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Chemical and Sensory Evaluations of Wheat *(Triticum aestivum L.)* Bread Enriched with Pumpkin (*Cucurbita maxima L.*) Flour

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Abstract Wheat flour is used to accelerate rheological properties of dough and as the vehicle for proven food fortification with high consumption and processing. Consumption of locally available vitamins and minerals rich foods like pumpkin by blending with wheat can be one of the strategies to combat the nutrient gaps and used to extend the shelf life of perishable fruits. Orange colored fresh pumpkin fruits were sorted, washed, peeled the hard rind, sliced the edible flesh, soaked and dried in open air and ground in to pumpkin flour. The wheat flour was made as control (BP_0) with 100% wheat and four pumpkin and wheat blends (BP_1, BP_2, BP_3 and BP_4) were prepared by substituting wheat with 5%, 10%, 15% and 20% pumpkin flour respectively. The developed composite flour breads were made by adding others ingredients and its proximate and sensory acceptability were analyzed. The moisture content, crude protein and utilizable carbohydrates of the composite flours breads decreased as the ratio of pumpkin flour increased in the blend. However; the ash, crude fat, crude fiber and energy contents increased as the proportion of pumpkin increased in the blends of pumpkin wheat composite flours breads. The results of sensory analyses using five point hedonic rating demonstrated that a higher degree of liking was attributed to the bread sample with 10% dried pumpkins additive comparing to control wheat bread and others sample. The effect of adding pumpkin flour to wheat flour in different proportion showed more than average values of consumer-oriented panelist scores in overall acceptability of the developed breads. The newly developed product of wheat based pumpkin flour enriched bread suggested to wheat bread stable consumers and verifies its application in bakery products of 10% pumpkin flour.

Keywords Pumpkin flour, Bread, Composite flour, Proximate analysis, Sensory evaluation

1. Background

In Ethiopia pumpkin (*Cucurbita maxima L.*) is grown in Southern and Northern parts and used as a source of food for human beings and feed for animals. Pumpkin is one of the fruits containing carotene, vitamins, minerals, pectin, dietary fiber, proteins and used to fill the gaps of healthier food products needs of generation [1]. The pumpkin fruits are variable in size, color, shape and weight and an important home garden fruits due to its nutritional values and health benefits. The fruits have a moderately hard rind, thick edible flesh and a central seed cavity. Pumpkin can be considered as a promising raw material for functional food product development. It is rich in carotenoids and used to the immune response and reduction of the risk of degenerative diseases such as cancer, cardiovascular diseases, atherosclerosis and cataracts [2], [3].

Most of the time edible part of pumpkin is fleshy but sometimes seeds, leaves and flowers are also edible parts. From those parts some are eaten either boiled, steamed, roasted or mashed [4]. In addition to that pumpkin is used as food ingredients or additives to improve food quality and getting attention in different socioeconomic groups of many developing countries. The delicious flesh of pumpkin is being processed to obtain juice, pickles and deride product to additive in a diversity of food products for children and pumpkin flour would improve the nutritional quality of bread [5], [6]. Consumption of pumpkin is more preferable to cardiovascular patients due to it reduce the risk of degenerative and cardiovascular diseases because it is the source of insoluble dietary fiber [7]. Thus Coelho and Salas-Mellado [8] reported that the adding pumpkin flour in bakery products can lead to differences in sensory acceptability and nutritional values.

The flesh of pumpkin at ripening stages changed from ribbed green color in to bright yellow or green. The pumpkin with yellow orange color has high health promoting roles in

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providing a valuable source of carotenoids and ascorbic acid which have major roles in nutrition as pro-vitamin A and as an antioxidant respectively [9]. Extending the shelf-life of pumpkin after harvesting is the great gaps of pumpkin producer and consumers in Ethiopia; because they have no aerated storing rooms available for fruits, no affordable processing and preservation technology and other environmental factors also influencing its shelf-life. Drying pumpkin constitutes an alternative to the consumption of fresh pumpkin fruits, and allows their use during the off-season. It is one of the methods for preservation by removing water from fresh pumpkin which leads to microbial spoilage and deterioration reactions [10], [11]. In the study area drying of pumpkin is not practiced still now , however; the present study tried to get quality parameter data on dried pumpkin flour and to show the advantages of drying by providing longer shelf-life, improve products quality, smaller space for storage and lighter weight for transportation [12].

