Endogenous knowledge and importance of "conoro", fermented condiment from seeds of Baobab (*Adansonia digitata*), Kapok (*Ceiba pentandra*) and Okra (*Abelmoschus sp*) by Bondoukou department populations (North-Eastern Cote d'Ivoire)

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ABSTRACT

"Conoro" is a traditional fermented condiments prepared from seeds of Baobab, Kapok and Okra. It is consumed by the North-Eastern Ivoirians. The aim was to report ethno-nutritional knowledge of "conôro" and to understand theirs uses. Data showed that respondents had a high knowledge level of "conôro" (86 to 96.67%). A significant difference is found in ethnic and age groups (p <0.05). Koulango were majority ethnic and people over 65 years old had the high knowledge level of "Conôro" to 96.8-100 % and 85.7-100 % respectively. Conoro's utilization rates varied between 85.27 to 97.93 %. Sauces seasoning (ICF = 0.92) and addition of "Conôro" to other natural substances (ICF = 0.46) were respectively the most reported food and therapeutic uses. Blood pressure (ICF = 0.19) and abdominal pain after childbirth (ICF = 0.33) represented the most common treated diseases. "Conôro" was made from seeds taken individually or combined. The production processes of "conôro" were studied in different localities. Fermentation took 3 days in all localities. It was sold in dumpling form at 25 to 100 FCFA. The conservation time of "conôro" was from 6 to 12 months.

Contribution/ Originality
This study found that the Conôro help to fight against the high blood pressure and abdominal pain after childbirth etc. In the economic level, its commercialization would represent a source of income for disadvantaged local populations. In addition, this study would promote the plant species used for "conôro" production and their preservation.

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1. INTRODUCTION

The global demand in food is continuously increasing due to population growth and urbanization (Lavalette, 2013). According to Durst *et al*. (2010), one billion people worldwide suffered from malnutrition and 98 % of them lived in Asia and Africa (Lavalette, 2013). The malnutrition is not only related to a food shortage, but also concerned the nutritional quality of food. Thus, to improve staple foods nutritional quality (cassava, yam, maize), traditional fermented condiments from seeds were used since centuries by African populations sauces cooking. These condiments are traditionally used as a proteins substitute and flavoring agents (Achi, 2005; Azokpota *et al*., 2011; Fatoumata *et al*., 2016). Moreover, they are empirically used by some ethnic tribes to cure high blood pressure, diarrhoea, and rubella and as an antiseptic (Parkouda *et al*., 2008). Unfortunately, these traditional condiments have been abondaned because of the high-industrialization and urbanization life of Africans people. Fermented condiments are considered as food for poor. In addition, cheapest agro-industrial products including seasonings are omnipresent on all displays of saleswomen condiments and various products (Dossou-Yovo *et al*., 2016).

Specifically in West Africa, these industrial seasonings dated from colonial time and were gained fulgurating because of their potential taste and the lobbying developed around them. More than 100 million industrial seasonings cubes are sold each day in Africa (Pivot, 2002; Anonymous, 2015; Dossou-Yovo *et al.*, 2016). However, increased and uncontrolled consumption of these industrial products may constitute a risk for consumer's health because of their high sodium content (Meneton, 2012). In addition, studies archived on nutritional quality assessment of the most consumed "cube" broths in South Benin revealed that their sodium levels is above the standard (Dossou-Yovo *et al.*, 2016). While American studies indicated a mean sodium value in "cube" broths, should be 10.670 % (DASH, 2006). According to DASH (2006), excessive sodium consumption contributed factor to higher blood pressure cardiovascular diseases and cerebral vascular accidents.

Salty products consumption generally answered to consumer tasteful requirements, but in a small proportion to the physiological needs of the organism. Indeed, genetic patrimony is always adjusted to a very low salt intake; about 2 to 3 g of salt per day are enough for physiological needs of the organism (Meneton, 2012). According to OMS, 5 g of salt consumption per day is the threshold limit not to exceed. In spite of the risks associated to the excessive consumption of salt provided by agro-food products and specifically seasoning broth, consumers are accustomed to them due to their characteristic taste (Meneton, 2012). For few exceptions, plants generally contain small amounts of salt (Arcand *et al.,* 2017). Therefore, vegetable resources may be used to reduce the rate of salt in the consumer's diet. To added value to local products for consumption and to enlarge their sale market, some fermented seed products in sub-Saharan Africa have been investigated. Indeed, studies on soumbala (Côte d'Ivoire and Mali), kantong (Ghana), dikouanyouri (Benin), bikalga (Burkina Faso) and ugba (Nigeria) showed that these fermented products have a potential flavoring ability for sauces, good nutritional and therapeutic values (Azokpota *et al*., 2011; Kaboré *et al*., 2012; Onyenekwe *et al*., 2012; Okorie and Olasupo, 2013; Kpikpi *et al*., 2014; Ojewumi, 2016; Fatoumata *et al*., 2016).

As well, "conôro" is used by North-Eastern people of Côte d'Ivoire to season sauces. It is made from fermented seeds of baobab (Adansonia digitata), kapok tree (Ceiba pentandra) and okra (Abelmoschus sp) used as single or in combination. Regarding species, several authors have published on whole seeds and kernels of baobab, kapok tree and okra. The results showed that they are rich in nutrients and have high antioxidant activities which are necessary for the body wellbeing (Kamatou *et al*., 2011; Anigo *et al*., 2013; Jitin *et al*., 2015; Manal and Hend, 2015). In addition, some food products derived from these seeds have been identified. Condiments such as Dikouanyouri and Kantong are obtained from the fermentation of baobab and kapok tree seeds respectively (Chadare, 2010; Kpikpi *et al*., 2014; Parkouda *et al*., 2015). Also, coffee substitute was made from the roasted seeds of okra (Çalişir *et al*., 2005).

