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## RESEARCH PAPER

# DEVELOPMENT OF CONVENIENT COCOYAM POTTAGE (MPOTOMPOTO)

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## ABSTRACT

***This study explored the feasibility of developing a ready-to-prepare cocoyam pottage, '****mpotompoto****' to meet consumers' need for convenience in traditional dishes. Cocoyam chunks (1.2cm x 1.2cm x 1.2cm) were pre-gelatinized to obtain the instant base ingredient, and an accompanying spice-mix recipe was developed. Standard methods were used to determine the moisture content and selected functional properties of the ready-to-prepare base product. A consumer panel of fifty assessors who were familiar with sensory testing evaluated the product's organoleptic properties. A dish following a traditional recipe was used as control. The moisture content of the instant base was low (10%), signifying the potential for good storability. The water absorption capacity, oil absorption capacity, swelling power and solubility were 247.39 ± 7.12%, 87.98 ± 3.76%, 6.44 ± 0.58% and 3.78 ± 0.29%, respectively, indicating desirable functional characteristics for reconstitution. The consumer panel generally appreciated all evaluated products with mean likeness scores between 5 and 6 for all tested attributes on a 7-point hedonic scale, 1 - (dislike extremely), 4 - (neither like nor dislike), 7- (like extremely). The convenient cocoyam pottage (****mpotompoto****) mimicked the traditionally prepared '****mpotompoto****'. This study provides baseline information that can be commercially explored as part of global efforts to update traditional foods for expanded markets.***

**Keywords:** Pottage; Cocoyam; Convenient foods; Traditional foods; Expanded markets

## INTRODUCTION

Traditional delicacies are gradually disappearing from most dining tables in urban Africa. The trend is largely attributed to the availability of more convenient (ready-to-eat; easier-to-prepare; easier-to-store) western meals that best suit the demands of the modern consumer in terms of time, methods/ recipes and storability (Gockowski *et al*., 2003; Laryea *et al*., 2016; Trolio *et al*., 2016)

Recent efforts to sustain such local/ traditional cuisines towards maintaining diversity in the diets of people have explored updating dishes of traditional cuisines to make them more attractive and fit for supermarket-chain distributions with enhanced access by the urban consumer(Carrigan *et al*., 2006; Inazu *et al*., 2002; Iwuoha and Eke, 1996) 'Poundo' yam, 'moin-moin' and canned palm soup base are typical examples of such commercialized indigenous African food products (Adeola *et al*., 2012; Ayodeji *et al*., 2017; Dedzo, 2018; Johnson *et al*., 2008; Olapade *et al*., 2005)

Of particular importance to achieving regional food and nutrition security are the highly perishable and seasonal root and tuber crops, which also form the majority of the staple crops in the African sub-region. A point in case is fufu, a West African delicacy made primarily from cassava and plantain; yam, and cassava or cocoyam. After being updated into ready-to-prepare flour, (Adebowale *et al*., 2005; Falade and Akingbala, 2010; Johnson *et al*., 2008) fufu has become a high commercial value 'international dish' which is presently integrated into supermarket chain vending and has attracted new consumers. It is now easier to prepare (requiring one person instead of two as done traditionally), and less time consuming (requiring 15 – 20 minutes compared to the almost 75 minutes needed in traditional preparation). The fufu flour also has longer shelf-stability, lasting more than a year compared to the few days storability of the fresh ingredients; cassava, yam, plantain and cocoyam.

Cocoyam pottage, *'Mpotompoto',* is a traditional pottage made from either yam, cocoyam, sweet potato, or taro chunks with other ingredients, including vegetables ( pepper, onion and tomatoes), fish and palm oil. This traditional pottage mostly has a soft porridge-like texture with soft chunks of yam, cocoyam, sweet potato or taro interspersed. Acclaimed for its digestibility and nutritional value, it is an essential diet for infants, the aged and convalescents (Pelto and Armar-klemesu, 2011) and is a delicacy of many West African communities. It is similar to some cocoyam recipes in Asia, the Caribbean and South America (Abe and Kawaguchi, 2010; Boakye *et al*., 2018), enjoyed by all consumers.

