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Research Article

Study of the Nutritional Properties of Broths Based on Soumbara (Nere *Parkia biglobosa*) and Products of Animal Origin (Beef, Chicken, Fish And Shrimp) in the Republic of Guinea - Conakry

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Abstract

This study was conducted to determine the physicochemical parameters of soumbara recipes based on beef, chicken, shrimp and bonga smoked fish produced at the Guinea Food Technology Institute (ITAG) to contribute to the (nutritional) improvement of the food of the populations. For the physicochemical composition, the average water content is between 6.97% for soumbara with beef; 4.95% for soumbara with smoked fish; 8.93% for soumbara with chicken and 11.34% for soumbara with shrimp. The Lipid contents are respectively: 27.03%; 19.22%; 29.65% and 13.09%. The carbohydrate contents are: 1.37% soumbara with beef and 1.08% soumbara with shrimp. The protein contents are respectively: 10.86%; 23.69%; 37.04% and 8.47%. The Ash contents are respectively: 0.03%; 0.07%; 0.03% and 0.02%. For PH the values are respectively: 3.04; 3.04; 3.03 and 2.03. The average acidity contents are respectively: 2.55%; 4.04%; 2.03% and 2.03%.

Keywords: Soumbara; Nutritional Properties; Broth; Animal Products and Ingredients

Introduction

Soumbara is a traditional spice from West Africa, its strong and intoxicating aroma, used in the preparation of delicious recipes [1].

Cube broths (Maggi, Doli, Shrimp, Jumbo, etc.) Have become an essential ingredient in many daily dishes. Thus, in West and Central Africa, they have a penetration rate of more than 70% in households [2]. For several decades after their creation, scientific studies reveal the toxic nature of these industrial broths that invade our markets. By pointing the finger especially at sodium glutamate and the huge amount of salt they contain, these products destroy health [3].

The condiment made from fermented néré seeds (soumbara) is consumed throughout West Africa, but the manufacturing processes differ from each other according to the regions and ethnic origin of the producers [1].

Soumbara is full of virtues that are beneficial to our health such as: (promote cardiac activity as well as brain function) [4].

In our approach, we start from strategic products among the local agri-food productions of Guinea, we study processing techniques to achieve these products, the methods of transformation of the know-how and the organization around the sale of productions, especially to rural communities. One of the strategic products in Guinea is soumbara, a food condiment made from the seeds of Néré (*Parkiabiglobossa*), it is one of the major elements accompanying the sauces of staple foods (rice, corn, fonio, millet, sorghum,to etc.) to enhance the taste of meals. It is highly appreciated by the population not only for its taste, but also for its nutritional (rich in proteins, minerals and vitamins) and medical (lowering high blood pressure, preventing the onset of goiter, cancer,fighting constipation and reducing anaemia).

Thus, this study is part of this context in order to develop a processing technology and to evaluate the physico-chemical characteristics of these broths based on Néré (parkia biglobossa) and animal products: beef, smoked fish, chicken, and shrimp with condiments (cooking salt, chilli, garlic, onions, pepper, carrots, bay leaf, tomato, peppers and parsley) produced in Guinea.

The objective of this study is to promote the consumption of soumbara broths in order to find an alternative to industrial cubes widely used on the market, which nowadays constitute a real public health problem.

Materials and Methods

Study framework

Nere seeds (soumbara), plant-based ingredients (onions, garlic, pepper, pepper, parsley, tomato, fresh pepper, bay leaf, and carrot), cooking salt and animal products (beef, fish, chicken, and shrimp) were purchased at the local market of the sub-prefecture of friguiagbé, Kindia prefecture.

Material 1st Ingrédients	Quantities g/kg (SOUMBARA = 300g)			
	Beef (359g)	Chicken (356g)	Fish (357g)	Shrimp (358g)
Salt	45	45	45	45
Onion	150	150	150	150
Pepper	10	10	10	10
Second	10	10	10	10
Chili pepper	10	10	10	10
Carrot	40	40	40	40
Pepper	20	20	20	20
Tomato	51	51	51	51
Parsley	5	5	5	5
Laurel	1	1	1	1
Water (litre)	1.4	2,0	1,0	1,5

Table 1: Weight of Soumbara, animal products and metals.

