# CORRELATION OF THE TEXTURAL ATTRIBUTES AND CONSUMER ACCEPTABILITY OF *OJOJO* AS INFLUENCED BY DIFFERENT FRYING TEMPERATURES AND TIMES

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## Abstract

*Ojojo*, a fried yam ball is usually prepared from grated fresh *Dioscorea alata* tuber, with no attention given to the frying conditions as it affects the textural quality, thus the need for this study. A batch of fresh *D. alata* tuber (10 kg) was processed into *Ojojo* and used as a control sample, and another batch (10 kg) was processed into flour and then to *Ojojo* using different frying temperatures and times (180°C for 4 min, 160°C for 3 min, and 170°C for 5 min). The textural attributes and consumer acceptability of the samples were analyzed using standard methods. Results showed that the consumer acceptability of the *Ojojo* was positively correlated ($p<0.05$) with the instrumental adhesiveness ($r=0.85$) while a negative correlation exists between the consumer acceptability and the sensory gumminess ($r=-0.94$). The consumer acceptability of the *Ojojo* produced from the frying temperature and time of 160$^{o}$C for 3 min and 170$^{o}$C for 5 min compared favourably with the control sample in all the locations. Therefore, *D. alata* tuber can be processed into flour and used to produce *Ojojo* at a frying condition of 160$^{o}$C for 3 min or 170$^{o}$C for 5 min which is texturally acceptable.

**Keywor**ds: *Dioscorea alata* tuber, *D. alata* flour, *Ojojo*, textural attributes, consumer acceptability.

## Introduction

*Ojojo* is a deep-fat fried snack made from *Dioscorea alata* (Onwueme, 2006). Traditionally, the freshly peeled tuber is grated to form a viscous mass which is mixed with other chopped vegetables such as onion and pepper (Aminu et al., 2018). The grating of the tuber is the most tedious because it is energy and time-consuming. Processors also sustain hand injuries while squeezing the tissue against the abrasive surface of grating utensils. Therefore, scientific studies are required to reduce or eliminate such drudgery encountered in the traditional processing of *Ojojo*. The development of a more convenient way of preparing the product would be a form of value addition (Aminu et al., 2018). This could be achieved through careful processing of grated tuber to flour that will ease its handling, storage, and shelf life and allow an all-year-round utilization in the production of *Ojojo*. However, the frying process of *Ojojo* needs to be controlled. Consequently, this study aims to determine the correlation between the textural attributes and consumer acceptability of *Ojojo* produced from *Dioscorea alata* flour as influenced by different frying temperatures and times. This may assist the traditional *Ojojo* processors who do not know how to standardize the frying temperatures and times when using *Dioscorea alata* flour for the production of *Ojojo*.

## Materials and Methods

The *Dioscorea alata* tubers, groundnut oil, fresh pepper, and onions, were purchased from Oja Oba market in the Ilorin-west Local Government Area of Kwara state, Nigeria. The knife, grater, trays, cabinet dryer, blender, deep fryer (Crown Star 3.5L), weighing balance, plastic buckets, aluminum foil, and other utensils were gotten from the Food Science and Technology Laboratory, Kwara State University, Malete. The method described by Okoye et al. (2018) with modification was used to produce *Dioscorea alata* tuber flour and the *Ojojo*. The paste for *Ojojo* preparation was made by mixing 100 g of flour with 200 ml of water. About 5 g of chopped fresh pepper, 4 g

of chopped onions, 0.1 g of seasoning, and 0.1g of salt were added to 200 g of the paste. The hand-held food blender was used to beat the mixture thoroughly, after which the mixture was then scooped with a spoon of 40 ml and dispensed into an electric deep fryer (Crown Star 3.5L, MC-DF3139, China), containing 3 liters of hot vegetable oil to deep fried. The *Ojojo* was produced using the frying conditions of 170°C for 5 min (most liked), 160°C for 3 min (slightly liked), and 180°C for 4 min (disliked) reported by Saliu (2022). The control sample was produced from fresh *Dioscorea alata* tuber using the best frying condition of 170°C for 5 min (Saliu, 2022). *Ojojo* produced from these different frying conditions was then evaluated for instrumental texture profile (ITPA) and Sensory texture profile (STPA) analysis using standard methods (Saliu, 2022). The consumer acceptability of the *Ojojo* was carried out in three locations (Malete, Ilorin, and Safari) within Kwara state, using a well-structured questionnaire with 50 respondents per location. The GPS of the locations is Malete (Longitude 8º43′23″N Latitude 4º29′2″E), Ilorin (Longitude 8º31′7″N Latitude 4º28′58″E), and Safari (Longitude 8º42′17″N Latitude 4º28′1″E). The statistical analysis was done using Statistical Package for Social Sciences (SPSS version 21.0) and XLSTAT free version 2022.

