

Original Research Article

Local foods based on baobab pulp (*Adansonia digitata* L.) consumed in savannah areas of northern Côte d'Ivoire

ABSTRACT

The African baobab (*Adansonia digitata* L.) is an indigenous fruit tree associated with the Savannah drylands of sub-Saharan Africa. It is a specie of great food and nutritional inter. The pulp of this fruit in addition to being eaten raw or in cold drinks, is also used in the composition of several unknown foods. In order value or promote these foods, this study was undertaken to identify the dishes integrating baobab pulp into their formulations and categorize their consumption practices. Thus, a household survey carried out in rural populations of the departments of Korhogo, Séguéla and Bouna with 135 people per zone to determine the modes, forms and frequencies consumption of these foods. Data revealed that consumers collect baobab in pods form (79.23-88.81 %) in field (76.15-86.57 %) before extracting pulp to make foods. Baobab pulp is used in the preparation of ten (10) local foods where 8 are meals and 2 are drinks or beverages (*Zoom-koom* and *Séladji*). Among Ivorian consumers, no specific foods appear depending on department except *Kagbèlè* (Korhogo) and *Séla biscuit* (Séguéla). The frequencies of consumption of these local foods varied from less than 1 to 4 times per month where *Sougé-baca* (meal) appeared the best known and the most consumed food with 68.39 % of knowledge by consumers and 4 times/month as a consumption frequency. Foods based on baobab are consumed either for breakfast or during Muslim Lenten break. Generally, rural populations used the pulp of baobab in foods for the taste and the health benefit. Therefore, to a better promote of these foods, it is essential to determine their biochemical composition.

Keywords: *baobab, pulp dishes, household survey, consumption practices, biochemical composition, Côte d'Ivoire.*

1. INTRODUCTION

The African baobab (*Adansonia digitata* L.) is the best known of the eight species of baobabs (genus *Adansonia*). The African baobab commonly called Sira or gimme, respectively in the Malinké and Senufo ethnic groups of Côte d'Ivoire, is most often found in the Sahelian, Sudano-Sahelian and Sudanian regions (Wickens, 1982; Sidibe and Williams, 2002). This plant is a natural resource belonging to the family Bombacaceae, according to the classical classification, or Malvaceae, according to the phylogenetic classification. The fruit of this species is of great food and nutritional interest in Africa (Kebenzikato et al., 2014; Assogbadjo et al., 2011; and Nour et al., 1980). Baobab pulp is a good source of vitamins (A, B1, B2, B6 and C), minerals (Cu, Fe, Na, P, K, Mg and Ca) and phenolic compounds (catechins, tannins, polyphenols and flavonoids). It can therefore reduce the rate

of dietary deficiencies given its nutritional richness. While Ivory Coast records food deficiencies of up to 40% for global acute malnutrition and more than 5% for severe acute malnutrition, in some areas of the country [6, 7, 8, 9]. Therefore, the exploitation of this product would contribute directly to the nutritional well-being of the populations. However, foods derived from this fruit are little known by the population. The pulp of this fruit is consumed raw or used for the preparation of cold beverages or is used in the composition of several other foods [10, 11, 12]. However, it is mainly in the forms of cold drinks (Siradji) that baobab pulp is widely encountered and consumed. Unfortunately, most of the data available in Ivory Coast on the pulp of this wild fruit tree only concern this ethnobotanical knowledge and its nutritional value [10, 12, 13]. Only a few recent studies [14,15] have focused on the juices or nectars of

this fruit among all baobab-based dishes. To our knowledge, no study in Côte d'Ivoire has yet identified cereal dishes incorporating baobab pulp into their preparation. In view of this situation, the optimization of the level of knowledge of natural resources is necessary in order to contribute to rational exploitation. The main objective of this study is to contribute to the knowledge of local dishes derived from baobab pulp, in the savannah areas of northern Côte d'Ivoire. More specifically, it will be a question of identifying the perception of the populations of the savannah zones and of describing the manufacturing processes of local dishes based on baobab pulp.

2. MATERIAL AND METHODS

2.1 Materiel

The biological material consisted of baobab pulp (*Adansonia digitata*. L) commonly consumed in the north of Côte d'Ivoire. A questionnaire containing consumption practices information (modes, forms and frequencies of consumption,

supplemented by the production process) of baobab pulp-based dishes was also used.

2.2 Methods

2.2.1 Selection of the departments and villages

According to [12] [and [15], the wild fruit tree *Adansonia digitata* L. is widely distributed and consumed in the departments of Korhogo, Séguéla and Bouna. Thus, the consumption survey was carried out in 3 villages of each different department after a pre-survey based on the consumption of baobab pulp and the easy access. So, the villages of Nahouokaha, Lataha and Kotchiéri (Korhogo), Sifié, Sélakoro and Bobi (Séguéla), and Niandégué, Bouko and Panzarani (Bouna) were surveyed.

2.2.2 Sampling

The selection of households was made by the snowball technique. The size (n) of the households surveyed was calculated according to formula described by [16] for an independent non-exhaustive sample

based on Côte d'Ivoire Population and Housing Census [17].

$$n = t^2 \cdot \frac{p \cdot (1 - p)}{m^2}$$

n = minimum sample size sought; t = 95% confidence level (standard value of 1.96); P = proportion of consumers in the study area; p estimated at 50 % given the lack of

knowledge of the number of households consuming wild fruit trees; m = margin of error at 5%.

To compensate errors of items incorrectly filled, 20 households were added in each department. Thus, 405 households were surveyed, i.e. 135 per department (Table 1).

Table 1. Households surveyed by department and village

Departements	Village	Surveyed	Total
Korhogo	Nahouokaha	48	135
	Lataha	51	
	Kohotiéri	36	
Séguéla	Sifié	41	135
	Sélakoro	44	
	Bobi	50	
Bouna	Niandégué	18	135
	Bouko	62	
	Panzarani	55	
Total		405	

2.2.3 Data treatment

Survey data were analyzed using SPHINX Plus² (V5) software. Recoding was

performed on the SPSS 20.0 software to establish the database and then transferred to the EXCEL 2016 spreadsheet. The data

were grouped in tabular form and the percentages of the different parameters were calculated. Descriptive statistics and statistical analyses were performed using the XLSTAT version 7.5 statistical software and the EXCEL 2016 spreadsheet. Descriptive statistics made to translate data into graphs, averages and standard deviations. Excel software was used to graph periods, consumption frequencies and the level of knowledge of food. Comparisons between dependent variables were determined by the Khi-2 test and the Z test at the 5% threshold. Factor component analyses (CFAs) were performed for comparisons of variables with more than three modalities.