Recently, the lack of documentation of traditional and indigenous foods, which are important for the transmission of food knowledge to future generations, is of increasing interest and concern (Wahlqvist, 2007; Chadare *et al.,* 2008). Effective valorization through improvement of traditional technologies and production of value-added products for a larger market would the increase income of rural populations. It would also ensure the safety and nutritional security of consumers.

However, in our mind there is no sustained research in Africa and specifically in Côte d'Ivoire on endogenous processing and food knowledge of ″conôro″. Ours study showed that ″conôro″ is used to enhance the taste of sauces and to cure some diseases. It is locally sold by the women and give them substantial incomes. This study is a prerequisite for valorization and promotion of the local products and to better orientate and prioritize further research.

It aims to report the ethno-nutritional knowledge of "conôro" and understand theirs uses by the populations, specifically evaluate the knowledge of "conôro" according to ethnicity and age and to identifie the uses, the manufacturing process, the conservation time, the therapeutic virtues and sale price of the "conôro"

2. MATERIAL AND METHODS

2.1. Study area
This study was carried out in the Region of Gontougo, specifically in the Department of Bondoukou (North-Eastern Côte d'Ivoire). It is located between 8°2 - 8°17 North latitude and 3°2-2°31 West longitudes. Investigated localities were Laoudi-Bah, Yezimala, Kouassi-N'dawa and Bondoukou (Figure 1). Seasons (dry, rainy) are very irregular. The most dominant ethnic groups are Abron, Degha, Koulango and Nafana (Ouattara *et al*., 2016).
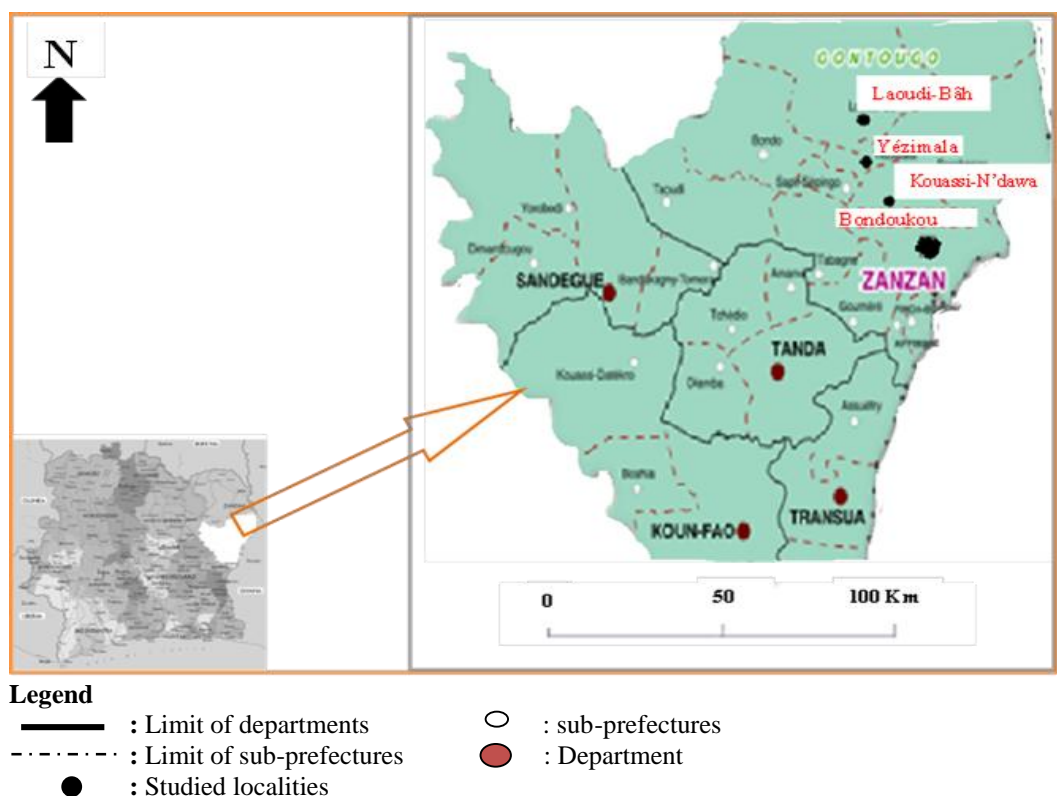

Legend

——— **:** Limit of departments   ◯ : sub-prefectures

– · – · – · – · **:** Limit of sub-prefectures   🔴 : Department

● **:** Studied localities

Figure 1: **Mapping of the studies area and localities**

2.2. Methodology

2.2.1. Sample size
A survey was carried out from February to May 2017. The sample size was determined following the normal approximation of the binomial distribution according Vessereau (1992).

$$n = t^2 \, x \, p \, (1\text{-}p)/e^2$$

n is total number of people for the study,
t is value of the normal random variable for a probability value of $\alpha = 0.05$, $t^2 = (1.96)^2$,
e is margin error taken as 4 %,
and p is proportion of people who used or at least knew of the "conôro" (50 %).

2.2.2. Investigation procedure
Respondents were selected using a random sampling scheme. A semi-structured interview method was used to collect data. During the survey, samples of "conôro" were kept and shown to the respondents. Information was collected through individual interviews. The interview focused on the socio-demographic information, which included the ethnic group, age and sex and the uses information, the manufacturing process, the therapeutic virtues, the sales price and the conservation time of the "conoro". A total of 600 people (men and women) were interviewed. Prior to the analyses, respondents were split into four age groups, (from 12 to 17 years for adolescents, from 18 to 44 years for young, from 45 to 64 years for adults and from 65 years or over elders).

