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SENSORIAL TEXTURE ATTRIBUTES AND CONSUMER ACCEPTABILITY OF SWEET-POTATO-BASED *AMALA* AS INFLUENCED BY DIFFERENT PROCESSING METHODS

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ABSTRACT

Sweet potato tuber is an important staple food in many developing countries, with research on the fermented flour spanning from characterization to value addition, but with little or no study on the textural attributes and consumer acceptability of the amala as influenced by different processing methods. This study aimed to close this research gap. The flour was produced using steeping temperatures of 30±2 °C (cold water) and 60 °C (warm water) for 24, 48, and 72 h, respectively. It was dried at 60 °C for 48 h in a dryer, milled, cooled, sieved, and packaged for further study. The flour (100 g) was reconstituted in boiling water (195 mL) to get the amala. The amala was evaluated for sensorial texture attributes using a well-structured questionnaire with 15 trained panelists, and the consumer acceptability was conducted in three locations (Malete, Asomu, Elemere) of Kwara State, Nigeria using a well-structured questionnaire with 50 panelists in each area. The result showed that the softness and stretchability of the amala were significantly different, while the stickiness and mouldability were not significantly different (p>0.05). The 48 h warm water fermented sweet-potato-based amala was preferred in Malete, Asomu, and Elemere by the consumers, due to its mouldability as shown in the principal component biplot. Therefore, the consumer acceptability of the fermented sweet-potato-based amala is linked to its mouldability.

Keywords: Steeping temperatures, steeping periods, fermented sweet potato flour *amala*, textural attributes, consumer acceptability

1. INTRODUCTION

Sweet potato tubers have become a focus of research due to their versatility and adaptability to variation in climatic conditions. Their versatility ranges from cooking, roasting, confectionery, unfermented flour, crisps, animal feed, starch, and sweet potato beverages to reconstitution of the fermented flour

in boiled water to *amala* (Egeonu, 2004). *Amala* is a traditional thick paste prepared from blanched, fermented, or unfermented dried root and tuber flour with a specific texture (Awoyale et al., 2010). Texture is the functional and sensory expression of food quality traits that may be identified by kinaesthetic aspects as well as by touch, hearing, and sight (Awoyale et al., 2022). One of the main factors influencing how well-liked cooked starchy dishes are by consumers is through their textural characteristics. Among these textural qualities are stretchability, moldability, stickiness, and softness/hardness (Awoyale et al., 2022). It is anticipated that differences in how sweet potato tubers are processed into flour might affect the texture and acceptance of amala among consumers. Thus, the purpose of this study is to assess how various methods of production affect the sensorial texture attributes and consumer acceptance of sweet-potato-based *amala*.

2. MATERIALS AND METHODS

The sweet potato tubers were bought from a local market in Ilorin and processed into fermented sweet potato flour. The flour was produced using steeping temperatures of 30±2 ^{o}C (cold water) and 60 ^{o}C (warm water) for 24, 48, and 72 h, respectively. It was then dried at 60 °C for 48 h in a cabinet dryer, milled, cooled, sieved, and packaged in a Ziplock bag and sealed for further study. The flour (100 g) was reconstituted in boiling water (195 mL) to get the *amala*. The *amala* was evaluated for sensorial texture attributes such as softness, mouldability, stretchability, and stickiness, using a well-structured questionnaire with 15 trained panelists, and the consumer acceptability was carried out in three locations (Malete, Asomu, Elemere) of Kwara State using a 5-point hedonic scale contained in a well-structured questionnaire with 50 panelists in each area. The data collected were analyzed using the Statistical Package for Social Sciences (SPSS) version 21 to determine the mean values, standard deviations, and significant differences between test samples at a 95% confidence level. The Principal Component Analysis (PCA) was done using the XLSTAT free version of 2023.

3. RESULTS AND DISCUSSION

The sensorial texture profile of sweet potato flour amala from various methods of processing revealed that it was moderately sticky, stretchable, moldable, and soft. Awoyale et al. (2022) noted a similar finding for cooked fufu flour dough. There was a significant difference ($p < 0.05$) in the *amala's* softness and stretchability, but not a significant difference ($p > 0.05$) in its mouldability and stickiness (Table 1). The softness of the 24 h warm water fermented sweet-potato-based amala was statistically equal ($p>0.05$) to that of the 72 h cold and warm water fermented sweet-potato-based amala, but it differed significantly from the 24 h cold water fermented, and 48 h cold and warm water fermented sweet-potato-based amala. The stretchability of the sweet-potato-based amala was affected by the 24 h cold water fermentation (Table 1). Consumers in the Malete community favoured the fermented sweet-potato-based amala that was produced with 24 h of cold water and 48 h of warm water fermentation. While consumers in the Elemere community preferred the 24 h cold and warm water fermented, and the 48 h warm water fermented sweet-potato-based amala, those in the Asomu community preferred the 24 h cold and warm water fermented and the 48 h warm water fermented sweet-potato-based amala (Table 2). Consumers in every region favoured the 48 h warm water fermented sweet-potato-based amala due to its mouldability, according to the Principal Component Biplot (Figure 1). This is because the 48 h warm water fermented sweet-potato-based amala's mouldability and consumer acceptance fell into the same quadrant across all locations. According to Awoyale et al. (2022), one of the most important textural characteristics for the acceptability of cooked fufu flour dough is mouldability, which also aligns with that of this study.