3. RESULTS

3.1 Socio-demographic characteristics of the households surveyed

The socio-demographic profile of the surveyed population indicated that 95 % of the respondents in households are woman compared to 5 % of man, and a large majority of them (78.51%) is illiterate. The age of consumers is between 16 and over 50 years with 8.39% aged 16 to 20 years and 31.11% for the age groups from 21 to 35 years. People aged 36 to 50 make up 32.34% of consumers of wild fruit and those over 50 years of age represent 28.18% of this population. The respondents are composed of 84.94% of Ivorians and 15.06% of non-Ivorians. Consumers are composed of 88.99% married, 10.12% single and 8.89% widowed (Table 2).

Table 2. Socio-demographic characteristics of consumers

Characteristics	Bouna	Korhogo	Séguéla	Total
Sex ratio (M/F)	0.05	0.08	0.02	0.05
Level of education (%)				
Primary	15.56	6.67	5.93	9.38

Secondary	8.89	8.89	11.11	9.63
Upper	1.48	5.18	0.74	2.47
None	74.07	79.26	82.22	78.51
Origin (%)				
Ivorian	65.93	100	88.89	84.94
Non-Ivorian	34.07	0	11.11	15.06
Age group (Years) (%)				
[16-35[48.15	26.67	43.70	39.51
[36-50]	31.11	37.04	28.89	32.34
>50 years	20.74	36.30	27.41	28.15
Marital status				
Married	81.48	77.04	84.44	80.99
Widowers	8.15	12.59	5.93	8.89
Single	10.37	10.37	9.63	10.12

3.2 Consumption characteristics of baobab

3.2.1 Location and form of baobab acquisition

The forms of baobab procurement or collection vary according to the department (Table 3). The most collected form is in pods with a proportion of 79.23% (Bouna), 81.15% (Séguéla) and 88.81% (Korhogo).

The second and third collected forms are

powder (16.42-24.59%) and pulp (1.64-5.97%). For household use, the consumers collect baobab mainly from fields in Korhogo (86.57%), Séguéla (79.51%) and Bouna (76.15%) (Table 4).

Table 3: Forms of baobab collected

	Bouna	Séguéla	Korhogo
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Pulp (%)	0.00 ^a	1.64 ^a	5.97 ^a
Powder (%)	20.77 ^b	24.60 ^b	16.42 ^b
Pod (%)	79.23 ^c	81.15 ^c	88.81 ^c
χ^2	197.469	177.787	233.8184
<i>dl</i>	2	2	2
<i>P</i>	< 0.001	< 0.001	< 0.001

The values, at the level of each column, bearing the same letters in superscript are not statistically different.

Table 4. Places of collected baobab

	Bouna	Séguéla	Korhogo
Market (%)	23.85 ^b	27.87 ^b	20.9 ^b
Field (%)	76.15 ^a	79.51 ^a	86.57 ^a
<i>z</i>	-8.43	-8.0884	-10.781
<i>P</i>	< 0.001	< 0.001	< 0.001

The values, at the level of each column, bearing the same letters in superscript are not statistically different.

3.2.2 Reasons for baobab consumption

The taste is mainly the first reason for baobab consumption in the three departments. Specifically, the baobab pulp is consumed in Korhogo for its health benefits, while in Séguéla it is consumed for its consistency and color (Figure 1).

3.2.3 Baobab dishes identification

Ten (10) baobab dishes appeared in the three departments visited (Korhogo,

Séguéla and Bouna). Dishes such as *Sougé-baca*, *Badégé-baca* and *Séladji* are common to these localities but their names differ according to department. *Manou-baca*, *Sougé in manou-baca* are consumed only in Korhogo and Séguéla where *Kagbèlè*, *Zoom-koom* and *Bafouratou*, *Tchobal* and *Séla biscuit* are consumed in

Korhogo, Bouna, and Séguéla respectively (Figure 2).

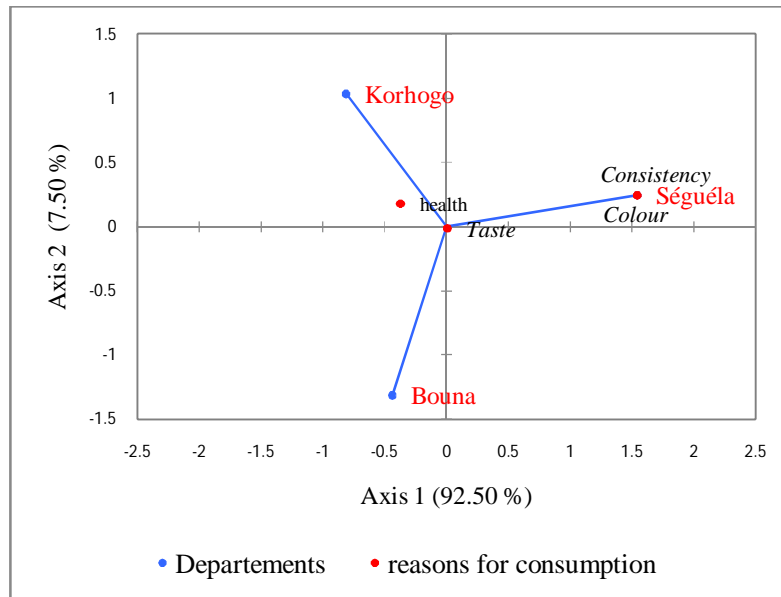
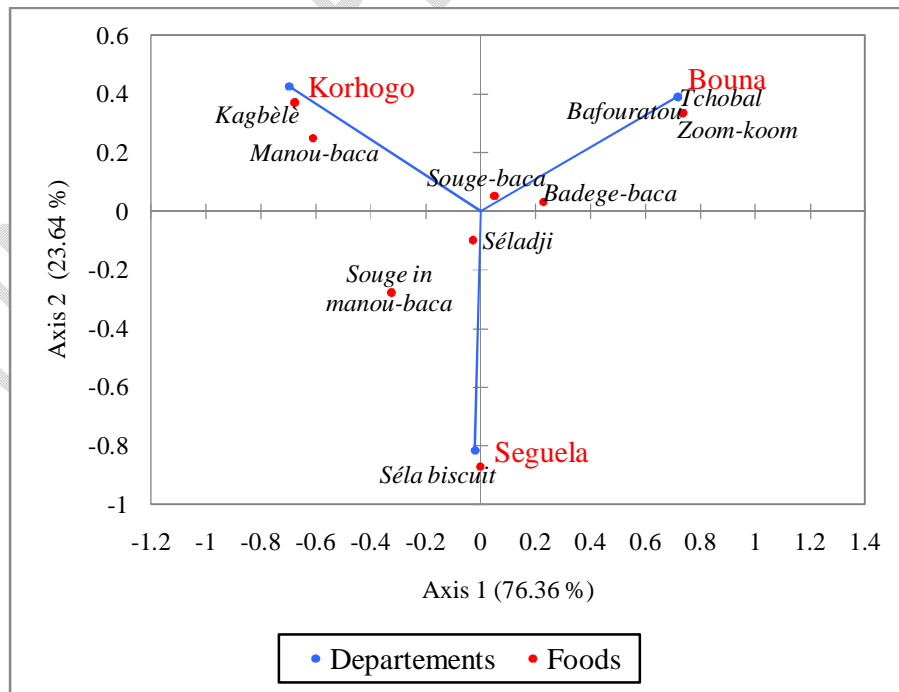


