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Nutrient Composition and Sensory Characteristics of Biscuit Produced from Sweet Potato (*Ipomea batata*) and Peanut (*Arachis hypogaea*)

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ABSTRACT

Biscuits are produced from composites of sweet potato flour and peanut flour. The sweet potato and peanut flours were mixed in the ratios 100%, 90:10%, 80:20%, 70:30%, and 60:40%, respectively. Proximate composition and functional characteristics, including water and absorption capacity, oil absorption capacity, swelling power, solubility index, and bulk density of the composites, were determined. Biscuits are made from the composites. Comparative color analyzes using a Hunter Lab color analyzer and sensory qualities of the biscuits produced from the flour are evaluated. The results indicated that protein (4.90 – 15.57%), crude fiber (2.50 – 8.08%), and fat content (0.97 – 1.64%) of the composites increased with an increase in the amount of peanut flour substitution while the moisture (9.30 – 6.23%), ash (3.07 – 2.63%) and carbohydrate (79.46 – 65.85%) of the composites flour decreased. Samples with 100% sweet potato had higher peak viscosity and were brighter in color. The biscuit sample with 20% peanut flour and 80% sweet potato was preferred in all the sensory attributes.

Keywords: Biscuits, Peanut, Sweet potato, Sensory qualities

1. INTRODUCTION

The term "biscuit" refers to dry baked goods with a golden-brown crust that are usually crunchy. Biscuits are distinguished from other leavened products such as breads and cakes (Amadi et al., 2025), having low moisture content, less than 5%. The primary ingredient in biscuit making is wheat flour combined with other ingredients such as sugar, margarine, leavening agents, eggs, milk, salt, and flavoring (Ani, 2021). In Nigeria, biscuits are a staple baked good that can be found in stores and supermarkets across the country, right next to bread. Biscuits are one of the cereal-based snacks enjoyed by all ages for their inexpensive, convenient, storable, and ready-to-eat products that contain important nutritional and digestive principles (Ani, 2021). A nutritious snack made from unappetizing dough made appealing by applying heat in an oven (Olaoye et al., 2007). Being low in protein and dietary fiber contributes to poor nutritional quality (Akpapunam and Darbe, 1999). Thus, it resulted in several health-related diseases, such as non-communicable diseases (obesity and celiac disease), that arise from poor diet quality. Since they are ready-to-

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eat food products, supplementing with vitamins and minerals and being fortified with additional protein sources from oil seeds, legumes, roots, and tubers improves the nutritional properties. Sweet potato and peanut are underutilized tubers and legumes, respectively, grown in tropical and subtropical regions with the potential to supplement, enrich, and fortify food products.

Sweet potato (Ipomoea batata) is a subsistence, healthful, economical, and famine-relief tuber crop. It is the fifth most important cultivated food crop in developed countries and ranks seventh in developing countries. It is an underutilized tuber crop with potential to improve global food security owing to its ability to thrive under different weather conditions and a short maturity period (Chiedu et al., 2023). It contains important components like minerals and vitamins, anthocyanins, beta-carotene, fiber, phenolic acids, and carbohydrates (Donaldben et al., 2020). Sweet potato plays an important role in the management of type-2 diabetes (Gbadamosi et al., 2020). And also, potato starch, chips, vegetables, and flour have gained ground in the snacks and beverages industries (Ani, 2021).

Peanuts (Arachis hypogaea) belong to the legume family, Fabaceae. Peanuts are often referred to as nuts in a culinary context. Peanuts are recognized as a rich source of plant-based protein for vegetarian and vegan diets, supplying 25–30 g of protein per 100 g. It is a rich source of edible healthy fats (monounsaturated and polyunsaturated); antioxidants; vitamins such as vitamin E and B vitamins; and minerals such as magnesium, potassium, iron, zinc, and phosphorus (Fanzo et al., 2013). Despite its nutrient-rich profile and utilization in oil-producing industries, this crop remains underutilized within baking sectors in the developing countries, particularly in Africa. As countries faced economic decline, there was an urgent need to explore indigenous alternatives to general-purpose flour, known as wheat flour, as a partial or total replacement in baking. This study investigates the composite flour for nutrient composition, sensory properties, and the level to which the peanut can be substituted with sweet potato flour in sweet potato-based composite blends for the production of functional foods.

