Phytology

Evaluation of different sweet potato processed products and their potential effects on food security in Eastern Zimbabwe

Nathan Banalya[1*], Louis Kakese Lwango[1], Onesiphore Sambia[1], Millicent Muendo[1], James Yellan Kamara[1] and James Theophilis Lamboi[1]

[1] Department of Agriculture Sciences, College of Health, Agriculture and Natural Sciences, Africa University, Zimbabwe

Corresponding author: Nathan Banalya

Received 5 Aug 2025; Accepted 26 Sep 2025; Published 3 Oct 2025

DOI: https://doi.org/10.64171/IJPR.2025.5.4.1-7

Abstract

This study was conducted to addressed the critical issue of low adoption of nutrient-rich sweet potato products in Zimbabwe, particularly when paired with sauce or relish, by evaluating consumer acceptability of various processed forms and assessing their potential contribution to food security. As a result, a 2X 4 factorial sensory trial was conducted where sweet potato products from two varieties were prepared using four different processing methods which were Un peeled and boiled, Boiled and smashed, Chips (fried) and peeled and boiled. The two sweet potato varieties used were: Beauregard (Orange fleshed) and German II (White fleshed). Participants were allowed to taste products from each variety across all the four different processing methods. Sensory evaluations across appearance, sweetness, and texture revealed that sweet potato chips were the most preferred product, consistently scoring 5 on the hedonic scale. However, Chi-square analysis indicated no statistically significant difference ($p = 0.05$) between chips and other processing methods, namely: unpeeled and boiled, boiled and smashed, and peeled and boiled; each of which also received favorable scores of 4. This suggests that multiple preparation techniques are broadly acceptable to consumers, offering flexibility for dietary integration and value addition. Importantly, the study found a statistically significant difference ($p = 0.05$) in cultivar preference, with 67.3% of participants favoring products derived from the Beauregard orange-fleshed variety over the German II white-fleshed counterpart (27.3%). Behavioral data further revealed that 54.5% of participants had never previously consumed sweet potatoes with sauce or relish; yet following the tasting experience, 83.3% of these individuals expressed willingness to incorporate sweet potatoes into lunch and dinner meals; a significant shift in traditional consumption patterns ($p = 0.05$). These findings underscore the potential of processed sweet potato products, particularly those based on the Beauregard variety, to enhance dietary diversity and household nutrition. Their high acceptability and versatility position them as strategic assets in food security interventions, especially in efforts to promote culturally adaptable, nutritionally rich staples within Zimbabwe's evolving dietary landscape.

Keywords: Consumer Acceptability, Food Security, Sensory Evaluation, Sweet Potato Processing

Introduction

Food insecurity remains one of the most pressing challenges in Sub-Saharan Africa. According to the 2022 World Bank Report on Food Crisis, at least one in five Africans goes to bed hungry, with approximately 140 million people facing acute food insecurity across the continent. The FAO (2023) [4] further highlights that Sub-Saharan Africa harbors the world's most food-insecure population, with 73.0% of Zimbabweans experiencing moderate to severe food insecurity. Despite this troubling landscape, certain crops hold promise for alleviating food insecurity and enhancing agricultural resilience. Sweet potatoes, as reported by Sapakhova *et al.* (2023) [11], are globally recognized as a famine-buffering staple due to their agronomic versatility, tolerance to low-fertility soils, high yield per unit area, and responsiveness to fertilizer application. Yet, Zimbabwe remains underutilized in its sweet potato production potential, ranked 16th among African producers, trailing behind regional neighbors such as Malawi, Tanzania, and Mozambique (FAO, 2021) [3]. This underutilization is compounded by dire nutritional needs: 34% of children under five suffer from chronic malnutrition, with widespread deficiencies in energy, protein, and vitamin A nutrients abundantly present in sweet potatoes (Food and Nutrition Council of Zimbabwe, 2018) [6].