Figure 1. Reasons of baobab consumption by department in a factorial plan



sougé-baca = millet granule porridge; Badégé-baca = corn granule porridge; Manou-baca = rice granule porridge; Sougé in manou-baca = granular porridge of 3/4 mil and 1/4 rice; Séladji = baobab juice; Zoom-koom = cereal juice; Tchobal = bread; Bafouratou= donut ; Kagbèlè = donut; Séla biscuit: baobab caramel.

Figure 2. Baobab dishes representation by department in a factorial plan

3.2.4 Baobab dishes knowledge level

Sougé-baca and *Séladji* are wellknown foods with a proportion of 68.39 % and 53.35 % respectively. With a proportion of

37.29 %, *Badégé-baca* is moderately known where *Manou-baca* is one of the least known food (12.60%) (Table 5).

Table 5. Level of knowledge of baobab dishes

	Korhogo	Séguéla	Bouna	Total	Proportion (%)	Level of knowledge
<i>Sougé-baca</i>	99	68	110	277	68.39	Well-known
<i>Séladji</i>	75	80	61	216	53.35	
<i>Badégé-baca</i>	34	39	78	151	37.29	Moderately known
<i>Manou-baca</i>	46	5	0	51	12.60	Little known
<i>Sougé in manou-baca</i>	22	24	0	46	11.37	
<i>Zoom-koom</i>	0	0	3	3	0.74	
<i>Kagbèlè</i>	2	0	0	2	0.50	
<i>Tchobal</i>	0	0	2	2	0.49	
<i>Bafouratou</i>	0	0	2	2	0.49	
<i>Séla biscuit</i>	0	1	0	1	0.26	

3.2.5 Periods and frequencies of consumption of baobab dishes

Sougé-baca, *Badégé-baca*, *Manou-baca* and *Sougé in manou-baca* are more

consumed at breakfast where *Séladji* is more consumed during the breaking of the Muslim fast (Figure 3). *Sougé-baca* is the most consumed baobab dish with 4 times per month as consumption frequency of).

This dish is followed by *Séladji* and *Badégé-baca* with consumption frequencies of 3 and 2 times per month respectively. *Kagbèlè* is far the least consumed food (Figure 4

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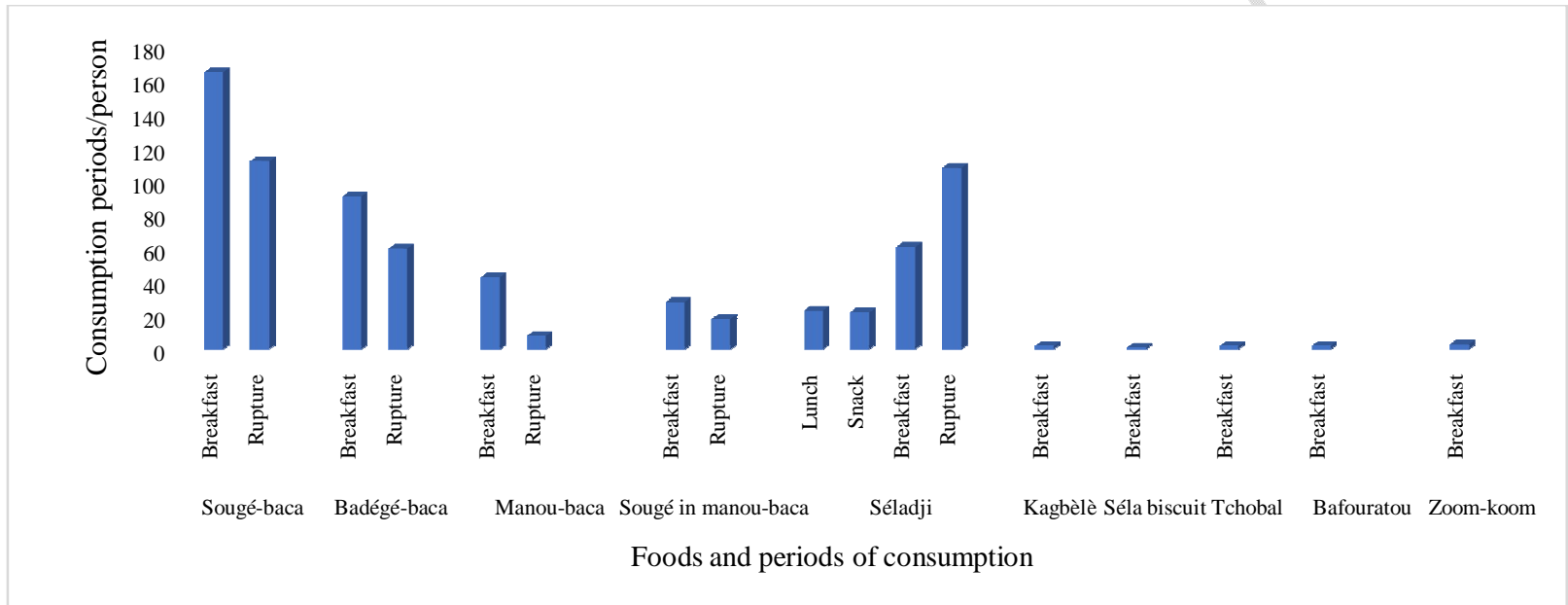