2. MATERIALS AND METHODS

Materials

Sweet potato and peanut are sourced from Sayedero Market, Ilaro, Ogun State, Nigeria. Other ingredients include margarine, salt, baking powder, eggs, sugar, and milk, were also sourced at Sayedero Market.

Methods

Preparation of sweet potato flour

Sweet potato flour was prepared using the method described by Ani (2021). Freshly harvested tubers were manually cleaned to remove extraneous physical contaminants. The tubers were manually peeled and sliced into uniform 3-mm-thick discs using a mechanical kitchen slicer. To inhibit enzymatic browning, the slices were rinsed in potable water and parboiled at 60 ^{o}C for 10 minutes. The parboiled samples were spread on a cleaned tray and oven-dried at 60 ^{o}C for 8 hours. The dried-sliced chips were ground using a disc attrition machine and sieved with a 60 mm mesh screen to obtain fine, uniform flour.

Production of Peanut Flour

Peanut flour was made from quality peanuts. Peanuts are first sorted to remove rotten ones and foreign materials such as sand and other adhering materials before rinsing in potable water. The well-cleaned peanuts were soaked in warm water to inhibit the anti-nutritional factor. The dry peanuts are roasted at 160 ^{o}C for 2 hours. The roasted peanuts were cooled and manually dehulled by rubbing them between the palms. The dehulled peanut was milled into flour using a Kenwood blender, sieved, packed, and sealed in a polythene bag and stored till further use.

Biscuit Formulation

The proportion of the sweet potato-peanut flour blends with other ingredients for biscuit preparation is shown in Table 1.

Table 1. Sample Ratio of Sweet potato-peanut flours

Sample	Peanut flour (Gram)	Sweet potato (Gram)	Salt (Gram)	Sugar (Gram)	Baking powder (Gram)	Baking fat (Gram)
BHT0	00	100	0.5	50	1	60
BHT1	90	10	0.5	50	1	60
BHT2	80	20	0.5	50	1	60

BHT3	70	30	0.5	50	1	60
BHT4	60	40	0.5	50	1	60

Biscuit Preparation

Biscuits were produced according to the formulation and procedure described (Fig.1) by Roger et al. (2022). The sugar and margarine were blended using a Kenwood mixer for 8 minutes to make a cream. Milk (powder) and the already whisked egg white, followed by the egg yolk, were added to the cream as the mixing continued. We stopped the mixing when the cream became light and fluffy. The solid ingredients—the baking powder, flavor, flour, and salt—were mixed thoroughly separately and poured into the light, fluffy cream in the mixer to produce a dough. The dough was kneaded with a rolling pin to have the desired thickness. The kneaded dough was rolled to a uniform shape and allowed to rest prior to baking in an oven at 160 ^{o}C for 13-18 minutes. The baked biscuit was cooled and packaged in an air-tight, high-density polyethene.

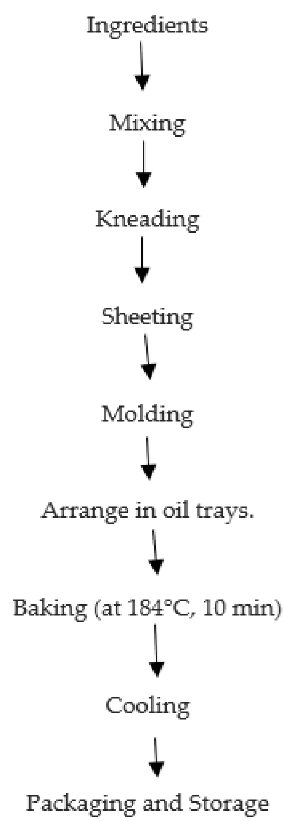

Figure 1. Preparation of Biscuits

Chemical Analysis

The moisture, lipid, protein, fiber, and ash contents of the biscuit samples were analyzed using AOAC methods (2012), while carbohydrate content was calculated by difference.

