

## Research Article

# Quality Assessment and Consumer Acceptability of Cookies from Blends of Wheat Flour and Pumpkin (*Cucurbita* Spp.) Seed Flour

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**Abstract:** This study was carried out to investigate the application of pumpkin seed flour as composite flour with the aim of improving the nutritional quality and reducing the burden on economy especially with importation of wheat. Wheat flour was blended with pumpkin seed flour in ratio (100%:0, 95%: 5%, 90%: 10%, 85%:15% and 80%:20%) to produce cookies. The proximate composition, mineral, phytochemical, antioxidant, physical properties and consumer acceptability of wheat-pumpkin seed cookies were determined. It was observed that the protein content of cookies increased from 17.95%-21.02%, fat (17.33%-23.08%) while there were reductions in carbohydrate (49.32%-43.22%) and moisture content (4.95%-3.05%) of cookies. Phosphorus (53.48 mg/100g-189.43 mg/100g) was the predominant mineral, followed by sodium (56.11 mg/100g-91.20 mg/100g) and zinc (0.41 mg/100g-1.06 mg/100g) was the least. The physical properties of the cookies include; weight (3.04 g-3.27 g), diameter (22.06 mm-31.33 mm), thickness (7.33 mm-8.30 mm) and spread ratio (0.24-0.36). The flavonoid content of cookies ranged from 0.01mg/100g-0.14 mg/100g while the ability of wheat-pumpkin cookies to scavenge free radicals (5.03 mg/100g-10.84 mg/100g) was found to decrease with increase in pumpkin seed flour. Result of the consumer acceptability of cookies revealed that there were no significant differences in the overall acceptability of cookies from wheat flour and wheat-pumpkin seed flour. Based on this study, pumpkin seed flour may be considered as composite flour in cookies production.

**Keywords:** pumpkin seed flour, pumpkin-wheat cookies, nutritional composition, consumer acceptability.

## INTRODUCTION

The increase in demand for fast food in a bid to save time and meet up with secular pressures among women in many developing countries have contributed to the rate at which snack such as cookies and biscuits are included in family menu. Composite flour produced from cereals and legumes possess the advantage of improving the overall nutrition according to Food and Agricultural Organization (FAO, 1995). The crop, seed or peel to be employed in composite flour blends should be readily available, acceptable culturally and possess increased nutritional potentials (Akobundu *et al.*, 2008).

Pumpkins are grown all round the world for a variety of reasons ranging from agricultural purposes to commercial and ornamental (Wolford and Banks, 2008). Pumpkin (*Cucurbita* spp.) locally referred to as 'elegede' in South West Nigeria is cultivated in various parts of the country as a traditional vegetable crop. The leaves are usually prepared as vegetable soup, the pulp are boiled or fried, while the seed are either, roasted, baked or added to stew to eat yam. It is estimated that pumpkin seeds constitute 2.9% in weight of the fresh fruit and 32% of the weight in the dry form. The seed kernels have been used as additives in some dishes, and there are reports on the nutritional value of pumpkin seed kernel proteins (25.4%-35. %) and oils (41.5%-49.1%) (Norfezah *et al.*, 2011; Rodr'iguez- Miranda *et al.*, 2014). Pumpkin seeds have also been reported to exhibit several health benefits including anti-diabetic, anti-hypertensive, anti- tumor, anti-bacterial, anti-hypercholesterolemic and anti-inflammatory actions (Rado'caj *et al.*, 2012).

A number of studies have reported improved nutritive values of cookies by incorporating, soy protein and fibre (Shrestha and Noomhorm, 2002), chickpea, lentil (Zucco *et al.*, 2011), soybean and maize (Mishra *et al.*, 2012), germinated sesame (Olagunju and Ifesan, 2013), barley (Sharma and Gujral, 2014), mango kernel (Ifesan, 2017) and watermelon seed (Ifesan and Ebosele, 2017) into wheat flour. The use of composite flour as substitute in baking industry will in some way preserve the economy of developing countries. Application of locally sourced and nutritious raw materials for product development has been widely accepted. In addition, the quest for healthy and functional foods has necessitated research into locally available food sources. There is need therefore to investigate the nutritional composition and acceptability of cookies made from blends of wheat and pumpkin seed flour.