Figure 3. Period of consumption of baobab foods

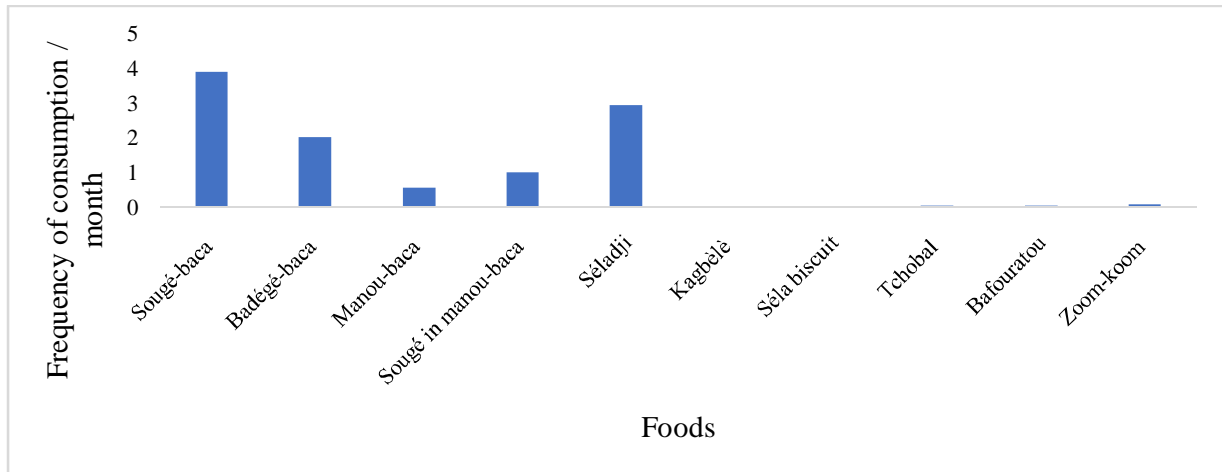


Figure 4. Consumption frequency diagram of baobab dishes

3.3 Production processes of baobab dishes

3.3.1 Production of Bacacrou

Four (4) types of *Bacacrou* exist (*Sougé-baca*, *Badégé-baca*, *Manou-baca* and *Sougé in manou-baca*). The production process of *Bacacrou* varies slightly according to department (Figure 5). A (1) kg of cereal (millet or rice or corn or 3/4 mil + 1/4 rice) is soaked in 3 L of water for 120 min before removing and washing cereal in 3 L of water. After draining, cereal is ground with 100 g of ginger and 20 g of cloves (Bouna) or with 10 to 20 g

of chili pepper (Korhogo) to obtain a flour.

The resulting flour is sifted and sprayed gradually with 100 to 200 mL water to obtain granules, which are dried in the sun or at room temperature for 4 to 5 h. Seven (7) to eight (8) L of water are boiled in a pot and granules are added and mixed to avoid clumping. An amount of 100 g of baobab pulp powder macerated in 0.5 L of water is added gently after 10 to 15 min of cooking and the resulting mixture is left cooking for 10 to 15 min. The sucrose (500 g) and 140 g of vanilla sugar (Bouna) or juice of 30 g of mint leaves (Séguéla) are added 2 min before the end of cooking.

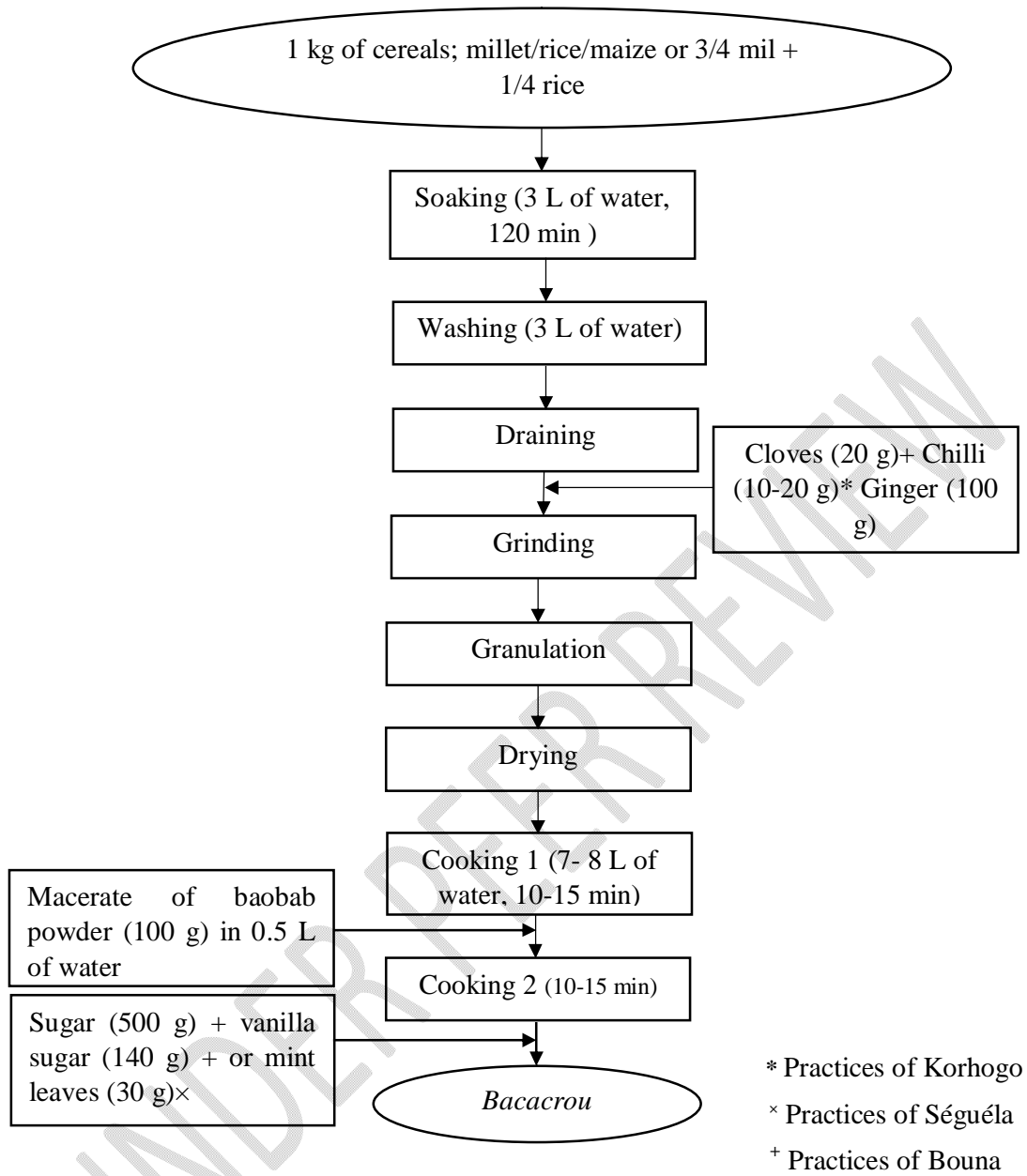


Figure 5. Production diagram of *Bacacrou*

3.3.2 Production of Kagbèlè

In 3 L of water, 1 kg of corn kernels are soaked for 120 min, then washed and removed (Figure 6). The grains obtained are drained and ground into flour with 100 g of chili pepper. An amount of 500 g of

baobab pulp powder macerated in 1.5 L of water and 30 g of salt are added in flour and the whole is kneaded for 10 to 15 min to obtain a consistent dough which is oil-fried into donuts as a cake (*Kagbèlè*).

