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ENHANCING THE USE OF PROCESSED COCOYAM FLOUR AS A THICKENER FOR TRADITIONAL SOUPS TO PROMOTE FOOD SECURITY, MEET GLOBAL CONSUMER DEMANDS, AND SUPPORT SUSTAINABLE ECONOMIC GROWTH FOR FAMILIES

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ABSTRACT
This research aims to evaluate the acceptability and use of processed cocoyam flour as a thickener for traditional soups in Nigeria and globally, focusing on food security, sustainability, and revenue generation. The study is driven by two specific objectives and two research questions. An experimental research design employing laboratory techniques was utilized, assessing thickening consistency and conducting sensory evaluations based on appearance and taste from a panel of 35 judges selected through purposive sampling. Data was collected using a gray scale to assess changes in color and thickening consistency. Statistical analysis involving mean and standard deviation was employed to address the research questions. Findings did not indicate significant level of suitability and acceptability for processed cocoyam flour in thickening soups, with a mean score of 3.0 or higher. Sensory evaluations demonstrated that this flour enhances thickening consistency regarding hand feel, appearance, mouth feel, taste, aroma, and overall acceptability. The research concluded that processed cocoyam flour significantly improves the physicochemical properties and acceptability of traditional soups and serves as a viable substitute for fresh cocoyam dumpling, potentially alleviating the high costs during off-peak seasons. The study found no significant differences in acceptability between soups thickened with processed cocoyam flour and those thickened with fresh cooked and pounded cocoyam.

Keywords: Cocoyam flour, thickener, traditional soups, food security, global consumer family economics

INTRODUCTION
Cocoyam is a perennial crop primarily cultivated in Nigeria for its edible roots, ranking third in significance after cassava and yam. It boasts superior nutritional benefits compared to these two (NRCRI, 2015) and is part of the Araceae family. Among cocoyam varieties, Colocasia esculenta (taro) is more commonly recognized than Xanthosoma sagittifolium (tannia) (Obiana, 2022). Nigeria leads global production, contributing over 3.1 million tonnes in 2017 (FAOSTAT, 2019), which represents more than 40% of the world's output and over 70% in West Africa (FAOSTAT, 2019). However, rural cocoyam farming is challenged by limited agricultural land, lack of funding, and the crop's short shelf life, leading to decreased market supply (Obiana, 2022). Despite being produced in large quantities, about 72% of cocoyam is consumed locally, often used as a yam substitute prior to the yam harvest (Talwana *et al*., 2009). It remains the most cultivated root crop in Nigeria, yet its products have not penetrated the international market (Oguniyi, 2008). Cocoyam serves as food for humans and livestock and can be processed into various forms, including soup

thickeners, fufu, and dried chips. It is also utilized for producing alcohol, medicines, flour, and starch (Ijioma *et al*., 2014). Cocoyam flour is a versatile ingredient in both food and industry, valued for its low carbohydrate content, making it suitable for diabetics and seniors. Given its numerous benefits, the Nigerian government should promote cocoyam for nutritional management, industrial use, and as a source of foreign exchange. Research funding is essential to enhance cocoyam flour processing and conversion into industrial products to boost productivity and minimize losses for farmers. Cocoyam does contain certain anti-nutritional factors that limit its use in food and animal feed, causing irritation if consumed raw (Patricia *et al*., 2014). As a traditional and culturally significant food, cocoyam tubers are comparable to other root crops and can be transformed into various products for industrial use (Agbelemoge, 2013). Processes like boiling, roasting, baking, frying, milling, and pounding can add value and shelf stability to cocoyam (Adeyanju *et al*., 2019). The pounded version serves multiple culinary functions, including as a soup thickener. In southeastern Nigeria, cocoyam is typically boiled, mashed into a paste, and added to soups along with ingredients such as bitter leaves, ora leaves, spices, and various meats. Proper processing of cocoyam through parboiling and steeping improves its digestibility, palatability, and storage quality, while reducing anti-nutritional factors that can affect nutrient content (Ekwe *et al*., 2009; G Karim *et al*., 2017). Cocoyam is processed into flour through various methods, including peeling, slicing, cleaning, and drying, often involving immersion in sulfurous acid and blanching before milling into flour suitable for making fufu (Adeyanju *et al*., 2019).