Wheat *(Triticum aestivum L.)* is the most important staple food crop around the study area and its flour is used to make breads, cookies, cakes, breakfast snacks, injera and it is also consumed as roasted and boiled without further processing. Wheat flour is used as a base to make breads by blending with locally available vitamins and mineral rich products are getting attention in different socioeconomic groups of many developing countries. This is because of it accelerate rheological properties of dough at the time of processing and developing breads. Wheat bread is the main wheat products in the study area and is consumed as stable food. The replacement of wheat flour with other ingredients as complements or supplements helps the wheat bread consumers to fill the gaps of minerals, vitamins and additional quality of the breads. The replacements of wheat with pumpkin flour breads show differences in chemical, physical and sensory qualities than the control one and with each other. From all the treatments the more preferred and accepted one is the bread with 10% pumpkin blended with 90% wheat flour. Therefore, the study of nutritional and sensory acceptability of the wheat bread enriched with pumpkin give the direction of possibility to incorporate 10% pumpkin flour in developing wheat bread to strengthen breads potential both in consumer acceptance, nutritional terms and as a value added product in study area of South Ethiopia.

2. Materials and Methods

2.1. Sources of Raw Materials

Yellow-greenish fleshed Pumpkin fruits (*Cucurbita maxima L.*) were purchased from Gurage Zone Sodo Woreda Gogiti 3 Kebele near to Kela town in the main asphalt road of Butagira to Addis Ababa. The pumpkin rind, fibrous matter and seeds were removed and the fleshes were cut into small pieces of 2-3 mm thickness by using stainless steel knife. The slices of pumpkin were washed in tape water and sun dried in open air until it brittle by hands. The dried pumpkin slices were grounded by using laboratory level grounder with code RRH-A500-High Speed Multi-function Comminutor and the flour was passed through a mesh sieve size of 710 µm. The flour was then packed in high density poly ethylene (HDPE) bag, labeled and stored in dry places till further use. While, wheat bread flour and ingredients for making of breads were purchased from Worabe town local market which is found in Siltie Zone.

2.2. Formulation of Composite Flours

The formulations of composite flour were done according to the method of Tilman [13] with slight modifications of using the quantities and types of recipes. Four different blend proportions and bread wheat flour as control were made for bread preparation **(Table 2.1)**. Selection of the blend proportions were aimed to analysis the more preferable bread due to its sensory acceptability and required nutrients from proximate composition.

Table 2.1. Blends proportion of wheat and pumpkin flours prepared for making of breads

Composite flour blends (%)	Wheat Pumpkin flour
BP_0 (Control)	100 0
BP_1	95 5
BP_2	90 10
BP_3	85 15
BP_4	80 20

BP - Blend proportion

2.3. Bread Making

Breads were made with wheat bread making technology: mixing of flours and additives, kneading of dough by hands, proofing for 20 min at room temperature (23±2 ℃), dividing, forming, second time proofing at 35±2 ℃ for 35 min, baking in an oven for 17±2 min at 200±10 ℃ temperature. Blending of pumpkin flour to wheat flour in the proportion of 5:95, 10:90, 15:85 and 20:80 and 100% wheat flour as control were used for bread preparation. The baked breads were cooled at room temperature and after the samples for further analyses were randomly selected from three batches.

Table 2.2. Ingredients for formulation of wheat and pumpkin blend breads

Samples	Wheat Flour (g)	Pumpkin Flour (g)	Yeast (g)	Sugar (g)	Salt (g)	Water (ml)
BP_0	500	-	2.6	1.8	1.3	400
BP_1	475	25	2.6	1.8	1.3	400
BP_2	450	50	2.6	1.8	1.3	400
BP_3	425	75	2.6	1.8	1.3	400
BP_4	400	100	2.6	1.8	1.3	400

Source: The formulations of composite flour breads were done according to a formulation and baking practices of consumers located at study area with some modifications.

The recipes used to bread making were presented in **Table 2.2.**

2.4. Determination of Breads Proximate Compositions

The proximate compositions of breads which were determined in the present study are moisture content, ash content, crude protein, crude fat, crude fiber, utilizable carbohydrates and energy. The analyses of proximate composition of samples were determined according to the standard method of AOAC [14].