2.3. Statistical analysis
The data were recorded in a database. Statistical analyses were performed using Statistica.v7.1 software. Chi-square test (χ^2) was used to test the independence between the variables and the statistical significance was test at $p < 0.05$. In addition, in order to assess informants' agreements on the variables studied, a consensus factor (degree) or Informant Consensus Factor (ICF) was calculated (Ilumbe et al., 2014).

3. RESULTS

3.1. Investigation

3.1.1. Socio-demographic status of respondents
The socio-demographic status of respondents is depicted in Table 1. The women were found to be the main respondents (57 to 70 %). Respondents came from different ethnic groups, of whom Koulango is the highest one (50.33 to 94.67 %) in all the localities. Regarding age, a high proportion corresponded for the age group from 18 to 44 years (46.67 to 59.33 %).
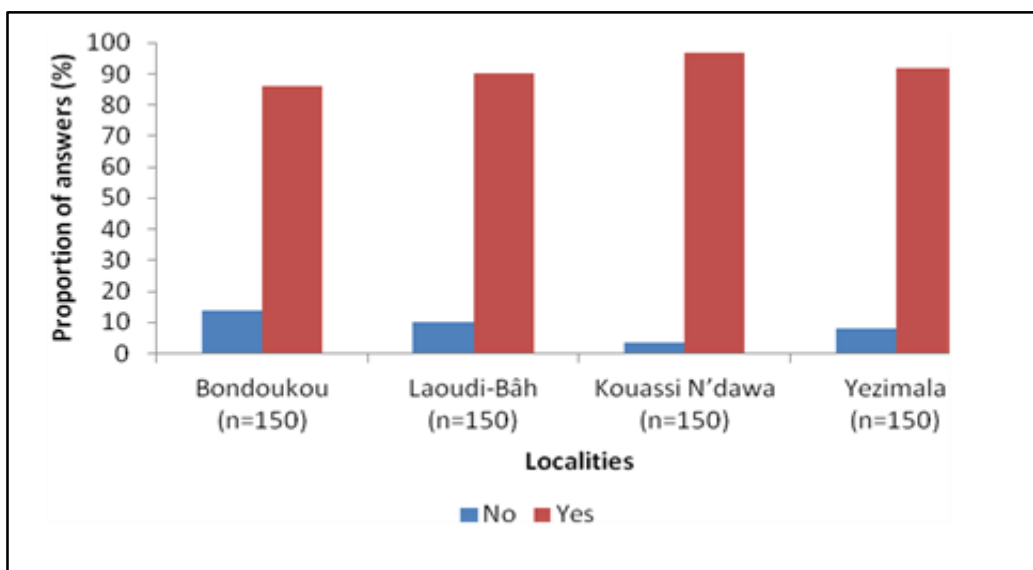
3.1.2. People knowledge level of "conôro"
The knowledge level of "conôro" is very high whatever the locality (Figure 2). The most predominant proportion is observed among the populations of Kouassi N'dawa (96.67%). The chi-square test (χ^2) revealed that the knowledge level of "conôro" is related to the study locality ($p < 0.05$).

Table 1: Socio-demographic status of respondents

Parameters	Localities			
	Bondoukou (n=150)	Laoudi-Bâh (n=150)	Kouassi-N'dawa (n=150)	Yezimala (n=150)
Gender (%)				
Men	36	43	30	35
Women	64	57	70	65
Age bracket (%)				
[12-17]	14	8.67	5.33	6
[18-44]	59.33	56	56	46.67
[45-64]	17.33	26	28	43.33
≥ 65	9.33	9.33	10.67	4
Ethnic group (%)				
Abbey	0	0	2	0
Abron	8.33	0	0	0
Agni	4.67	0	0	5.33
Ashanti	0	0	3.33	0
Attie	2	0	0	0
Baoule	2	0.67	0	1.33
Nafana	6	0	0	0
Degah	0	1.33	0	5.33
Ebrie	1.33	0	0	0
Guere	0	0	0	2
Koulango	50.33	75.33	94.67	78
Lobi	1	20.67	0	0
Malinke	9	0	0	8
Mossi	3	0	0	0
Senoufo	3.33	2	0	0

n is the number of respondents

Figure 2: Knowledge level of "conôro" in studied localities

n is the number of respondents

3.1.3. Knowledge level of "conôro" according to the age

For analysis of the survey results, four age groups were defined, namely: 12 to 17 years, 18 to 44 years, 45 to 64 years and 65 years or over (Table 2). The statistical test (Chi-square) showed a significant different in knowledge level of "conôro" between groups discriminated and studied localities (p <0.05). Aged people 65 years and over ($\geq$ 65 years) showed the highest knowledge level of "conôro" with proportions ranging from 85.7 to 100 % in all the studied localities.