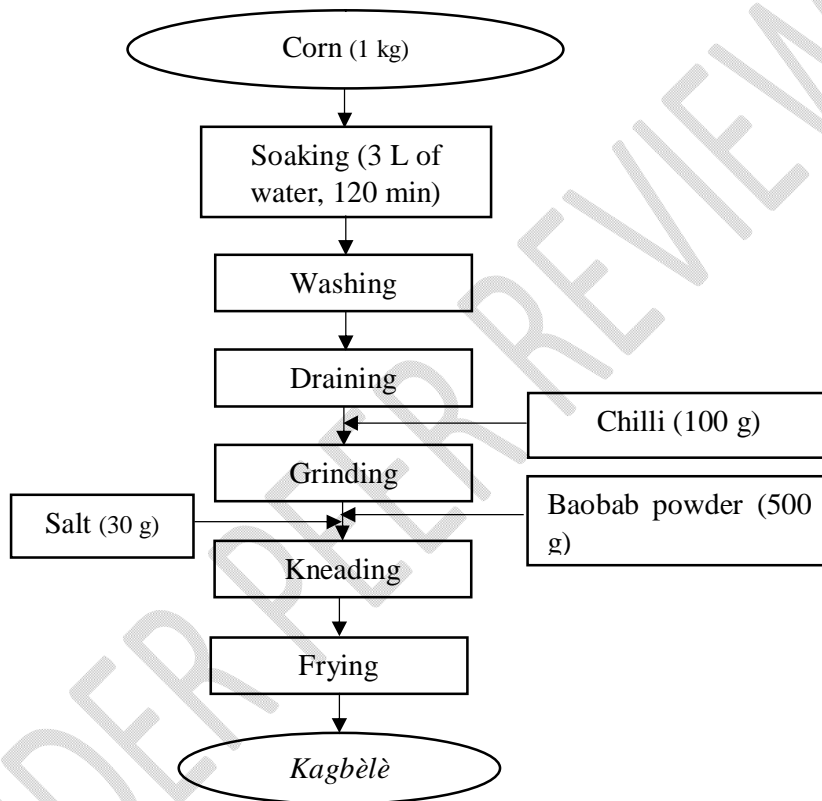


Figure 6. *Kagbèlè* production diagram

3.3.3 Production of Tchobal

Tchobal is a dish baked in an oven with baobab pulp powder and millet (Figure 7). A (1) kg of millet flour is mixed with 500 g of baobab pulp powder and 0.5 g of baking powder to obtain homogeneous flour. Then, a volume of 0.5 L of water is added and the whole is kneaded for 20 min until a baking dough is obtained. The dough is cut into slices of 25-30 g, arranged for 10 to 15 min in bread moulds before baking for 20 to 30 min.

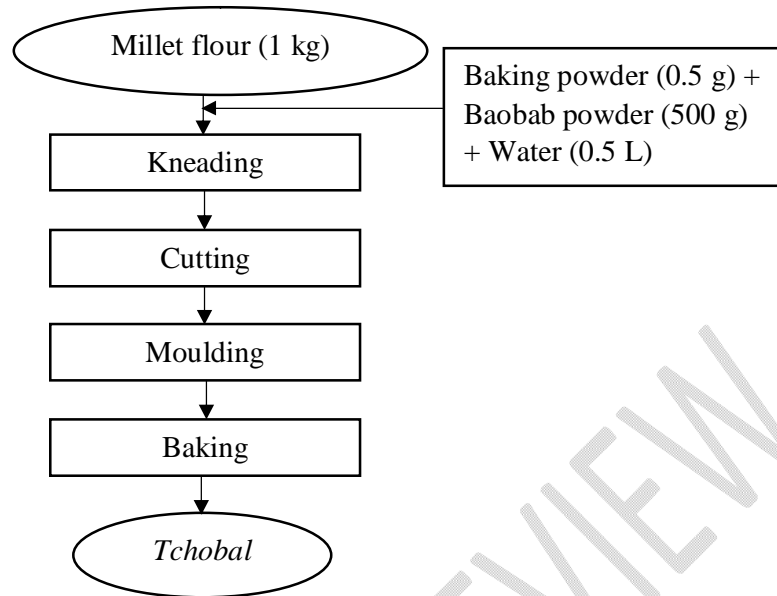


Figure 7. *Tchobal* production diagram

3.3.4 Production of Séla biscuit

To obtain *Séla biscuit* (Figure 8), a mass of 500 g of sucrose dissolved in 0.5 L of water is brought to heat. At boiling, an amount of 0.5 L of sterilized industrial liquid milk is gradually added and the

mixture is constantly stirred for 5 min.

Then, two (2) kg of baobab pulp powder are added and the mixture is homogenized for 5 min by rotational movements. The resulting dough is removed from heat to coolness and cut with a knife into shapes.

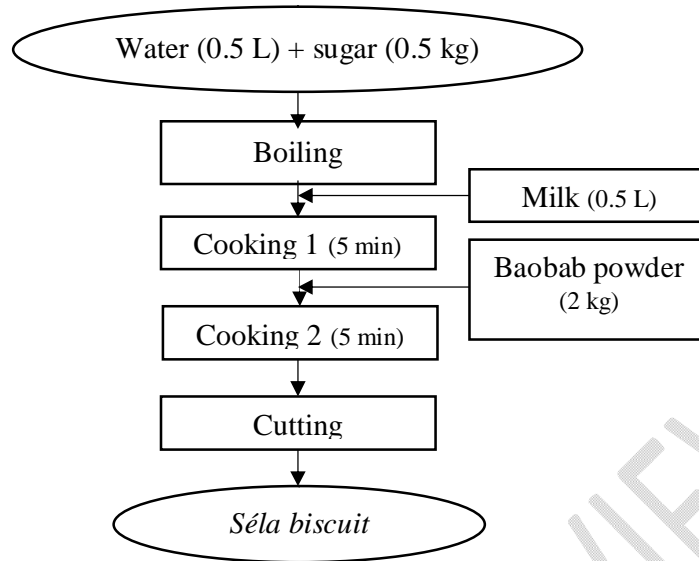


Figure 8. Production diagram of *Séla biscuit*

3.3.5 Production of Bafouratou

A mass of one kilogram of *néré* (*Parkia biglobosa* L.) pulp powder is mixed with 1 kg of baobab pulp powder and 1 kg of millet flour to obtain a homogeneous flour.

A volume of 1.5 L of water is added to the resulting flour and the whole is kneaded by hands for 10 to 15 min to have dough which is oil-fried to obtain donuts as cakes (Figure 9).