## MATERIALS AND METHODS

### Materials

Wheat flour, sugar, margarine, powdered milk, salt, sodium bicarbonate and vanilla flavor used for this study were bought from Oba market in Akure, Ondo State while the pumpkin fruits were purchased from Owena market in Osun State, Nigeria.

### Preparation of pumpkin seed flour

Mature pumpkin fruits were washed, cut into small sizes and then cooked for 45 min. They were allowed to cool down for easy separation of the pulp from the seed. The seeds were then oven dried at 60 °C for 4 hour, milled to obtain pumpkin seed flour and packaged in air tight polythene bag.

### Formulation of wheat-pumpkin seed flour for cookies production

Blends with different proportions of wheat flour and pumpkin seed flour were prepared while 100% wheat flour served as control (Table 1). A digital weighing balance (Model: FA2004) and Philips blender (HR 1702) were used for weighing and mixing of the flour, respectively.

**Table 1.** Formulation for the wheat-pumpkin seed flour for cookies production

Composite flour	Wheat flour (WF) (%)	Pumpkin seed flour (PSF) (%)
Wheat flour (WF)	100	0
95% WF:5% PSF	95	5
90% WF:10% PSF	90	10
85% WF:15% PSF	85	15
80% WF:20% PSF	80	20

WF= wheat flour; PSF=pumpkin seed flour

Cookies were produced as described by Olagunju and Ifesan (2013) with slight modifications. All the ingredients (sugar, margarine, powdered milk, salt, sodium bicarbonate and vanilla flavor) were appropriately weighed and mixed thoroughly in a Kenwood mixer. The content was transferred into the mixing bowl while wheat flour or wheat-pumpkin seed flour and sodium bicarbonate were added with continuous mixing for 15 minutes until smooth dough was obtained. A piece of this dough was cut, placed on a clean table then rolled out using rolling pin until the desired uniform texture and thickness of 0.44 cm was obtained. Biscuit cutter was then used to cut the sheet of the dough into required shapes and sizes and placed on the baking tray already greased with margarine. The baking was done at 200 °C for 20 minutes. After baking, the hot cookies were placed on clean trays to cool down. The cookies were then packed into polyethylene sachet and sealed prior to further analyses.

### Determination of proximate composition of wheat, wheat-pumpkin seed cookies

Crude protein, lipid, crude fibre, moisture and ash content were determined in accordance with the standard methods of Association of Official Analytical Chemist (AOAC, 2012). Carbohydrate was determined by difference.

### Determination of mineral content of cookies from wheat and wheat-pumpkin seed flour

Mineral composition of cookies was determined following the dry ashing technique (AOAC, 2012).

### Preparation of wheat, wheat-pumpkin seed cookies extract

Aqueous extract of cookies was prepared using the method described by Oboh *et al.* (2010). About 2.5 g of the ground cookies was soaked in 100 ml of distilled water at 37 °C for about 24 hours. It was then filtered, centrifuged at 2,000 rpm for 10 min and supernatant was stored in the refrigerator for further analyses.

### Determination of total flavonoid content of cookies extract

About 0.2 ml of the extract was added to 0.3 ml of 5% NaNO<sub>3</sub> at zero time. After 5 minutes, 0.6 ml of 10% AlCl<sub>3</sub> was added and after 6 minutes, 2 ml of 1 M NaOH was added to the mixture followed by the addition of 2.1 ml of distilled water. Absorbance was read at 510 nm against the reagent blank and flavonoid content was expressed as mg rutin equivalent (Bao, 2005).