Functional Properties

Bulk Density

Bulk density (loose and packed) was determined following the method outlined by Ohizua et al., (2016). 10 g of the flour sample was weighed into a 50 ml measuring cylinder. The volume was recorded. Samples were repeatedly tapped for ten minutes to eliminate air space in the flour until a constant volume was obtained. The bulk density was calculated as the sample weight (g) per unit volume (cm^3) of the sample.

Water and Oil Absorption Capacity

Adamu and Akhere's (2020) was followed with m modification. 1 gram of samples was weighed and mixed with 15 ml of distilled water in a 25 ml centrifuge tube. The suspension was agitated using a glass rod at 25 ^{o}C for 30 seconds and allowed to stand for 30 minutes at ambient temperature before centrifuged at 4100 revolutions per minute for 20 minutes. Supernatant was decanted, and the tube was re-weighed. The weight of the water bound by 100 g of flour is expressed as the water absorption capacity. Oil absorption capacity was determined using the same method as refined vegetable oil, replacing distilled water.

Swelling Power

The swelling power of the composite flour was determined using the method described by Obinna-Echem et al. (2020). 0.1 g of starch was weighed into a sterile test tube. 10 ml of distilled water was added to form a suspension. The suspension was heated in a water bath at 50 ^{o}C for 30 minutes with continuous stirring. The starch paste was weighed after the supernatant was decanted, and the test tube was centrifuged for 20 minutes at 1500 rpm.

Solubility Index

The method outlined by Obinna-Echem et al. (2020) was used. 0.5 g of the flour sample was mixed with 15 ml of distilled water, weighed into a sterile test tube, and stirred. The mixture was heated in a water bath set at 50 ^{o}C for 30 seconds. After centrifuging at 1500 rpm for 30 minutes. The decanted (insoluble component) and dried (soluble component) to a constant weight of five milliliters of the supernatant. The percentage was calculated by measuring the dissolved flour in the heated solution as the solubility.

Pasting Properties of Flour Blend Using the Rapid Visco-Analyzer (RVA)

In accordance with Ohizua *et al.* (2016), with minor modification, pasting properties of the flour samples were determined using a Rapid Visco Analyzer (RVA). A suspension was made by adding the weighted sample to 25 milliliters of distilled water, with the weight determined by the sample's moisture content. The suspension temperature was maintained at 50°C for one minute, raised to 95°C in three minutes, and then cooled back to 50°C for two minutes. Evaluated parameters included peak viscosity, setback, trough, breakdown, pasting temperature, and pasting time.

Color Determination

Cookie color was measured using a Hunter Lab color analyzer (Model No. CR210/CR-310/CR-410, Konica Minolta Sensing, Inc., Japan) as outlined by Ahmed and Hussein (2014).

Sensory evaluation

A 20-person untrained panel of staff and students from the Federal Polytechnic, Ilaro, assessed the cookies for color, texture, flavor, crispiness, and overall acceptability. Sensory attributes were rated on a 9-point hedonic preference, ranging from 9 (extreme like) to 1 (extreme dislike).

Statistical analysis

The data collected were subjected to analysis of variance (ANOVA). Mean and standard deviation are separated using XLSTAT 2019 (Duncan's Multiple Range Test at 0.05 probability level).