Table 2: Knowledge level of "conôro" according to the age

Localities	Age groups	Knowledge of "conôro" (%)		Chi-square parameters		
		Yes	No	dl	χ^2	p
Bondoukou (n=150)	[12; 17]	57.1	42.9			
	[18; 44]	76.4	23.6			
	[45; 64]	84.6	15.4			
	$\geq$ 65	85.7	14.3			
Laoudi-Bâh (n=150)	[12; 17]	71.4	28.6			
	[18; 44]	89.2	10.8			
	[45; 64]	92.3	7.7			
	$\geq$ 65	92.9	7.1	15	59.49	< 0.05
Kouassi N'dawa (n=150)	[12; 17]	71.4	28.6			
	[18; 44]	96.4	3.6			
	[45; 64]	100	0			
	$\geq$ 65	100	0			
Yezimala (n=150)	[12; 17]	72.7	27.3			
	[18; 44]	88.6	11.4			
	[45; 64]	96.8	3.2			
	$\geq$ 65	100	0			

n is the number of respondents, dl is the degree of freedom, χ^2 is the chi-square, p is the probability

3.1.4. Knowledge level of "conôro" according to the ethnic groups

The knowledge level of "conôro" differs according to the ethnic groups of the respondents. Study showed that "conôro" is more known by Koulango (96.8 to100 %) and followed respectively by Degah, Malinke, Nafana, Lobi and Abron (Table 3). The Chi-square test (χ^2) is significant at the 5 % confidence level ($p < 0.05$) in all studied localities.

3.1.5. Use level of "conôro" in the studied localities

The use level of "conôro" in different localities is shown in Figure 3. The results showed that use level of "conôro" is high in all studied localities. However, the localities of Kouassi N'dawa, Yezimala and Laoudi Bâh have a highest use level compared to Bondoukou locality. The chi-square test (χ^2) showed significant correlation between the use of "conôro" and the studied localities (p <0.05).

Table 3: Knowledge level of "conôro" according to the ethnic groups

Localities	Ethnic groups	Knowledge of *conôro* (%)		Chi-square parameters		
		Yess	No	dl	χ^2	P
Bondoukou	Abron	57,1	42,9			
	Agni	4,3	95,7			
	Attie	0	100			
	Baoule	3,3	96,7	24	73.11	< 0.05
	Nafana	77,8	22,2			
	Ebrie	0	100			
	Koulango	96,8	3,2			
	Lobi	73,3	26,7			

	Malinke	81	19
	Mossi	10,7	89,3
	Senoufo	8,5	91,5
Laoudi-Bâh	Baoule	0	100
	Degah	100	0
	Koulango	97,3	2,7
	Lobi	74,2	25,8
	Senoufo	0	100
Kouassi N'dawa	Abbey	0	100
	Ashanti	12	88
	Koulango	100	0
Yezimala	Agni	25	75
	Baoule	0	100
	Degah	75	25
	Guere	0	100
	Koulango	100	0
	Malinke	66,7	33,3

n is the number of respondents, dl is the degree of freedom, χ^2 is the chi-square, p is the probability
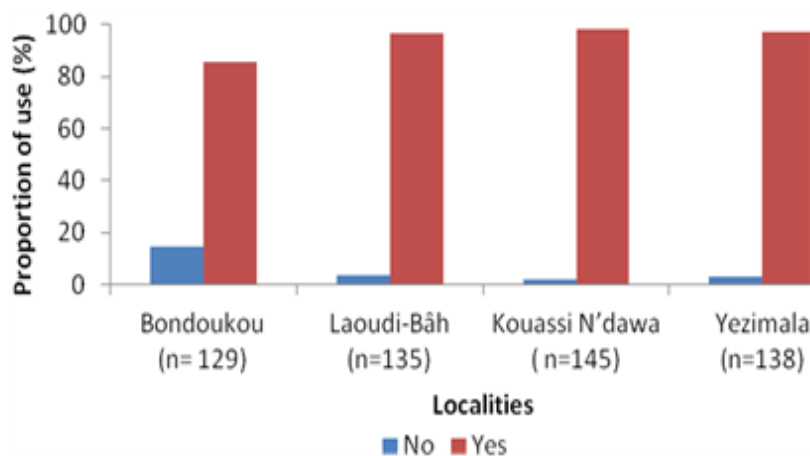

Figure 3: Use level of "conôro" in studied localities

n is the number of respondents

3.1.6. Uses of "conôro" in localities
The results of survey revealed dual uses of "conôro" in all studied localities including food and therapeutic (Table 4). For food's used, "conôro" is used in households for cooking and seasoning of sauces with consensus indices (ICF) of 0.92 and 0.08 respectively. In therapy, "conôro" is used in four forms. The form in which it combined with other traditional remedies is the most important with ICF of 0.46.

Table 4: Uses of "conôro" in studied localities

Uses of "conôro"	Localities				Total	ICF
	Bondoukou (n=110)	Laoudi-Bâh (n=130)	Kouassi N'dawa (n=142)	Yezimala (n=134)		
Food uses						
Seasoning of sauces	103	113	130	128	474	0.92
Preparation of sauces	7	17	12	6	42	0.08
Therapeutic uses						
Addition to traditional remedies	70	88	51	27	236	0.46
Addition to fruit extract of *Coelocaryon oxycarpum*	12	14	28	20	73	0.14
Addition to leaves decoction of *Jatrofa sp*	28	28	63	72	191	0.37
Addition to salt solution	0	0	0	15	15	0.03

ICF is the consensus factor index; n is the number of respondents who use "conôro"

3.1.7. Therapeutic virtues of "conôro" in studied localities

At the end of this survey, it appears that "conôro" is used for several diseases treatment such as malaria, diabetes, blood pressure, pain of throat, nausea, stiffness, and abdominal pains after childbirth. IFC values are ranged from 0.01 to 0.33. The highest values were obtained for abdominal pain treatments after childbirth (ICF = 0.33) and blood pressure regulation (ICF = 0.19).