2.5. Sensory Evaluations of Breads

The sensory quality attributes were determined according to the procedures of Oluyemi [15] and Olaoye [16] with modification of nine point hedonic scale to five points. Breads were evaluated by 30 consumer-oriented sensory panelists from Gurage Zone Woredas (Meskan and Soddo) and from Hadiya Zone (Lemo Woreda) ten from each woredas. The consumer-oriented sensory panelists were oriented for scoring of breads sensory attributes. They were advised not to drink coffee/tea and not to smoke six hours prior to testing. Furthermore, they were instructed to evaluate each sample based on the order: appearance, texture, aroma, taste, and overall acceptability. The samples were presented in identical containers; coded with three digit random numbers. The individual consumer-oriented sensory panelist was used five point hedonic scale with scores: liked very much (5), liked slightly (4), neither liked nor disliked (3), disliked slightly (2) and disliked very much (1) to find out the most suitable (liked) bread. They were provided water to rinse the mouth between evaluation and covered buckets to put the samples after evaluation.

2.6. Statistical Analysis

Data were analyzed by one way analysis of variance (ANOVA) model using the SAS software program, version 9.3.1 for windows. The results were reported as an average value of triplicate analysis (mean ± SD). Differences between treatments were determined by Fisher's Least Significance Difference (LSD) method and statistical significance was set at $p < 0.05$.

3. Results and Discussions

3.1. Proximate Composition of Pumpkin and Wheat Composite Flour Breads

Moisture contents, ash contents, crude protein, crude fat, crude fiber, carbohydrate and energy of breads developed from pumpkin and wheat flour blends are presented in **Table 3.1.**

Table 3.1. Effect of blending ratios on breads proximate composition - dry weight basis (%)

Blend Proportions	Moisture	Ash	Crude Protein	Crude Fiber	Crude Fat	Carbohydrate	Energy (Kcal/100 g)
BP_0	11.25 ± 0.1^a	0.91 ± 0.01^e	6.12 ± 0.10^a	0.21 ± 0.07^d	15.66 ± 0.01^e	65.76 ± 0.94^a	431.82 ± 0.89^e
BP_1	10.63 ± 0.3^b	$0.98\pm.01^d$	5.93 ± 0.03^b	0.23 ± 0.05^d	16.81 ± 0.12^d	65.46 ± 0.51^b	440.85 ± 0.56^d
BP_2	$9.91+\pm0.15^c$	$1.41\pm.02^c$	5.73 ± 0.06^c	0.44 ± 0.01^c	17.72 ± 0.05^c	64.79 ± 0.29^c	442.56 ± 0.85^c
BP_3	9.34 ± 0.1^d	$1.63\pm.01^b$	5.69 ± 0.05^c	0.60 ± 0.03^b	18.56 ± 0.03^b	64.18 ± 0.22^d	447.52 ± 0.35^b
BP_4	9.20 ± 0.16^d	1.73 ± 0.02^a	5.29 ± 0.10^d	0.69 ± 0.04^a	19.23 ± 0.04^a	63.86 ± 0.36^e	451.67 ± 0.2^a

BP_0 (100% wheat flour), BP_1 (95% wheat & 5% pumpkin flour), BP_2 (90% wheat & 10% pumpkin flour), BP_3 (85% wheat & 15% pumpkin flour) & BP_4 (80% wheat & 20% pumpkin flour). Values with the same column with different superscript letters are significantly different with each other ($p < 0.05$) & values are means ± SD.

The moisture content of breads decreased as the proportion of pumpkin increased in the composite flour shown in Table 3.1. The bread made from only wheat recorded high moisture contents than all others blends of pumpkin with wheat at different ratio. This might be due to the lesser moisture content of pumpkin than that of wheat flour at the processing time and cultivars nature. Among the composite flours breads BP_4 recorded value is the lowest moisture content value ($9.20\pm0.16\%$) than others. At lower moisture content the deterioration of baked product would be lowered due to reduced activity of microorganisms. Thus the lower moisture content used to reduce microbial activity and extend shelf-life of bakery products [17].

The ash content of the bread increased when more pumpkin was added in the composite flour and all were significantly different ($p < 0.05$) from each other. The increments of ash in more pumpkin added bread indicates the presence of more minerals in pumpkin flour than wheat and has more advantages to the consumers to fill their daily minerals requirement by using the developed breads of pumpkin and wheat composed. Gopalan [18] reported similar results with the finding of pumpkin added bakery product are richer in minerals than the only wheat products. Pongjanta [19] also reported with increasing the level of pumpkin from 5% to 15% the ash contents were significantly increased in the products.