The paradox lies in prevailing consumption habits, where sweet potatoes are predominantly consumed as unpeeled boiled snacks, often relegated to breakfast and rarely integrated into main meals. This contributes to their marginal role as a staple starch and may explain low production and consumption levels compared to neighboring countries. Studies such as Kudita *et al.* (2021) [8] have documented farmer preferences and agronomic performance of Orange Fortified Sweet Potato varieties, but few have explored consumer sensory responses to processed products beyond traditional forms. Existing sensory evaluation research has largely focused on raw or boiled sweet potatoes, with limited attention to processed formats such as chips that could enhance acceptability and diversify usage. This study addressed the critical problem of low adoption of nutrient-rich sweet potato products in Zimbabwe, especially when paired with sauce or relish by

evaluating consumer acceptability of various processed forms and examining their potential contribution to food security. By integrating sensory assessments with behavioral data, the research filled a key gap in understanding how strategic processing and cultivar selection can shift consumption patterns, improve nutritional outcomes, and reposition sweet potatoes as culturally adaptable staples in Eastern Zimbabwe.

Material and Methods

Study location and design

This study was conducted in Manicaland Province, Eastern Zimbabwe. A 2 × 4 factorial design was used to assess consumer preferences across two sweet potato varieties and four distinct processing methods.

The sweet potato varieties processed were:

- Beauregard (Orange-fleshed)
- German II (White-fleshed)

These varieties were chosen due to their active promotion by the Horticulture Research Centre of Zimbabwe, with the aim of enhancing community adoption through improved understanding of their processed forms.

Sweet potato processing

Harvested sweet potatoes were washed thoroughly using clean water. Furthermore, Peeling was performed for all samples except for the control group (Treatment 1). In addition, two primary processing techniques were employed:

- Boiling in water
- Frying in cooking oil

The four treatments applied to each variety included:

- Treatment 1: Unpeeled and boiled
- Treatment 2: Boiled and smashed
- Treatment 3: Fried (as chips)
- Treatment 4: Peeled and boiled.

Tasting Protocol

A sensory evaluation was conducted in the dining hall of Africa University. Participants evaluated sweet potato products under two serving conditions:

1. Plain food: served without any accompaniment
2. Non-plain food: served with sauce or relish

1. Plain food serving

Boiled products

Sweet potato variety	Processed Products
Beauregard (Orange fleshed)	Peeled and boiled, Boiled and smashed, unpeeled and boiled
German II	Peeled and boiled, Boiled and smashed, unpeeled and boiled

Fried products

Sweet potato variety	Processed Products
Beauregard (Orange fleshed)	Chips
German II (White fleshed)	Chips

2. Non-plain food serving

Boiled products with relish

Variety	Whole + Relish	Smashed + Relish	Unpeeled + Relish
Beauregard (Orange fleshed)	Beans	Beans	Beans
German II (White fleshed)	Beans	Beans	Beans

Fried products with relish

Variety	Relish
Beauregard (Orange fleshed)	Chicken and salads
German II (White fleshed)	Chicken and salads

Sampling and Ethics

A total of 55 participants from across Manicaland Province were involved. Participation was voluntary, with verbal consent obtained prior to tasting.

Statistical analysis

The results of the study were subjected to statistical analysis using Chi- square formula below:

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

χ^2 = the test statistic $\sum$ = the sum of

O = Observed frequencies E = Expected frequencies

The degrees of freedom were used to identify the critical threshold value, against which the calculated Chi-square statistic was compared to assess the presence of a statistically significant difference.

Results and Discussions

Participation demographics and profile

A total of 55 participants were included in the study. Gender distribution revealed that 54.5% were male and 45.5% were female, as depicted in Figure 1. This near-balanced representation minimizes gender-based bias and enhances the generalizability of sensory perception findings across male and female consumers. The slight male predominance may reflect broader trends in participation rates. Age-wise, the majority of respondents fell within the 36–50 age group, constituting 49% of the sample. This segment likely represents an active consumer demographic with established dietary habits and purchasing power. Their preferences hold strategic value for market positioning, particularly for functional or value-added food products such as sweet potato chips and processed tubers. Moreover, individuals in this age category may exhibit heightened awareness of health and nutrition, which could influence their sensory judgments of appearance, texture, and sweetness. The remaining age groups of below 35 and above 50, were present in proportions of 29% and 22% respectively.