Statement of the Problem

Cocoyam exhibits sensory and textural limitations, including an inability to form stable gels, ease of retrogradation, and a tendency to spoil quickly, contributing to the yearly loss of over 70% of harvested crops (Ubalua, 2016; Obiana, 2022). These issues can be mitigated through drying and flour processing techniques at the domestic level.

Objectives of the Study

This study primarily aims:

1. To evaluate the acceptability of processed cocoyam flour as a thickener for traditional soups
2. Focusing specifically on the functional attributes of cocoyam flour
3. Its thickening capabilities relative to fresh cocoyam dumpling,
4. Its sensory properties in soup thickening.

Source of Raw Materials

Cocoyam tubers were purchased from the Sabongari market in Kano State, Nigeria.

Equipment

The necessary equipment, including a cooker (heating element), bowl, measuring cylinder, weighing balance, pots, wooden mortar, and ingredients for Ora soup, were sourced from the Food Processing Laboratory of the Department of Home Science and Management at Federal University Gashua, Yobe State, Nigeria.

Production of Cocoyam Flour

Cocoyam flour was produced following the method described by Karim *et al*. (2017) with minor modifications. The cocoyam roots (*Colocasia esculenta*) were peeled and washed to eliminate sand and dirt. After peeling, the roots were sliced thin, blanched, and drained. The drained cocoyam was dried in an oven at 60 °C for 12 hours, then milled using a hammer mill. The resulting cocoyam flour was sieved and packaged for future use. The steps for producing cocoyam flour included cleaning, peeling, slicing, steeping, blanching, drying, and milling.

Preparation of Bitter-leaf Soup Using Processed Cocoyam Flour

Bitter/Ora leaf soups were made following a traditional optimized procedure from Igbo land, where the soup was formulated as outlined in Table 1.

Table 1: ingredients and composition of the soup

S/N	Ingredient	Quantity
1	Meat(preferred choice)	2.5kg
2	Bitter leave and Ora leave	200g
3	Palm oil	1/4 liter
4	Stock fish	0.5kg
5	Dry fish	O,5kg
6	Cray fish	40g
7	Cocoyam flour/fresh dumpling	200gfresh, 200gprocessed
8	Dawadawa/ogiri	Two tie
9	Dry paper	5g
10	Table salt	Salt to taste
11	Knor cube	2 Knor cues

Preparation of Soup Ingredients: Rinse the fresh bitter leaves multiple times, changing the water until they are clean and no longer taste bitter when chewed. Next, soak them in clean water and set them aside. Meanwhile, wash and prepare the Or leaves by plucking, washing, and cutting. Clean the meat and stock fish, seasoning them with salt and a Knorr cube. Add water and boil until the meat is very tender. While the meat is cooking, wash the cocoyam and boil it until soft, then peel and pound it in a mortar with a pestle until it becomes a smooth, lump-free dumpling. Wash the crayfish and pound or blend to your preference. Clean and debone the dried fish.

Making the Soup

To the boiled meat and stock fish, add enough water to reach your desired soup quantity, then bring it to a boil. As it boils, incorporate the washed dried fish, blended crayfish, pepper, salt, and other seasonings to taste. Gradually add the pounded cocoyam dumpling or flour, continuing to cook until the soup thickens to your liking. Finally, add the washed bitter leaves and simmer for two minutes before serving with your choice of *tuwo* dumpling, such as semovita. Sensory Quality Evaluation: Samples of soups made with both processed cocoyam flour and fresh cocoyam dumplings were prepared, coded, and presented to a panel for sensory evaluation using a scoring test. A panel of 20 semi-trained tasters, familiar with traditional Ora soup, was instructed on sensory evaluation methods and asked to rate the soup samples based on thickening consistency, gel viscosity, color, taste, aroma,

texture, and overall acceptance using a nine-point hedonic scale (where 9 means "like extremely, " 5 means "neither like nor dislike, " and 1 means "dislike extremely").