The crude protein content of breads with pumpkin supplements were significantly ($p < 0.05$) lower than BP_0 (control). Crude protein contents of the breads were reduced with increasing of pumpkin flour proportion in the composite flour. This may be due to more nitrogen loss in pumpkin supplemented bread than wheat at the time of preparing the breads at high temperatures. Pumpkin is more susceptible to elevated temperature than wheat in baked products reported by Singh [20]. Moreover, Okorie [21] reported the decrease of crude protein contents when more pumpkin was added in

the composite flours of breads production. The assessment of protein content of breads showed decrements with increasing of pumpkin flour was similar with the results reported by Gopalan [18].

The fiber contents of bread increased when the incorporation of pumpkin flour increased. An increase in fiber content with incorporation of pumpkin flour was also observed by Noor [22] and recommended that foods prepared from pumpkin flour could have nutritional advantage in terms of vitamins, minerals and dietary fiber. The present findings is in agreement with the findings of Pongjanta [19] who reported that with increasing the level of pumpkin from 5% to 15% the fiber contents were significantly increased in the products. The results imply that the bread obtained from more pumpkin flour could be recommended as the component suitable for food production with high content of dietary fiber.

The fat content of bread increased with more pumpkin incorporated when compared to the control and each others were significantly ($p < 0.05$) different. An increase in crude fat content of blend proportions due to addition of pumpkin was also confirmed by the finding of Oboh [23] who reported fats present in a smaller extent in wheat than in pumpkin. Higher values of fats were recorded than different findings leads the products more preferable by society due to getting more fat from bread enriched with pumpkin flour.

The carbohydrate content of breads from pumpkin and wheat composite flours was lower than only wheat bread. The carbohydrate contents of bread decreased when more pumpkin was added to wheat flour. This may be due to the fact that wheat flour has more starch granules than the pumpkin; which gave more carbohydrate content to the control bread. See *et al.* [24] reported that substitution of pumpkin flour to wheat flour led to a reduction in total carbohydrate content of breads. Although, pumpkins added bread products were with low carbohydrates values than the wheat bread the utilization of pumpkin in the society can get attention and it helps as thickening agent. Moreover, pumpkin is a rich source of β-carotene and can also be utilized in combination with carbohydrates rich cereals products to enrich with other nutritional properties of such products.

The utilizable energy contents of breads were ranged from 431.82±0.89 to 451.67±0.02 Kcal/100 g. The maximum value was recorded in BP_4 and the minimum one in control. An increase in energy level was observed where the proportion of pumpkin flour was increased. The higher energy value of 20% pumpkin incorporated bread is showed direct relation of fat value from the products. Usha *et al.* [25] reported that incorporation of pumpkin flour increased energy, fat, protein, β-carotene, fiber, and antioxidant levels in a weaning mix. The recommended minimum daily requirement of energy for average man in Ethiopia based on FAO [26] was 1820 kilocalories per person per day. The present study breads can cover up to 25% of daily requirement of energy for an average man per day.

3.2. Sensory Evaluation of Wheat and Pumpkin Composite Flour Breads

Appearance, texture, aroma, taste and overall acceptability of the breads analyzed by using a five point hedonic scale are given in **Table 3.2**. The sensory evaluation of breads parameters were identified by comparing the samples with respect to different ratios of wheat and pumpkin flour.

Appearance

The scored values of breads appearance are given in the **Table 3.2**. From the results BP_2 scored the highest (4.30±0.66) and BP_4 scored the lowest (3.59±0.68) values of appearance from five point hedonic scales. Organoleptic evaluation score of appearance were significantly ($p < 0.05$) different to each other except for BP_3 and BP_4. The consumer oriented panelist more preferred the appearance of bread with 10% of pumpkin added than the others. Their control preference is at the middle; thus they prefer it more than the last two breads with pumpkin 15% and 20% added. As the level of pumpkin flour supplementation was increased with more than 15% in the wheat flour the appearance of the bread decreased. The decrease of appearance may be due to bread with more pumpkin subjected to the dark brown in color. This is confirmed by previous report of Mebpa [27] that showed that supplementing bakery products with other than wheat increases the deterioration in appearance as a result of Maillard's reaction. Moreover, the findings were in agreement with the present study due to decreasing of appearance when more pumpkin was added to wheat flour in the developed bread.