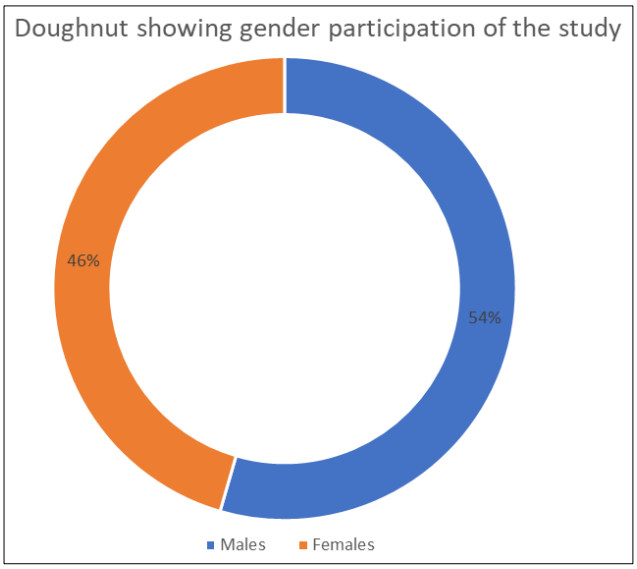

Fig 1: Doughnut showing Gender participation in the study

Sensory assessment of sweet potato processed products

Table 1: Scores of different sweet potato products on Hedonic scale

Treatment	Mean score for Appearance	Mean score for sweetness	Mean score for texture
Un peeled and boiled	4[a]	4[a]	4[a]
Boiled and Smashed	4[a]	4[a]	4[a]
Chips	5[a]	5[a]	5[a]
Peeled and boiled	4[a]	4[a]	4[a]
X^2 value	0.1765	0.1765	0.1765
Critical Threshold value	7.815	7.815	7.815

Means with the same superscript are not significantly different at p=0.05, X^2 refers to Chi square value used to test hypothesis.

Appearance

From Table 1, the sensory evaluation of sweet potato products based on appearance revealed scores of 4 for unpeeled and boiled, boiled and smashed, and peeled and boiled treatments, while chips received a slightly higher score of 5. Despite this variation, the Chi-Square test yielded a value less than the critical threshold of 7.815 at a 0.05 significance level with 3 degree of freedom, suggesting that consumers did not strongly differentiate between these treatments based on visual appeal alone. This outcome aligns with findings by Leksrisompong *et al*. (2011), who evaluated consumer acceptance of sweet potato cultivars with varying flesh colors and found that appearance had a limited impact on overall liking when flavor and texture were favorable. Their study emphasized that while visual cues like color and moistness can influence initial impressions, they are often secondary to taste and mouthfeel in driving consumer preference. Therefore, the uniformity of scores across most treatments suggests that appearance was consistently acceptable, but not a decisive factor in preference.

Similarly, Gavino *et al*. (2021) [7] conducted a sensory evaluation of blended taro and sweet potato products and used Chi-Square analysis to assess differences in attributes like texture and moldability. They found no significant differences in overall acceptability, reinforcing the idea that minor variations in appearance may not translate into meaningful consumer bias. This supports the study result, where chips, despite scoring slightly higher did not outperform other treatments in a statistically significant way. The similarity in sweet potato appearance across different processing methods might be due to the retention of core visual characteristics such as color. Additionally, the absence of dramatic structural changes such as crisping or charring means that consumers perceived these products as visually similar, which explains the uniform scores in sensory evaluation and the non-significant Chi-Square results. This therefore suggests that multiple sweet potato processing methods can be equally viable from a consumer appearance standpoint. For food security initiatives in Eastern Zimbabwe, this flexibility is valuable: communities can adopt diverse processing techniques without compromising visual appeal, which is often a barrier to adoption. It also opens the door for value-added product development, where appearance can be optimized through packaging or presentation rather than altering the core processing method.

Sweetness

In Table 1, the sensory evaluation of sweet potato products based on sweetness revealed that, Unpeeled and boiled, boiled and smashed, peeled and boiled all scored 4, while chips received a slightly higher score of 5.

However, the Chi-Square test yielded a value less than the critical threshold of 7.815 at a 0.05 significance level with 3 degrees of freedom, hence no significant difference. This indicates that the perceived sweetness across these treatments was relatively uniform from the Participant's perspective. This finding resonates with the work of Leksrisompong *et al*. (2011) [10], who conducted a comprehensive sensory analysis of sweet potato cultivars with varying flesh colors and flavor profiles. Their study found that although sweetness was a valued attribute, it did not consistently drive consumer preference unless paired with favorable texture and flavor characteristics. In their cluster analysis, sweetness was appreciated across all groups, but it was not the sole determinant of acceptability liking, reinforcing the idea that sweetness alone may not differentiate products significantly when other sensory attributes are held constant. This similarity in sweetness across different cooking methods might be due to the fact that sweet potatoes used in the study originated from the same cultivar and were harvested at similar maturity levels therefore their intrinsic sugar content remained stable, minimizing variation across treatments (Leighton *et al*., 2008) [9]. Similarly, the sweet potatoes may not have been cured for long in order to facilitates starch degradation and sugar accumulation hence no significant difference. Or they were not prepared with high-temperatures for caramelization to occur, sweetness perception remains relatively uniform, as supported by the non-significant Chi-Square results in this study. Although chips may score slightly higher due to surface caramelization, the difference is not statistically meaningful, echoing findings by