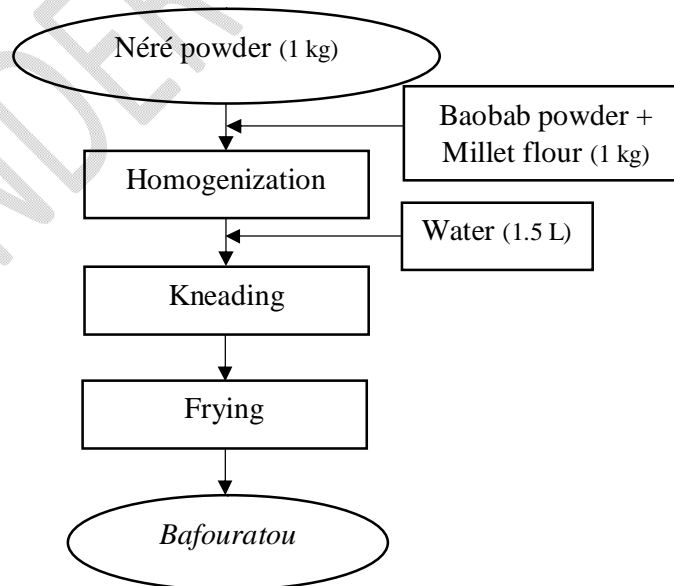


Figure 9. *Bafouratou* production diagram

3.3.6 Production of Séladji

A mass of 1 kg of baobab pulp powder is relayed in 7 L of water. The obtained

solution is filtered, and 1 kg of sucrose and 140 g of vanilla sugar are added for another filtration (Figure 10).

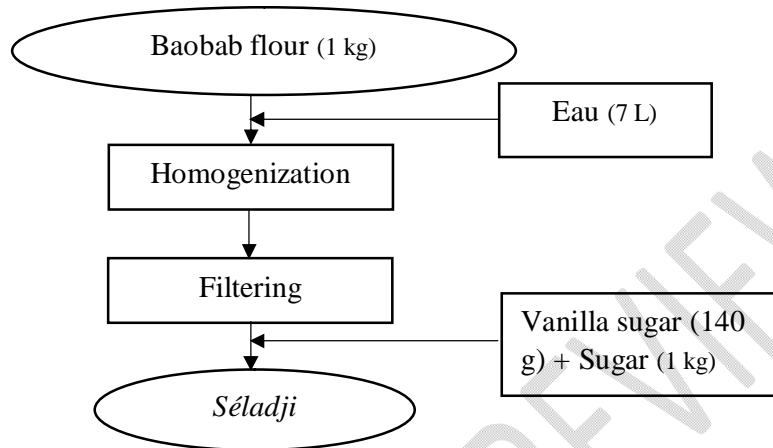


Figure 10. *Séladji* production diagram

3.3.7 Production of Zoom-koom

Zoom-koom is produced from millet flour powder or rice to which baobab pulp is added (Figure 11). One (1) kg of cereal (millet or rice) is soaked in 3 L of water for 120 min before removing and washing in 3 L of water. After draining, the cereals are ground into flour with 200 g of ginger and

50 g of cloves. The flour obtained is sifted and relayed in 10 to 15 L of water for 1 h. Then 100 g of baobab pulp powder are added in 500 of water and the floury solution is homogenized, filtered before adding 2 kg of sucrose and 280 g of vanilla sugar.

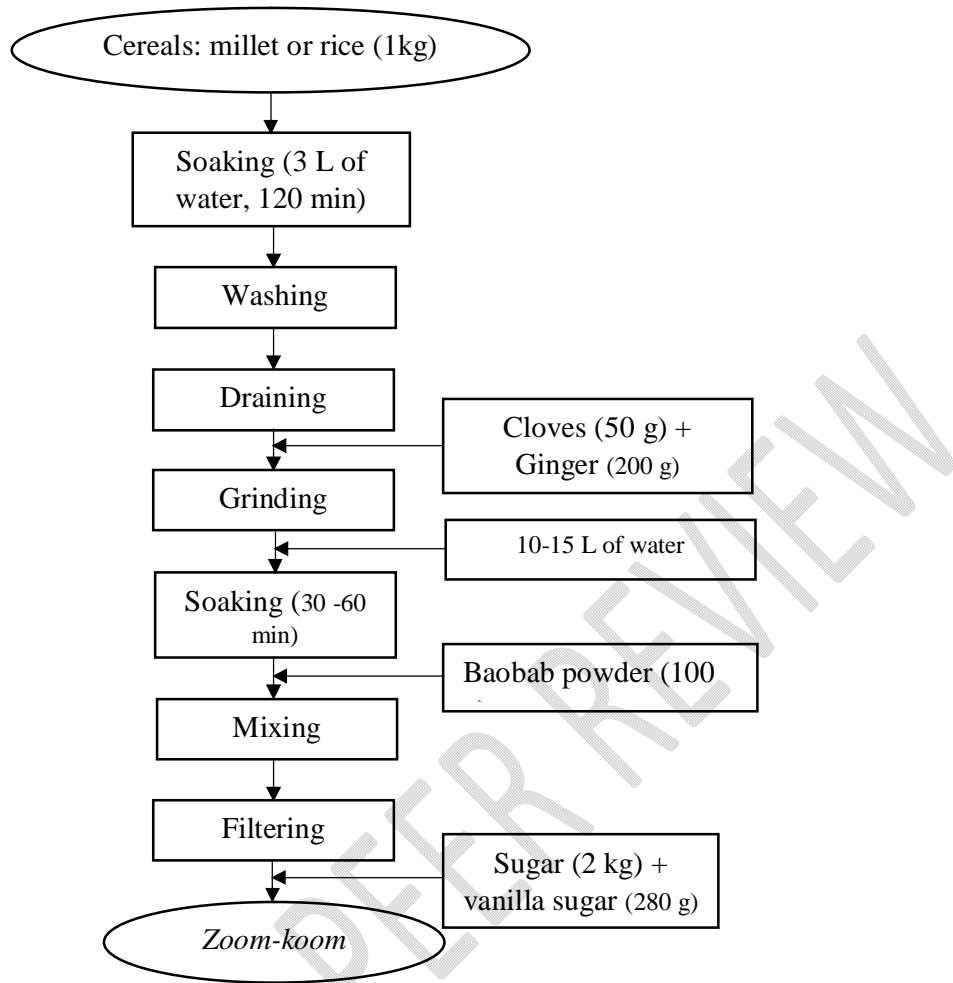


Figure 11. *Zoom-koom* production diagram

4. DISCUSSION

The present study focused on foods made with the pulp of the African baobab fruit (*Adansonia digitata* L) consumed in the savannah areas of northern Côte d'Ivoire. Data showed that consumers investigated in households are mainly woman (95 %). This proportion of woman could be

justified by the rural households' survey and by women cultural habits in the preparation of the traditional dishes in households. [18,19] confirm this hypothesis where they notified that in Côte d'Ivoire as in all African societies, woman performs household tasks and they spend more time on them. Also, [20] showed that

woman's involvement in food tasks by the fact that woman themselves have chosen food work because it is easier or prefer to cook for the respect of quality, cleanliness and for family health.

