. Sp, Capscium frutescens, , salt*	Smoked python meat is cooked with pumpkin seed paste, salt, and hot pepper	Snake, smoked, cooked with pumpkin seed, salt, hot pepper
Doo Doy/termites ailées *grillées*	*Bellicotermes natalensis, salt*	Termites are collected using a sieve just at their exit, then mixed with salted water before sun drying. The feathers are remove and termites are grilled in low flame (doo doy) or fried (hanna doy)	Termites, salted, grilled
Hanna Doy/Termites frites dans l'huile de sésame ou d'arachide.	*Bellicotermes natalensis, Sesamum indicum or Salt. Arachis hypogaea*		Termites, salted, fried
Les criquets/ locust	*Omocestus viridulus Salt. Arachis hypogaea*	Green grasshopper are fried in vegetable oil and salt	Green grasshopper, salted, fried
Têtards/ tadpoles	*Pyxicephalus aspersus*	The method of preparation of the tadpoles was not given, because according to people interviewed this is part of their rites	Têtards, frais

Table 4: Foods list of vegetable, fruits and their products from North Cameroon's biodiversity, their methods of preparation and proposed tag name

Local food Name/dishes	Ingredients	Methods of Preparation	Proposed long food name
Toro/ Sissongo	*Pennisetum purpureum, Capscium frutescens, salt*	The buds of the plant are harvest, wash and steam cook, with salt and pepper. Some time a vegetable oil is also added	Toro, steam cooked with salt and hot pepper
Koumbi or houlahada/ Morelle noire	*Solanum suprium, Meat or fish or* shrimp, groundnuts butter (*Arachis hypogaea)*	The leaves are harvest or buy on local market fresh, cut in small pieces, rewashed in hot water, and then cook in groundnut butter with meat or dry shrimp or dry fish, variants spices are also added depending of the taste and family incomes.	Morelle noire, cook in groundnuts butter, meat and spices
Vernonia/ Souaka	*Vernonia* sp., vegetable oil (maize or grounduts), *Capscium frutescens, salt, fish or shrimps or smoke meat*	The leaves of the plant are harvest, wash and precook in steam. Onion is then fried in vegetable oil with salt and pepper then precooked leaves are added and leave cook at low temperature. Sometime dry shrimps or smoke fish / meat are also added	Vernonia leaves, cook in onion, and vegetable oil.
Casse fétide/ Tasba	*Cassia tora, Meat or fish or* shrimp, groundnuts butter (*Arachis hypogaea)*	This are cook as describe for Koumbi leaves (*Solanum suprium)*	Casse fétide, cook in groundnuts butter, meat and spices
Neverdié / Guilgandja / Kona	*Moringa oleifera*		Guilgandja cook in groundnuts butter, meat and spices
