



COMPARATIVE ANALYSES OF SELECTED PHYSICOCHEMICAL AND
ORGANOLEPTIC PARAMETERS ON IJAKPO MADE FROM UNDERUTILIZED
FRESH LEAVES FROM PUMPKIN AND POTATO

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Abstract

Ijakpo is a readily prepared Yakurr traditional cassava leaf diet which can help fulfill the malnutrition needs of diverse communities. The samples were prepared with the use of other leaves that have not been adequately exploited: pumpkin(A) and potato(B). The products were analyzed with regard to sensory properties granted by 25 volunteer adult panelists who are conversant with cassava Ijakpo but do not know about the specific modifications till after the score. Physicochemical analyses were conducted for the products as well. The values thus acquired were further processed with the aid of ANOVA with the help of Ai assisted Microsoft Excel at $p < 0.05$. As for the sensory analyses, it has been found that the mean values of pumpkin Ijakpo are significantly higher in the choice for appearance (5.84 against potatoes 4.16), aroma (5.12 against 3.7), mouthfeel (4.96; 3.75) but not significantly higher in taste (4.92 versus 4.16) and general acceptance (5.56 versus 4.68). From the physicochemical analysis it has become clear that pumpkin Ijakpo is significantly higher in iodine test (which measures vitamin C levels), Chlorophyll but significantly lower than potato in browning index, wettability where as specific gravity, gelatin and foam are not significantly different. This implies that despite all its superior properties, potato leaf can be used as an alternative.

Key Words: Nutrient, physicochemical, Sensory, Analyses, diet

Introduction

Indeed, there exists global speed in the improvement of technology. However, with the improvement in technology, a big

portion of the world still faces different forms of food related crises. According to USDA (2024), more than 23 million people live in food deserts with more than 40% of low-income earners being victims of potassium and iron deficiencies. The



agency encourages leaves of crops such as pumpkin and potatoes as culturally acceptable food sources. In Sub-Saharan Africa, 31.4% of children under the age of 5 years face growth stunting (FAO and others. 2023). This has been attributed to the presence of iron and protein conditioning varieties of underutilized nutrient dense food sources in various parts of the world (Okoro and Ajibade, 2021). These sources include the weeds or waste parts of crops apart from the main produce. For instance, potato is primarily grown for its starch rich tubers rather than the leaves which themselves have more nutrients than the tubers and are less poisonous than cassava leaves. Pumpkin is another example of crops which, though mostly grown for their fruits can also be classified as underutilized in terms of their potential uses (Olaoye and Idowu, 2019).

Nutrient value of these leaves cannot be overlooked according to various studies done (Johnson and Pace, 2017). Ene-Obong et al (2019) found out that though the two crops; potato and cassava provided over 200% of RDA of Vitamin A, only 20% were utilized leading to vitamin A deficiency in 68% of preschool children in Cross River. One of the main solutions is the involvement of culinary methods familiar with local traditions by preparing varieties of local dishes using alternative underutilized crop parts. For instance, a good example of such a popular dish is Ijakpo. Techniques such as this will increase the status of the underutilized foods (Li et al 2021. Raju et al, 2023).

Ijakpo is a simple but unique diet of Yakurr community of Cross River State, which is mainly produced through utilization of the underexploited and nutritious leaf of cassava through an easy process that not only cleanses the body but increases the nutrient value of the end product. Ijakpo is one of the symbols of the leboku festival, which is a tourist attraction point (Iyam et al. 2014, Leboku (n.d) 2026) and crucial for TVET training in the locality. There are no records of Ijakpo from leaves alternatives mentioned. This is based on the fact that such information would provide for alternatives based on choice, acceptability and utilization of the available leaves in specific communities to address malnutrition and food problems.

Materials and Methods

Sample preparation: The process is done following the traditional preparation techniques of preparing cassava Ijakpo. Fresh samples of the leaves were obtained from the farm. The ingredients used and the procedures are as shown in the flow chart provided below (Figure 1).

Ingredients used per 500g chopped leaf sample;

Seasoning (Maggi) 1 cube

Pepper

Onion 2 small sized

Salt

Palm oil

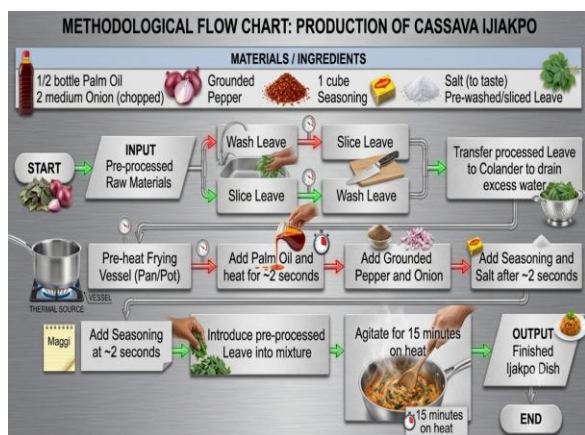


Figure 1: Flow chart of Ijakpo production

1. Sensory Analysis

Hedonistic evaluation was done using a 7-point scale using semi-trained adult panelists numbering 25 who were employed and who included native Yakurr people and residents of Ugep. The samples were evaluated blindly after obtaining their consents. Parameters for analysis were: appearance, aroma, taste, mouth feel, and acceptance.