Despite the age-old nutritional and cultural importance of the dish in local cuisines, it has lost its prevalence in urban homes primarily because of difficult-to-follow and time-consuming recipes that have very limited storability (Abe and Kawaguchi, 2010). Research investigations to develop convenient alternatives with increased storability will contribute to global efforts to update indigenous cuisines for food security, health and wealth. Therefore, this study aimed to develop a consumer-acceptable convenient pottage from cocoyam *(Xanthosoma sagittifolium).*

## MATERIALS AND METHODS

### Raw materials

Red variety of cocoyam (*Xanthosoma sagittifolium*), onions, chili pepper, anchovies, tomatoes and iodized salt were obtained from the Ejisu market (a major local market in the Ashanti region of Ghana). Palm oil used in the final preparation of the dish for consumer assessment was obtained from a cottage producer in Kumasi, Ghana.

## Product formulation

### Development of instant base ingredient (Pre-gelatinized cocoyam chunks)

Cocoyam corms (5kg) were washed in a basin, peeled and rewashed. The corms were then chopped into cubes with an average thickness of 1.2 cm using kitchen dicer (Nicer Dicer Plus by Genius, China). Preliminary studies showed an optimal boiling time of 6 min for precooking the chunks in a water-to-sample ratio of 2:1 in boiling water followed by a 20 h drying at 60 °C in a hot-air oven after cooling. These conditions were employed to develop the pre-gelatinized instant (ready-to-prepare) base for the convenient *mpotompoto*. The ready-to-prepare base ingredient was then cooled and sealed in airtight High-Density Polyethylene (HDPE) flexible bags for further use.

### Spice preparation and formulation

#### *Processing of fish powder*

Sun-dried anchovies (500 g) were sorted to remove foreign materials, descaled, and the heads discarded. The dried fish was further dried for 30 min in a hot air oven at 50 °C after which they were cooled and milled to a rough-textured powder using a mixer grinder (Preethi ECO PLUS MG-138, India). The powder was then stored in airtight High-Density Polyethylene (HDPE) flexible bags for further use.

### Processing of powdered pepper

The method by Tunde-Akintunde (2010) was adopted. Chilli pepper samples (500 g) were cleaned and blanched in boiling water for 3 min. They were then cooled in excess cold water for 3 min, spread evenly on drying trays and dried in a hot air oven at 60 °C for 16 h. The dried sample was then milled into a fine powder with a mixer grinder (Preethi ECO PLUS MG-138, India) and stored in airtight High-Density Polyethylene (HDPE) flexible bags for further use.

### Processing of Tomato powder

The method as described by Owureku-asare *et al*. (2014) was adopted. Tomatoes (Roma variety, 1kg) were washed, sliced and blanched in 0.1% citric acid + 0.1% ascorbic acid solution for 10 min. The samples were then arranged on perforated drying trays and dried in a hot air oven at 55 °C for 25 h. The dried tomato was then milled in a mixer grinder (Preethi ECO PLUS MG-138, India) and stored in High-Density Polyethylene (HDPE) flexible bags for further use.

### Processing of Onion powder

Fresh onions (500g) were peeled, weighed, washed and sliced. They were packaged in zip-lock bags and frozen in a freezer at -4 °C for 24 h. The frozen onions were freeze-dried in a vacuum freeze-dryer (YK-118 model, True Ten Industrial Company Ltd, Taiwan) for 72 h, milled with a mixer grinder (Preethi ECO PLUS MG-138, India), sealed in a freezer bag and stored in a laboratory freezer for further use.

### Spice-mix formulation

The spice-mix for the *mpotompoto* was formulated based on preliminary tests and bench-top sensory evaluations following the recipe by Kissi (2015). From preliminary testing and to mimic traditional recipes for *mpotompoto*, two formulations were selected for the consumer evaluation of the final product. The formulated spice-mix contained dried anchovies, powdered pepper, freeze-dried onions powder and salt (spice-mix 1). The second formulation contained all these and tomato powder (spice-mix 2).

