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Research Article

Assesment of the Knowledge Level in the Mifi Division (Western Region of Cameroon) and the Nutritional Value of the Wild Leaf Vegetable *Lactuca capensis*

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Abstract

Leafy vegetables, for the most part unconventional, are endowed with nutritional and therapeutic virtues. This study aimed at assessing the knowledge level in the Mifi division (Western Region of Cameroon) and the nutritional potential of *Lactuca capensis* leaves, a leafy vegetable consumed in West Cameroon. A nutritional survey was first carried out in 136 households using direct interview. Analysis of nutrient contents and phyto-chemical screening were carried out using standard methods of the AOAC. Results showed that *Lactuca Capensis* is known as wild vegetable by people over 40 years old (75.00%) and increasingly little known by youth. This vegetable is consumed in cooked (62.69%) or cooked and raw (37.31%) form. More than 94% of the amount need is harvested and more often during the rainy season (96.96%). The water content was 87.87%, crude protein, total fat, crude fibre, total carbohydrate and ash were 20.44%, 4.14%, 12.37%, 50.46% and 13.33% respectively compared to dry matter. Potassium with a content of 2200.67mg/100g, is the most abundant mineral. Average contents of vitamine C and total carotenoids were respectively 0.23g/100g and 1174 µg/g. Analysis also revealed the presence of secondary metabolites namely condensed tannins, steroids, terpenes and saponins. *Lactuca Capensis* is therefore a source of nutrients and secondary metabolites essential for nutrition and health benefits for consumers.

Keywords

Lactuca capensis, Leafy Vegetable, Nutritional Value

1. Introduction

Food and nutrition are important factors for promotion and maintenance of health and well-being of all living beings throughout their live [1]. To cover qualitative and quantitative nutritional needs, from a biological point of view, it is recommended to have a healthy and balanced diet. Nutritional needs, as well as the available food resources, vary and depend on food preferences and habits from one population to another and even within a region. This may limit the diversity

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of food systems. The absence of a diversified diet can lead to deficiencies or overabundance of nutrients or shortage of others causing low immunity and chronic diseases (CVD, infectious diseases) [2, 3]. Developing countries and the countries of sub-Saharan Africain particularly, are facing food insecurity problems, exposing populations to malnutrition [4]. Strategic action to tackle malnutrition also implies food fortification to improve the nutritional composition of foods [5]. But other foods well indicated for their nutritional and therapeutic virtues as vegetables remain under-exploited. In Cameroon, each ethnic group, guided by their culture and history, has developed specific strategies and made specific choices among available food resources [6].

*Lactuca capensis*is is an edible vegetable commonly known as «titche» in the West Region of Cameroon. It is a lettuce widely distributed in Tropical Africa, South Africa, Madagascar and Yemen. Leaves of *Lactuca capensis* are used in infusions in northern Nigeria. Crushed with natron, the leaves is served as vermifuge for horses. The boiled roots are used for threatment of venereal diseases in Kenya or ulcers, wounds and eczema in R. D Congo. They are also used in the treatment of chronic diseases in Kenya [7]. Some studies on therapeutic and neuropharmacological effects of methanolic extract of *Lactuca capensis* leaves has been reported [8, 9] but fewer works were reported on their nutritional value. In order to find out alternative sources of nutrients for human or animal consumption, we have study nutritional value of the leaves of *Lactuca capensis* consumed in the western region of Cameroon.

2. Material and Methods

2.1. Study Site

The study was carried out in Bafoussam, master city of West region located on the Highlands of Cameroon between 10°20’ and 10°41’67’’East longitude; the latitude 5°46’67 and 5°24’north. Thanks for his rich land, Bafoussam is once of the agricultural cities of the Country. [10]. The main crops are cereals, vegetables, tubers and fruit [11].

2.2. Economics and Demographics Characteristics of the Participants

The survey took place from August to September 2019 in 136 randomly selected households of bafoussam city. They were choosed because of their knowledge of the plant. The survey was conducted either in french or in the traditional language of local population. The questionnaire was analysed according to the Chardon Protocol (1981) [12].

2.3. Plant Material

Lactuca capensis (figure 1) locally known as 'titche' in Bafoussam was harvested during the month of June 2019 in Bafoussam. Identification was done at the Cameroon National Herbarium under the reference number N °27743 (SRF) Cam, in comparison to the plant material to the Letonzey specimen.

Lactuca capensis leaves were convened to the laboratory and dried at room temperature for three weeks. They were then crushed using an Electronic blender brand robomixer. Powder were later introduced in small plastic bags for furthen analysis.