Materials

Soumbara seeds have been vanized, sorted, washed, dried and roasted to transform them into powder. The ingredientsand animal products were washed, cut and then cooked with mineral water. The materials used for the preparation of our products: pan, stainless steel knives, stove, passoir, plastic bowl, sieve, scale, spoon, charcoal are accessible at the local market. The drying took place in an oven of 105°C.

The figures: raw materials of animal origin, ingredients and soumbara powder.

Method

It is summarized by the diagram below: Broth manufacturing technology based on soumbara (néré *parkia biglobossa*) and beef).

Soumbara broth preparation technology (soumbara flavor).

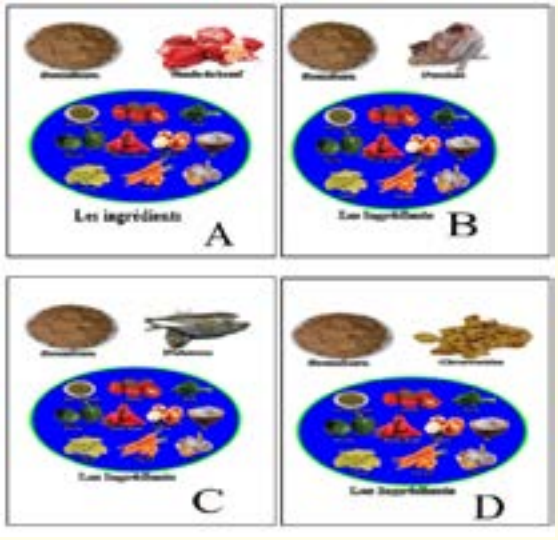

Figure 1: Legend:
A = soumbara + beef + ingredients, B = soumbara + chicken + ingredients, C = soumbara + Fish + + ingredients, D = soumbara + Shrimp + + ingredients.

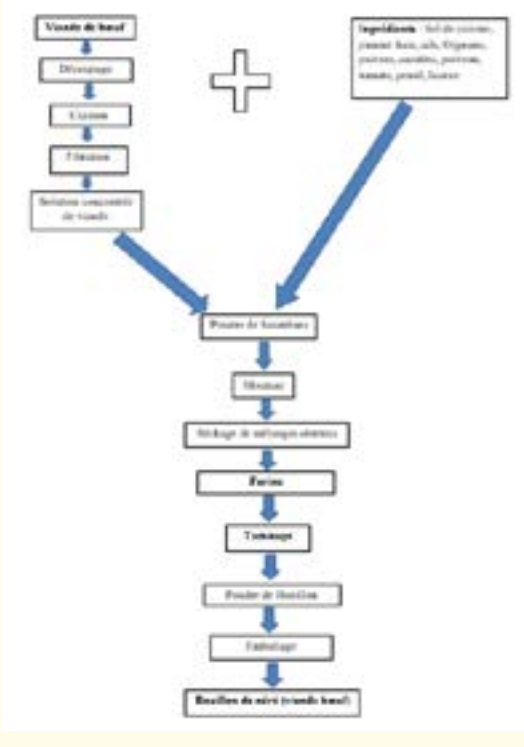

Figure 2

Different broth products from the four (4) recipes.

Figure 3

NB the same technological scheme was for other animal products: chicken, fresh fish and shrimp.

Physico-chemical analyses

The following parameters were analyzed: at the National Office of Quality Control of Matoto Republic of Guinea, ref: 02285/ONCQ/LAB/2022: net weight, humidity, salt content, ash, carbohydrates, proteins, lipids, PH and acidity, total anaerobic mesophilic flora, total and faecal coliforms.

- **Physical findings:** The sample has the characteristicsof the above-mentioned product. It is free of foreign matter and visible mold.
- **Physico-chemical analysis techniques:** The determination of water, dry matter, protein, lipid and ash contents was carried out according to the AOAC method [5]. Indeed, the moisture and dry matter contents were calculated according to the difference in weight of the substrate before and after drying in an oven at 105°C for 6 hours. Protein contents were determined according to the method of Kjeldhal [6]. The fat or total lipid was determined after soxhlet extraction.