Solanacées Grande morelle * Ngago /hako kouitadjé	*Solanum gilo raddi*		Grande morelle cook in groundnuts butter, meat and spices
Balanites /datier du désert / Hako doubao	*Balanites aegyptiaca*		Balanites cook in groundnuts butter, meat and spices
«Hako'ndiam »- l'Amarante/ Agnaka	*Amaranthus caudatus,or Amaranthus spinosus,or Amaranthus vindis, arachis hypogea, Amaranthus hybridus*		Amarante cook in groundnuts butter, meat and spices
Boungou/Gouboudo	*Cerathotheca sesamoïdes*		Gouboudo cook in groundnuts butter, meat and spices
Feuilles de baobab /Boko	*Adansonia digitata*		Boko cook in groundnuts butter, meat and spices
«Ourdi soulabe »/ Yakamré /le basilic	*Ocinum gratissimum Ocimum viride*, Meat or dry shrimp or dry	The leaves are harvest fresh, cut in small pieces, rewashed in hot water, and then cook in cow milk butter, with meat or dry shrimp or dry fish, variants spices	Basilic, cook in cow milk butter and, spice

	fish		
Sésame au gombo/ gombo soup in sesame	*Sesamum indicum Hibiscus esculentus*, Meat or dry shrimp or dry fish	Hibiscus's fresh fruits are cut in small pieces, cook in Sesame oil, and sesame butter is added. Meat or dry shrimp or dry fish, variants spices	Hibiscus, fruits, cook in Sesame oil, sesame butter
Graines séchées de gala aux feuilles de manioc	*Solanum sp, Manihot esculenta Crantz*	Cassava leaves are washed, pounded, and cooked with solanum seed butter	Pistachio, dried seeds, paste, cassava leaves
Graines séchées de gala aux champignons	*Solanum sp, wild mushrooms* , Meat or dry shrimp or dry fish	Wild mushrooms are cooked with solanum seed butter, in vegetable oil with meat or dry shrimp or dry fish. Variants spices are also added depending of the taste and family incomes	Pistachio, dried seeds, paste, in wild mushrooms
Graines séchées de gala de a la corète potagère le Chanvre de Guinée/«Gouboudo	*Coratotheca sesanoides, Solanum sp*., spices	The leaves of the plant are cut in small pieces, rewash in hot water, and then cook with solanum seed butter with meat or dry shrimp or dry fish, variants spices are also added.	*Gouboudo* cook in solanum butter, meat (fish or shrimp)added, and spices
Graines séchées de gala au **gombo**	*Hibiscus esculentus Solanum sp, spices*		*Gombo* leaves cook in solanum butter, meat (fish or shrimp)added, and spices
Graines séchées de *gala* + sauce mucilagineuse **à** base de sève de *triumfetta sp*	*Triumfetta sp. Solanum sp*, meat fish or shrimp are added, and spices		Triumfetta leaves cook in solanum butter, meat (fish or shrimp) added, and spices