**Results and Discussion**

A perceived poor textural quality can hurt the acceptability of fried products by consumers (Yusuf et al., 2017). The results of the consumer acceptability revealed that the control sample was the most acceptable ($p<0.05$) in all the locations (Malete, Ilorin, and Safari Towns) (Table 1). This may be attributed to the negative correlation that exists between consumer acceptability and the sensory gumminess ($r=-0.94$) of the *Ojojo* (Table 2). This was also supported by the principal component analysis (PCA) biplot, which revealed that the control sample (fresh *Dioscorea alata* tuber *Ojojo*) was in the same quadrant with the sensory gumminess of the *Ojojo* (Figure 1). The

*Ojojo* produced from the frying conditions of 180$^{o}$C for 4 min, 160$^{o}$C for 3 min, and 170°C for 5 min were slightly acceptable compared to the control sample (Table 1). The slight acceptability of the *Ojojo* produced from 160$^{o}$C for 3 min and 170°C for 5 min may be due to the positive correlation that exists between the instrumental hardness (r=0.41), instrumental adhesiveness (r=0.85) and the consumer acceptability of the *Ojojo* (Figure 1). Also, the sensory hardness of the *Ojojo* produced from 180$^{o}$C for 4 min may be responsible for its slight acceptability as shown in Figure 1.

The correlation loading of the textural attributes and consumer acceptability of the *Ojojo* is shown in Table 2. The result depicts that the principal component 1 (PC1) was positively correlated with the instrumental hardness (r=0.41), instrumental adhesiveness (r=0.85), sensory hardness (r=0.88), and consumer acceptability (r=0.96), but negatively correlated with the sensory chewiness (r=-0.28), and sensory gumminess (r=-0.94). The PCA biplot, as shown in Figure 1, allowed us to separate the *Ojojo* samples based on the textural attributes and consumer acceptability of the *Ojojo*. The result showed a data variance of about 82.25%, with PC1 contributing 53.32% and PC2 28.93%. The 160$^{o}$C for 3 min and 170$^{o}$C for 5 min *Ojojo* were in the same quadrant with the instrumental adhesiveness, instrumental hardness, and consumer acceptability of the *Ojojo*. Similarly, the 180$^{o}$C for 4 min *Ojojo* was in the same quadrant with the sensory hardness, while the control sample was in the same quadrant with the sensory gumminess of the *Ojojo* (Figure 1). This implied that the consumer preference for the *Ojojo* produced from the frying temperature and time of 160$^{o}$C for 3 min and 170$^{o}$C for 5 min in all the locations may be attributed to the positive contributions of the instrumental hardness and adhesiveness.

## Conclusion

The consumer acceptability of the *Ojojo* produced from the frying temperatures and times of 160$^{o}$C for 3 min and 170$^{o}$C for 5 min compared favourably with the control sample in all the locations. The acceptability of these *Ojojo* samples may be attributed to the instrumental hardness and adhesiveness. Therefore, fresh *Dioscorea alata* tuber can be processed into flour and used for the production of *Ojojo* at frying temperatures and times of 160$^{o}$C for 3 min or 170$^{o}$C for 5 min, in order to reduce the drudgery involved in the use of fresh *Dioscorea alata* tuber and obtain a standardized *Ojojo*