The carbohydrate content was determined by the differential method. The calculation was carried out with the determined values of protein, lipid, ash and dry matter levels according to the differential formula.

The energy value was calculated using Atwater-specific coefficients for proteins, fats and carbohydrates [7].

Organoleptic analyses

In order to judge the quality of the samples collected, we proceeded to a tasting session that allowed everyone to appreciate the products obtained.

Results and Discussions

Results

The results of theanalysis ofthe physicochemical parameters of the broth prepared at the Institute of Food Technology of Guinea are as follows.

Parameters Produce	Protein (%)	Fat (%)	Carbohydrates (%)	Ash (%)	Humidités (%)	PH	Acidités (%)
Soumbara (beef)	10,86	27,03	1,37	0,03	6,97	3,04	2,55
Soumbara (Fresh fish)	23,69	19,22	------	0,07	4,95	3,04	4,04
Soumbara (Chicken)	37,04	29,65	-------	0,03	8,93	3,03	2,03
Soumbara (Shrimp)	8,47	13,09	1,08	0,02	11,34	2,03	2,03

Table 2: Protein, fat, ash, moisture, acidity and P^H of the broth.

Discussion

The protein contents (8.47 to 37.04%) measured are in the same order of magnitude, as those (33 ± 2.4 to 34.6 ± 2.6%) reported for the fermented Hibiscus Seddanfal seed samples (a West African condiment) analyzed by Bengaly [8].

This powder contains 28.60% protein, 35.03% fat, 18.50% total carbohydrates and 10.49% fiber with an energy value of 503.67 kcals. Analyzed by Cissé [9].

In our case, the protein content of soumbara powder with chicken is about37.04% higher than 8.44% compared to that found by Cissé [9].

The measured protein contents (8.47 to 37.04%) are in the same order of magnitude, as those of (28.47 ± 3.1 and 30.90 ± 2.16%) reported fornéré and soybean seed ecantillons by Camara [10].

The difference (6.14%) between the values found by Camara [10] (30.90 ± 2.16%) and those we obtained must be due to the intake of chicken source of protein.

The discrepancy between these results could be related to the varietal characteristics and high water contents of the sobbara samples analyzed.

Thus, their exposure to the open air during marketing could cause high activity of proteases produced by microorganisms and strong degradation of proteins [11-13].

The fat content (19.22 to 29.65%) determined during this study for soumbara is relatively close to the values (19.39 to 22.56%) indicated by Koura [13] for the crude seeds of *Parkia biglobosa* used in Benin, except for shrimp which would be less rich in lipids. (13, 04%). Regarding lipid contents, the averages found by Nout [14] were between 19.62 ± 0.56 and 35.35 ± 0.47% respectively. Indeed, drying inhibits the process of lipolysis of the fat contained in food [14] which also explains the same realities that we encountered in our analyses (19.22 to 29.65%), roasting could lead to a decrease in lipid levels in the product. (Biochemical and microbiological characterization of néré soumbara in Niger).

The fat contents (19.22 to 29.65%) determined during this study are relatively low at those (26.66 ± 2.88 to 37.13 ± 2.69%),values indicated by CAMARA [10]. This would indicate that the varieties of the raw seeds of *Parkia biglobosa* used in Côte d'Ivoire would have different physical characteristics (length and mass) and chemical composition from those used in Guinea. On the other hand, our values are relatively close to those (19.39 to 22.56%) indicated by Koura [13] inuse in Benin.

The water content of soumbara mixed with animal products (11.34%) determined during this study is lower than the moisture content obtained from samples of néré soumbara taken from community producers (13.61 ± 0.34%) reported by Roukaya [16] in Niger. This high moisture content is explained by insufficient drying. The moisture content (4.95%) determined during this study is relatively equal to that (4.61 ± 0.21%) obtained from samples of néré soumbara produced at the laboratory indicated by Roukaya [16] in Niger. This is explained by the efficiency of the work tools used.

The total carbohydrate contents (1.08 to 1.37%) determined during this study are significantly lower than those (18.50 ± 0.50%) indicated by Cissé [9].

The ash contents (0.02 to 0.07%) determined during this study are significantly lower than those determined (4.07 ± 0.03%) by Cissé [9] and that reported (4.3%) by Ogunyinka [16] for non-defatted fermented seeds. This would depend on the mass of the sample and the incineration time.

