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TECHNICAL SHEET OF CONTRIBUTION TO THE VALORIZATION AND POPULARIZATION OF THE "CLACLO" OR TRADITIONAL DONUTS OF RIPE PLANTAIN BANANAS (*MUSA* SPP.) AT THE STAGE OF SENESCENCE IN CÔTE D'IVOIRE

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ABSTRACT

The "Claclo" (in baoulé language in Côte d'Ivoire) is a traditional dish of vegetable oil fried dumplings (donuts) of pulp plantain banana pulp (*Musa* spp.), ripe at the stage of senescence (color of skin spotted with more than black or yellow or black), added with cereal flour or sweet cassava flour (*Manihot esculenta* Crantz). Banana at the "senescence stage" is very advanced ripening banana and at the limit of the decay. This traditional donut "Claclo" is much consumed by people in the regions of Côte d'Ivoire. The nutritional composition of "Claclo" contains significantly per 100 g, high energy levels of about 250 - 275 kcal, essential nutrients (carbohydrates, lipids, proteins), dietary fiber and mineral salts (K, Mg, P, Ca and Na) which are important nutritional supplements in diets. The aim of the study was to contribute to the valorization and the popularization of the preparation of some traditional dishes based on plantain (*Musa* spp.). This presents a simple way of traditional technology processing, consumption and conservation of the banana at the stage of senescence to reduce post-harvest losses of plantain by certain populations in Côte d'Ivoire and in other developing countries.

Key words : *Claclo*, Banana, *Musa* spp., Senescence, Baoulé, Côte d'Ivoire

1. INTRODUCTION

The "Claclo" (in Baoulé language in Ivory Coast) is a traditional dish in the form of donuts obtained from mature plantain banana (*Musa* spp.) in "stage of senescence" with the varieties most available on the Ivorian market named locally. "Kpatregnon", "Ameletiha", "Agnrin" and "Afoto" or dessert or sweet banana (Poyo) (*Musa sapientum*) (Kouamé *et al.*, 2015). Banana at the "senescence stage" is very advanced ripening banana and at the edge of rotting.

They are fried dumplings of ripe banana pulp (of skin color spotted with more than black or yellow or sometimes black) with cereal flour or sweet cassava (*Manihot esculenta* Crantz). It acts in particular of the ripe banana pulp made in pulp by grinding and fried with the vegetable oil making it possible to value and to avoid the setting to the rebus of bananas too ripe at the limit of the decay (Ourega *et al.*, 2015). The product is consumed hot or cold, as is or accompanied by seasoned pepper paste, hard-boiled egg, meat product or fried peach product (meat or fish for example). These banana fritters are found in Côte d'Ivoire, in some countries of West and Central Africa (Tchango T. J. and Ngalani J.A., 1998).

The objective of this study is to contribute to the valorization and popularization of the preparation of certain traditional dishes based on plantain (*Musa paradisiaca*) or dessert banana (*Musa sapientum*) such as the "Claclo" made from bananas at the stage of senescence (very advanced stage of ripening) to reduce post-harvest losses of plantain in Côte d'Ivoire.



The aim of the work is to present a simple way of traditional technology of transformation, consumption and conservation of the banana at the stage of senescence by certain populations of Ivory Coast.

2. MATERIAL AND METHODS

2.1 Plant material

Bananas and other ingredients (wheat, millet or maize flour, vegetable oil, onion, chilli, etc.) used for the preparation of "Claclo" were purchased on the market in Abidjan, Côte d'Ivoire.



Photos : YAO K., 2017

Figure 1: Different ripening stages of banana ripe bananas

Plantain bananas : a. immature ; b. ripe ; c. ripe stage of senescence used to make "Claclo" ; d. Banana dessert

2.2 Technical equipment and equipment

The necessary technical equipment is, among others, a gas stove or stove, a skillet or skimmer, a mortar with a pestle or grinder, a perforated ladle, a tablespoon, a bowl with lid, a sewer, a tray or a storage tureen and / or an enclosure for sale.

2.3 Methods

The process of preparation of the "Claclo" consists of washing, peeling and grinding in a mortar the pulp of the ripe banana at the stage of senescence to make it into paste. Care should be taken to remove lumps from the homogeneous paste.

Then, by mixing with the homogeneous dough, cereal flour, especially wheat (*Triticum* spp.), Corn (*Zea mays* L.), millet (*Pennisetum glaucum*) or sweet manioc (*Manihot esculenta* Crantz) should be added. in an appropriate proportion according to the consistency expected after cooking. It is possible to add, if necessary, some cooking salt and other ingredients or seasoning (onion, pepper, pepper, etc.).