Corète potagère aux champignons	*Coratotheca sesanoides, wild mushrooms*	Wild mushrooms are cooked with *Coratotheca sesanoides* leaves, in vegetable oil with meat or dry shrimp or dry fish. Variants spices are also added depending of the taste and family incomes	*Coratotheca* leaves cook with wild mushrooms, meat (fish or shrimp) added, and spices
Doum	*Ceiba pentandra*	Young leaves are cooked and used as soup	Doum, leaves, cook, soup
Ground pea sauce/ sauce aux Pois de terre grillés	*Pisum sativum, Capscium frutescens, Alium cepa*, salt, *Meat or fish or* shrimp	Peanuts are roast and ground into a paste. Added to water (mainly the after meat cooking remaining water) till it becomes a soup. Onions, salt and pepper are then added. The whole mixture is cook until about half-thick. A previously-browned chicken or smoke meat or dry fish is then added to the soup (bouillon cube may also be added). This mixture is then again cook down into a thick a sauce. Serve hot.	Ground pea sauce, cook, browned chicken or smoke meat or dry fish added
le néré	*Parkia biglobosa*	-The ripe fruit is processed into confectionery -The dried pounded fruit is used as flour. The pulp then soaked in water, and salt or sugar added gives a nice drink	Nere, ripe fruit, raw Nere, ripe fruit, dry, pounded, drink
Sito or Biii	*Adansonia digitata*	Young fresh leaves are cooked as a vegetable. Dry leaves are molded into a powder which is used in soup and also mixed with sorghum; leaves are also used in sauce preparation. The fruit is eaten raw, The fruit is soaked in water and taken as an appetizer	Adansonia, fresh leaves, cooked Adansonia, dry leaves, pounded Adansonia, fruit, raw Adanonia, fruit, soaked, appetizer
Kasuowo(m) Kassu(w) Bukagu(j)	*Anacardium occidentale*	The cashew nut is roasted and the kernel is extracted and eaten. The ripe apple (fruit) is eaten raw Juice is extracted for preparation of beverages and liquor. The seeds are roasted and eaten. The seeds are cooked as soup	- Anacardium, cashewnut, roasted - Anacardium, ripe apple (fruit) raw - Anacardium seeds, roasted - Anacardium, cooked, soup
Annone/Sore/Popoli	*Annona senegalensis*	The ripe fruit is eaten raw	Popoli, fruit ripe, raw
datier du désert / Hako doubao	*Balanites aegyptica*	The ripe fruit is eaten raw The ripe fruit is dried and eaten. The nut is roasted, and kernel extracted and eaten. The fruit pulp is used as a beverage.	*Balanites, ripe fruits, raw* *Balanites, ripe fruits, dry* *Balanites, nuts, roasted* *Balanites, fruits, pulp, drink*

Red kapok tree, le Kapokier	*Bombax costatum*	The young leaves are dried and pounded, then used with coos. The young flower are dried and pounded, then used with coos	*Bombax*, leaves, dried, pounded *Bombax*, flour, dried, pounded