### Preparation of *mpotompoto* from instant base and spice-mix

Preliminary tests showed that 10 g of the spice-mix was adequate for 30 g of the instant base for product reconstitution. Water (400 ml) was brought to a boil and 30 g of the instant base added while stirring. The spice-mix (10 g) was added after 15 min and followed with 5 ml palm oil. The resulting pottage was allowed

to simmer on low heat for approximately one minute with intermittent stirring. The cooked pottage was then dished for consumer panel evaluation.

**Preparation of Control (Traditional *mpotompoto*)**

A typical traditional preparation process for *mpotompoto* was followed. For one medium-sized corm of cocoyam, one medium-sized tomato and onion were used. The cocoyam corms (approximately 250 g) were washed, hand peeled with a knife and washed again with potable water. The corms were chopped into chunks (3 cm cubes) and cooked until soft, taking about 30 min. Tomato (medium-sized Roma variety) and onion were blended and added to the boiling corms and the pottage allowed to cook for a further 10 min. Dried anchovies (20 g) and 3 g of powdered pepper were added and cooked for another 10 min. One gram of salt and 5 ml of palm oil were added to complete the dish.

## Analytical tests

The moisture contents of both the instant base (pre-gelatinized cocoyam chunks) and spice-mix were analyzed. The instant base's functional properties (water absorption capacity, oil absorption capacity, solubility index and swelling power) were determined to evaluate its cooking properties and inform appropriate conditions for reconstitution. All tests were done in triplicates. The protocols employed are discussed below.

**Moisture content determination**

The instant base was ground into powder before analysis. The oven method was used to measure the moisture content by weighing 1 g of each sample into a pre-weighed petri dish and dried in a convection oven at 105 °C for 4 h where constant weight was achieved. The moisture content was calculated as a percentage of moisture lost after cooling in a desiccator.

**Water absorption capacity**

The method used by Falade & Okafor (2015) was adopted. About 1 g of sample was weighed into graduated 15 ml conical centrifuge tubes, and 10 ml of distilled water was added. The centrifuge tubes containing distilled water and the sample were manually shaken until they were uniformly mixed to form a suspension. The suspensions were allowed to stand at 30±2 °C for 1 h. The suspension was centrifuged (using Hettich Universal 1200-01 Centrifuge, Depexbv, Netherlands, 1991) at 2200 rpm for 30 min, the supernatant was decanted, and the sample reweighed. Change in weight was expressed as percent water absorption based on the original sample weight.

**Oil absorption capacity**

The method used by Falade & Okafor (2015) was adopted. One gram of sample was weighed into a dry, clean centrifuge tube and weight was recorded. Commercial oil (Unoli soya oil) (10 ml) with a calculated density of 0.98 gcm−3 was poured into the tube and thoroughly mixed by shaking manually. The suspension was centrifuged (using Hettich Universal 1200-01 Centrifuge, Depexbv, Netherlands, 1991) at 3000 rpm for 15 min. The supernatant was discarded, and the tube and its content reweighed. The gain in mass was expressed as a percentage of the oil absorption capacity of the sample.

**Solubility Index and Swelling Power**

The swelling power and solubility of the flours were determined according to the methods described by Dossou *et al*.,2014. One gram of sample was weighed into 15 ml centrifuge tubes and thoroughly mixed with 10 ml distilled water by shaking manually. The mixture was heated in a water bath (Buchi B-480 Water Bath, BUCHI Labortechnik AG, Germany) at 85°C for 30 min, cooled to room temperature and then centrifuged (using Hettich Universal 1200-01, Centrifuge, Depexbv, Netherlands, 1991) at 2200 rpm for 15 min. The supernatant was carefully decanted into clean and dried

pre-weighed petri-dishes, evaporated in a hot air oven at 100°C for 30 min, and the resulting solids were cooled in a desiccator. The petri dishes were reweighed, and the residue in the centrifuge tubes, also weighed. The difference in weights for both the residue in the centrifuge tubes and the solids in the petri dishes were expressed as the percent swelling power and solubility, respectively, using the equations;

$$\% \text{ Swelling Power} = \frac{Weight\ of\ residue\ (paste)}{Weight\ of\ original\ sample} \times 100 \ldots\ldots\ldots\ldots (1)$$

$$\% \text{ Solubility} = \frac{Weight\ \ of\ resulting\ solids\ (soluble\ fraction)}{Weight\ of\ original\ sample} \times 100 \ldots\ldots\ldots (2)$$

## Consumer acceptance test

A 7-point hedonic scale, 1 being "dislike extremely" and 7, "like extremely", was employed. An in-house consumer panel assessed the three (3) *mpotompoto* samples: two of the developed convenient samples (each with one of the two spice-mixes) and a control (prepared using the traditional recipe). The samples were coded as follows: 996 (traditionally prepared *mpotompoto*), 372 (Instant base and spice-mix 1; without tomato) and 768 (Instant base and Spice mix 2; with tomato).