3. RESULTS & DISCUSSION

The proximate composition of the composite flour blends from sweet potato and peanut is displayed in Table 2. Moisture content is a major attribute that affects shelf life, quality, and processing characteristics. Moisture content ranged from 6.23% to 9.50%. This content is within the recommended value of less than 10% to prolong shelf life as stipulated by the Standards Organization of Nigeria (SON). Samples with higher moisture may require less water to form a dough during mixing (Bello *et al.* 2020). The crude protein of the composite flour ranged from 4.90 in BHT_0 to 15.57% in BHT_4. The samples were statistically different ($P > 0.05$). Sample BHT4 had the highest percentage, followed by sample BHT3. The increase in crude protein may be due to the proportion of defatted peanut in the samples. Chiedu et al. (2023) also observed similar results in composite flour from peanut, rice bran, wheat, and sweet potato. Composite flour from sweet potato and peanut could also play a role in addressing protein deficiency in infants and adults (Bello *et al.*

2020). The crude fiber content ranged between 2.50% and 8.08%. The crude fiber levels observed in this research were lower when compared to the 1.86–10.82% reported by Chiedu et al. (2023) and higher compared to the 1.33–2.51% reported for composite flour from sprouted sorghum, pigeon pea, and orange-fleshed sweet potato. Crude fiber helps reduce the risk of obesity, constipation, and diabetes, and protects against cardiovascular diseases (Chiedu *et al.* 2023; Bello et al. 2020). It is also useful in combating oxidative processes in food products. The crude fat content ranged from 0.97% to 1.64%. The samples were statistically different (P > 0.05), with BHT0 having the least. The increase in crude fat may be a result of the variation of defatted peanut in the samples. Adenuga (2010) observed a similar increase in fat content from blends of cowpea, sweet potato, and peanut. The ash content ranged from 2.63% to 3.30%. The ash content recorded in this research was lower compared to the 1.49–4.41% reported by Chiedu et al. (2023). Carbohydrate content varied between 65.85% and 79.46%. Sample BHT4 had the lowest value, and the highest value was recorded in sample BHT0. The gradual reduction in the carbohydrate content of the flour could be a result of the increase in the proportion of defatted peanut.

Table 2. Proximate composition of flour blends of sweet potato and peanut

Sample	Crude protein %	Moisture %	Crude fiber %	Crude fat %	Ash %	Carbohydrate
BHT0	4.90 ^{e}	9.50^{a}	2.50^{e}	0.97^{e}	3.07^{b}	79.46^{a}
BHT$_1$	6.11^{d}	8.27^{b}	6.70^{d}	1.29^{d}	3.30^{a}	74.33^{b}
BHT$_2$	8.73^{c}	8.57^{b}	7.40^{c}	1.41^{c}	3.14^{ab}	70.75^{d}
BHT$_3$	10.80^{b}	8.05^{b}	4.70^{b}	1.50^{b}	2.87^{c}	72.08^{c}
BHT^4	15.57^{a}	6.23^{c}	8.08^{a}	1.64^{a}	2.63^{d}	65.85^{e}

Means of triplicate samples

Means in the same column and denoted by the same letters are not statistically different from each other (p>0.05).

BHT$_0$=100% sweet potato flour

BHT$_1$= 10% peanut flour and 90% sweet potato flour

BHT$_2$= 20% peanut flour and 80% sweet potato

BHT$_3$= 30% peanut flour and 70% sweet potato flour

BHT$_4$= 40% peanut flour60% and sweet potato flour

Table 3a & 3b. Functional properties of flour blends of sweet potato and peanut

Sample	WAC (g/g)	FAC (g/g)	Loose (g/ml)	Packed (g/ml)
BHT$_0$	3.62^{a}	2.50^{a}	0.4^{a}	0.65^{a}
BHT$_1$	3.43^{b}	2.35^{ab}	0.37^{b}	0.56^{bc}
BHT$_2$	3.29^{c}	2.27^{b}	0.36^{b}	0.53^{c}
BHT$_3$	3.24^{d}	2.22^{bc}	0.33^{c}	0.53^{c}
BHT$_4$	3.14^{e}	2.17^{c}	0.33^{c}	0.61^{ab}

Means of triplicate samples

Means in the same column and denoted by the same letters are not statistically different from each other (p>0.05)