African palmyra palm, black rhun palm, palmier ronier	*Borassus aethiopium*	The young fresh shoots / roots are eaten raw or cooked. - The young fresh terminal bud is eaten raw - The juice in the immature seed is consumed; - The fruit pulp is eaten raw or roasted	*Ronier* young fresh shoots ,raw *Ronier* young fresh roots, raw *Ronier* fresh terminal bud, raw *Ronier*, seed, juice *Ronier*, fruit, pulp, raw *Borassus*, fruit, pulp, roasted
fipagrass	*Detarium senegalensis* *Detarium mierocarpum*	The fresh ripe fruit is eaten raw	*Fipagrass, ripe fruit, raw*
Tachinkot, Kachi	*Dialium guineensis*	The mature ripe fruits are eaten raw. The young fresh leaves are chewed	*Kachi fruit, ripe, raw*
le jujubier,	*Zizyphus jujuba*	Fruits are eaten fresh or dried	*Jujube ripe fruit, raw, fresh* *Jujube. ripe fruit, raw, dry*
le tamarin	*Tamarindus indica*	The fruit pulp is soaked in water and squeezed to make a drink. The pulp is also added to soup.	Tamarin, fruit pulp ,soaked , squeezed ,drink
Fruits des Figuiers	*Ficus sycomorus* *Ficus platyphilla*	Fruits are eaten fresh or dried	*Figues. ripe fruit, raw, fresh* *Figues. ripe fruit, raw, dry*
dattier du désert	*Balanites aegyptiaca*		*Dattes ripe fruit, raw, fresh* *Dattes, ripe fruit, raw, dry*
Palmiers le doum, doum palm, Herb tea of doum *or* Gingerbread Palm	*Hyphaene thebaica*	The fruit is break the soft pulp is eaten , Leaves are also infused and drink as tea	Gingerbread Palm, *ripe fruit, raw, fresh* Gingerbread Palm, infusion, hot drink
le karite	*Vitellaria paradoxa*	The fruit when ripe is eaten fresh	Karite, *ripe fruit, raw, fresh*
karya walnut, Marula jelly plum, cat thorn, morula, cider tree, marula, maroola nut/plum, dania	*Sclerocarya birrea*	The fruit when ripe is eaten fresh. Can intoxicate when eaten in larger amounts Inside is a walnut-sized, thick-walled stone. These stones, when dry, expose the seeds by shedding 2 (sometimes 3) small circular plugs at one end.	Marula jelly plum, *ripe fruit, raw, fresh* Marula jelly plum, thick-walled stone
dull-leaved mukwakwa, dull-leaved strychnos, monkey orange, wild orange	*Strychnos innocua*	The fruit when ripe is eaten fresh.	wild orange, *ripe fruit, raw, fresh*
African Hackberry	*Celtis integrifolia*	The fruit is a small drupe 6-10 mm diameter, edible in many species, with a dryish but sweet, sugary consistency, reminiscent of a dates	African Hackberry, dry,raw
Black Plum	*Vitex doniana*	The ripe black fruit pulp is eaten raw In certain areas the fruits are cooked before consumption but this process is only undertaken during food shortage periods.	Black Plum, *ripe fruit, raw, fresh*