### Determination of DPPH free radical scavenging ability of cookies extract

The free radical scavenging ability of cookies extract against DPPH (1,1-diphenyl-2-picrylhydrazyl) radical was evaluated (Gyamfi *et al.*, 1999). About 1 ml extract was mixed with 1 ml of 0.4 mM/l methanol solution containing DPPH radicals. The mixture was left in the dark for 30 minutes and the absorbance was measured at 516 nm using the

spectrophotometer. The DPPH free radical scavenging ability was calculated with respect to the reference, which contained all the reagents without the test sample.

### ***Determination of phytochemical content of wheat and wheat-pumpkin seed cookies***

#### ***Oxalate determination***

One gram of sample was weighed into a conical flask and 75 ml of 3 M H<sub>2</sub>SO<sub>4</sub> was added. The solution was placed on a magnetic stirrer for about 1h, and then filtered using Whatman No. 1 filter paper. About 25 ml of sample filtrate was collected and titrated hot (80- 90°C) against 0.1M KMNO<sub>4</sub> solution to the point when a faint pink colour appeared that persisted for at least 30 seconds (Day and Underwood, 1986).

#### ***Phytate determination***

Phytate was determined according to the method of Wheeler and Ferrel (1971). Four gram of each sample was soaked in 100 ml of 2 % HCl for 3 hours and then filtered through a No 1 Whatman filter paper. About 25 ml was taking out of the filtrate and placed inside a conical flask and 5ml of 0.3 % of ammonium thiocyanate solution was added as indicator while 53.5ml of distilled water was added to give the proper acidity and then titrated against 0.00566 g per ml of standard iron (III) chloride solution that contained about 0.00195 g of iron per milliliter until a brownish yellow colour was observed.

#### ***Determination of saponin***

The spectrophotometric method of Brunner (1984) was used for saponin determination. About 2 g of the finely ground cookies was weighed and 100 ml of Isobutyl alcohol was added. The mixture was placed on a shaker for 5 hours to ensure uniform mixing. The mixture was filtered with No 1 Whatman filter paper into a beaker containing 20 ml of 40% saturated solution of magnesium carbonate. The mixture obtained was again filtered through No 1 Whatman filter paper to obtain a clean colourless solution. One millilitre of the colourless solution was taken into volumetric flask while 2 ml of 5% iron (III) chloride solution was added and made up to mark with distilled water. It was allowed to stand for 30 min for the colour to develop. The absorbance was read against the blank at 380 nm.

#### ***Determination of sensory attributes of wheat-pumpkin seed cookies***

Quality attributes of cookies made from wheat flour and wheat-pumpkin seed flour was assessed by 20 member sensory panelists. The panelists were supplied with a form and asked to score the cookies using the 9 point Hedonic scale with respect to colour, taste, flavour, appearance, crumb texture and overall acceptability (Solomakos *et al.*, 2008). Statistical Analysis.

All data collected was subjected to Analysis of Variance (ANOVA) using SPSS (version 16). Duncan New Multiple Range Test (DNMRT) was used to separate the differences in the mean scores.

## **RESULTS AND DISCUSSION**

### ***Proximate composition of cookies***

Table 1 showed the proximate composition of cookies made from wheat and wheat-pumpkin seed flour blends. Moisture content ranged from 3.05% to 4.95%. Moisture and water activity of food product dictates greatly the keeping quality of the food (Ajani *et al.*, 2012). The values obtained from this study are lower than those reported by Chauhan *et al.* (2016) for wheat- amaranth cookies. It was observed that the moisture content reduced with increase in pumpkin seed flour substitution while the dry matter content increased gradually. This is similar to what was observed when soybean was added to cowpea (Ogundele *et al.*, 2014). The reduction in the moisture content of cookies may be due to the increase in protein content as a result of the addition of pumpkin seed flour. Protein has been reported to possess certain functional attributes which include; water sorption, viscosity, elasticity, foamability, foam stability and fibre formation (Sunful *et al.*, 2010).