Statistical Analysis

All measurements presented in this study were conducted in triplicate. For each measure, a mean and standard deviation were calculated. ANOVA was performed, and mean values were separated using Duncan's Multiple Range Test at P.

RESULTS AND DISCUSSION

Table 2: Sensory Attributes of Bitter and Ora Leave Soups Thickened with fresh Cocoyam Dumpling and Processed Cocoyam Flour

Parameters	OSTFCP	OSTPCF	BSTFCP	BSTPCF	P-value
Aroma	7.75±1.04	7.85±1.00	7.30±1.30	7.30±1.55	0.492
Taste	8.18±1.20	8.15±1.24	8.05±1.24	8.04±1.27	0.298
Thickening feel	8.25±0.90	7.95±0.82	8.24±0.21	7.85±1.52	0.348
Appearance	8.25±1.14	8.25±1.14	7.35±1.05	7.34±1.37	0.567
General acceptability	8.11±0.05	8.11±0.05	7.85±0.75	7.63±0.25	0.151

OSTFCP = Ora soup thickened with fresh cocoyam paste; OSTPCF = Ora soup ticked with processed cocoyam flour; BSTFCP = Bitterleave soup thickened with fresh cocoyam paste; BSTPCF = Bitterleave soup thickened with cocoyam flour;

The findings from the sensory evaluation of soups thickened with fresh cocoyam paste and processed cocoyam flour revealed a notable difference in the taste between Ora soups and Bitter leaf soups. Nevertheless, Table 2 indicates that the soups thickened with either fresh cocoyam or processed cocoyam flour did not exhibit significant variations in attributes such as thickening consistency, aroma, and appearance ($p > 0.05$), including overall acceptability. The data showed a preference for soups thickened with fresh cocoyam. The taste ratings for the thickened soups were as follows: OSFCP and BSFCP scored 8.18 and 8.15, respectively, indicating an "extremely liked" status. The acceptability scores for OSPCF and BSPCF were 8.05 and 8.04, also reflecting strong preference. Regarding thickening consistency, the scores for ORTFCP, BSTPCF, OSTPCF, and BSTPCF were 8.25, 7.95, 8.24, and 7.85, respectively. The overall general acceptability scores were 8.11, 8.02, 7.85, and 7.63 for soups ORTFCP, BSTPCF, OSTPCF, and BSTPCF, respectively, indicating a strong preference for both fresh and processed cocoyam flour as effective thickeners in traditional soups.

CONCLUSION

The study concluded that traditional Ora and Bitter leaf soups thickened with either fresh cocoyam paste or processed cocoyam flour did not show significant differences in acceptability attributes, although the taste between the two soups differed significantly regardless of the thickening method. Nonetheless, soups thickened with fresh cocoyam paste were rated most favorably. Thus, processed cocoyam flour can serve as a valuable resource for thickening traditional soups, making it viable for local and international markets, which could help generate revenue and enhance food security. This approach could also mitigate waste management issues farmers face due to the short shelf life of cocoyam, leading to potential income generation for cocoyam farmers both locally and globally.