Jackalberry, African Ebony	*Diospyros mespiliformis*	the edible fruit has a chalky, floury consistency with a lemon-sweet flavor and is eaten ripe and raw fresh or preserve They are also dried and ground into flour. A beer and brandy is also brewed from them	Jackalberry, *ripe fruit, raw, fresh* Jackalberry, *ripe fruit, raw, dry, flour* Jackalberry, juice, *fermented, alcoholoic drink*

Table 5: Foods composition of cereal and cereal products from North Cameroon's biodiversity

Proposed long food name		Proximate composition (g/100)					Minerals (mg/100g)					
	Moisture	Ash	Lipids	Proteins	Dietary fibre	Total carbohydrates	Ca	Cu	Fe	Mg	Mn	Zn
CEREALS AND CEREALS PRODUCTS												
Sandburgrass, seeds, pearl millet, bread	11.7±2.1	2.4±0.5	9.1±1.4	13.8±4.3	3±0.6	60±12	2.5±0.9	0.8±0.0	25±8.2	1.8±0.7	35.3±4.9	2.3±0.7
Sandburgrass, seeds, pounded, porridge	12.2±1.4	1.7±0.2	8.9±1.1	16.7±1.4	0.5±0.0	60±9.1	1.9±0.3	0.1±0.0	11±0.4	1.4±	19.3±1.8	2.1±0.7
Sandburgrass, seeds, raw	9.7±1.7	1.8±0.4	9.4±1.4	17.1±2.7	3.0±1.1	59±10.2	2.21±10.9	0.14±0.	19±5	1.5±0.2	25.3±5.6	4.7±0.9
Dactyloctenium seed grains, cooked, thick porridge	12.4±2.8	8.3±2.1	1.9±0.1	13.1±1.2	4.0±1.3	60.0±9.01	10.7±1.8	0.8±0.4	12±1.3	2.2±0.9	42.5±8.7	6.9±1.6
Dactyloctenium, cooked with semi-ground *Phaseolus aconitifolius*	13.8±1.7	8.9±0.9	2.3±0.2	23±8	2.5±0.4	49.5±10.0	11±1.2	0.7±0.0	13±1	2.8±0.7	40.1±7.5	7.2±1.5
Dactyloctenium, husked seeds, boiled thick mush	11.8±1.7	8.5±1.8	1.5±0.1	11.2±2.1	8.3±1.4	58.7±10	11.7±0.3	0.3±0.1	10.1±1	2.6±0.9	39.5±2.1	4.7±1.8
Hungry Rice grains, ground, thick porridge	10±2.8	1.1±0.4	4.6±1.4	12.6g±2.3	4.4±0.9	67.3±11.2	25±2	0.9±	3.2±	1.9±	12.6±2.3	5.9±1.8
kissar ,*Eragrostis*, grains, ground, thick porridge	12.1±2.3	5±1.2	2.9±0.7	15±2	5.3±1.4	59.7±10	20±10	0.3±0.1	6.5±1.2	2.1±0.8	22.4±5.3	7.8±
Gamba grass, grains, raw	11.5±1.1	5.5±1.1	39.9±9.	6.4±1.6	2±0	34.7±9.7	nd	nd	nd	nd	nd	nd
African rice flour, hard porridge, cooked	12.5±2.3	1.1±0.4	1.7±0.7	8.7±1.5	4±1	72±4	22.1±12.1	1.4±0.8	2.1±0.2	1.7±	19.7±	6.4±1.7
ROOTS TUBERS AND PRODUCTS												
Amorphophallus, boiled	69±11	1.4±0.4	0.5±0.0	3.2±0.9	5.9±1.1	20.0±8.2	2.9±	1.8±0.8	8±0.7	0.4±0.0	20.4±3.4	1.1±0.0
Anchomanes, boiled	70±9	1.3±0.5	0.1±0.0	3.7±1.0	3.0±0.0	21.9±7.5	9.1±0.8	0.5±0.1	5.3±0.3	1.6±0.3	37.1±9.1	4.1±0.7
Cochlospermum, boiled	50±8	2.5±0.1	0.8±0.0	1.5±0.6	5.1±1.0	40.1±9.2	1.3±0.9	1.1±0.0	15±2	20±3	17.3±1.5	1.1±0.4
Cochlospermum, cooked, pounded	57±11	2.1±0.1	0.5±0.0	1.4±0.8	2±0.0	37±4	1.2±0.7	0.8±0.1	12±2	18±4	15.1±1.4	1.5±0.6
Cyperus, raw, sweetened	19.9±5	1.5±0.9	1.2±0.4	3.4±	4.5±0.9	69.5±6.0	5.1±1.4	0.7±0.0	7.1±1.0	2.9±0.4	17.1±2.1	3.2±0.0