Table 5: Therapeutic virtues of "conôro" in studied localities

Therapeutic virtues of"conôro"	Localities				Total	ICF
	Bondoukou (n=110)	Laoudi Bâh (n=130)	Kouassi N'dawa (n=142)	Yezimala (n=134)		
Antimalarial	8	7	0	21	36	0.07
Aperitif	12	15	21	0	48	0.09
Antidiabetic	6	0	0	0	6	0.01
Regulator of blood pressure	52	7	9	32	99	0.19
Treatment of throat pain	4	0	0	0	4	0.01
Treatment of abdominal pain after childbirth	28	47	55	42	172	0.33
Removal of nausea	0	33	7	8	48	0.09
Suppression of alcohol effect	0	5	18	0	23	0.04
Tonic	0	6	16	11	33	0.07
Treatment of body aches	0	5	0	0	5	0.01
Pregnancy keeping	0	5	0	0	5	0.01
Favorable to lactation	0	0	3	5	8	0.01
Anti diarrhea	0	0	13	15	29	0.06

ICF is the consensus factor index; n is the number of respondents who use "conôro"

3.1.8. Different varieties of "conôro"

The investigations revealed seven types of "conôro" obtained from baobab, kapok tree and okra seeds in all the localities studied (Figure 4). The results showed that "conoro" obtained without combination of seeds had the highest proportions from 23.70 to 29.5 % and from 21.61 to 37.11% respectively for CB and CK, against "conôro" (CG) formulated from okra seeds (7.5 to 11.15%). However, the mixed "conôro" obtained by combining baobab and kapok tree seeds (C.BK),

expressed a proportion from 16.11 to 21.18 % close to "conôro" without seeds combination. The chi-square test (χ^2) shows that the use of the "conôro" is independent of study locality ($p > 0.05$).
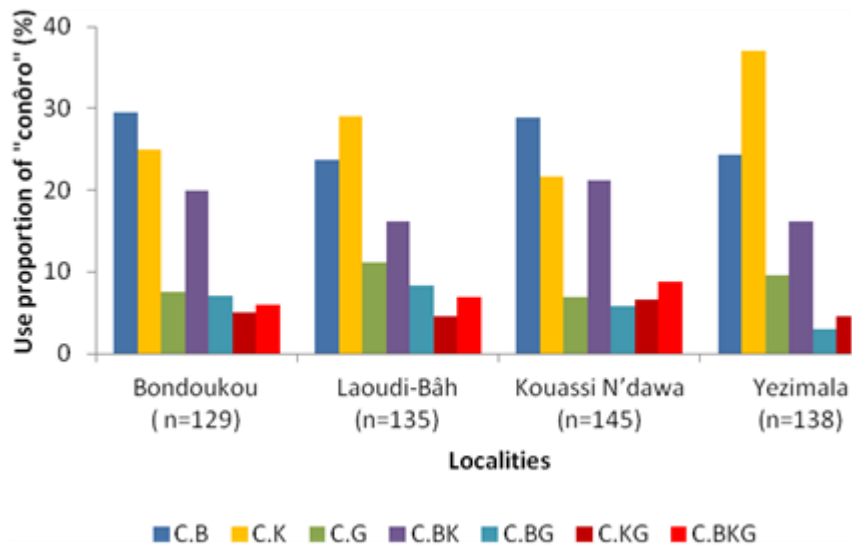

Figure 4: Proportion of various types of "conôro" in studied localities

C.B: "conôro" manufactured from baobab seeds; C.K: "conôro" manufactured from kapok tree seeds; C.G: "conôro" manufactured from okra seeds; C.BK: "conôro" manufactured from baobab and kapok seeds; C.BG: "conôro" manufactured from baobab and okra seeds; C.KG: "conôro" manufactured from kapok tree and okra seeds; C.BKG: "conôro" manufactured from baobab, kapok tree and okra seeds;, n: Number of respondents knowing "conôro"