Figure 1. *Lactuca capensis plant.*

2.4. Chemical Analysis

Water, protein, fat, ash, crude fibre and mineral contents were determined using AOAC methods [13]. Total carbohydrates levels were obtained by difference according to the following formula:

%Carbohydrates = Dry matter -% protein -% fat -% ash

The specific coefficient of Merrill and Watt for carbohydrates, proteins, and lipids was used to determine the total energy according to the following formula [14]:

Energy Value (Kcal) = (4 x Q Carbohydrate) + (4 x Q Protide) + (9 x Q Lipid)

Q = Amount of nutrient in grams (g). Phyto-chemical screening was done by colorimetric methods. Carotenoids were measured by photometer and vitamin C by iodometry according to Dongho *et al*. [15].

2.5. Statistical Analysis

All physico-chemical analysis were performed in triplicate and the results were expressed as means ± standard deviation. Analysis of variance and multiple-range test were used to discriminate between means that differed significantly. All analyses were performed using.

Statgraphics Centurion software version 17.1.12. Probability was estimated at the traditional 5% threshold.

3. Results

3.1. Economics and Demographics Characteristics of the Participants

Table 1 shows socio-demographic and socio-economic characteristics of respondents. It was found that 93.3% of the respondents were women. More than 75% of the participants were more than 40 years old and live in Bafoussam City. They were mostly engaged in informal activities: 43.38% were farmers; 19.11%, traders and 33.08% for others activities.

Table 1. *Distribution of participants according to their socio-demographic and socio-economic status.*

	Responses	Participants	Percentages (%)
Gender	Female	127	93.38
	Male	09	6.62
Ages (Years)	11-19	3	2.20
	20-29	6	4.41
	30-39	21	15.44
	40-49	37	27.21
	≥50	65	47.79
	No response	4	2.94
Main activities	Agriculture	59	43.38
	Trading	26	19.11
	Tailoring	6	4.41
	No response	45	33.08

Table 2 shows the participants' knowledge of *Lactuca capensis*' plant. Indeed, 95.60% of the participants know *Lactuca capensis* as a wild leafy vegetable and for 94.12% of them, *Lactuca capensis* is more abundant in the rainy season.

Table 2. *Knowledge of Lactuca capensis by the participants.*

	Responses	Participants	Percentage (%)
Type of plant	Wild	130	95.60
	Wild and cultivated	6	4.40
Harvesting period	Rainy season	128	94.12
	Dry season	2	1.47
	Intermediary season	2	1.47
	No response	4	2.94
Source	Gathering in farms	129	94.85
	Buying	7	5.14

Lactuca capensis is consumed by 98.52% of participants, wether as food for 57.46% of participants or either for food and therapeutic usage for 42.54%. 62.69% of the consumers eat *Lactuca capensis* leaves in cooked form, while 37.31% consumed it both cooked and raw forms. *Lactuca capensis* leaves are regularly consumed during the rainy season

(60.45%) with fufu, tubers. Theses results are resumed in the below table 3.

Table 3. Consumption of Lactuca capensis leaves.

	Responses	Participants	Percentage (%)
Consumed	Yes	134	98.53
	No	2	1.47
Use	Only as food	77	57.46
	Food + therapeutic usage	57	42.54
Form of consumption	Cooked	84	62.69
	Cooked or raw	50	37.31
Frequence of consumption	Rarely	53	39.55
	Regularly during the rainy season	81	60.45
Complements	Fufu, Tubers, starches	121	99.30
	Others	13	9.70

Concerning the therapeutic usages, *Lactuca capensis* leaves are used by people of Bafoussam in the treatment of many diseases. The main deseases treated are diabetes (12.28%), hypertension (7.01%), gastric pain (7.02%) and prostatitis (7.02%), etc. In these cases, leaves are used mainly in macerated or infused form or rather eaten as salad. The below table 3 resumes theses results.

Table 4. Some diseases relived by Lactuca capensis leaves.

Disease	Number of citation	Forms of utilisation	Frequency (%)
Diabetes	7	Macerate, infusion, salad	12.28
Hypertension	4	Macerate, salad	7.02
Gastric pain	4	Macerate	7.02
Prostatitis	4	Infusion	7.02
Stomach ache	3	Macerate	5.26
Nerve ache	2	Macerate	3.51
Bite	2	/	3.51
Others diseases	31	/	54.37

3.2. Bromatological Analysis of Leaves of *Lactuca capensis*

Table 5 shows bromatologic composition and energy value of *Lactuca capensis* leaves. Water content was high, 87.87 ±1.13%. Carbohydrates was the most abundant macronutrients, 38.09 ±1.13%, followed by proteins and lipids with contents of 20.44 ±1.2% and 4.14 ± 0.5% respectively for an average energy value of 271.38 Kcal.

Table 5. Bromatological composition of the leaves of Lactuca capensis.