Sample	SW. 60^{0}C (g/g)	SW. 80^{0}C (g/g)	SW. 80^{0}C (g/g)	SW. 90^{0}C (g/g)	Sol. 60 ^{o}C (%)	Sol. 70 ^{o}C (%)	Sol. 80 ^{o}C (%)	Sol. 90 ^{o}C (%)
BHT$_0$	3.90^{a}	5.89^{a}	8.80^{a}	6.24^{a}	19.00^{a}	8.00^{b}	11.00^{bc}	10.00^{b}
BHT$_1$	3.55^{b}	5.60^{ab}	7.45^{b}	5.55^{b}	16.50^{b}	10.50^{a}	12.50^{ab}	11.50^{b}
BHT$_2$	3.47^{c}	5.45^{c}	7.18^{c}	5.08^{c}	15.50^{b}	8.50^{b}	9.50^{c}	11.50^{b}
BHT$_3$	3.29^{c}	5.10^{cd}	6.59^{d}	4.75^{c}	12.50^{c}	5.50^{c}	13.50^{a}	11.50^{b}
BHT$_4$	3.17^{d}	4.72^{d}	5.76^{e}	4.71^{c}	9.50^{d}	5.50^{c}	9.50^{c}	16.00^{a}

Means of triplicate samples

Means in the same column and denoted by the same letters are not statistically different from each other (p>0.05)

SW__ Swelling

SL__ Solubility

The functional properties of a food material play a crucial and quantifiable role in controlling factors such as moisture, viscosity, texture, consistency, mouthfeel, and shelf life. Consequently, application and ultimate use are determined by these functional properties (Adamu and Akhere, 2020). Water absorption capacity (WAC) varied between 3.14 and 3.62 g/g, with BHT0 having the highest value and BHT4 the least. WAC has a positive relationship with the amount of carbohydrates in a food (Bello *et al.* 2022). The ability of food products to imbibe water is largely associated with the amount of carbohydrate they contain. As the amount of sweet potato in the samples increased, there was a significant increase (P < 0.05), correlates with the results of Ohizua et al. (2016) and Bello et al. (2022). The ability of a food product to imbibe oil is denoted by its oil absorption capacity (OAC). OAC ranged from 2.17 to 2.50 g/g, with BHT0 having the lowest value of 2.17 g/g. The ability of proteins to absorb and hold oil is measured by a liquid retention index, which affects mouthfeel and texture. OAC is a crucial functional characteristic that enhances mouthfeel without diminishing food product flavor (Adamu and Akhere, 2020). The values recorded in this study are lower when compared to those reported by Chiedu et al. (2023) for composite blends based on whole wheat, sweet potato, and defatted peanut. Bulk density varied between 0.53 and 0.65 g/ml. The highest value observed in BHT0. This value is lower than those reported by Bello et al. (2022) and Obinna-Echem et al. (2020), which were 0.90–0.96 g/g and 0.71–0.82 g/g, respectively. Bulk density is important for food packaging design, storage, and transportation (Olopade, 2011). The swelling power (SWP) of the composite flour blends is displayed in Table 3a & 3b. SWP was determined at temperatures of 60 ^{o}C, 70 ^{o}C, 80 ^{o}C, and 90 ^{o}C. Peak SWP was observed at 80°C, with BHT0 having the highest value, while there was a decline at 90°C. In baked goods, the SWP of a flour is a crucial metric, as it relies on cultivars, varieties, and preparation methods (Obinna-Echem et al. 2020). The ratio of amylopectin to amylose in the flour samples could cause the variance in swelling ability (Chiedu *et al*. 2023). Solubility (SL) was determined similarly to SWP. At 90 ^{o}C, no significant difference (P < 0.05) was recorded among BHT0, BHT1, BHT2, and BHT3.