RECOMMENDATIONS

Cocoyam flour is an effective substitute for fresh cocoyam paste in thickening traditional soups, reducing reliance on fresh cocoyam dumplings. Processing cocoyam into flour can significantly lower the 60-70% waste typically incurred by farmers due to spoilage. Commercial production of cocoyam flour should be encouraged to bolster food security and economic sustainability for cocoyam growers. This strategy would ensure a continuous supply of cocoyam flour throughout the year, thus addressing seasonal shortages of fresh cocoyam dumplings for soup thickening. Additionally, the use of cocoyam flour for thickening continental soups should be promoted among Africans in the diaspora. Beyond enhancing soup thickness, cocoyam flour can also be blended with other flours for dishes like dumplings and puddings. Researchers are currently exploring the use of cocoyam flour combined with plantain flour to prepare dietary meals aimed at managing type II diabetes

REFERENCES

Adeyanju, J. A., Babarinde, G. O., Abioye O.A., Olajire, S. A. and Bolarinwa, F. D. (2019). Cocoyam Processing: Food Uses and Industrial Benefits. *International Journal of Scientific and Engineering,* Research, 10(9):

Agbelemoge, A. (2013). "Utilization of cocoyam in rural households in Southwestern Nigeria," African Journal of Food, Agriculture, Nutrition and Development, 13(4): 7944-7956.

Boakye, A. A., Wireko-Manu, F. D., Oduro, I., Ellis, W. O., Gudjónsdóttir, M., and Chronakis, I. S. (2018). Utilizing cocoyam (*Xanthosoma sagittifolium*) for food and nutrition security: A review. *Food science & nutrition, 6*(4): 703-713.

Eleazu C. O., Iroaganachi M., and Eleazu K. C. (2013) Ameliorative Potentials of Cocoyam (Colocasia esculenta L.) and Unripe Plantain (Musa paradisiaca L.) on the Relative Tissue Weights of Streptozotocin-Induced Diabetic Rats, *Journal of Diabetes Research,* Volume 2, Issue 2:140-147.

Ekwe K, Nwosu K, Ekwe C, Nwachukwu L (2009). Examining the underexploited values of cocoyam (Colocasia and Xanthosoma spp.) for enhanced household food security, nutrition and economy in Nigeria. In: Jaenicke H, Ganry J, Zeledon Hoeschle I, Kahare R (eds). *Proceedings of the International symposium on underutilized plants for food security, income and sustainable development. Acta Horticulture* 86: 71-78.

Falade, K. O., & Okafor, C.A. (2013). Physicochemical properties of five cocoyam *(Colocasia esculenta and Xanthosoma sagittifolium)* starches. *Food Hydrocolloids*, 30, 173-181.

FAOSTAT, FAOSTAT statistics database, (2017). https://search.library.wisc. edu/catalog/999882363002121

Folashade O. A., Olaide R. A., Monusurat T. O. and Barbara S. (2020). Comparative evaluation of instant poundo cocoyam (*colocasia esculenta*) and yam (*Dioscorea rotundata*) flours produced flash and cabinet drying. *International Journal of Food Science and Technology* , 56(3): 1482-1490.

Ijioma, J.C, Effiong J. B, Ogbonna M. O and Onwuamaoka E. A. (2014). "Determinants of adoption of selected NRCRI cocoyam technologies among farmers in Umuahia South Local Government Area of Abia State, Nigeria," *American International Journal of Contemporary Re-search. 4:*6.

Karim, R. (2017). Evaluation of Cocoyam (Colocasia esculenta) Genotypes for Yield and Yield Components. *Journal of Agricultural Science*, 9(2): 234-242.

National Root Crops Research Institute (NRCRI) Umudike, Cocoyam Program. www.nrcri.org (Accessed online on 13th February, 2015).

Obiana, C.I. (2022). B.Sc. project submitted to the faculty of Agriculture; Federal University, Dutsinma, Katsina State, Nigeria.

Okoson, Chidimma. J. and Nickaf Maimuna. S. (2013) Processing and Preservation of Cocoyam:Journal of 42nd HETAN National Conference.

Ubalua, A. O. (2016). Cocoyam (taro and tannia): Staples with untapped enormous potentials-A Review. *Plant Knowledge Journal, 5*, 27-35.