Thereafter, by hand or with a tablespoon, make dough balls of the ground banana pulp and fry in vegetable oil for 10 to 15 minutes over low heat. The cooking temperature must not higher than 160 ° C to limit the formation of undesirable compounds (Rojas GJA, 2007; Sawadogo D., 2010).

At the end of cooking, we obtain golden balls, the "Claclo" or banana dough donuts which are drained using a colander. The "Claclo" is usually eaten warm or cold as is or accompanied by seasoned pepper paste, hard-boiled egg, meat or fried fish.

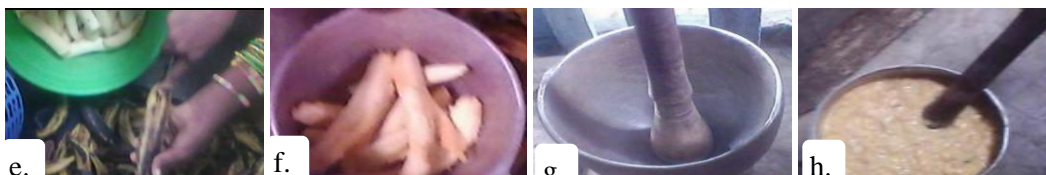


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Wash ripe bananas in the senescence stage with drinking water



Peel and crush or crush the senescent banana pulp in a rough mortar with a mixture of cereal flour (corn, wheat, rice or millet, etc.) or sweet cassava flour.



Photos : YAO K., 2017
e. Peeling of senescent ripe bananas; f. Peeled pulp; g. mortar; h. Pasta of ripe banana pulp crushed in mortar



Photos : YAO K., 2017

Keep the dough in a container with a lid
Make dumplings using a tablespoon (diameter of the balls: 3 to 4 cm)
Fry for 10 to 15 minutes at a temperature below 160 ° C.
Drain with a sewer or strainer



Photos : YAO K., 2017
i. Preserving the dough of ripe banana pulp ; j. Dumplings with a cooking spoon ;
k. Cooking meatballs with vegetable oil ; m. Cooked and golden "Claclo" meatballs;
n. Draining



Banana frit known as "Claclo".
Put on sale in glass enclosure out of reach of insects (flies) and dust



Photos : YAO K., 2017

Figure 2 : Process for the preparation of "Claclo" or traditional donuts of senescent plantain banana (*Musa spp.*) and dessert banana (*Musa sapientum*)



3. RESULTS AND DISCUSSION

The traditional "Claclo" of ripe banana at the stage of senescence is generally prepared by the method described above (Figure 2). The balls of "Claclo" or banana dough fritters have a golden appearance, more or less soft and fat depending on the type of banana used, the quality and quantity of cereal flour added. The nutritional composition of the "Claclo" analyzed in relation to nutrients contains a significant content of 32.49 - 36.10 g of carbohydrate, 1.51 - 1.66 g of protein, 12.66 - 13.78 g of material. fat, 2.60 - 5.82 g of fiber and 250 - 275 kcal per 100 g serving. "Claclo" also contains, depending on the variety of banana used, significant levels of minerals including potassium (K) of 350 - 510 mg, magnesium (Mg) of 35 - 51 mg, phosphorus (P) of 26 - 42 mg, calcium (Ca) 7 - 19 mg and sodium (Na) 5 - 6 mg per 100 g serving (see Table of determined indicative nutrient values of "Claclo"). These traditional "Claclo" donuts are widely consumed by people in all forest regions in Côte d'Ivoire.

Table of determined nutrient values of "Claclo"

Indicative nutrient values of "Claclo" per 100 g (values influenced by the nature of the flour and banana variety used)			
Calories	250 - 275 kcal	Potassium	350 - 510 mg
Carbohydrates :	32,49 - 36,10 g	Magnésium	35 - 51 mg
Protein :	1,51 - 1,66 g	Phosphore	26 - 42 mg
Fat :	12,66 - 13,78 g	Calcium	7 - 19 mg
Fibers	2,60 - 5,82 g	Sodium	5 - 6 mg

The indicative equipment costs range from 25,000 to 70,000 f. CFA. The capacity of the "Claclo" production device is 2 to 10 kg of plantain or banana dessert or more and the shelf life is estimated at 1 to 5 years. The making of "Claclo" is done at the domestic level and restaurant and the destination is self-consumption and local sales. The consumption period is preferably at breakfast, lunch, afternoon tea or at certain buffets. The sales market of "Claclo" is mostly feminized and the women interviewed earn between 4500 and 20,000 CFA francs per week. On marketing, the selling price of a "Claclo" meatball of 10 to 15 g is 10 f. CFA.