Leksrisompong *et al*. (2011) [10] that sweetness alone does not drive consumer preference unless complemented by favorable texture and flavor. Moreover, these study results implied that the processing method does not drastically alter sweetness perception among these treatments. This is encouraging for food security initiatives in Eastern Zimbabwe, as it means communities can adopt diverse sweet potato preparation techniques without compromising sweetness; a key factor in consumer acceptability. It also opens up opportunities for value-added product development, where sweetness can be enhanced through natural additives or cultivar selection rather than relying solely on processing changes.

Texture

In table 1, the sensory evaluation of sweet potato products based on texture reveals that, unpeeled, smashed, peeled, and boiled all scored 4, while chips received a slightly higher score of 5. Despite this variation, the Chi-Square test yielded a value less than the critical threshold of 7.815 at a 0.05 significance level with 3 degrees of freedom, hence no significant difference. This outcome suggests that while chips may have been perceived as slightly more texturally appealing, the overall variation in texture across the different processing methods was not strong enough to influence consumer preference.

This finding aligns with the work of Leighton *et al* (2008) [9], who conducted a detailed sensory analysis of five sweet potato cultivars using trained panels and quantitative descriptive analysis. Their study found that while cultivars differed in specific textural attributes such as graininess, density, and adhesiveness, these differences did not always translate into significant consumer preference unless paired with other favorable sensory traits like flavor and appearance.

Similarly, a study on blended taro and sweet potato products by Gavino *et al*. (2021) [7] used Chi-Square analysis to assess sensory attributes, including texture. Although some treatments showed higher scores for moldability and mouthfeel, the overall acceptability did not differ significantly across formulations. This reinforces the idea that texture, while important, may not be the sole driver of consumer preference, especially when the differences are subtle or when other attributes like sweetness and appearance are consistent. The similarity in texture of sweet potato products across different preparation methods might be due to the shared structural composition and moisture retention of the root, especially when using moist-heat techniques like boiling, steaming, or smashing. These methods soften the sweet potato without introducing significant variation in mouthfeel, as they preserve the natural fiber matrix and gelatinized starch profile (Truong *et al*., 2018) [13]. When the same cultivar is used, with consistent maturity and post-harvest handling, the cell wall integrity and starch granule behavior remain uniform, resulting in comparable softness, density, and cohesiveness across treatments (Leighton *et al*., 2008) [9]. Moreover, unless subjected to dry-heat methods like roasting or frying which can create crisp or chewy textures the products tend to maintain a smooth, moist, and tender consistency. This explains why participants perceived the texture as similar, leading to non-significant differences in Chi-Square analysis. These study results suggested that multiple sweet potato processing methods are texturally acceptable to consumers in Eastern Zimbabwe. This is promising for food security and dietary diversification, as it allows communities to adopt various preparation techniques without compromising consumer satisfaction. It also supports the development of value-added products such as chips, where texture can be enhanced through formulation or cooking method without alienating consumers.

Prevalence of prior consumption of sweet potatoes with sauce or relish

From the study, 54.5% of participants had never eaten sweet potatoes with any sauce or relish before and 45.5% had eaten sweet potatoes with relish or sauce before as shown in figure 2. This result likely reflects a combination of cultural food habits, economic accessibility, and regional preparation norms**.** In many rural and peri-urban communities of Eastern Zimbabwe, sweet potatoes are traditionally consumed as a standalone staple often boiled or roasted without accompaniments like relish or sauce. This practice is shaped by both economic constraints, where households prioritize affordability and simplicity, and cultural perceptions, where sweet potatoes are viewed more as a snack or breakfast item than a main meal requiring side dishes. The 54.5% who have never paired sweet potatoes with relish may represent households with limited access to protein-rich or vegetable-based sauces, or those adhering to longstanding culinary traditions. Meanwhile, the 45.5% who have tried sweet potatoes with relish likely reflect urban influence, dietary diversification, or exposure to nutrition education**,** where sweet potatoes are integrated into more balanced meals. This split underscores the importance of nutrition-sensitive education and participatory recipe development in food security programs, encouraging communities to explore sweet potato combinations that enhance dietary diversity without compromising cultural acceptability.