jeda, boiled	38.9±10	0.9±0.0	0.7±0.0	4.5±1.2	3.0±0.4	52±5	4.0±0.9	2.1±0.6	1.4±0.3	1.3±0.1	12.1±2.1	9.1±1.7
Nymphea, roots, boiled	65±9	1.4±0.0	0.4±0.0	6.1±1.0	2.4±0.6	69.6±9.0	8.1±1.0	1.0±0.0	3.3±0.4	1.1±0.1	25.1±9.2	5.2±0.7
Tiger-nut, starch, raw	39±6	1.7±0.4	14±2	4.7±1.2	5.6±0.0	35.0±5.2	10.8±0.7	2.1±0.8	7.5±1.5	1.4±0.5	12.3±2.4	7.1±0.6
Stylochiton, boiled	25±7	1.3±0.1	1.5±0.8	2.1±0.9	4.4±0.3	25.5±6.7	1.9±0.4	3.2±0.8	8.2±1.5	1.2±0.9	13.2±3.1	3.2±
Tacca, tuber, raw	70±9	1.1±0.0	0.2±0.0	1.5±0.8	7.1±1.2	20.1±5.4	3.0±0.7	1.5±	4±	0.8±	10.4±	12.1±2.1
Tacca, starch, raw, juice	85±10	1.1±0.0	0.1±0.0	0.99±0.00	2.5±0.7	10.31±5.3	2.6±0.2	1.2±0.0	3.7±0.8	0.2±0.0	7.3±1.2	8.2±1.7
MEAT POULTRY-FISH-INSECTS AND PRODUCTS												
Antelope, smoked, cooked in groundnut oil, hot	48±11	2.4±0.6	12±5	36.9±6.7	0.1±0.0	0.6±0.0	2.1±0.7	1.3±0.4	4.2±0.8	1.2±0.2	23.2±9.3	7.2±0.8
Antelope, smoked, cooked with pumpkin seed, savory onion, salt, hot pepper	38.5±6	5.1±0.8	14±1	42.3±9.8	0.0±0.0	0.1±0.0	2.4±0.1	1.7±0.0	5.2±1.2	3.1±0.9	23.2±9.4	7.2±1.6
Astrild, offal, grill, spicy, hot	65±5	1.3±0.2	8.7±1.2	24.1±8.1	0.2±0.0	0.7±0.0	3.1±0.5	2.8±0.6	5.2±0.7	0.7±0.1	17.2±2.4	1.2±0.1
Bengalis, offal, grill, spicy, hot	62±5	0.9±0.1	7.5±1.3	29.2±3.9	0.0±0.0	0.4±0.0	1.1±0.0	2.4±0.5	7.3±0.9	0.2±0.0	21.1±1.8	2.2±0.0
Chevrotain, smoked, salted	5±1	13±2	11±2	70.5±9.7	0.2±0.0	0.3±0.0	0.1±0.0	2.1±0.6	2.1±0.7	3.7±0.8	14.1±3.1	17.4±2.3
Erinaceus, meat, offal, salted, smoke	8.3±2.1	13±3	2.6±1.0	75.5±10.1	0.1±0.0	0.5±0.0	8.0±0.8	4.3±0.2	7±2	1.5±0.0	14.4±1.6	7.1±1.0
Fish, salted cooked in groundnuts oil, salt, onion, and hot pepper	20±5	15±3	2±0	63±11	0.0±0.0	0.0±0.0	6.5±0.3	5.8±0.8	9.4±0.8	4.8±1.0	40.4±7.2	32.5±8.3
Fish, salted, sundry	11±2	22±5	2.2±0.8	62.8±9.7	0.5±0.0	1.5±0.0	6.0±0.5	4.5±1.7	8±1	2.8±0.6	30.4±5.6	24.1±3.9
Green grasshopper, salted, fried	12±3	4.6±0.7	15.4±2.	65±10	1.0±0.0	2.0±0.0	1.0±0.0	4.5±0.4	6±1	0.4±0.0	0.9±0.0	12.3±1.7
Shrimps, dried, groundnut oil, fried	8±1	2.5±0.9	25±11	60±10	1.5±0.1	3.0±0.9	3.1±	4.7±	6.1±	1.7±	15.2±	3.2±0.7
Snake, smoked, cooked with pumpkin seed, salt, hot pepper	20±4	10±2	14±2.	56±12	0.0±0.0	0.0±0.0	3.5±0.8	8.3±1.2	2.4±0.8	7.8±0.8	32.4±9.5	3.5±0.8
Termites, salted, fried	14.2±2.1	6.2±0.8	45±12	33.6±2.4	0.0±0.0	1.0±0.0	2.9±0.9	1.2±0.7	8.2±1.4	1.0±0.0	12.3±1.8	13.2±2.0
Termites, salted, grilled	1.7±0.8	5±1	54±11	35.7±2.1	0.5±0.2	3.0±0.8	3.0±0.8	1.5±0.4	7.8±0.1	0.9±0.0	11.4±1.2	12.1±2.0
Tisserans, offal, spices, grill, hot	57±10	1.7±0.6	7.9±1.4	32.3±10.2	0.1±0.0	1.0±0.1	1.1±0.5	5.2±1.0	7.3±0.8	1.7±0.7	12.3±1.4	1.2±0.9