The panel were fifty (50) in number and aged between seventeen and twenty-seven. More than two-thirds of the panel had consumed traditionally prepared *mpotompoto* before, and all were familiar with the protocols for sensory testing. Product attributes identified as necessary from bench-top studies were appearance, texture, taste, aroma and aftertaste. These were assessed together with the overall acceptability. Slices of cucumber and potable water were provided as palate cleansers. Panel members assessed the samples in booths at the sensory evaluation laboratory of the Department of Food Science and Technology, KNUST, Kumasi, Ghana. Appropriate sample randomization and all other sensory testing protocols were observed to avoid bias in the evaluation.

## Ethical considerations

The consent of each panel member was sought by clearly explaining the study objective and allowing respondents to participate voluntarily. Each panel member could choose to stop the assessment at any time. Respondents' confidentiality during and after the study was also guaranteed.

## Statistical Analysis

Data obtained were analyzed using a One-way Analysis of Variance and Tukey's Honest Significant Difference at 95% confidence level. The IBM Statistical Package for Social Scientists software (SPSS) (version 22.0) was used for all analyses.

# RESULTS AND DISCUSSION

Data obtained for the product development, moisture content, functional properties and consumer assessment of the sensory attributes of the developed convenient *mpotompoto* compared to *mpotompoto* prepared following a traditional recipe is discussed.

## Developed Convenient Mpotompoto

A ready-to-prepare/convenient *mpotompoto* was developed. The product comprises an instant base and a spice-mix with an option to add palm oil. Two formulations differing only in the composition of the spice-mix were obtained: Formulation 1 (Sample 372) being convenient *mpotompoto* without tomato powder in the spice-mix (Plate 1.0) and Formulation 2 (Sample 768), convenient *mpotompoto* with tomato powder in the spice-mix (Plate 2.0).


**Plate 1.0: Reconstituted convenient *mpotompoto* without tomato powder in the spice-mix (Sample 372)**


**Plate 2.0: Reconstituted convenient *mpotompoto* with tomato powder in the spice-mix (Sample 768)**

The developed convenient *mpotompoto* is easier to prepare, requires only a few activities in dish preparation (Section 2.2.3) and has reduced preparation time (approximately 20 min) compared to almost 2 hours with the traditional recipe (Section 2.2.4). The convenience in the preparation and storability of the developed *mpotompoto*, meets the food demands of the modern (urban) consumer as proposed by Laryea *et al*. (2016) and Trolio *et al*. (2016). The findings suggest the potential to find new markets if commercially exploited as a supermarket chain franchise.

## Moisture Content

The dry base ingredient and packed spice-mix, for convenient *mpotompoto* preparation, had moisture contents of 10±0.5% and 12.5±0.2%, respectively. The relatively low moisture contents and easy-to-handle/ easy-to-prepare state of the developed product suggest a longer storability and enhanced opportunities for broader markets.

## Functional Properties of the instant base

The functional properties of the instant cocoyam base are presented in Figure 1.0. The instant base had relatively high water and oil absorption capacities but low swelling power and solubility.

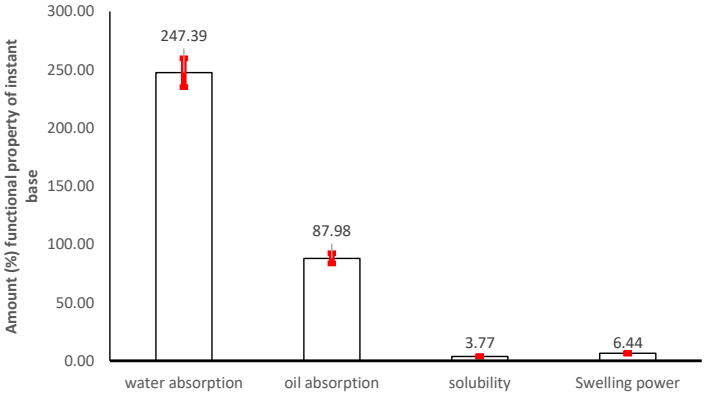


**Figure 1.0: Selected functional properties of the instant base**

Bars represent means of triplicate measures for the selected functional property.