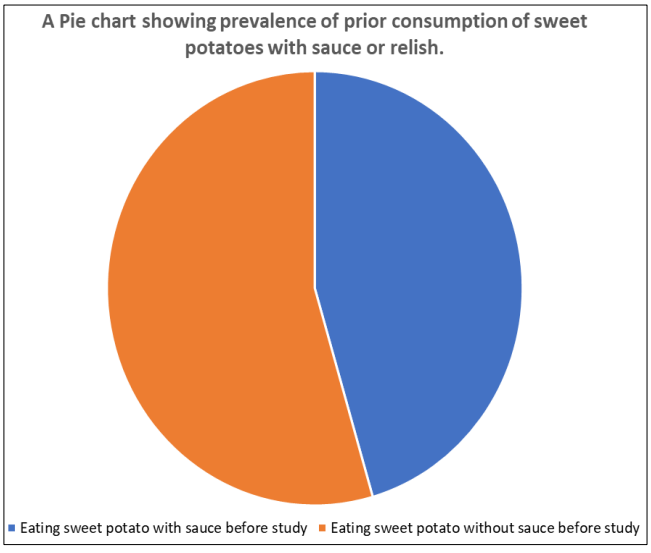

Fig 2: A Pie chart showing prevalence of prior consumption of sweet potatoes with sauce or relish

For those who had eaten sweet potatoes with relish or sauce, when asked whether they had been eating it during lunch or dinner, the study revealed that 76 % had been eating it for either lunch or dinner, and 24% had not eaten them for lunch or dinner but rather during breakfast. These findings reveal a nuanced understanding of consumption habits related to sweet potatoes when paired with savory accompaniments. Notably, 45.5% of participants reported prior experience eating sweet potatoes with relish or sauce, suggesting that nearly half of the population already considers this pairing culturally acceptable or gastronomically appealing. Among these experienced consumers, a significant majority (76%) indicated consumption during lunch or dinner, situating sweet potatoes as a viable alternative starch in main meals. This aligns with evolving dietary preferences in urban and peri-urban settings where meal diversity and protein-starch combinations are increasingly normalized. The smaller subset (24%) who consumed sweet potatoes with relish primarily at breakfast may reflect regional breakfast traditions or individual household practices where savory meals are introduced early in the day. These data underscore the potential for integrating sweet potatoes more broadly into midday and evening meals across diverse populations. While prior unfamiliarity (54.5%) was noted, the complementary analysis of those who do consume sweet potatoes with relish or sauce supports targeted promotion strategies. Educational campaigns and culinary demonstrations could capitalize on the existing practice during lunch or dinner to normalize and expand savory applications of sweet potatoes, especially in institutional catering, school feeding programs, and urban food markets. Sweet potatoes remain an underutilized crop despite their nutritional richness and climate resilience. Enhancing their palatability through familiar sauces or proteins may stimulate demand, reduce post-harvest losses, and contribute to food security. Moreover, these results provide actionable insights for nutrition-sensitive agricultural marketing, guiding processors and marketers to tailor sweet potato products for lunch and dinner offerings, thereby aligning with predominant consumption trends.

Adoption Potential of sweet potato as a staple, accompanied by sauce or relish post-intervention

Table 2: Post-Tasting intention among participants previously unfamiliar with the sweet potato-Relish combination

Response category	Percentage (%)
Promised	83.3[a]
Declined	10[b]
Undecided	6.7[b]
X^2 value	33.8
Critical Threshold value	5.991

Means with the same superscript are not significantly different at p=0.05, X^2 refers to Chi square value used to test hypothesis

From Table 2, the chi-square value is greater than the critical threshold value at a 0.05 significance level with 2 degrees of freedom, indicating a compelling shift in consumer behavior regarding sweet potato consumption when paired with savory accompaniments. Initially, 54.5% of participants had never eaten sweet potatoes with any form of sauce or relish, reflecting a traditional perception of the crop as a plain, standalone starch typically consumed during breakfast. However, after a sensory trial involving sweet potatoes served with beans and chicken, 83.3% of these previously non-consuming individuals expressed willingness to adopt this pairing for lunch or dinner as shown in figure 3.