Table 1: Sensorial texture attributes of sweet-potato-based amala produced from different processing methods

Sweet potato flour samples	Softness	Mouldability	Stretchability	Stickiness
24 h cold water fermented	2.13±0.74a	2.47±0.52a	1.60±0.51b	2.00±0.76a
24 h warm water fermented	1.27±0.59b	2.73±0.46a	2.40±0.63a	2.27±0.88a
48 h cold water fermented	1.93±0.70a	2.40±0.63a	2.53±0.64a	2.27±0.70a
48 h warm water fermented	1.80±0.56a	2.40±0.63a	2.40±0.83a	2.07±0.88a
72 h cold water fermented	1.67±0.72ab	2.47±0.52a	2.40±0.74a	2.13±0.74a
72 h warm water fermented	1.67±0.62ab	2.47±0.74a	2.73±0.46a	1.87±0.92a
Mean	1.74	2.49	2.34	2.10
p level	*	NS	***	NS

Means with the same letters within the same column are not significantly different (p>0.05), ±Standard deviation.
*p<0.05, ***p<0.001, NS-Not significant.
Softness (1-Soft, 2-Moderately soft, 3-Hard), Mouldability (1-Not mouldable, 2-Moderately mouldable, 3-Mouldable), Stretchability (1-Not stretchable, 2-Moderately stretchable, 3-Stretchable), Stickiness (1-Not sticky, 2-Moderately sticky, 3-Sticky)

Table 2: Consumer acceptability of sweet-potato-based amala in different locations

Sweet potato flour samples	Malete community	Asomu community	Elemere community
24 h cold water fermented	1.60±1.05bc	2.28±1.16b	1.56±1.05c
24 h warm water fermented	2.04±0.99ab	2.56±1,25b	1.90±0.81bc
48 h cold water fermented	2.18±0.92a	2.68±1.15b	2.34±1.10ab
48 h warm water fermented	1.46±0.89c	2.16±1.13b	2.02±1.38bc
72 h cold water fermented	2.40±1.37a	3.24±1.20a	2.44±1.45ab
72 h warm water fermented	2.52±1.55a	3.22±1.62a	2.70±1.76a
Mean	2.03	2.69	2.16
p level	***	***	***

Means with the same letters within the same column are not significantly different (p>0.05), ±Standard deviation.
***p<0.001. 1-Like extremely, 2-Like slightly, 3-Neither like, nor dislike, 4-Dislike slightly, 5-Dislike extremely

4. CONCLUSION

The processing methods had an important influence on the sweet-potato-based amala's softness and stretchability. Perhaps because of its mouldability, consumers in Malete, Asomu, and Elemere favoured the 48 h warm water fermented sweet-potato-based amala. Consequently, the textural quality that influences how well-liked sweet-potato-based amala is by the consumers is its mouldability.

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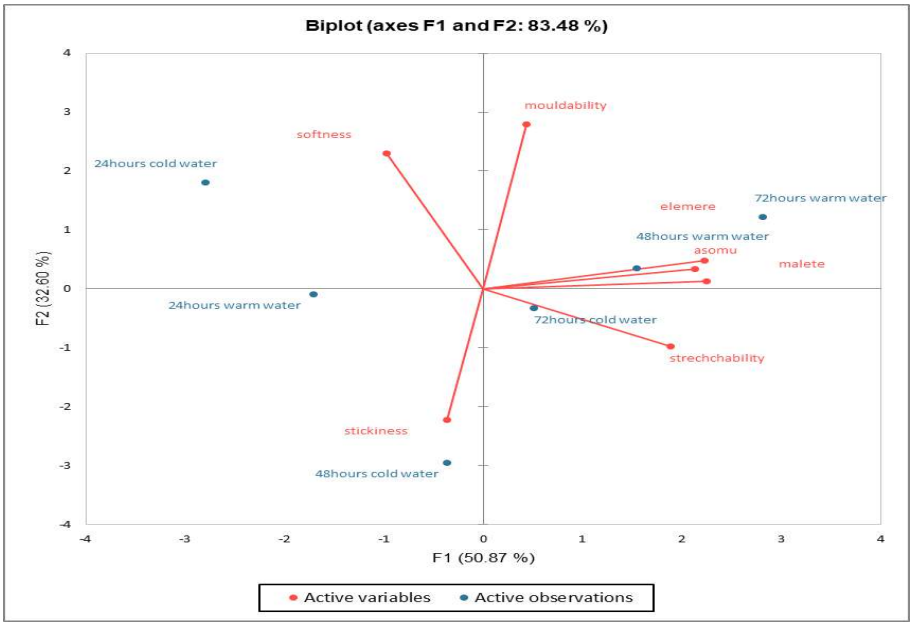


Figure 1. Principal Component Biplot of the sensory texture attributes and the consumer acceptability of sweet-potato-based amala.