**Water absorption capacity of the instant base**

The water absorption capacity (WAC) of a food matrix is influenced by its constituent biomolecules and how they can associate with water. That for cocoyam roots is largely attributed to the water uptake by the starch granules and other polysaccharides since cocoyam has relatively low protein (Chandra and Shamsher, 2013).

The water absorption capacity (WAC) of the instant base was high (247%) and found to be higher than the values obtained for oven-dried flour (32% and 69%) from two cultivars of Xanthosoma spp (Falade and Okafor, 2015). This was expected as the pre-gelatinized chunks forming the instant base was obtained from a hydrothermal process involving boiling prior to drying, contrary to the preparation of native flours. Boiling ascribes a higher probability for starch granule disintegration/ loss of crystallinity, associated with high WAC levels of a food matrix (Falade and Akingbala, 2010).

Drying further disrupts the morphology of foods and so influences textural properties and degree of rehydration (Kerdpiboon *et al*., 2007). The present study thus supports findings of Njintang and Mbofung (2006) who reported increase in the water absorption capacity of pre-gelatinized Colocasia esculenta flour from 150 to 550 g/100 g with increasing precooking time and temperatures. These results indicate good capacity of the instant base to rehydrate during reconstitution. High WAC is critical for convenient products that require rehydration prior to consumption. It informs potential for the product to regain original textural attributes and thus could dictate consumer acceptance and market viability of the developed convenient pottage in the present study.

**Oil absorption capacity of the instant base**

Foods that absorb oil have improved flavour retention and mouthfeel. Thus, high oil absorption capacities (OAC) are desirable in ready-to-prepare foods involving reconstitution with lipid-rich ingredients. The OAC of the instant cocoyam base (Figure 1.0) is appreciable compared to the reported values (24% and 27.5%) for studies on oven-dried flours of similar species (Falade and Okafor, 2015). OAC of foods is enhanced by the lipophilic nature of constituent biomolecules and suggests presence of hydrophobic proteins in a food matrix (Ubbor and Akobundu, 2009). Traditionally, *mpotompoto* is spiced for good flavour. The high OAC of the base ingredient thus shows a high potential for the instant base to retain the flavours (from the spice-mixes)

during preparation for enhanced organoleptic attributes and consumer acceptance.

**Swelling power and solubility of the instant base**

The swelling power and solubility of the instant cocoyam base were relatively low being 6.44% and 3.78%, respectively (Figure 1.0). Swelling power measures the ability of starch granules to expand when water molecules are imbibed (hydration potential), whereas solubility indicates the ability for solutes to dissolve in a solvent. Both properties are highly influenced by the nature and surface area of a food matrix as well as the type and size of starch granules under study and the temperature of evaluation (Alam and Hasnain, 2009; Biliaderis, 2009).

Gelatinisation disrupts integrity of starch granules, reduces their ability to swell after cooling (Jurislav *et al*., 2009; Perry and Donald, 2002) and could have contributed to the low swelling ability of the instant base which was pre-gelatinized during the development of the convenient instant base (section 2.2.1). Formation of amylose-lipid complexes is also known to inhibit swelling of gelatinized starch (Wadchararat and Thongngam, 2006), further supporting the observations in the present study.

Solubility of a starch granule positively correlates to its swelling power; the higher the granule swelling capacity, the higher its solubility and vice-versa. Solubilities are further decreased by reduced amylose leaching and increased amylose-lipid complexes following gelatinization (Ambigaipalan *et al*., 2013; Wadchararat and Thongngam, 2006). The relatively low solubility of the instant base thus indicates the likely preclusion of complete dissolution (mashing) during reconstitution of the convenient *mpotompoto*. This is a desirable attribute following the traditional recipe for *mpotompoto* which requires the presence of soft chunks of the main starch ingredient (cocoyam or yam) interspersed in the final pottage. The functional properties of the instant base of the developed convenient *mpotompoto* show good potential for appreciable organoleptic properties and, by inference, consumer acceptance of the reconstituted product.