Moisture (g/100g FM)	Ash (g/100g DM)	Proteins (g/100g DM)	Lipids (g/100g DM)	Carbohydrate (g/100g DM)	Fiber (g/100g DM)
87.87 ±1.13[a]	13.33 ±1.15[b]	20.44 ±1.20[c]	4.14 ±0.50[d]	38.09 ±1.50[e]	12.37 ±3.01[b]

Values are expressed as means ± standard deviation, $n = 3$. FM: Fresh mater; DM: Dry mater.
Mean values with different letter in the same line are statistically different ($p < 0.05$).

Micronutrients composition (table 6) showed that potassium is the most abundant mineral in the leaves of *Lactuca capensis* with a content of 2200, 67 ±47, 003 mg/100g DM, while the least abundant mineral was iron 14.09 ±0.68 mg/100g DM. In addition, total carotenoids and vitamin C are respectively 1.174 ±0.01g and 0.23 ±0.01 mg/100g FM.

Table 6. Micronutriments composition of Lactuca capensis leaves.

	Micronutrients	Content (mg/100g DM)
Mineral elements	K	2200.67 ±47.00[a]
	Ca	889.33 ±130.86[b]
	Mg	364.66 ±30.28[c]
	Na	277.00 ±42.50[d]
	P	200.10 ±31.07[e]
	Zn	21.66 ±0.70[f]
	Fe	14.09 ±0.68[g]
Vitamins	Total carotenoid (g/100g FM)	1.174 ±0.01
	Vitamin C (g/100g FM)	0.23 ±0.01

Values are expressed as means ± standard deviation, $n = 3$. DM: Dry mater; FM: Fresh mater.
Mean values with different letter in the same column are statistically different ($p < 0.05$).

Phytochemical screening of *Lactuca capensis* leaves powder revealed presence of sterols, terpenes, condensed tannins and saponins but alkaloids and flavonoids were absent.

4. Discussion

The survey revealed that *Lactuca Capensis* vegetable is well known by women than men. This could be justify by the fact that women are mainly concerned with family choice of foods dishes. A comparable result was also found by Vodouhe et *al* [16] in a study of a few local leafy vegetables produced in the coastal zone of southern of Benin. *Lactuca capensis* has been neglected by population throughout ages. This can explain why the majority of respondents are more than 40 years old. This result corroborates that of Effoe et *al* [17] where 74.25% of respondents were between 40-80 years old. Indeed, according to Kahane et *al*, traditional leafy vegetables in Africa suffer from competition with exotic vegetables [18].

The majority of respondents were farmers. Indeed, according to B ɗanger (2020) [19], availability of food depends on agricultural system especially in poor countries. *Lactuca capensis* is harvested mainly in the rainy season. This seasonality may explain the fact that *Lactuca capensis* leaves are more eaten during the rainy season. This result differs from that of Randrianatoandro [20] which showed that leafy vegetables are produced and present on Madagascar markets throughout the year, even during difficult times. The single consumption of leaves of this vegetable in bafoussam city could be justify by the fact that it is a vegatable leaf [21]. But this result differs from Postu et *al* [8] which reported that pulverized roots of this plant were used to treat ulcers in R. D Congo. The leaves of *Lactuca capensis* leaves are consumed in cooked form, and in raw and cooked form. These leaves are used in different local recipes. These results corroborate those of Effoe et *al* [17] who noted that culinary recipes can be made of decoction of raw materials of food plants used in traditional medicine in the Maritime region of Togo.

Leaves of *Lactuca capensis* are suitable for the preparation a dish locally known as 'Tenue militaire' and are often accompanied by tubers or fufu corn. This result is consistent with that of Mananga et *al*. [22] who found that the *Tiliacora funifera* leaves are suitable for making Saka-saka dishes but also often accompany bread, cassava, foufou.

Some respondents pointed out activity of leaves extracts of *Lactuca capensis* against diseases such as hypertension, diabetes, prostatitis and stomach ache. These results are consistent with those of Effoe et *al* [17] who showed the health importance of leafy vegetables for local populations.

The studied leaves showed had a high water content (87.87 ±1.36%). Similar results were obtained by Bogmis et *al* [23] with leaves of African nightshade (about 85%), Itoua et *al* [24] with leaves of *Lagenaria siceraria* (87.07 ± 0.52). According to Kouame et *al* [25], water contents of leafy vegetables are generally high and varies between 85 and 95%. This character could explain their high susceptibility to degradation. Protein content was 20.44 ±1.2% which is comparable to that of meat (17 to 24g/100g) [26]. The leaves of *Lactuca capensis* could therefore be used as a dietary supplement in the fight against protein malnutrition that prevails in this part of the Country. With a protein content more than 12%, a plant can be used as good source of protein and can contribute to the food balance of poor populations (sheetal et *al*., 2005 quoted by Ocho-anin et *al* [27].