Table 3.2. Sensory evaluation of breads prepared from composite flours of wheat pumpkin

Blends	Appearance	Texture	Aroma	Taste	Overall acceptability
BP_0 (control)	$3.79±0.65^{c}$	$3.82±0.68^{c}$	$3.93±0.51^{b}$	$3.89±0.68^{b}$	$3.82±0.63^{b}$
BP_1	$4.05±0.65^{b}$	$4.07±0.61^{b}$	$3.94±0.76^{b}$	$3.91±0.72^{b}$	$4.33±0.61^{a}$
BP_2	$4.30±0.66^{a}$	$4.44±0.64^{a}$	$4.18±0.68^{a}$	$4.33±0.75^{a}$	$4.37±0.68^{a}$
BP_3	$3.77±0.68^{cd}$	$3.42±0.79^{d}$	$3.71±0.61^{c}$	$3.59±0.68^{c}$	$3.59±0.57^{c}$
BP_4	$3.59±0.68^{d}$	$3.42±0.65^{d}$	$3.53±0.49^{c}$	$3.65± 0.73^{c}$	$3.59±0.57^{c}$

BP_0 (100% wheat flour), BP_1 (95% wheat & 5% pumpkin flour), BP_2 (90% wheat & 10% pumpkin flour), BP_3 (85% wheat & 15% pumpkin flour) & BP_4 (80% wheat & 20% pumpkin flour). Values with the same column with different superscript letters are significantly different with each other ($p < 0.05$) & values are means ± SD.

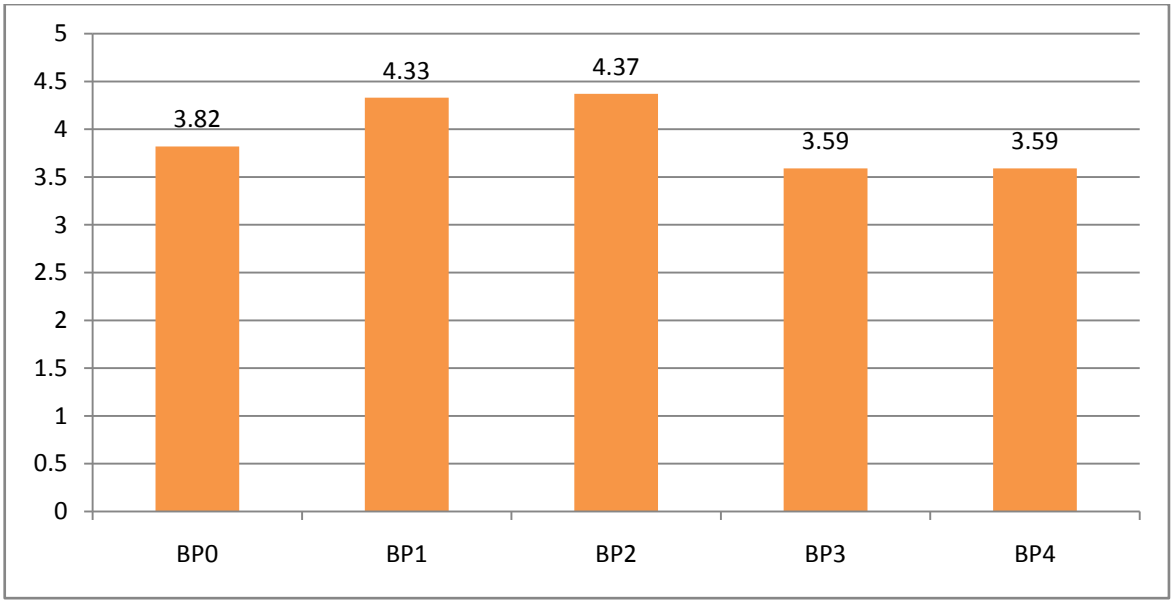

Figure 3.1. Overall acceptability of mean scores of sensory evaluation of pumpkin-wheat bread

Texture

The bread prepared from 90% wheat and 10% pumpkin was found to be having texture value (4.44 ±0.64) which was significantly ($p < 0.05$) higher than others, while the lowest value was recorded for BP_4 (3.42±0.65). The pumpkin flour of 15% and above creates roughness of the surface texture in bread. Kampuse *et al.* [28] from the findings of quality parameters of wheat bread enriched with pumpkin obtained the same result of the present study of texture. The consumer-oriented panelists have accepted breads prepared from all the blend proportion of the composite flours with respect to the texture due to no hard feeling of beating the breads; even the values are different and less with more pumpkin added breads. The least acceptance level of the bread texture with 20% pumpkin incorporated was the same as obtained by Jirappa [29] who stated that the texture values of the product increased with higher incorporation of pumpkin flour along with a corresponding decrease in acceptance of the product.