Varanus, meat, offal, salted, smoke	16±6	5±1	10.4±1.	68.6±9.5	0.0±0.0	0.0±0.0	3.1±0.6	8.2±0.9	7.2±1.7	1.3±0.8	14.3±1.9	2.9±1.7
wild pig, smoked cooked in maize oil, salt, onion, and hot pepper	20±7	3.8±0.9	12.8±2.4	63.1±11.0	0.0±0.0	0.3±0.0	1.9±0.1	0.9±0.0	4.6±0.4	1.7±0.0	19.5±0.7	5.1±0.5
VEGETABLES-FRUITS-SEED AND THEIR PRODUCTS												
Adansonia, fresh leaves, cooked	80±10	5.8±0.5	0.2±0.0	2.8±0.8	3.1±0.4	8.1±1.0	4.1±0.8	3.4±0.9	5.6±0.7	2.4±0.6	17.1±5.7	18.1±4.3
Adansonia, fruit, raw	44.6±11	3.8±0.3	0.3±0.0	1.1±0.3	6.2±0.3	44.0±11.3	2.1±0.9	1.2±0.7	1.3±0.3	2.1±0.7	0.1±0.0	5.1±0.6
African hackberry, fruits, dry, raw	10.5±2	4.2±0.7	0.1±0.0	1.7±0.8	3.2±0.5	80.3±12.2	1.5±0.5	1.8±0.8	0.3±0.0	5.1±1.6	20.1±4.6	0.1±0.0
Amarante cook in groundnuts butter, meat and spices	75.5±12.1	3.5±0.8	12±2	4.9±1.1	1.0±0.0	3.1±1.3	3.5±0.5	2.2±0.1	3.4±0.2	1.4±0.5	10.4±1.2	8.5±1.8
Anacardium, cashewnut, roasted	10.5±2.1	7.2±1.7	5±1	10.5±1.9	6.5±0.2	60.30±1.0	1.7±0.1	1.5±0.3	0.6±0.1	4.8±0.9	18.1±3.1	0.4±0.0
Anacardium, ripe apple (fruit) raw	33.5±11.1	8.2±1.0	6±1	11.5±1.7	2.7±0.4	38.09±8.9	1.9±0.6	1.2±0.5	1.7±0.7	2.2±0.6	3.2±0.4	1.3±0.1
Balanites cook in groundnuts butter, meat and spices	80±12	2.7±0.4	9.9±1.1	3.8±1.0	1.4±0.3	2.2±0.9	2.3±0.6	1.0±0.4	4.3±0.6	4.1±0.1	9.1±0.6	6.1±0.4
Balanites, ripe fruits, raw	35±11	9.2±1.5	5.2±1.1	15.2±1.9	5.2±0.5	30.2±9.1	2.5±10.2	1.3±0.0	2.1±0.7	1.9±0.6	2.9±0.3	1.1±0.1
Basilic, cook in cow milk butter and, spice	70.1±12.1	2.1±0.7	17±3	4.1±1.7	2.5±0.4	4.2±1.0	3.1±0.6	1.7±0.4	7.2±0.6	1.1±0.5	17.8±0.9	5.1±0.6
Black Plum, *ripe fruit, raw, fresh*	40±11	7.3±1.6	4.5±1.1	2.5±0.8	5.6±0.0	40.1±11.2	2.0±0.5	1.1±0.0	1.1±0.1	1.0±0.0	2.5±0.8	3.1±0.5
Boko cook in groundnuts butter, meat and spices	78±10	2.6±0.8	10±2	5±1	1.4±0.2	3.0±1.0	1.8±0.9	1.2±0.0	3.2±0.5	2.1±0.7	5.1±1.5	7.2±1.4
Bombax, flour, dried, pounded	10.7±2.1	7.3±1.5	0.6±0.0	22.6±8.6	1.2±0.0	40.0±10.1	1.9±0.5	0.9±0.1	1.6±0.0	2.0±0.5	0.1±0.0	5.2±0.8
Bombax, leaves, dried, pounded	65±12	4.1±1.0	1.3±0.0	1.9±0.8	2.2±0.3	7.9±2.1	4.2±0.4	2.8±0.6	4.7±0.6	1.7±0.5	12.1±2.1	8.9±0.1
Casse fétide, cook in groundnuts butter, meat and spices	80±11	1.7±0.1	7.5±1.5	4.2±1.3	1.5±0.3	5.1±1.3	2.4±1.0	1.4±0.8	4.3±0.6	4.1±0.4	9.1±0.6	6.1±0.4
Coratotheca leaves cook with wild mushrooms, meat (fish or shrimp) added, and spices	82.5±9.8	10±2	0.6±0.0	4.5±1.7	0.2±0.0	2.2±0.9	2.2±0.9	3.1±0.8	1.8±0.3	1.8±0.1	1.7±0.1	1.1±0.0
Dattes ripe fruit, raw, fresh	59.5±8.5	1.2±0.6	0.5±0.0	1.9±0.6	2.5±0.3	34.4±10.8	1.9±0.5	0.9±0.0	0.7±0.5	1.9±0.6	0.7±0.3	0.1±0.0
Dattes, ripe fruit, raw, dry	15±2	2.3±0.4	0.4±0.0	1.9±0.7	4.1±0.7	76.3±12.2	2.1±0.8	1.1±0.0	1.3±0.1	2.1±0.6	1.4±0.9	1.3±0.3