**Table 2.** Proximate composition (%) of cookies made from wheat flour and wheat-pumpkin seed flour

<b>Cookies</b>	<b>Moisture</b>	<b>Ash</b>	<b>Protein</b>	<b>Fat</b>	<b>Fibre</b>	<b>CHO</b>
100% WF	4.95±0.02 <sup>a</sup>	2.48±0.00 <sup>d</sup>	17.95±0.03 <sup>e</sup>	23.08±0.00 <sup>e</sup>	2.20±0.02 <sup>d</sup>	49.32±0.06 <sup>a</sup>
95% WF:5% PSF	4.34±0.00 <sup>b</sup>	2.48±0.02 <sup>d</sup>	18.23±0.02 <sup>d</sup>	25.17±0.01 <sup>d</sup>	2.64±0.01 <sup>a</sup>	47.11±0.01 <sup>b</sup>
90% WF:10% PSF	3.33±0.08 <sup>d</sup>	2.52±0.01 <sup>c</sup>	19.65±0.03 <sup>c</sup>	25.39±0.03 <sup>c</sup>	2.56±0.00 <sup>b</sup>	46.56±0.01 <sup>c</sup>
85% WF:15% PSF	3.57±0.01 <sup>c</sup>	2.64±0.01 <sup>b</sup>	20.57±0.04 <sup>b</sup>	26.08±0.02 <sup>b</sup>	2.55±0.01 <sup>b</sup>	44.56±0.06 <sup>d</sup>
80% WF:20% PSF	3.05±0.00 <sup>a</sup>	2.96±0.01 <sup>a</sup>	21.02±0.03 <sup>a</sup>	27.33±0.01 <sup>a</sup>	2.41±0.01 <sup>c</sup>	43.22±0.01 <sup>e</sup>
100% PSF	6.13±0.00	5.88±0.00	38.68±0.023	42.04±0.010	0.44±0.02	7.46±0.034

Means with different letters are significantly different in the same column at the p≤0.05

WF=wheat flour; PSF=pumpkin seed flour

Protein content of cookies made from wheat-pumpkin seed flour ranged from 17.95% -21.02% and was found to increase with increase in addition of pumpkin seed flour. The protein content of pumpkin seed flour (38.68%) is greater than that of wheat flour (17.95%). The result in this study is similar to the findings of Dixit *et al.* (2011) who reported an increase in protein content of akara with substitution of soybean, higher than that of wheat-mango kernel cookies (9.74%-11.93%) (Ifesan, 2017), and lower than that of wheat-watermelon seed cookies (21.00% - 33.25%) (Ifesan and Ebosele, 2017). The protein content of wheat-pumpkin seed cookies is higher than the 10% which was the minimum value recommended by Food Agriculture Organization/World Health Organization as reported by Ojinnaka *et al.* (2016). The ash content of a food material could be used as an index of its mineral constituent. It was observed that the ash content of cookies (2.48%-2.96%) increased with increase in pumpkin seed flour substitution. The same observation was made by Banu *et al.* (2012) who reported that addition of wheat bran to dough meal increased the ash content. Fat content of wheat and wheat-pumpkin cookies ranged from 23.08%-27.33% and the result of the fat content of cookies followed the same trend with ash and protein content. Similar observations were made when African walnut was employed as composite flour in cookies production and there was increase in the fat content of cookies (Ndie *et al.*, 2010; Ekwe and Ihemeje, 2013). Due to high fat content of pumpkin flour, it should be used shortly after production to prevent rancidity which can lead to deterioration of food product (Ikujenlola, 2014). It was observed that the fibre content of wheat flour (2.20%) and pumpkin flour (0.44%) yielded fibre content of 2.41% -2.64% in wheat-pumpkin cookies. The carbohydrate content of cookies ranged from 43.22% to 49.22% and the values decreased significantly with increase in addition of pumpkin flour. A decrease in carbohydrate content of cake with increasing substitution of African bread fruit flour was reported (Ihediohanma *et al.*, 2009).