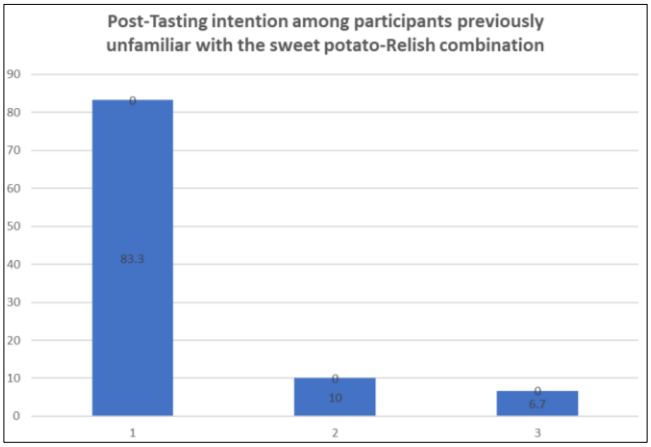

Fig 3: A bar graph showing post-tasting intention among participants previously unfamiliar with the sweet potato-Relish combination

This dramatic increase in acceptance underscores the transformative power of taste adaptation and contextual exposure in shaping dietary habits.

Such findings align with the work of Leksrisompong *et al.* (2011) [10], who demonstrated that consumer acceptance of sweet potato cultivars was significantly influenced by flavor and texture, especially when paired with familiar or complementary ingredients. Their study found that even unfamiliar cultivars gained acceptance when the sensory experience was enhanced through preparation and pairing, suggesting that contextual presentation plays a critical role in consumer perception. Similarly, Sosa *et al.* (2023) [12] reported, that cooking method and regional familiarity influenced the acceptability of sweet potato cultivars in Argentina. Their use of the "Check All That Apply" (CATA) method revealed that pairing and preparation style directly impacted consumer descriptors and willingness to consume, reinforcing the idea that sensory context can reshape food preferences.

Moreover, the significant difference in adoption observed, mirrors findings by Funtua *et al.* (2020) [5], who evaluated sweet potato grits in comparison to commercial cereal products. Their sensory panel revealed that while taste alone was comparable, attributes like consistency and flavor complexity often enhanced through pairing led to greater overall acceptability. This supports the notion that savory enhancement not only improves palatability but also expands the functional role of sweet potatoes in daily meals, transitioning them from a breakfast staple to a versatile component of lunch and dinner.

The 10% of participants who declined future consumption with relish or sauce, and the 6.7% who remained undecided, may reflect cultural food norms, religious dietary restrictions, or

limited access to complementary ingredients. Nonetheless, the overwhelming 83.3% affirmative response signals a promising opportunity for repositioning sweet potatoes within Zimbabwean diets. By promoting savory pairings and integrating sweet potatoes into diverse meal contexts, food security initiatives can leverage both nutritional value and consumer appeal to drive adoption and dietary diversification. These result about Post-Tasting intention among participants previously unfamiliar with the sweet potato-Relish combination likely stemmed from the powerful influence of experiential exposure and sensory satisfaction in shifting food preferences. Many participants who had never previously eaten sweet potatoes with relish or sauce may have lacked either the opportunity or the cultural precedent to try such combinations. However, the sensory trial provided a direct, positive experience pairing sweet potatoes with protein-rich, flavorful accompaniments like beans and chicken which likely enhanced the overall taste, texture, and satiety of the meal. This aligns with findings by Leksrisompong *et al*. (2011) [10] and Leighton *et al*. (2008) [9], who emphasized that consumer acceptance increases when sweetness and texture are complemented by favorable flavor profiles. The trial may have also reframed sweet potatoes from a snack or breakfast item into a versatile base for main meals, expanding participants' culinary imagination. Additionally, the social and educational context of the trial likely reduced psychological barriers and encouraged openness to new food pairings, demonstrating the value of participatory sensory evaluation in promoting dietary diversification and food security adoption.