Gombo leaves cook in solanum butter, meat (fish or shrimp)added, and spices	85±9	1.9±0.7	7.8±1.2	3.2±0.9	2.0±0.0	0.1±0.0	1.8±0.0	1.5±0.8	3.2±0.4	2.2±0.3	7.2±0.8	5.3±0.9
Gouboudo cook in groundnuts butter, meat and spices	78.9±8.9	2.1±0.9	9.2±1.8	6.7±1.1	1.1±0.5	2.1±0.8	2.8±0.1	1.5±0.2	3.8±0.6	1.3±0.9	5.1±0.8	8.1±1.0
Gouboudo cook in solanum butter, meat (fish or shrimp)added, and spices	71.4±4.6	3.4±0.6	10±1	12.8±5.3	2.1±0.0	0.3±0.0	1.3±0.6	0.5±0.0	4.3±0.9	5.1±1.2	10.1±1.1	1.4±0.9
Grande morelle cook in groundnuts butter, meat and spices	79.6±10.3	2.5±0.8	11±2	4.5±1.4	1.2±0.2	1.2±0.3	2.1±1.0	1.1±0.7	1.3±0.9	0.1±0.0	4.1±1.1	1.2±0.8
Ground pea sauce, cook, browned chicken or smoke meat or dry fish added	75.7±9.6	1.2±0.0	8.2±1.0	11.8±2.4	2.0±0.0	1.1±0.4	0.2±0.0	1.2±0.0	1.0±0.0	4.1±1.8	5.2±1.0	0.4±0.0
Guilgandja cook in groundnuts butter, meat and spices	80.5±7.3	2.2±0.1	10±2	2.9±0.9	1.2±0.3	3.2±0.9	1.1±0.0	0.5±0.0	2.1±0.4	4.2±1.0	10.2±2.1	1.8±0.4
Jujube ripe fruit, raw, fresh	71.5±9.7	1.6±0.7	0	1.9±0.8	10±2	15±1.9	0.7±0.0	0.5±0.0	0.2±0.0	1.7±0.1	1.0±0.0	0.5±0.0
Nere, ripe fruit, raw	10±2	3.4±0.0	0.9±0.0	5.7±1.2	20±5	60±13	0.2±0.0	0.7±0.0	0.7±0.0	1.2±0.7	1.9±0.0	1.1±0.0
Pistachio, dried seeds, paste, cassava leaves	27.13±1.2	3.4±0.1	45±11	21.9±3.1	1.4±0.5	1.17±0.4	1.4±0.6	8.7±1.5	4.2±1.3	1.2±0.8	7.8±1.2	0.9±0.0
Tamarin, fruit pulp ,soaked, squeezed ,drink	80±9	1.2±0.7	0.2±0.0	2.0±0.2	4.4±1.0	12.4±4.2	2.5±0.4	1.7±0.8	2.1±0.2	1.0±0.0	4.9±1.3	1.1±0.1
wild orange, *ripe fruit, raw, fresh*	85.1±8.6	1.5±0.3	0.3±0.0	0.8±0.0	2.3±0.3	10.0±2.0	0.5±0.0	0.7±0.0	0.1±0.0	1.0±0.0	0.9±0.1	0.1±0.0

nd: not determined

n= 4

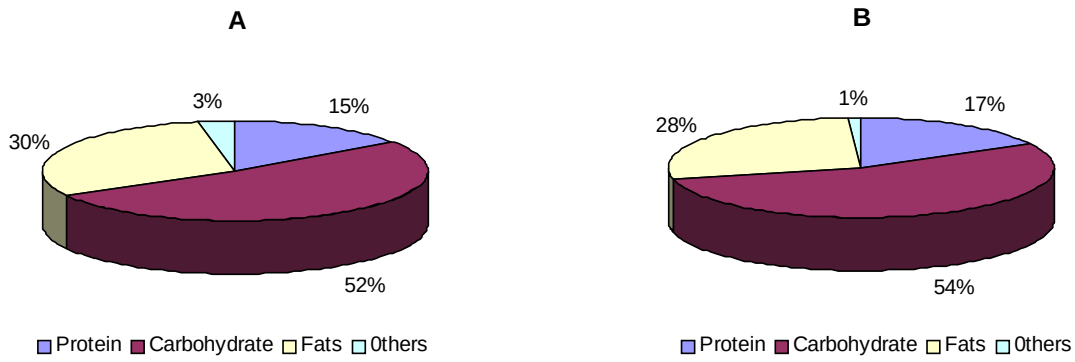

Fig 1: Macronutrients composition of the bush meals from wild (A), Comparing to the nutritional standards (B) for the lunch time (USRDA, 2000).

CONCLUSION

Wild foods products play a fundamental role in the diet of North Cameroonian's rural population. However several restrictions and laws related to collection and use of some species from biodiversity by local population has been taken by Cameroonian government, thus their nutritional contribution for local population's diet can be compromise. This is a shortcoming which needs to be closely examined and remedied by those responsible for the country's national nutrition program in order to develop and manage wild foods resources. Given their nutritional importance, edible wild food products from North Cameroon'biodiversity should be given greater consideration in plans to manage and conserve natural resources for socio economic development.

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