### Mineral content of wheat-pumpkin cookies

The mineral content of wheat-pumpkin cookies generally increased with increase in pumpkin content (Table 2). The sodium content of the cookies ranged from 56.11 mg/100g -91.20 mg/100g, calcium (7.19 mg/100g-63.28 mg/100g), phosphorus (53.48 mg/100g-189.43 mg/100g), magnesium (6.81 mg/100g-8.22 mg/100g), zinc (0.41 mg/100g-1.06 mg/100g) and iron (2.78 mg/100g-2.81 mg/100g). The calcium content of the cookies were found to increase appreciably with increase in pumpkin seed flour from 7.13 mg/100g in control to 63.28 mg/100g in sample with 80% wheat+20% pumpkin seed flour. The values obtained from this study are higher than those reported by Fasasi and Alokun (2013) for maize snack enriched with soy flour. Calcium is an important mineral needed for bone formation and neurological functions of the body. The values obtained may be an indication that composite flour from pumpkin seed employed for cookies production are good sources of minerals than wheat flour. Pumpkin fruit has a good content of  $\beta$ -carotene content with moderate content of carbohydrates, vitamins and minerals (Yadhav *et al.*, 2010).

**Table 2.** Mineral composition (mg/100g) of wheat and wheat-pumpkin seed cookies

Cookies	Na	Ca	P	Mg	Zn	Fe	Pb	Ni	Cd
100% WF	56.11±0.00 5 <sup>e</sup>	7.19±0.100 <sup>e</sup>	53.48±0.352 e	6.81±0.06 0 <sup>e</sup>	0.41±0.00 <sup>e</sup>	2.78±0.005 c	N	N	N
95% WF:5% PS F	75.45±0.11 1 <sup>d</sup>	38.05±0.23 1 <sup>c</sup>	85.16±0.072 d	6.90±0.06 8 <sup>c</sup>	0.48±0.00 5 <sup>d</sup>	2.79±0.010 bc	N	N	N
90% WF:10% P SF	79.43±0.57 7 <sup>c</sup>	42.06±0.04 5 <sup>b</sup>	103.71±0.06 0 <sup>c</sup>	6.91±0.02 5 <sup>c</sup>	0.51±0.01 7 <sup>c</sup>	2.81±0.005 a	N	N	N
85% WF:15% P SF	85.43±0.00 0 <sup>b</sup>	42.61±0.02 0 <sup>b</sup>	134.50±0.10 0 <sup>b</sup>	7.50±0.04 1 <sup>b</sup>	0.92±0.00 5 <sup>b</sup>	2.81±0.00 <sup>ab</sup>	N	N	N
80% WF:20% P SF	91.20±0.00 0 <sup>a</sup>	63.28±0.01 7 <sup>d</sup>	189.43±0.28 8 <sup>a</sup>	8.22±0.00 <sup>a</sup>	1.06±0.01 0 <sup>a</sup>	2.81±0.00 <sup>bc</sup>	N	N	N

Means with different letters are significantly different in the same column at the  $p \leq 0.05$  level.

WF=wheat flour; PSF=pumpkin seed flour; ND=not detected

### Physical Properties of wheat-pumpkin seed cookies

It was observed that there were fluctuations in all the values obtained for the physical properties of wheat-pumpkin seed cookies (Table 3). The control sample had a weight (3.04 g) that is lower than those of wheat-pumpkin cookies (3.27 g-3.84 g). The low weight of the samples may suggest ease of packaging of the cookies. The diameter of wheat biscuit was 29.86 mm while those of wheat-pumpkin cookies ranged from (22.06 mm-31.33 mm). The thickness of the control sample (7.33 mm) was found to be lower compared to wheat-pumpkin seed cookies (8.13 mm-11.15 mm). The increase in thickness of cookies could be due to the binding and swelling of the flour components as a result of water absorption (Sengev *et al.*, 2015). This is consistent with the findings of Chinma and Gernah (2007) who reported a similar observation when wheat was substituted with cassava, soybean and mango kernel flour. Cookies prepared from wheat flour had lower spread ratio (0.24) compared to the cookies made from wheat-pumpkin seed flour blends (0.26-0.36). This is similar to observations from wheat-mango kernel cookies (Ifesan, 2017) and wheat-watermelon cookies (Ifesan and Ebosele, 2017). It however disagreed with the findings of Adeyeye (2016) who reported the highest value for

wheat flour during cookies production from blends of wheat and sorghum flour. The differences recorded might be due to nature of starch in the composite flour (Mir *et al.*, 2015).