Aroma

The scored aroma values at BP_2 was more preferable to the consumer-oriented panelist than the others breads proportions. The breads with BP_3 and BP_4 were not significantly different ($p < 0.05$) to each other and addition to that the aroma values of BP_0 and BP_1 are also not significantly different. The results shown in **Table 3.2** indicate that the aroma of breads changed and not like as the others when pumpkin amounts increased to 20%. This may be due to the newly developed product of more pumpkin flour bread aroma is not familiar by consumer-oriented panelists like wheat bread. Sharif [30] also reported aroma of wheat and pumpkin blend bakery shown decreasing when more pumpkin added to the developed bakery agrees the present study finding.

Taste

The highest score value of taste was recorded for 90% wheat flour with 10% pumpkin (4.33±0.75) and the lowest score value (3.65±0.73) for BP_4 (**Table 3.2)**. Consumer-oriented panelist taste score value of BP_2 is significantly different ($p < 0.05$) from all others and more preferred than others; breads in BP_0, BP_1 are not significantly different with each other and preferred after BP_2. The breads with BP_3 and BP_4 are also not significantly different with each other and they are not preferred like control. The taste of bread increased in less pumpkin addition (5% and 10%) but decreased in more pumpkin supplemented (15% and 20%) to the wheat flour. This may be due to the typical flavor component and caramelization of free sugar in more pumpkin flour added bread during baking. Alam [31] were reported similar results of bread taste decreasing as the amount of pumpkin supplementation increase in wheat flour. All the breads were liked moderately by consumer-oriented panelists, even though the variation of taste occurred in different blend ratios.

Overall Acceptability

The overall acceptability of breads analysis regarding the wheat and pumpkin flour composition with different proportion are given in Fig 3.1. Maximum score value of overall acceptability from five point hedonic scale was (4.37±0.68) obtained by blending 90% wheat with 10% pumpkin flour bread; while, minimum score value (3.59±0.57) was scored by 80% wheat and 20% pumpkin composite flour bread (BP_4). Tatjane [32] reported that breads sample with pumpkin additive of 10% up to 25% were tastier and acceptable pumpkin blends breads than the only wheat bread/ control. The present study also agree with this findings that the breads in 5% and 10% pumpkin added were more preferable than the control /wheat bread. The

overall acceptability value of the bread decreased when 15% and above pumpkin flour was added to the wheat flour during bread formation. This may be due to the results of appearance, texture, aroma and taste of the bread with different amounts of pumpkin. The study result is also in agreement with earlier study by El-Demery [33] who reported that addition of 5% and 10% pumpkin pulp flour resulted in bread with higher acceptability in terms of all the quality attributes evaluated. Changing immediately the feeding practice of staple foods of a population in a certain society can influence the overall acceptability of new products. Even if the newly developed food products are more nutritious than the areas stable it takes time to be accepted by consumers. The consumer-oriented panelist of the selected districts liked all the products moderately and above; even they preferred bread with 90% wheat and 10% pumpkin (BP_2) more than the others. See *et al.* [24] from the wheat flour bread supplemented with pumpkin flour had good nutritional value and sensory characteristics were the same findings of the present study.