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Table 1. Consumer acceptability of *Ojojo* produced from different frying temperatures and time

| Frying Temp (°C) | Frying Time (min) | Consumer Acceptability |
|---|---|---|
| 180.00 | 4.00 | 2.37±1.14a |
| 160.00 | 3.00 | 2.20±1.10a |
| 170.00 | 5.00 | 2.30±1.0a |
| Control sample | | 1.34±1.0b |
| Location | | |
| Malete | | 2.23±1.20a |
| Ilorin | | 1.70±1.0b |
| Safari | | 2.23±1.20a |
| Mean | | 2.05 |
| p sample | | *** |
| p location | | *** |

| | |
|---|---|
| p sample x location | ** |

Means with the same letters within the same column are not significantly different (p>0.05)

1= Liked very much, 2= Liked slightly, 3= Disliked very much, **p<0.01, ***p<0.001

Table 2. Correlation loading of the textural attributes and consumer acceptability of *Ojojo* produced from different frying temperatures and times

| Attributes | F1 | F2 | F3 |
|---|---|---|---|
| I Hardness | 0.41 | 0.16 | 0.90 |
| I Adhesiveness | 0.85 | 0.45 | -0.28 |
| S Hardness | 0.88 | -0.41 | -0.24 |
| S Chewiness | -0.28 | 0.86 | -0.43 |
| S Gumminess | -0.94 | -0.31 | -0.18 |
| Consumer acceptability | 0.96 | 0.25 | -0.11 |

I-Instrumental, S-Sensory

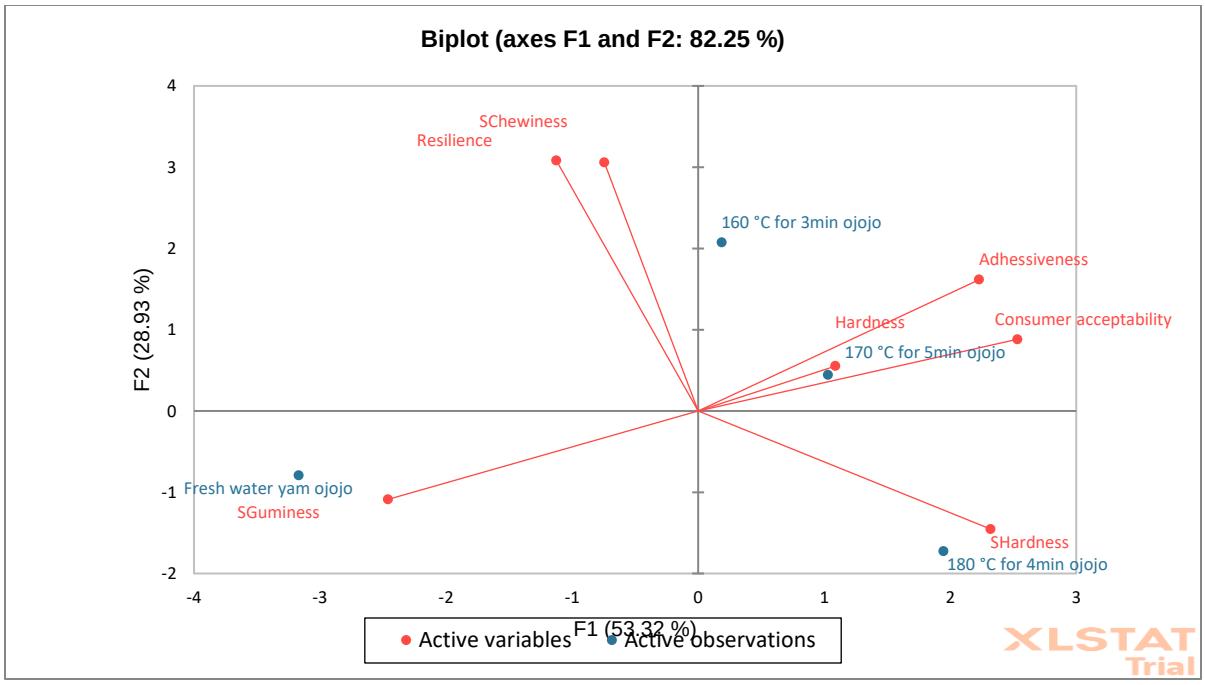



Figure 1. Principal component biplot of the biophysical traits of the *Ojojo*, and the textural attributes and consumer acceptability of the *Ojojo* produced from different frying temperatures and times.

SHardness-Sensory hardness, SChewiness-Sensory chewiness, SGumminess-Sensory gumminess