Conclusion

This study evaluated the physicochemical characteristics of soumbara recipes manufactured at the Institute of Food Technology of Guinea (ITAG). The study showed that the values of each of the parameters vary from one sample to another.

From a nutritional point of view, soumbara, fermentationproduct of *Parkiabiglobosa* grains, contributes significantly to improving the nutritional intake in the diet of populations, West Africa in general and the Republic of Guinea in particular. In poor families, it could find its place as a protein substitute and mainly as a major condiment in the preparation of sauces for cereal-based dishes such as rice, millet, sorghum..., in all four (04) Natural Regions of the Republic of Guinea under the names: Kenda (in Soussou), Odji (in Poular), Himanan (in Guerzé) and Soumbara (in Malinké) given its organoleptic properties which are very appreciated.

For perspectives, we suggest a characterization of the seeds and the development of a process better suited for fermentation and drying (or roasting) of soumbara recipes. These recipes are highly appreciated by the population not only for their taste, but also for their nutritional qualities (rich in proteins and vitamins) and medical (lowers high blood pressure, fights the appearance of goiter, reduces anemia, cancer prevention and fights constipation).

Bibliography

1. Râteau N. "Study of the nutritional value of néré or "parkiabiglobosa". DESS thesis in Nutrition and Food in the Developing Country". University of Sciences. MontPellier2-France (1995): 33-45.

2. NESTLE Group press conference 2013 – nigerdiapora.info.

3. AYITE AJAVON, entrepreneur togolais 2017, le bouillon AFRIQUECUBE Togon, www. Ivorianfood .com anticube – cube-bouillon les 19 juins (2020).

4. FAO Juillet. Quarante et unième session de la Conférence de la FAO, bureau de l'évaluation de l'organisation des nations unies pour l'alimentation et l'agriculture (2019).

5. AOAC. Analytic Official Methods of Analysis of the Association Chemists (1990).

6. Kjeldhal. Association of Official Analitycal. *Chemists Journal, JANCA* 73.3 (1990): 339-484.

7. FAO Corporate Document Repository. Calculation of the Energy Content of Foods-Energy Conversion Factors (2006).

8. Bengaly MD., *et al*. "Fermented seeds of Hibiscus sabdariffa L: a West African condiment rich in protein; potential vehicle for iron fortification". *European Scientific Journal* 16.3 (2005).

9. Ibrahima C., *et al*. "Phytochemical and nutritional composition of fermented seeds of Parkiabiglobosa from northern Côte d'Ivoire". *Journal of Applied Biosciences* 168 (2021): 17507-17519.

10. Fatoumata C., *et al*. "Biochemical and microbiological characteristics of African mustards produced from fermented seeds of Parkiabiglobosa and Glycine max, sold in Côte d'Ivoire". *International Journal of Biological and Chemical Sciences* 10.2 (2016): 506-518.

11. Omabuvfe BO., *et al*. "Fermentation of soybean (glycine max) for soy-daddawa production by starter cultures of bacillus". *Food Microbiology* 19.6 (2002): 561-566.

12. Li C and Fang HHP. "Fermentative Hydrogen Production from Wastewater and Solid Wastes by Mixed Cultures". *Critical Reviews in Environmental Science and Technology* 37.1 (2007): 1-39.

13. Koura K., *et al*. "Physic and chemical characterization of seeds of Parkiabiglobosa (Jacq.) R. Br. In use in North Benin". *Journal of Applied Biosciences* 75 (2014): 6239-6249.

14. Nout R., *et al*. "Food: Processing, Preservation and Quality". CTA, Postbus 380, 6700 AJ Wageningen, the Netherlands (2003).

15. Roukaya A S and Halima O D. "Biochemical and microbiological characterization of Soumala of néré (Parkiabiglobosa) and guinea sorrel (*Hibiscus sabdariffa*) produced in Niger" (2020).

16. Ogunyinka BI., *et al*. "Comparative study on proximate, functional, mineral and antinutrient composition of fermented, deffated and protein isolate of Parkiabiglobosa seed". *Food Science and Nutrition* 5.1 (2017): 139-147.