## Consumer Acceptance Tests

Evaluation of consumers' liking of a new or improved product is key to its market success. This need is heightened in novel food products. Thus, the assessment of eating quality of any developed product by potential consumers is a required component of final steps to completing the product development process. The consumer liking scores for attributes of the developed convenient *mpotompoto* [instant base with spice mix 1 (without tomato) and instant base with spice-mix 2 (with tomato)] is presented in Table 1.0 with the traditionally prepared *mpotompoto* as control.

**Table 1.0: Consumer likeness scores for sensory attributes of the study samples**

| | Sample code | | |
|---|---|---|---|
| **Attribute** | 768 | 372 | 996 |
| **Appearance** | 5.52 ± 1.07[a] | 5.26 ± 1.38[a] | 5.66 ± 1.10[a] |
| **Aroma** | 5.78 ± 1.09[a] | 5.46 ± 1.23[a] | 5.28 ± 1.01[a] |
| **Texture** | 5.26 ± 1.14[ab] | 4.92 ± 1.43[a] | 5.74 ± 0.85[b] |
| **Taste** | 5.88 ± 1.06[a] | 5.46 ± 1.28[a] | 5.58 ± 1.07[a] |
| **Aftertaste** | 5.50 ± 1.28[a] | 5.02 ± 1.46[a] | 5.56 ± 1.07[a] |
| **Overall acceptability** | 5.76 ± 0.82[a] | 5.34 ± 1.02[a] | 5.62 ± 1.14[a] |

*Values are presented as averages ± standard deviation of triplicate measures.*
*Values in the same row with the same letters are not significantly different; p>0.05.*
***Scale: (1 - dislike extremely; 4 – neither like nor dislike; 7 - like extremely)***
***Legend:*** *768 - Convenient mpotompoto (Instant base + Spice mix with tomato powder)*
*372 - Convenient mpotompoto (Instant base + Spice mix minus tomato powder)*
*996 – Control (mpotompoto prepared from a traditional recipe*

**Appearance**

The samples' possible colour differences were masked by the palm oil, a generally preferred ingredient in *mpotompoto*. Despite this, the dish originally has a unique 'look' that combines a thick porridge embedded with soft non-chewy chunks of cocoyam (or yam depending on root crop used) and fish (with sometimes meat). Appearance plays a vital role in consumer acceptance of products, and this unique appearance of *mpotompoto*, is the deciding factor for most consumers.

The consumer panel assessment showed no significant differences (p>0.05) among the product 'look' of the three samples. Mean scores ranged from 5.26 (instant base with spice-mix 1) to 5.66 (control), falling within like moderately (5.0) and like very much (6.0) on the employed assessment scale, indicating a general consumer panel appreciation of the developed convenient products in comparison to the control. It is noteworthy that the numerical values of the instant base (spice-mix 2) was closey related to the control and both conformed to the 'like very much score'.

This overall appreciation of the product's appearance supports the high WAC and low solubility exhibited by the instant base, indicating its potential to be hydrated with a resulting soft look and preservation of chunks with minimal dissolution/ mashing. This is a significant step for the acceptance of the convenient *mpotompoto*.

**Aroma**

Aroma refers to the smell (of chemicals) perceived in the nostrils. Similar to the appearance, *mpotompoto* has a peculiar aroma particularly when prepared from cocoyam. There were no significant differences among the developed convenient *mpotompoto* and the control in terms of the panel's assessment of the characteristic 'cocoyam *mpotompoto*' smell. This further suggests that the processing protocols employed in the development of the spice-mix were appropriate, blending well with the instant base to mimic the unique odours of cocoyam *mpotompoto*. Again, the consumer assessment supports the high OAC obtained for the instant base which indicates good potential for the base to retain flavours

(including aromatic compounds) from the blend of the spice-mix and oils. All samples were scored like moderately - like very much for aroma with the convenient product (spice-mix with tomato; Sample 768) having the highest numerical mean value.