Favorable factors are among others, the facility to make the "Claclo", the favorable appreciation by the populations and the costs of production and maintenance of equipment are low. The storage time is 72 h at room temperature after cooling. This storage time can be extended to 7 days or more at +4 ° C in the refrigerator. The limit concerns the cooking temperature with vegetable oil which should not exceed 160 ° C (Rojas G. J. A., 2007; Sawadogo D., 2010).

4. CONCLUSION

"Claclo" is a traditional dish and a simple form of transformation, consumption and preservation of the banana at the stage of senescence (very advanced stage of ripening). The nutritional value contains per 100 g serving, important levels of energy (kcal), essential nutrients (carbohydrates, lipids, proteins), dietary fiber and mineral salts (K, Mg, P, Ca and Na) which are nutritional supplements needed in diets. The promotion and popularization of "Claclo" consumption could also significantly reduce post-harvest losses of plantain and other banana varieties at the senescence stage in Côte d'Ivoire and other developing countries.

REFERENCES

- [1] Coulibaly S., Nemlin G.J. et Kamenan A., 2007. Chemical Composition, Nutritive and Energetic Value of Plantain (*Musa* spp.) Hybrids CRBP 4, CRBP 39, FHIA 7, FHIA 2 and Orishele Variety. TROPICULTURA, 25 (1), 2-6.
- [2] Kouamé Adam Camille, Kouassi Kouakou Nestor, N'dri Yao Denis, Amani N'guessan Georges (2015). Plantain (*Musa* spp., AAB genome) Cultivar Preference, Local Processing Techniques and Consumption Patterns of Plantain Based Foods Mostly Consumed in Urban Area of Abidjan, Côte d'Ivoire. Revue « Nature & Technologie ». B- Sciences Agronomiques et Biologiques, n° 12, Pages 117-129.
- [3] Lassoudière A. (1973). Le bananier plantain en Côte d'Ivoire, *Fruits* 28 (6), p. 453-462.
- [4] Ourega Digbeu Armand ; Ban Koffi Louis ; N'guessan Kouadio Florent ; Nemlin Gnopo Jean ; TANO Kablan et DJE Koffi Marcellin, 2015. Caractéristiques physico-chimiques des bières de plantain produites à partir de rebuts de plantain de différentes variétés de Côte d'Ivoire (Orishele, French 2 et Corne 1). International Journal of Innovation and Applied



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(Scholarly Peer Review Publishing System)

Studies, ISSN 2028-9324, 10 (2), pp. 666-677.

- [5] **Mémoire** Rojas Gonzalez Juan Alfredo, 2007. Impact de l'opération de friture du plantain (*Musa AAB* « barraganete ») sur différents marqueurs nutritionnels : caractérisation et modélisation. Thèse en vue de l'obtention du grade de Docteur de l'Institut des Sciences et industries du vivant et de l'Environnement, Discipline : Génie des Procédés. AgroParisTech., 187 p. Français. <NNT : 2007AGPT0082>.
- [6] Sawadogo Djakaridja, 2010. Effets du temps et de la température de cuisson sur la formation de l'acrylamide dans les frites de banane plantain mûre. Mémoire de fin de cycle de l'Institut des Sciences de la Nature et de la Vie de l'Université polytechnique de Bobo Dioulasso (Burkina Faso) - Licence professionnelle en génie biologique option Industrie Agroalimentaire 2010, 41 p..
- [7] Tchango Tchango Jean et Ngalani J.A. (1998). Transformations et utilisations alimentaires de la banane plantain en Afrique centrale et occidentale ; International Network for the Improvement of Banana and Plantain (INIBAP) : Bananas and Food Security. Les productions bananières : un enjeu économique majeur pour la sécurité alimentaire. International symposium, Douala, Cameroon, 10-14 November 1998. C. Picq, E. Fouré and E.A. Frison, editors
- [8] Web : Fonds Interprofessionnel pour la Recherche et le Conseil Agricole (FIRCA) (2015). Fiche technique 45, Frite de banane plantain.
http://www.rongead.org/IMG/pdf/diagnostic_de_la_filiere_banane_plantain_en_cote_d_ivoire_15_12_2015_final.pdf. Consulté le 12 mai 2017
- [9] FatSecret (2017). Valeurs Nutritives du plantain frit, France, Disponible sur : <https://www.fatsecret.fr/calories-nutrition/g%C3%A9n%C3%A9rique/plantain-frit> . Consulté le 12 août 2017.