4. Conclusions

Food Scientists and technologist are exploring to develop and evaluate nutrient rich source but underutilized crops. Pumpkin is one of such nutrient rich and in limited traditional utilization in form of fresh boiling and sauces in study area. The study was attempted to investigate the acceptability proportion and nutritional status of breads of pumpkin incorporated with wheat flour. The pumpkin was processed in to flour and developed breads with blend of wheat flour by incorporating 5, 10, 15 and 20% pumpkin flour and analyzed its proximate and sensory analysis. The nutrient analysis of the breads shows that an increase in incorporation of pumpkin flour increased energy, fat, ash and fiber levels. The moisture, crude protein and carbohydrate contents decreased when more pumpkin added to wheat flour. These properties of the pumpkin blended breads lead to more nutritional advantages than the bread containing only wheat flour. The sensory analysis of the four pumpkin blended and only wheat bread showed different value of overall acceptance. The incorporation of pumpkin flour in wheat to develop breads significantly alter the sensory parameters, there is scope for further incorporation of pumpkin flour. Consumer-oriented panelist preferred the 10% pumpkin substitute at first, 5% pumpkin at second and the control at third level. Breads developed with 10% pumpkin added were more preferable by consumer-oriented panelists than the others and nutritionally scored optimum values to fill the daily requirements of different age groups. In terms of the overall mean score, there was no disliked bread between the two composite flour bread samples. Pumpkin flesh flour can be used as ingredient in bakery products with in wheat as base in varying food formulations. In view of the results of the present study, the use of pumpkin-wheat flour blend in bread formulation appeared to be promising from nutritional quality, acceptability and economical point of view.

REFERENCES

[1] Que F., L. Mao, X. Fang, and T. Wu. (2008). Comparison of hot air drying and freeze-drying on the physicochemical properties and antioxidant activities of pumpkin (*Cucurbita moschata Duch.*) flours. *International Journal of Food Science and Technology*, vol. 43, pp. 1195–1201.

[2] González, E., Montenegro, M. A., & Nazareno, M. A. (2001). Carotenoid composition and vitamin A value of an Argentinian squash (*Cucurbita moschata*). *Archivos Latinoamericanos de Nutrición*, 51(4), 395–399.

[3] Noelia, J.-V., Roberto, M.-J. M., Jesús, de Z.-M. J., & Alberto, G.-I. J. (2011). Physicochemical, technological properties and health-benefits of pumpkin (*Cucurbita moschata Duchense)* vs. Cehualca: A Review. *Food Research International*, 44, 2587–2593.

[4] Stavely, Keith W.F. and Fitzgerald, Kathleen (2004). America's Founding Food: The Story of New England Cooking., N.C.: University of North Carolina Press, ISBN 0-8078-2894-7.

[5] Ptitchkina, N.M., Novokreschonova, L.V., Piskunova, G.V., & Morris E.R. (1998). Large enhancements in loaf volume and organoleptic acceptability of wheat bread by small additions of pumpkin powder. *Journal of Food Hydrocolloids*, 12(3), 333–337.

[6] Nawirska A., Figiel A., Kucharska A.Z., Sokóá-àČtowska A. & Biesiada A. (2009). Drying kinetics and quality parameters of pumpkin slices dehydrated using different methods. *Journal of Food Engineering*, 94(1), 14-12.

[7] Rao A. V., and L. G. Rao (2007). Carotenoids and human health, Pharmacological Research, vol. 55, pp. 207–216.

[8] Coelho, M.S. & Salas-Mellado, M. M. (2015). Effects of substituting chia (*Salvia hispanica L.*) flour or seeds for wheat flour on the quality of the bread. LWT. *Journal of Food Science and Technology*, 60(2), 729–736.

[9] Monteiro, B.A. (2009). Nutritional value of conventional and unconventional parts of fruits and vegetables. Dissertation, Paulista State University.

[10] Que, F., Mao, L., Fang, X. and Wu, T. (2008). Comparison of hot air-drying and freeze-drying on the physicochemical properties and antioxidant activities of pumpkin (*Cucurbita moschata Duch.*) flours. *International Journal of Food Science and Technology* 43: 1195-1201.

[11] Alibas I. (2007). Microwave, air and combined microwave air drying parameters of pumpkin slices. LWT. *Journal of Food Science and Technology*, 40(8), 1445-1451.

[12] Jangam S. V., C. L. Law, and A.S. Mujumdar, (2010). Drying of Foods, Vegetables and Fruits", vol. 1, ISBN: 978-981-086759-1, 2010.

[13] Tilman, J. C, Colm, M. O. B., Denise, M. C., Anja, D. and Elke, K. A. (2003). Influence of gluten free flour mixes and fat powder on the quality of gluten free biscuits. *Journal of European Food Research Technology*, 216: 369 - 376.

[14] Association of Official Analytical Chemists (AOAC) (2000). Official Method of Analysis, 16th (ed). Washington, DC.

[15] Oluyemi, E. A., Akilua, A. A., Adenuya, A. A. and Adebayo, M. B. (2006). Mineral contents of some commonly consumed Nigerian foods. *Journal of Science*, 11: 153 - 157.