3.1.9. Manufacturing process of "conôro"
The results revealed many manufacturing steps of the "conôro" (Figure 5). The steps include cleaning, washing, pounding, sieving, drying, moulding. The Chi-square test (χ^2) revealed that there is no significant difference between the different manufacturing process of localities ($p > 0.05$).
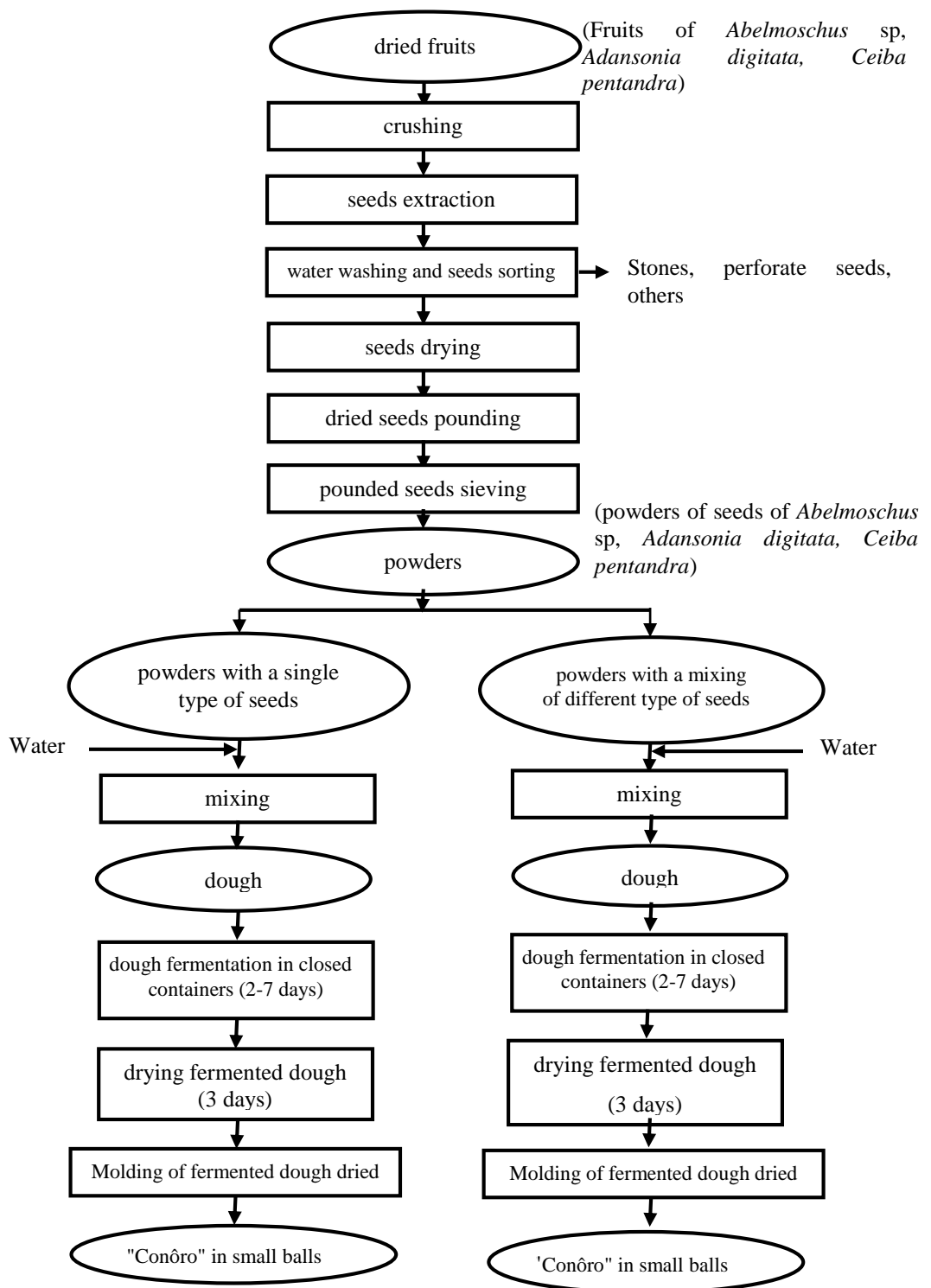
dried fruits — (Fruits of *Abelmoschus* sp, *Adansonia digitata, Ceiba pentandra*)

crushing

seeds extraction

water washing and seeds sorting → Stones, perforate seeds, others

seeds drying

dried seeds pounding

pounded seeds sieving

powders — (powders of seeds of *Abelmoschus* sp, *Adansonia digitata, Ceiba pentandra*)

Left branch:

powders with a single type of seeds

Water →

mixing

dough

dough fermentation in closed containers (2-7 days)

drying fermented dough (3 days)

Molding of fermented dough dried

"Conôro" in small balls

Right branch:

powders with a mixing of different type of seeds

← Water

mixing

dough

dough fermentation in closed containers (2-7 days)

drying fermented dough (3 days)

Molding of fermented dough dried

'Conôro' in small balls

Figure 5: Traditional manufacturing process of "Conôro"

3.1.10. Fermentation time of dough obtained from seed powders for the production of "conôro"

Table 6 shows the different fermentation times ranging from 2 to 7 days. Among all of them, fermentation over 3 day is found to be the most used time in all studied localities giving proportions ranging from 64.08 to 78.55%. The chi-square test (χ^2) shows that the fermentation time is related the study locality ($p < 0.05$).

Table 6: Fermentation time of the dough from the seed powders in the manufacture of "conôro"

Localities	Fermentation time (%)						Chi-square parameters		
	2 days	3 days	4 days	5 days	6 days	7 days	dl	χ^2	p
Bondoukou (n=62)	8.01	64.08	11.21	9.61	4.81	2.27			
Laoudi-Bâh (n=113)	5.31	68.14	9.73	7.96	5.31	3.54	15	31.98	< 0.05
Kouassi N'dawa (n=127)	4.72	76.38	6.30	6.30	3.94	2.35			
Yezimala (n=115)	2.86	78.55	8.58	4.29	4.29	1.43			

n is the number of respondents who know how to make conôro; dl is the degree of freedom, χ^2 is the the Chi-square, p is the probability

3.1.11. Sale price of "*conôro*" in the studied localities

In all localities, "conôro" is marketed in the dumpling form which weigh is between 20 and 70 g. Its sale price is from 25 to 100 F CFA (Table 7). However, the price fixed at 50 F CFA is the most used by respondents (49.09 to 60%), followed 25 F CFA (17.65% to 40%) and 100 F CFA (5.71% to 25%). The chi-square test (χ^2) shows a dependency ratio between the sales price of "conôro" and studied locality ($p < 0.05$)

Table 7: Proportion of the sale price of the "conôro" meatball in the different localities

Localities		Selling price (%)			Chi- square parameters		
		25 FCFA	50 FCFA	100 FCFA	dl	χ^2	p
Bondoukou	(n= 110)	27.27	49.09	23.64			
Laoudi-Bâh	(n=130)	40	54.29	5.71	6	32.05	< 0.05
Kouassi N'dawa	(n= 142)	17.65	57.35	25			
Yezimala	(n= 134)	24.17	60	15.83			

n is the number of respondents who use the "conôro" ; dl is the degree of freedom, χ^2 is the Chi-square, p is the probability