Table 4. Pasting properties of sweet potato and peanut flour blends

Sample	Peak viscosity	Through	Breakdown	Final viscosity	Set back	Peak time	Pasting temperature
BHT_0	1845.00^a	1045.00^a	800.00^a	1554.00^a	509.00^a	4.30^a	80.70^a
BHT_1	1437.00^b	957.00^b	480.00^b	1350.00^b	370.50^b	4.27^b	80.28^a
BHT_2	1096.50^c	803.50^c	293.00^c	1064.00^c	260.59^c	4.33^b	81.52^a
BHT_3	778.00^d	663.00^d	115.00^d	840.50^d	177.50^d	4.40^b	81.10^a
BHT_4	563.50^e	528.00^e	35.50^d	657.00^e	129.00^e	5.57^a	80.70^a

Means of duplicate samples
Means in the same column and denoted by the same letters are not statistically different from each other (p>0.05)

The pasting property values for the composite flour are displayed in Table 4. Pasting properties impact the digestibility, texture, and use of starch-based raw materials, which dictate aesthetic value and quality (Chiedu et al. 2023). Peak viscosity increased significantly (P ≤ 0.05) and ranged from 563.50 RVU in BHT4 to 1845 RVU in BHT0. Peak viscosity measures a food's capacity to swell unrestrictedly prior to physical breakdown. The reduction in peak viscosity may be associated with the low starch content in peanut flour. Trough values varied from 528 RVU in BHT4 to 1845 RVU in BHT0. The trough, which assesses the paste's resistance to breaking down after cooling, represents the lowest viscosity value. The trough value reverts as peanut substitution increases. Breakdown/pasting stability ranged from 35.50 to 800 RVU, and the samples showed significant differences (P ≤ 0.05). The highest breakdown was observed in BHT0, and the minimum in BHT4. Breakdown viscosity refers to the ability of starch to retain its viscosity under cooking conditions. High breakdown viscosity indicates more stability of starch granules, while lower values indicate ruptured granules, affecting texture and quality (Adamu and Akhere, 2020). Final viscosity varied from 657 to 1554 RVU. Values in this study were higher than those reported by Chiedu et al. (2023) and Adamu and Akhere (2020). Final viscosity determines the stability and quality of the starch in the cooked paste. Setback values varied from 129 to 509 RVU. The setback expresses the tendency of gelatinised starch to retrograde on cooling due to high amylose content. Adamu and Akhere (2020) reported that high setback is an indicator of the degree of swelling power. This study shows that sample BHT0 may not retrograde on cooling. Peak time varied between 4.27 and 5.57 minutes. Samples BHT1, BHT2, and BHT3 did not differ significantly (P ≤ 0.05), while BHT0 and BHT4 also showed no difference. Pasting temperatures ranged from 80.28 ^{o}C to 81.52 ^{o}C. There is no statistical difference found among the samples (P ≤ 0.05). Pasting temperature indicates the minimum temperature required to cook the flour, while peak time denotes the duration required for cooking. Adamu and Akhere (2020) reported similar values for orange-fleshed potato and red Bambara groundnut flour blends.

Table 5 presents the color values (L*, a*, b*) of the samples made with a blend of sweet potato and peanut flour. L* indicates visual lightness or brightness of the blend samples, with values ranging from 48.28 to 68.81. A significant difference (P < 0.05) exists among the samples BHT0, BHT1, and BHT2, but not observed BHT3 and BHT4. The L* value quantifies whether a sample appears dark (0) or light (100). High L* values in refined flour imply a bright white color, which is frequently desired (Popovska, 2023). Values obtained in this study were lower than those reported by Ohizua et al., (2016) and Chiedu et al., (2023). The composite flour mixes a* and b* values ranged from 1.23 to 5.96 and 13.78 to 23.35, respectively. The a* value is crucial for assessing the harmony between red and green hues (Tanko et al., 2023). The a* value showed how color changed as peanut flour substitution increased. A shift towards red is indicated by a higher a* value, while the b* value represents the yellow-blue component. Sample BHT2 was positive than the other samples. Chroma (C) varied from 12.02 in BHT4 to 14.86 in BHT2, while the hue angle varied from 67.60° in BHT4 to 85.71° in BHT0. Chroma shows the degree of color saturation, while hue is the perceived color. Variations in the pigments of raw materials may cause these differences (Kazemi et al. 2016).

Table 5. Color Evaluation of biscuit produced from Sweet Potato of sweet potato and peanut flour blends.