[16] Olaoye, O. A., Onilude, A. A. and Oladoye, C. O. (2007). Breadfruit flour in biscuit making: effects on product quality. African Journal of Food Science, 4: 20 - 23.

[17] Ezeama, C. F. (2007). Food microbiology: Fundamentals and applications. Natural Prints Ltd. Lagos.

[18] Gopalan C, Rama Sastri BV & Balasubramanian SC (1991). Nutritive Value of Indian Foods. National Institute of Nutrition (ICMR), Hyderabad.

[19] Pongjanta J, Naulbunrang A, Kawngdang S, Manon T, Thepjaikat T. (2006). Utilization of pumpkin powder in bakery products. *Journal of Science and Technology*, 28(1): 71-9.

[20] Singh, S, Riar, C. S. and Saxena, D. C. (2008). Effect of incorporating roots and sweet potato flour to wheat flour on the quality characteristics of cookies. *African Journal of Food Science*, 2: 065-072.

[21] Okorie, S. U. and Onyeneke, E. N. (2012). Production and quality evaluation of baked cookies from blend of pumpkin and wheat flour. Natural and Applied Sciences, volume 3 No. 2. Imo State University, Owerri, NIGERIA.

[22] Noor Aziah AA, Komathi CA (2009). Physicochemical and Functional Properties of Peeled and Unpeeled Pumpkin Flour. *Journal of Food Science*, 74(7):328-333.

[23] Oboh, G. and Akindahunsi, A. A. (2003). Biochemical changes in cassava products (flour & gari) subjected to saccharomyces cerevisae solid media fermentation. *Journal of Food Chemistry*, 82(4): 599 - 602.

[24] See EF, Wan Nadiah WA, Noor Aziah AA (2007). Physico-Chemical and Sensory Evaluation of Breads Supplemented with Pumpkin Flour. *ASEAN Food Journal*, 14(2): 123-130.

[25] Usha, R., Lakshmi, M. and Ranjani, M. (2010). Nutritional, sensory and physical analysis of pumpkin flour incorporated into weaning mix. *Malaysian Journal of Nutrition*, 16: 379-387.

[26] FAO (2004). The minimum level of dietary energy requirement standards for different sex and age groups. Available at: http://millenniumindicators. un.org/unsd/mdg/ Metadata.aspx (accessed on 19 May 2010).

[27] Mepba, H. D., Eboh, L. and Nwaojigwa, S. U. (2007). Chemical composition, functional and baking properties of wheat-plantain composite flours. *African Journal of Food, Agriculture, Nutrition and Development.* 7(1): 23 - 31.

[28] Kampuse Wongsagonsup, R., 3Kittisuban, P., Yaowalak, A. and Suphantharika, M. (2014). Physical and sensory qualities of composite wheat-pumpkin flour bread with addition of hydrocolloids. *International Food Research Journal*, 22(2): 745-752 (2015).

[29] Jirappa Pongjanta, Angkana Naulbunrang, Siriporn Kawangdang, Tippawan Manon & Thirawat Thepjaikat (2006). Utilisation of pumpkin powder in bakery products. *Songlanakarin Journal of Science and Technology*, 28(1): 71-79.

[30] Sharif, M. K., Butt, M. S., Anjum, F. M. and Nawaz, H. (2009). Preparation of fiber and mineral enriched pumpkin supplemented cookies. *Pakistan Journal of Nutrition*, 8(5): 571 - 577.

[31] Alam, S., Shah, H., Ullah, S., and Riaz, A. (2007). Comparative studies on storage stability of ferrous iron in whole wheat flour and flat bread (naan). *International Journal Food Science and Nutrition*, 58 (1): 54 - 62.

[32] Tatjana Rakcejeva, Ruta Galoburda, Liga Cude, Envija Strautniece (2011). Selection and/or peer-review under responsibility of 11th International Congress on Engineering and Food (ICEF 11) Published by Elsevier B.V. Executive Committee doi:10.1016/j.profoo.2011.09.068.

[33] El-Demery, M. E. (2011). Evaluation of physicochemical properties of breads fortified with pumpkin (*Cucurbita moschata*) flour. The 6th Arab and 3rd International Annual Scientific Conference, Faculty of Specific Education, Mansoura University, Mansoura, Egypt, 1, 13–14.