**Table 3.** Physical Properties of Cookies from Wheat and Pumpkin Seed Flour Blends

Samples	Weights (g)	Diameter (mm)	Thickness (mm)	Spread ratio
100% WF	3.04±0.429 <sup>c</sup>	29.86±0.115 <sup>b</sup>	7.33±0.288 <sup>c</sup>	0.24±0.014 <sup>c</sup>
95% WF:5% PSF	3.48±0.223 <sup>abc</sup>	22.06±0.115 <sup>c</sup>	8.13±0.152 <sup>b</sup>	0.36±0.005 <sup>a</sup>
90% WF:10% PSF	3.55±0.220 <sup>ab</sup>	31.26±0.251 <sup>a</sup>	11.15±0.444 <sup>a</sup>	0.35±0.015 <sup>a</sup>
85% WF:15% PSF	3.84±0.092 <sup>a</sup>	30.33±0.757 <sup>ab</sup>	8.20±0.173 <sup>b</sup>	0.27±0.010 <sup>b</sup>
80% WF:20% PSF	3.27±0.055 <sup>bc</sup>	31.33±1.154 <sup>a</sup>	8.30±0.300 <sup>b</sup>	0.26±0.015 <sup>bc</sup>

Means with different letters are significantly different in the same column at the  $p \leq 0.05$  level.

WF= wheat flour; PSF=pumpkin seed flour

#### **Phytochemical content of wheat and wheat-pumpkin cookies**

Results of the phytochemical properties of wheat and wheat-pumpkin seed cookies were found to increase with addition of the composite flour. The tannin content for control was 0.14 mg/100g while it increased from 0.15 mg/100g – 0.19 mg/100g for cookies with pumpkin seed flour. Phytate content was 32.14 mg/100g for wheat cookies and 38.73 mg/100g-53.56 mg/100g for wheat-pumpkin seed cookies. Saponin in the cookies ranged from 15.20 mg/100g in control to 22.50 mg/100g in cookies with composite flour. The increases observed in the phytochemicals of cookies with addition of pumpkin seed is an indication that pumpkin seed flour is rich in phytochemical and may further be investigated as a functional flour.

**Table 4.** Phytochemical composition (mg/100g) of cookies from blends of wheat and pumpkin flour

Samples	Tannins	Phytates	Saponins	Oxalates
100% WF	0.14±0.104 <sup>a</sup>	32.14±0.020 <sup>c</sup>	15.20±0.030 <sup>c</sup>	6.51±0.020 <sup>c</sup>
95% WF:5% PSF	0.15±0.010 <sup>a</sup>	38.73±0.030 <sup>d</sup>	17.80±0.040 <sup>d</sup>	7.56±0.020 <sup>ab</sup>
90% WF:10% PSF	0.18±0.006 <sup>a</sup>	41.02±0.040 <sup>c</sup>	19.96±0.076 <sup>c</sup>	7.56±0.005 <sup>ab</sup>
85% WF:15% PSF	0.18±0.020 <sup>a</sup>	42.20±0.020 <sup>b</sup>	20.50±0.020 <sup>b</sup>	7.52±0.020 <sup>b</sup>
80% WF:20% PSF	0.19±0.010 <sup>a</sup>	53.56±0.040 <sup>a</sup>	22.50±0.020 <sup>a</sup>	7.58±0.040 <sup>a</sup>

Means with different letters are significantly different in the same column at the  $p \leq 0.05$  level.