**Texture**

The textural attribute evaluated in the present study is the overall product smoothness and softness in the mouth (mouthfeel). There was no significant difference between the control (traditionally prepared *mpotompoto*) and convenient *mpotompoto* (spice-mix with tomato; Sample 768). However, significant differences ($p<0.05$) were observed in the mean panel scores for convenient *mpotompoto* (spice-mix without tomato; Sample 372) and the control; and between the two developed convenient products, Samples 768 and 372.

Tomato powder has appreciable soluble dietary fibre content, a notable constituent for enhancing smoothness in food products as it associates with the inherent water molecules of the food (Kim *et al*., 2014; Wang *et al*., 2016). The use of tomato powder in Sample 768 may have thus been the distinguishing feature giving it the perceived similarity in mouthfeel to the control, contrary to the observation for convenient sample 372, which had no tomato powder added.

**Taste and Aftertaste**

There was no significant difference between the three test samples regarding taste and aftertaste (Table 1.0). Taste primarily refers to perceived sensations when food chemically reacts with taste buds in the oral cavity. It is also partly responsible for food flavours. In contrast, aftertaste, a generally negative attribute in food products, is the lingering sensations after the stimulus (food or drink) is removed from the oral cavity (ASTM, 2009). Both attributes are vital to consumer acceptance of food products despite 'looks' and the pleasant aroma of the food.

The panel found the taste of the three samples acceptable with mean likeness scores of 5.46 (convenient *mpotompoto*; spice-mix without tomato) – 5.88 (convenient *mpotompoto*; spice-mix with tomato). Although no statistical difference was observed ($p>0.05$) in the panels' appreciation of the taste of samples, it is worth noting that the developed convenient pottage again has a higher mean score for likeness against that for the control (5.58). The findings further support the potential of the developed product as a convenient alternative for the traditional dish in meeting new consumer demands and dietary trends. Similar findings are obtained for the aftertaste, which had mean likeness scores of 5.02, 5.50 and 5.56, for convenient *mpotompoto* (spice-mix without tomato, convenient *mpotompoto* (spice-mix with tomato) and the control, respectively.

**Overall acceptability**

All three samples had appreciable mean likeness scores for the overall acceptability. Mean scores ranged between "liked slightly" and "liked very much" with no statistical difference ($p>0.05$) between the consumer panels appreciation of the developed convenient dish and that of the traditionally prepared dish (Table 1.0).

Overall acceptability measures a consumers' general (and most times, total) appreciation of a product given all assessed attributes: this is also critical in assessing the market viability of products in the product development process. The findings further support the afore-discussed potential of the developed convenient *mpotompoto* to be accepted as a convenient alternative to the traditionally prepared dish and a potential niche on the traditional foods market.

## CONCLUSION

A convenient alternative to the indigenous West-African pottage from cocoyam, *mpotompoto*, has been successfully developed. The ready-to-prepare/convenient *mpotompoto* has a low moisture content (10%), signifying a potentially longer storability contrary to the prepared traditional dish. Furthermore, the instant base of the convenient *mpotompoto* had high water absorption and oil absorption capacities and low solubility and swelling ability suggesting its potential to obtain desirable organoleptic attributes when reconstituted. This deduction was confirmed by the consumer panels' appreciation of the reconstituted convenient *mpotompoto* dishes; sample 372 (spice-mix without tomato powder) and sample 768 (spice-mix contains tomato powder). There were generally no significant differences ($p>0.05$) between the convenient *mpotompoto* dishes and the control except for texture of the convenient *mpotompoto* (without tomato powder in spice-mix) which was less liked compared to the control and the convenient *mpotompoto* (with tomato powder in spice-mix). The findings show the developed convenient *mpotompoto* mimicked the organoleptic characteristics of the traditional *mpotompoto*. The convenient *mpotompoto* thus has good potential for acceptance among indigenes with an additional potential to create new markets should its commercial value be explored via supermarket-chain distribution channels.

## CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

## DATA AVAILABILITY

All relevant data supporting the findings of this study are included in the article.

## FUNDING INFORMATION

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