Most preferred sweet potato variety

Table 3: Most preferred sweet potato variety in the study

Variety	Percentage (%)
Beauregard Orange fleshed	67.3[a]
German II White fleshed	32.7[b]
X^2 value	6.56
Critical Threshold	3.841

Means with the same superscript are not significantly different at p=0.05, X^2 refers to Chi square value used to test hypothesis.

The results presented in Table 3 indicate a statistically significant difference in consumer preference between sweet potato products derived from the Beauregard orange-fleshed variety and those from the German II white-fleshed variety. The Chi-Square test yielded a value greater than the critical threshold of 3.841 at a 0.05 significance level with 1 degree of freedom, confirming that the observed distribution of preferences is unlikely to be due to chance alone. Specifically, 67.3% of participants favored products made from Beauregard, while only 32.7% preferred those from German II. This substantial disparity underscores the influence of varietal characteristics particularly flesh color and associated sensory traits on consumer acceptance.

These findings are consistent with the work of Leksrisompong *et al*. (2011) [10], who found that orange-fleshed sweet potato cultivars were generally more accepted by consumers due to their sweeter flavor profiles and smoother textures. Beauregard, being an orange-fleshed cultivar, tends to exhibit higher sugar content and a moist, dense texture, which likely contributed to its favorable reception in the study.

Further support comes from Sosa *et al*. (2023) [12], who evaluated the sensory acceptability of multiple sweet potato cultivars across different cities in Argentina. Their research showed that Beauregard consistently received higher scores for taste and overall acceptability, especially when fried or boiled. Interestingly, they also noted that consumer perceptions varied by region, suggesting that cultural familiarity and exposure may influence varietal preference. In this study, the dominance of Beauregard may reflect both its sensory appeal and increasing visibility in food security programs across Eastern Zimbabwe.

In contrast, the lower preference for German II aligns with findings from Leighton *et al*. (2008) [9], who observed that white-fleshed sweet potatoes, while more fibrous and moister, were often perceived as less flavorful and less visually appealing. Their descriptive sensory analysis highlighted that orange-fleshed varieties tend to evoke flavor notes similar to pumpkin or butternut, which are generally well-liked, whereas white-fleshed types may lack the same depth of flavor.

In addition, Beauregard sweet potato chips were found to be easier to prepare and work with, exhibiting a soft texture that contrasted markedly with the German II variety, whose chips were hard, brittle, and challenging to handle. Notably, Beauregard chips also showed minimal oil retention after frying, suggesting structural and biochemical differences between the cultivars. The softness and reduced oil absorption in Beauregard may be attributed to its lower dry matter content and higher moisture levels, which promote gelatinization and inhibit excessive oil uptake during frying. In contrast, the denser starch composition and higher dry matter of German II likely contribute to its crispness and brittleness, as well as greater surface porosity that facilitates oil absorption. These varietal characteristics have significant implications for processing choices and consumer acceptability. This is supported by Abebe *et al* 2024 who examined how frying conditions can affect chips quality across three orange fleshed varieties and found that moisture content and dry matter levels significantly influence oil uptake, texture, and crispness. Varieties with lower dry matter and higher moisture, like Beauregard, produced softer chips with reduced oil retention, while those with higher dry matter yielded crisper, more brittle chips.

This result therefore, reinforce a growing body of evidence that supports the promotion of orange-fleshed sweet potato varieties like Beauregard in food security and nutrition strategies. Their higher consumer acceptability, combined with superior nutritional profiles particularly in beta-carotene content make them ideal candidates for scaling up in both household consumption and value-added product development.

Conclusion

This study demonstrated robust consumer acceptability for a variety of processed sweet potato products among participants in Eastern Zimbabwe. While sweet potato chips received the highest sensory scores across appearance, sweetness, texture, and flavor (5 on the hedonic scale), Chi-square analysis revealed no statistically significant differences between chips and other products such as Un peeled and boiled, boiled and smashed and peeled and boiled; all of which scored favorably (4). This suggests that multiple processing methods are culturally and sensorially acceptable, offering flexibility for dietary integration without compromising consumer satisfaction. Such versatility is promising for food security and dietary diversification, as it enables communities to adopt preparation techniques aligned with local preferences while supporting the development of value-added products like chips and flour-based snacks. Importantly, the study revealed a statistically significant preference for the Beauregard orange-fleshed variety, with 67.3% of participants favoring it over the German II white-fleshed cultivar (27.3%). Furthermore, cultural dietary norms showed notable shifts: 83.3% of participants who had never previously consumed sweet potatoes with sauce or relish expressed willingness to incorporate them into lunch and dinner meals following the tasting. This behavioral change underscores the potential for sweet potatoes to transcend their traditional role as a breakfast snack and emerge as a staple across multiple mealtimes. In summary, the findings highlight that diversifying processing methods and promoting nutrient-rich cultivars like Beauregard can significantly enhance the marketability, cultural relevance, and nutritional impact of sweet potatoes. These insights offer valuable direction for food innovation, participatory nutrition programming, and policy interventions aimed at strengthening household food security in Zimbabwe and similar contexts