WF= wheat flour; PSF=pumpkin seed flour

#### **Antioxidant properties of wheat-pumpkin seed cookies**

Antioxidants are compounds that inhibit or delay the oxidation of other molecules by inhibiting the initiation or propagation of oxidizing chain reactions. They are compounds when added to food products, especially to lipids and lipid-containing foods, can extend the shelf-life by retarding the process of lipid peroxidation, which is one of the major reasons for deterioration of food products during processing and storage (Mala and Kurian, 2016). Table 5 showed that the flavonoid content of cookies ranged from 0.01 mg/100g to 0.14 mg/100g. There was no significant difference in the samples except for cookies produced from 95% wheat flour; 5% pumpkin flour blend which had the highest value. The ability of wheat-pumpkin seed cookies to scavenge free radicals revealed that the control (10.84 mg/g) had the highest value and the DPPH values decreased with increase in addition of pumpkin seed (6.17 mg/100g-5.03 mg/100g).

**Table 5.** Antioxidants properties of wheat-pumpkin Cookies (mg/100g)

Samples	Flavoniods	DPPH
100% WF	0.01±0.001 <sup>b</sup>	10.84±0.020 <sup>a</sup>
95% WF:5% PSF	0.14±0.105 <sup>a</sup>	6.17±0.020 <sup>b</sup>
90% WF:10% PSF	0.01±0.001 <sup>b</sup>	5.94±0.000 <sup>c</sup>
85% WF:15% PSF	0.01±0.000 <sup>b</sup>	5.96±0.005 <sup>c</sup>
80% WF:20% PSF	0.02±0.001 <sup>b</sup>	5.03±0.010 <sup>d</sup>

Means with different letters are significantly different in the same column at the  $p \leq 0.05$  level.

WF= wheat flour; PSF=pumpkin seed flour.

#### **Consumer acceptability of wheat-pumpkin seed cookies**

Table 6 showed the sensory attributes of cookies made from pumpkin seed and wheat flour. The panelist scored the cookies on appearance (7.11-8.00), colour (7.05-8.16), texture (7.38-8.05), taste (7.38-8.16) and overall acceptability (7.27-7.83). It was observed that cookies made from 95% wheat: 5% pumpkin seed was rated higher and preferred than the control sample with 100% wheat in all the sensory attributes. The overall acceptability score for all the samples showed that cookies from wheat-pumpkin seed were well accepted and could compete with cookies made from 100% wheat flour.

## CONCLUSION

The result of this study revealed that cookies of high nutritional content could be produced from blends of wheat-pumpkin seed flour. Cookies produced from 100% wheat flour and composite flour cookies had the same acceptability score. Increasing the utilization of pumpkin seed flour to fortify wheat flour will increase the nutritional quality of products and reduce dependence on wheat as the sole source of flour.

**Table 6.** Sensory Evaluation of Cookies from blends of pumpkin seed and wheat flour

Samples	Appearance	Colour	Texture	Taste	Overall Acceptability
100% WF	8.00±0.76 <sup>b</sup>	7.66±1.02 <sup>ab</sup>	7.44±0.92 <sup>b</sup>	7.38±1.03 <sup>b</sup>	7.47±0.79 <sup>a</sup>
95% WF:5% PSF	8.67±0.48 <sup>a</sup>	8.16±0.70 <sup>a</sup>	7.88±0.75 <sup>ab</sup>	8.16±0.92 <sup>a</sup>	7.83±0.78 <sup>a</sup>
90% WF:10% PSF	8.33±0.68 <sup>ab</sup>	7.88±0.90 <sup>a</sup>	7.38±0.77 <sup>b</sup>	7.83±0.70 <sup>ab</sup>	7.27±1.27 <sup>a</sup>
85% WF:15% PSF	7.83±0.85 <sup>b</sup>	7.55±0.78 <sup>ab</sup>	8.05±0.63 <sup>a</sup>	7.77±0.94 <sup>ab</sup>	7.44±0.92 <sup>a</sup>
80% WF:20% PSF	7.11±1.07 <sup>c</sup>	7.05±1.16 <sup>b</sup>	7.44±0.92 <sup>b</sup>	7.77±0.94 <sup>ab</sup>	7.61±0.69 <sup>a</sup>

Means with different letters are significantly different in the same column at the  $p \leq 0.05$  level.

WF= wheat flour; PSF=pumpkin seed flour

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