Ten (10) foods made from baobab (*Adansonia digitata* L) were identified in the departments of Korhogo, Séguéla and Bouna. This diversity of foods produced from this wild fruit justify the importance of baobab in the food security of rural populations. So, the popularization of these foods could contribute to reduce the food insecurity that affects developing countries, particularly in Côte d'Ivoire. According to [21] in the city of Abidjan, 3.8% of households were food secure. Several authors have shown the importance of wild fruits in the human diet. In fact, [22] identified 37 woody species providing food during the lean season by local populations with a fruit use rate varying from 25.5 to 28.8% depending on the locality. [23] confirm that edible wild fruits

are used as adaptation strategies to address the problem of food insecurity.

Baobab pulp is processed to obtain 8 meals and 2 drinks and justify its importance in the diet of local and rural populations. Many researchers [24,25] confirm these findings where they state that wild fruits are generally used as a supplement to diets based on cereals and starches, because of their richness in minerals and vitamins. These various forms of foods (beverages or meals) are consistent with those described by [26,27] who reported that the floury pulp of the baobab fruit can be diluted in a liquid in order to prepare a sweet and refreshing drink. For [28], flour from baobab pulp can be consumed as porridge. Among the 10 foods involved, 3 (*Sougé-baca*, *Badégé-baca*, *Séladji*) are consumed in all of the departments with some small differences in production processes depending on consumers ethnics. The similarity of the consumed dishes could be explained by the interaction between peoples. [29] corroborate this hypothesis

by linking the similarity of knowledge and eating habits between neighboring ethnic groups to exchanges between ethnic groups through inter-ethnic marriages and friendships. However, some specificities of foods consumed exist according to locality and could be related to culture and food habits. [30] asserts that there is a strong relationship between local populations and their environments, so traditional knowledge is transmitted from generation to generation.

The study showed that baobab pulp is more used for foods in Korhogo and the reasons for using baobab in foods vary by department with health benefit as the most important. According to [31], the habits, knowledge and uses of the plants that differ from one region to another, from one people to another are linked to the ethnofloristic space. For [32], the lack of knowledge of all the benefits of fruits can influence food uses. It appears that baobab based foods in form of beverages and porridges (*Sougé-baca*) are more

consumed at breakfast and during the break of the Muslim fast. These results confirm those of [33] who showed that porridges are consumed at breakfast, snack and are highly appreciated during Ramadan. This preference for this dish porridge (*Sougé-baca*) with millet could be explained by the good acceptability and the availability of millet in the survey areas (north of Côte d'Ivoire). This hypothesis is supported by [34] who reported that millet and sorghum are traditionally grown in the northern region of Côte d'Ivoire. [35] showed that millet porridges have good organoleptic quality of compared to those of corn.

5. CONCLUSION

A popularization of the 10 dishes based on baobab is necessary for better consumption and the reduction of food insecurity. Rural populations for its taste and health benefit mainly integrate this fruit into foods. The production processes and consumption patterns of these dishes are largely cultural, with a strong preference for millet porridge

(*Sougé-baca*) with 68.39 % of knowledge and 4 times per month for frequency of consumption by rural consumers. However, the contribution of this fruit in food security requires the perception of consumers through scientific knowledge such as nutritional and functional properties of foods based baobab.

CONFLICT OF INTEREST

The authors declare no conflicts of interest. Potential funders had no role in the design of the study, in the collection, analysis, or interpretation of the data, in the writing of the manuscript, or in the decision to publish the results.

REFERENCES

1. Wickens GE. The baobab – Africa's upside-down tree. *Kew Bulletin*. 1982; 37(2): 173-209. <https://doi.org/10.2307/4109961>
2. Sidibé M, Williams JT. Baobab – *Adansonia digitata* L. International Center for Underutilized Crops (ICUC), 94p. 2002.
3. Kouamé NMT, Soro K, Mangara A, Diarrassouba N, Coulibaly AV, Boraud NKM. Etude physico-chimique de sept (7) plantes spontanées alimentaires du centre-ouest de la Côte d'Ivoire. *Journal of Applied Biosciences*. 2015; 90: 8450-8463, DOI: 10.4314/jab.v90i1.12
4. Coulibaly H, Bazile D, Sidibé A, Abrami G. Les systèmes d'approvisionnement en semences de mils et sorghos au Mali : production, diffusion et conservation des variétés en milieu paysan. *Cahiers Agricultures*. 2008; 199-202. , <http://doi:10.1684/agr.2008.0177>
5. Kébenzikato AB, Wala K, Dourma M, Atakpama W, Dimobe K, Pereki H, et al. Distribution et structure des parcs à *Adansonia digitata* L. (baobab) au Togo. *Afrique Science*. 2014 ; 10(2): 434-449.
6. FAO, Introduction to the concepts of food safety. EC-FAO Programme "Food Security Information for Action". Rome : FAO (2008).
7. OMS, Global prevalence of vitamin A deficiency in populations at risk 1995–

2005. WHO global database on vitamin A Deficiency. Available (2009).
8. Schwartz H, Grellety Y, Evaluation of the management of acute malnutrition in Côte d'Ivoire: Mission report. UNICEF Regional Office for West and Central Africa (2010) 29 p.
9. N'goran P, Food and Nutrition Security in Côte d'Ivoire: State of play, challenges. National Nutrition Program (2014) 42 p.
10. Cissé I, Characterization of the biochemical and nutritional properties of baobab pulp of endemic species of Madagascar and continental Africa with a view to their valorization. Thesis, Doctoral School: Process Sciences-Food Sciences. Montpellier Supagro, France. (2012) 6-77.
11. Sina S, Reproduction and genetic diversity in *Parkia biglobosa* (Jacq) G. Don. PhD. Thesis Wageningen University, Wageningen Netherlands. ISBN. 90-8504 361-1, (2006) 102 p
12. Ambé GA. Les fruits sauvages comestibles des savanes guinéennes de Côte d'Ivoire: état de la connaissance par une population locale, les Malinkés. *Biotechnology Agronomy Society Environment*. 2001 : 5(1): 43-58. <https://popups.uliege.be/1780-4507/index.php?id=15005>.
13. Diallo, B. O., H. I. Joly, D. McKey, M. Hossaert-McKey, and M. H. Chevallier. 2007. Genetic Diversity of *Tamarindus indica* Populations: Any Clues on the Origin from Its Current Distribution? *African Journal of Biotechnology* 6(7):853–860.
14. Kouassi A.K., Kouassi N.K., Beugré M.A.G., N'dri D.Y., Amani G.N. & Gnakri D. (2018a). Glycemic Index and Glycemic Load of Juice from Edible Wild Fruits (*Adansonia digitata*, *Tamarindus indica* and *Parkia biglobosa*) Consumed in Côte d'Ivoire. *Journal of Biosciences and Medicines*. Vol.06 No.01.
15. Kouassi K A, Beugré M.A.G., Kouassi N.K., N'dri D.Y., Amani G.N. & Gnakri D, Biochemical characterization of juices from three wild fruit species consumed in