References

1. Abebe T, Okpomor EO, Okoyeuzu CF, Eze CM, Mbachiantim TJ, Nwankwo CS, *et al*. Optimization of frying time and temperature for the development of quality chips from varieties of sweet potato (Ipomoea batatas L). Food Research [Internet]. 2024;8(3):343-52. Available from: https://doi.org/10.26656/fr.2017.8(3).171
2. World Bank. Putting Africans at the heart of food security and climate resilience, 2022 Oct 17. Available from: https://www.worldbank.org/en/news/immersive-story/2022/10/17/putting-africans-at-the-heart-of-food-security-and-climate-resilience
3. Food and Agriculture Organization (FAO). World food and agriculture statistical yearbook 2021. Rome: FAO, 2021. Available from: https://doi.org/10.4060/cb4477en
4. Food and Agriculture Organization (FAO). Africa – Regional overview of food security and nutrition report, 2023. Available from: https://openknowledge.fao.org/core/content
5. Funtua MS, Bilyaminu IB, Balen DMA. Proximate and sensory evaluation of sweet potato (Ipomoea batatas L) grits. Acta Scientific Nutritional Health [Internet]. 2020;4(2):45-50. Available from: https://actascientific.com/ASNH/pdf/ASNH-04-0599.pdf
6. Food and Nutrition Council of Zimbabwe. National Nutrition Survey 2018. Government of Zimbabwe and UNICEF, 2018. Available from: https://www.unicef.org/zimbabwe/media/1056/file/Zimbabwe%202018%20National%20Nutrition%20survey%20Report.pdf
7. Gavino ZC, Gunnawa VV, Cammaja JR, Marian MJP. Sensory evaluation of blended taro (Colocasia esculenta) and sweet potato (Ipomoea batatas) polvoron. Indian Journal of Science and Technology [Internet]. 2021;14(35):2784-8. Available from: https://doi.org/10.17485/IJST/v14i35.12388
8. Kudita S, Munda E, Chiduwa M, Pinkson S, Gwaze T. Agronomic performance and farmer preference of biofortified orange-fleshed sweet potato varieties in Zimbabwe. International Potato Centre, 2021. Available from: https://doi.org/10.41609789290605669
9. Leighton CS, Schonfeldt HC, Kruger R. Quantitative descriptive sensory analysis of five different cultivars of sweet potato to determine sensory and textural profiles. Journal of Sensory Studies. 2008;25(1):2-18. Available from: https://doi.org/10.1111/j.1745-459X.2008.00188.x
10. Leksrisompong PP, Whitson ME, Truong VD, Drake MA. Sensory attributes and consumer acceptance of sweet potato cultivars with varying flesh colors. Journal of Sensory Studies. 2011;26(5):413-26. Available from: https://doi.org/10.1111/j.1745-459X.2011.00367.x
11. Sapakhova Z, Raissova N, Daurov D, Zhapar K, Daurova A, Zhigailov A, *et al*. Sweet potato as a key crop for food security under the conditions of global climate change: A review. Plants. 2023;12(13):2516. Available from: https://doi.org/10.3390/plants12132516
12. Sosa MC, Rodriguez AL, Fernandez JP. Assessing the sensory qualities and acceptability of sweet potato (Ipomoea batatas) and purple yam (Dioscorea alata) cookies: opportunities for livelihood development. Journal of Applied and Natural Sciences. 2023;17(1):356-62. Available from: https://doi.org/10.31018/jans.v17i1.6249
13. Truong VD, Avola RY, Pecota KV, Yencho GC. Sweet potato production, processing and nutritional quality. In: Sweet potato: Chemistry, processing and nutritional quality. Academic Press, 2018, p1-26. Available from: https://doi.org/10.10.6/B978-0-12-812002-300001-4.