Sample	L	A	B	C	Hue angle
BHT_0	61.81^a	1.23^e	16.35^b	12.84^b	85.71^a
BHT_1	58.29^b	2.11^d	16.35^b	13.03^b	82.67^b
BHT_2	56.28^c	4.35^c	17.61^a	14.86^b	76.14^c
BHT_3	47.28^d	5.96^a	15.14^c	13.32^b	68.50^d
BHT_4	47.48^d	5.68^b	13.78^d	12.02^c	67.60^e

Means of triplicate samples
Means in the same column and denoted by the same letters are not statistically different from each other (p>0.05)
L_Lightness, A_Redness to Greennes,s B_Yellowness to Blueness, C__Chroma

Table 6. Sensory properties of biscuits

Sample	Color	Taste	Flavor	After taste	Crispness	Overall acceptability
BHT_0	7.4^{ab}	6.50^b	5.95^b	5.95^b	6.50^{ab}	7.50^a
BHT_1	7.4^{ab}	6.90^{ab}	7.05^a	6.50^{ab}	6.80^{ab}	6.65^b
BHT_2	7.65^a	7.45^a	7.55^a	7.15^a	7.30^a	7.50^a
BHT_3	6.70^{bc}	5.80^c	6.85^a	6.40^b	6.25^b	5.20^c
BHT_4	6.60^c	5.45^c	6.85^a	6.25^b	6.30^b	5.40^c

Means in the same column and denoted by the same letters are not statistically different from each other (p>0.05)
BHT_0=100% sweet potato flour
BHT_1= 10% peanut flour and 90% sweet potato flour
BHT_2= 20% peanut flour and 80% sweet potato
BHT_3= 30% peanut flour and 70% sweet potato flour
BHT_4= 40% peanut flour60% and sweet potato flour

The sensory qualities of biscuits from the blends are displayed in Table 6. Color ranged from 6.60 to 7.4, and taste ranged from 5.45 to 7.45. No significant difference exists between BHT0, BHT1, BHT3, and BHT4 regarding color and taste. Sample BHT2 (80% sweet potato and 20% peanut) was the most preferred due to its appealing color and refreshing peanut taste. Flavor ranged from 5.95 to 7.55. At P < 0.05, there was no significant difference among samples BHT1, BHT2, BHT3, and BHT4, likely due to the peanut content. Aftertaste, crispness, and overall acceptability varied from 5.95–7.15, 6.25–7.30, and 5.40–7.50, respectively. No significant difference (P < 0.05) exists among BHT0, BHT1, BHT3, and BHT4 in terms of taste and crispness, while BHT0 and BHT2 had the highest mean for overall acceptability. Cookies with 80% sweet potato and 20% peanut received excellent remarks.

4. CONCLUSION

This research evaluated the functional, sensory, and nutritional characteristics of sweet potato-peanut composite biscuits. Twenty panelists from Federal Polytechnic, Ilaro, assessed the biscuits. Statistical analysis revealed that the 20% peanut substitution level was the most preferred. Therefore, in nations where wheat is not grown, using peanut and sweet potato flour as a substitute offers major advantages. Locally accessible raw materials could replace wheat to significantly lower production costs. Adding peanut flour to sweet potato reduces dependency on wheat for baked goods. Incorporating this composite flour into the diet can help reduce protein and energy malnutrition.

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Author Contributions

This manuscript has been read and approved by all the authors, and the requirements for authorship as stated earlier in this document have been met. Each of the authors believes that this manuscript represents honest work done by us.

Bashiru Ogunbiyi: Writing—original draft preparation, conducting formal analysis, and critically revising the manuscript.

Olamide Adeosun: Data collection and analysis, critically revising the manuscript.

Informed consent

Not applicable.

Conflicts of interests

The authors declare that they have no conflicts of interest, competing financial interests or personal relationships that could have influenced the work reported in this paper.

Ethical approval & declaration

Not applicable. This article does not contain any studies with human participants or animals performed by any of the authors.

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Data and materials availability

Data that support the findings of this study are embedded within the manuscript.

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