- Côte d'Ivoire "Adansonia digitata, Parkia biglobosa and Tamarindus indica". Open Science Journal (2018b) 3(4): 1-11.
16. Dagnelie P. Theoretical and applied statistics. Paris, De Boeck & Larcier, Paris, Belgium. 1998: 2(): 659p.
17. RGPH. General Population and Housing Census of Côte d'Ivoire, 2014: 5p.
18. Monyn ED, Bakayoko A, Tra Bi FH, Yao K, Koné MW. Niveau de connaissance et composition minérale de *Hydrocotyle bonariensis* Lam. (Araliaceae), une plante utilisée dans les ménages du District d'Abidjan (Côte d'Ivoire). International Journal of Biological and Chemical Sciences . 2017: 10(5): 2046-2061. DOI: 10.4314/ijbcs.v10i5.9
19. Kouakou DKR, Piba SC, Yao K, Koné MW. Evaluation des connaissances des populations de la région du N'Zi sur l'utilisation des plantes alimentaires dans le traitement du diabète de type 2, de l'hypertension artérielle et de l'obésité (Centre-Est De La Côte d'Ivoire). European Scientific Journal. 2020b: 16(15):262. <https://doi.org/10.19044/esj.2020.v16n15p262>
20. Beagan B, Chapman GE, D'Sylva A, Bassett BR. 'It's Just Easier for Me to Do It': Rationalizing the Family Division of Foodwork. Sociology. 2008: 42(4): 653–671, <http://doi:10.1177/0038038508091621>
21. Sackou KJ, Lobilé YH, Kouadio KKL. Household food insecurity and association with sociodemographic factors in Abidjan. European Journal of Public Health. 2020: 30(): 166-220. <https://doi.org/10.1093/eurpub/ckaa166.220>
22. Douma S. Etude ethnobotanique et écologique des plantes ligneuses alimentaires de soudure des systèmes agroforestiers du sud-ouest du Niger : diversité, importance, structure et niveau de menace. Thèse unique de l'université

- Abdou Moumouni de Niamey, Niger. 2020 : 84 p
23. Okori W, Obua J, Baryamureeba V. Famine disaster causes and management based on local community's perception in Northern Uganda. *Research Journal of Social Sciences*. 2009 : 4: 21–32.
24. Kouyaté AM, Damme PV, Meulenaer BD, Diawara H. Contribution des produits de cueillette dans l'alimentation humaine. Cas de *Detarium microcarpum*. *Afrika Focus*. 2009: 22(1): 77-88. <https://doi.org/10.21825/af.v22i1.17851>
25. Krishnamurthy SR, Sarala P. Determination of nutritive value of *Ziziphus rugosa* Lamk.: A famine edible fruit and medicinal plant of Western Ghats. *Indian Journal of Natural Products and Resources*. 2012: 3(1): 20-27. <http://nopr.niscpr.res.in/handle/123456789/13801>
26. Andon NS, Assouman SF, Soro GR. Perception paysanne de l'arbre dans le paysage agricole du nord de la Côte d'Ivoire: cas du département de Korhogo. *Revue de Géographie Tropicale et d'Environnement*. 2018 : (2): 49-60.
27. Amani CY, Kieba MK. Approche socio-écologique des pratiques agroforestières paysannes à base d'anacardiers à Odienné (Nord-Ouest de la Côte d'Ivoire). *Annales de l'Université de Moundou Série A*. 2018 : 4(1): 139-155. <https://aflash-revue-mdou.org/vol41/>
28. Kouakou YB, Malan DF, Kouassi KG, Diop AL, Bakayoko A, Disponibilité de quelques plantes alimentaires spontanées utilisées par les populations Koulango et Lobi de la périphérie Est du Parc National de la Comoé, Côte d'Ivoire. *Afrique Science* 2020 16(3) 33 - 50. ISSN 1813-548X, <http://www.afriquescience.net>
29. Atakpama W, Batawila K, Dourma M, Pereki H, Wala K, Dimobe K et al. Ethnobotanical knowledge of *Sterculia setigera* Del. in the Sudanian zone of Togo (West Africa). *International Scholarly Research Network*. 2012 : 8p, ID 723157; doi:10.5402/2012/723157.

30. Al-Fatimi M. Wild edible plants traditionally collected and used in southern Yemen. *Journal of Ethnobiology and Ethnomedicine*. 2021; 17(21): 49p. <https://doi.org/10.1186/s13002-021-00475-8>
31. Ouattara ND, Gaille E, Stauffer FW, Bakayoko A. Diversité floristique et ethnobotanique des plantes sauvages comestibles dans le Département de Bondoukou (Nord- Est de la Côte d'Ivoire). *Journal of Applied Biosciences*. 2016; 98(): 9284-9300. DOI: 10.4314/jab.v98i1.5
32. Soma-massieke AAR, Tapsoba FW, Kabore D, Seogo I, Tankoano A, Dicko MH et al. Etude sur la capacité de production, du circuit de commercialisation et de la consommation du zoom-koom vendu dans la ville de Ouagadougou au Burkina Faso. *International Journal of Biological and Chemical Sciences*. 2017; 11(): 2294-2305. DOI: 10.4314/ijbcs.v11i5.27
33. N'Guessan YD, Bedikou ME, Megnanou RM, Niamke SL. Importance of local cereal flours in the diet habit of consumers in the district of Abidjan Côte d'Ivoire. *Journal of Faculty of Food Engineering*. 2014; 13(2): 134-146. <http://fia-old.usv.ro/fiajournal/index.php/FENS/article/view/90>
34. Koffi KE, Yao SDM, Diarrassouba N, Siene LAC. Etat des lieux et gestion des semences des principales céréales cultivées au nord de la Côte d'Ivoire. *European Scientific Journal*. 2017; 13(): 112-125, <https://doi.org/10.19044/esj.2017.v13n3p112>
35. Tou EH, Guyot JP, Mouquet-Rivier C, Rochette I, Counil I, Traoré AS, Trèche S. Study through surveys and fermentation kinetics of the traditional processing of pearl millet (*Pennisetum glaucum*) into ben-saalga, a fermented gruel from Burkina Faso. *International Journal of Food Microbiology*. 2006; 106(1): 52-60,

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