- I. Physicochemical analysis. Standard procedures of the following were employed (as cited from the above sources):
- II. Gelation (as cited from Onwuka 2005)
- III. Iodine for vitamin C (as cited from Witham et al. 1971, Raghuramulu et al. 2003, Agoreyo et al. 2012).
- IV. Chlorophyll (as cited from Onwuka 2005)
- V. Foam (as cited from Onwuka 2005)
- VI. Specific Gravity (as cited from Egan et al. 1981, Pearson's Chemical Analysis., Onwuka 2005.)
- VII. Wettability (as cited from Onimawo & Akubor 2012)

2. Statistical Analysis

The (25) scores from the sensory analysis and triplicate values from the physico-chemical properties were subjected to mean frequency and ANOVA at $p < 0.05$ using Ai aided Microsoft Excel.

Discussion

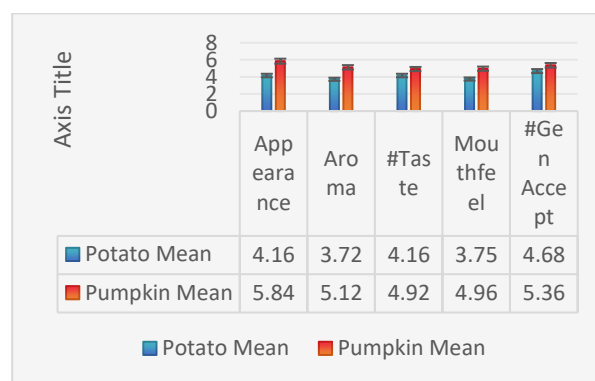


Figure 2. Analysis of Sensations. # Indicates results not statistically significant

From the result shown in figure 2, it was clear that pumpkin had a statistical difference from potato in the case of appearance (5.84 against potatoes 4.16), aroma (5.12 against 3.7), and mouthfeel (4.96; 3.75) but not statistically different from ijakpo potato in taste (4.92 versus 4.16) and general acceptance (5.56 versus 4.68). Comparison of these results indicated that the two diets were generally accepted compared to literature values (Mihafu et al, 2020, Olayemi et al, 2020).

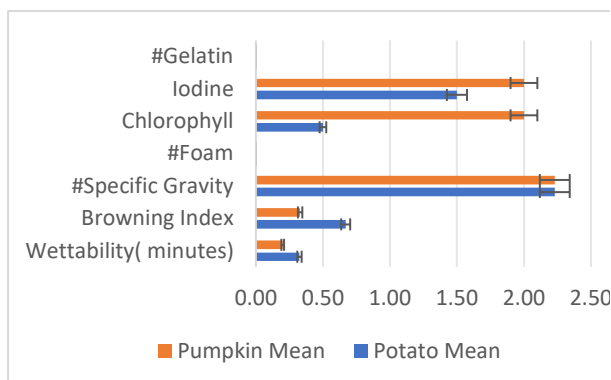


Figure 3: Physicochemical Properties: # Gelatin, Foam and Specific Gravity are not significantly different.

The data shown in figure 3 revealed that Pumpkin Ijakpo is significantly higher than potato in iodine test (which determines the levels of Vitamin C), Chlorophyll, but is significantly lower than potato in browning index, wettability, while specific gravity, gelatin and foam are not significantly different. It can be seen from the above findings that although pumpkin leaf is better physicochemical property, potato leaf may serve as an alternative in the absence of pumpkin leaf.

Conclusion

Performance of pumpkin and potato Ijakpo shows that they are acceptable alternative leaf sources that can substitute cassava for the production of nutritious ijakpo. They are hence suggested in cases of nutritional problems or areas where the use of cassava is not suitable.

Conflict of Interest

Authors declare that there are no conflicts of interest.

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Appendix

A 7-point hedonistic Scale Questionnaire for Sensory Evaluation of the Ijakpo Samples

Instruction

Kindly (✓) **tick** the number that best fits your choice or preference in the mentioned parameters of the Ijakpo sample presented before you.

Positive score increases from 1 (least liked) to 7 (most liked)

Sample A	Appearance	Taste	Aroma	Mouth feel	General Acceptance
1					
2					
3					
4					
5					
6					
7					



NATIONAL BOARD FOR TECHNICAL EDUCATION
NIGERIAN JOURNAL FOR TECHNICAL EDUCATION
Volume 25 Nos. 1 2026
ISSN No. 2992 - 3522



Instruction

Kindly (✓) **tick** the number that best fits your choice or preference in the mentioned parameters of the Ijakpo sample presented before you.

Positive score increases from 1 (least liked) to 7 (most liked)

Sample B	Appearance	Taste	Aroma	Mouth feel	General Acceptance
1					
2					
3					
4					
5					
6					
7					