3.1.13. Conservation time of *"conôro"* in the localities

Figure 6 show the most common conservation time practiced by consumers was the ranging from 6 months to 12 months (46.59 - 72.83 %,), followed by times higher 12 months (14.04 to 35.54%) and that between one month and five months (13.13 to 20.47 %). In addition, the chi-square test (χ^2) revealed a link between the conservation time of the "conôro" and the studied locality ($p < 0.05$).
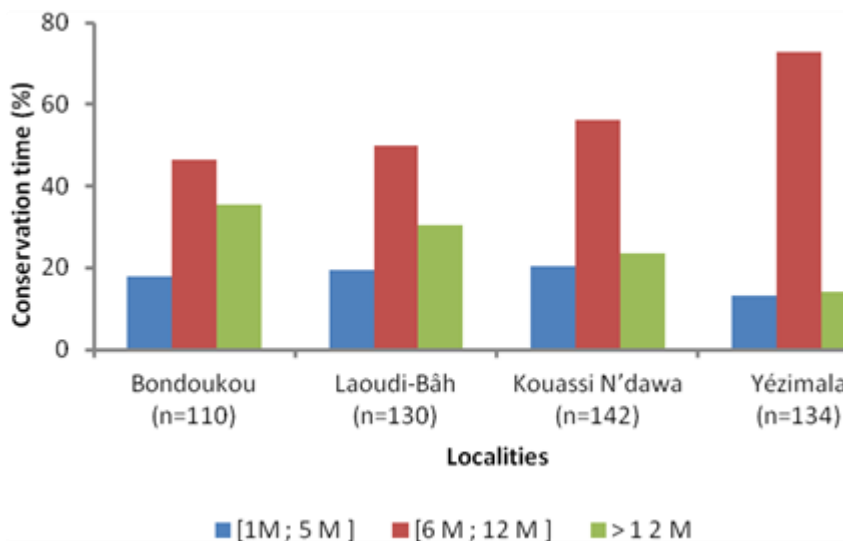
Figure 6: Conservation time of "conôro" in study localities

[1 M; 6 M [: Shelf life between 1 month and 5 months; [6 M; 12 M]: Shelf life between 5 months and 12 months; > 12 M: Shelf life longer than 12 months; n: Number of respondents who use "conôro"

4. DISCUSSION

"Conôro" is the common name given to all traditional fermented condiments based on vegetable seeds (*Abelmoschus* sp, *Adansonia digitata, Ceiba pentandra*) which have the same manufacturing processes. The ethno-nutrition survey carried out on this condiment among the populations of Bondoukou department (North-Eastern Côte d'Ivoire) allowed to get data on the manufacturing process, food and therapeutic uses, therapeutic virtues, the economic aspect and the conservation time. It also took account the socio-demographic characteristics of the respondents.

The high proportion of people between 18 and 44 years (54.5%) indicates the youthfulness of the population in the study area. Indeed, the results of the 4th general census of population and housing (RGPH, 2014) reveal that Côte d'Ivoire has 23 million inhabitants. This population is relatively young and unevenly distributed in the country with a proportion of 36.2% whose age varies between 15 and 34 years. In addition, the characteristic of the young population is confirmed in several African countries (Gendreau, 1993; Garenne, 2011). Regarding to gender, the high frequency of women (57 to 70 %) shows real involvement of these women in livelihoods of the housekeeping. During survey, most men let their wives answer the questionnaires. In sub-Saharan Africa, traditional skills are usually held by women. The expertise of these women is also recognized in the production of shea butter (Elias and Carney, 2007, Saussey *et al.*, 2008). Among ethnic groups, the Koulango recorded the highest proportion (50.33 to 94.67 %). The indigenous populations of the Bondoukou department are Gbin, Koulango, Abron, Nafana, Déga and Lobi. Ethnobotanical surveys of edible wild plants carried out by Ouattara *et al.* (2016) in the same studied localities indicated Koulango as the majority indigenous ethnic group.

The results of the survey revealed that 86 to 96.67% of the interviewees know perfectly the "conôro" against 3.3 to 14% who don't know it. However, the knowledge level of "conôro" has varied according to age and ethnic group. Among the ethnic groups, Koulango achieved the highest level of knowledge (96.8 to 100%). This is due to the fact that consumption of "Conôro" is an integral part of the Koulango's eating habits. Old people (65 years and over) have a higher knowledge level

than young people (85.7 to 100%) in all studied localities. This is congruent with previous findings relative to species knowledge in rural communities within the semi-arid region of Brazil (Arévalo-Marín *et al*., 2015) and wild edibles used by the Naxi in Baidi Village of northwest Yunnan province (Geng *et al*., 2016). Our findings can be justified as knowledge transmission through generations, which is facing a progressive vanishing with the slow demise of old people, as reported by Geng *et al*. (2016). A difference occurring between generations could be linked on one hand to the mode of use and on the other hand to the therapeutic virtues of the "conôro" of which the old people would have more accumulated knowledge than the young people.

The high use level of "conôro" by the respondents in all studied localities (85.27 to 97.93%) is explained by their eating habit. This observation is confirmed by Ouali-N'goran *et al*. (2018) who reported that insect consumption in Côte d'Ivoire is an eating habit for ethnic groups Krou and Mandé. Surveys showed dual use of "conôro" included food and therapeutic. Indeed, the food and therapeutic use product is one of basic human needs. This corroborates the works of Séguéna *et al*. (2013) who showed that the populations of Bingerville in Côte d'Ivoire rely heavily on both food and medicinal plants in their habits. The North - East of Côte d'Ivoire is one of the regions where population lives in poverty. This has led many households to explore food and health options based on local products. Nutritional and health importance associated with feeding has been reported also by several authors on fruit trees (Okullo *et al*., 2004; Gouwakinnou *et al*., 2011) and fermented seeds of *Parkia biglobosa* (Sackey and Kwaw, 2013; Biobaku *et al*., 2017).