Lactuca. capensis leaves are low in lipids (4.14 ± 0.50%) which is a characteristic of leafy vegetables [28]. It could else where enrich the repertory of low calorie foods for obese patients. Fiber content value was 12.37 ±3.01% which is higher than in *Amaranthus Sp* leaves (1.94 ±0.73%) [29]; suggesting that *Lactuca capensis* leaves could be used to solve digestion problems in constipated people. The ash content (13.33 ±1.15%) was higher than that obtained by Tchiegang and Aissatou [30] with the leaves of *Amaranthus*sp commonly consumed in Western Cameroon. This suggests that this vegetable could be an important source of minerals. The most abundant mineral in this leaves was potassium (2200.67 ±47.003mg/100g ash). The potassium content was significantly higher than the other mineral contents ($p < 0.05$). This mineral is generally abundant in plant product [31]. According to Munganga [32], high potassium content protects consumers from developing high blood pressure, especially due to excessive sodium intakes [33]. High levels of potassium may explain hypotensive effect of these leaves as reported by the ethnonutritional survey. The recommended daily intake of potassium is 2000 mg. It appear that 100g of *Lactuca capensis* leaves could cover approximately 13.34% of the recommended daily intake.

Magnesium plays a key role in the regulation of insulin [34] and body temperature. This may explain his use by population to relieve diabetics and fever as confirmed by the survey. Magnesium level obtained was 364.66 ±30.28003mg/100g. The recommended daily intake is 350 mg. This means that 100g of *Lactuca capensis* leaves could cover 12,63% of the recommended daily intake of this mineral.

The mean iron content of *Lactuca capensis* leaves was 14.09 mg. It was low compared to that of nightshade harvested in West region of Cameroon which is more than 50 mg/100 g [22]; so with vitamin C, these leaves could contribute to the formation of hemoglobin and fighting against iron-fringed anemia [34]. The recommended daily intake of iron is 14mg. 100g of *Lactuca capensis* leaves would cover approximately 12,20% of recommended daily intake.

Ca/P ratio of *Lactuca capensis* leaves was 4.44. This suggests significant calcium absorption during consumption [34]. A Ca/P ratio greater than 1 in a food is of nutritionally advantage because it favors absorption of calcium [35]. The recommended daily intake of calcium and phosphorus for adult is 800mg. Consumption of 100g of *Lactuca capensis* would cover 13,5% and 3,05% of recommended daily needs of calcium and phosphorus respectively.

According to Lestienne [36], as long as the iron/zinc molar ratio is less than or equal to 2,5; the iron content cannot interfere with the zinc intakes. The recommended daily intake of zinc is 10 mg. Fe/Zn ratio of *Lactuca capensis* leaves was 0.65 and 100g of the plant would cover 26.3% recommended daily intake.

The ratio Na/K (0.12) was less than 1; this situation is favorable to the smooth functioning of the body. According to HE and Mac (2008) quoted by Mobouna and Malaisse [34], when this ratio in a food is less than 1, there is a decrease in blood pressure, reduction of cardiovascular mortality, increase prevention of urinary lithiasis and osteoporosis and increase in kidney function.

According to interviewees, *Lactuca capensis* leaves have an antihypertensive effect. That could be explained by tannins presence. Similarly, their use in fight against filaria would be due to saponins presence. These secondary metabolites may not pose a deleterious risk to the bioavailability of nutrients in the leaves of *Lactuca capensis*. For example, condensed tannins whose biological effect is their ability to complex proteins in foods containing up to 10% protein and significantly reduce their in vivo digestibility may not have an effect in the case of *Lactuca capensis* leaves because their protein content is 20% and according to Li et al., 2003 quoted by Mezajoug [37] at this percentage of protein in a food, the tannins effect is absent.

5. Conclusion

This study permitted to determine the importance of *Lactuca capensis* in the mifi division of the western region of Cameroon as well as its nutritional value. It is a wild leaf vegetable used as food and medicine to relieve certain ailments. However it is becoming increasingly absent from the diet due to its wild nature, therefore very little cultivated and the pressure of modern agriculture through the use of chemical herbicides.

Lactuca capensis leaves have good nutritional values

thanks to their high content of proteins, minerals, carotenoids. These results could contribute to the development of this wild leaf vegetable in order to preserve biodiversity; to diversify the diet and meet nutritional needs.

Abbreviation

Q	Amount of Nutrient (Gram)
DM	Dry Matter
FM	Fresh Matter

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Author Contributions

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Conflicts of Interest

The authors declare no conflicts of interest.

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