In terms of food uses, "conôro" used in the form of seasoning is well known to the population (ICF > 0.5). According to the respondents, the "conôro" allows to raise the taste of the sauces accompanying their basic dishes. This form of use (sauces seasoning) is in accordance with that of (Chadare *et al*., 2008; Parkouda *et al*., 2008; Kpikpi *et al*., 2014; Fatoumata *et al*., 2016) respectively for condiments Tayohounta (fermented kernels of *Adansonia digitata*), Bikalga (fermented seeds of *Hibiscus sabdariffa*), kantong (fermented seeds of *Ceiba pentandra*) and soumbara (fermented seeds of *Parkia biglobosa*). Sauces consumed with staple foods are an essential component of the diet. Indeed, staple foods provide the calories but are poor in other nutrients. Soups are the one of the ways to improve the diet (Achi, 2005).

In therapy, "conôro" is combined with other natural's substances to the specific treatment. The different combinations performed show many pathologies that "*conôro*" can cure. The survey show that "conôro" is used for its therapeutic virtues. The health is a factor that greatly influences the choice of foods to consume. Many interviewed consumers of "conôro" have recognized the following virtues: antimalarial, antidiabetic, blood pressure regulator, throat treatment, treatment of abdominal pain after childbirth, suppression of nausea, suppression of alcohol, invigorating, treatment of body aches, maintenance of pregnancy, favorable to lactation, anti diarrhea and appetizer. All these virtues recognized by "conôro" could classify it as a functional food. Studies conducted on other condiments and species with significant socio-economic value in the sub-region confirm these findings (Fandohan *et al*., 2010; Kim *et al*., 2016; Najafi *et al*., 2016; Monyn *et al*., 2016). The study conducted among the populations revealed seven types of "conôro". They are obtained by combination or not of different seeds. The seeds used for "conôro" manufacturing are those of baobab (*Adansonia digitata*), kapok tree (*Ceiba pentandra*) and okra (*Abelmoschus sp*). These raw materials are used to create the different varieties of "conôro". Similar fermented condiments have already been studied. Indeed, "Ogiri" is the name used by Igbos for the traditionally prepared fermented condiments based on melon seeds (Citrullus vulgaris), fluted pumpkin (Telferia occidentallis) and castor oil seeds (Ricimus Communis) (Ojukwu *et al*., 2013). The high proportions of "conôro" obtained from boabab and kapok tree seeds (23.70 to 29.5% and 21.61 to 37.11%) show the availability of these seeds in study areas. It should be noted that baobab and kapok tree seeds are used in the same way as nere (*Parkia Biglobosa*) and melon *(Citrullus vulgaris)* seeds for the most part in the production of fermented condiments (Omafuvbe *et al*., 2004; Kpikpi *et al*., 2014, Parkouda *et al*., 2015). On the other hand, low proportion of okra seeds (7.5 to 11.15%) compared

to previous seeds, explained by the fact that okra is usually grown for its tender fruits and leaves used as vegetables in culinary preparations (Çalişir *et al*., 2005).

Information from the respondents on process of "Conôro" in studied localities allowed establishing a general production diagram. The steps of production included cleaning, washing, pounding, sieving, fermentation, drying and moulding. Technology of production of «conôro» doesn't require large means for their establishment. Indeed, it has been shown by some authors that these technological steps make it possible to improve the quality of food (Chadare *et al*., 2008; Parkouda *et al*., 2008; Dossou *et al*., 2011).

The investigation showed the fermentation times of "conôro" which between 2 to 7 days. Most used fermentation time is 3 days (64.08 to 78.55%). According to the respondents, this fermentation time of 3 days is the most favorable for development of typical organoleptic characteristics of "conôro" (dark brown color, strong odor, sour taste, smooth texture, soft appearance). The fermentation of three (3) days seeds to obtain food condiments was reported by Achi in 2005 and Enujiugha in 2003. In fact, the microorganisms associated with fermentation have a significant impact on taste, texture, the smell and nutritional value of the fermented food (Visessanguan *et al*., 2006).

"Conôro" is marketed in dumpling form of which the sale price is between 25 and 100 F CFA. The sale price of 50 F CFA the dumpling is most know by the surveyed people (49.09% to 60%). For this purpose "conôro" is accessible condiment to all social classes because of its low selling price. In addition, these prices are in line with those applied to the sale of afitin (soumbala), Toyohounta, Ubga and Bikalga condiments respectively obtained from the fermentation of Parkia biglobosa seeds, Adansonia digitata, Pentaclethra macrophylla Benth and Hibiscus sabdariffa (Chadare, 2010; Akintan *et al*., 2013; Hongbete *et al*., 2017). Concerning the conservation time of conôro, results of the investigation indicate that it is conserved more on period of 6 to 12 months (46.59 to 72.83%). According to Assogbadjo *et al*. (2004), valorization of a food product depends on its conservation capacity for use over time.

5. CONCLUSION AND RECOMMENDATION

Consumption surveys conducted in Bondoukou revealed that the "conôro" is made from seeds of baobab (*Adansonia digitata*), kapok tree (*Ceiba pentadra*) and okra (*Abelmoscus sp*). These seeds are used either single or combined for the manufacturing. "Conôro" is used, for food and medicinal treatment by the people. In traditional medicine, it is more used to fight against hypertension and abdominal pains after childbirth. In addition, its shows an economic interest for various actors involved in the production and marketing activity. Depending to knowledge level, Koulango and people over 65 years old were majority.

However, the knowledge level of "conôro" related to the age whose elders had perfect acquaintance, could lead to its long-term decline if no decision regarding its sustainability is not took. Indeed, in agricultural sectors diversification context to improve living conditions of the populations and to contribute the resolution of food insecurity problems, all knowledge related to "conoro" remains fundamental for its valorization.

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