

Quality Characteristics of Breads Produced from Millet-African Bread Fruit Composite Flours

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Abstract The proximate, mineral and sensory properties of millet-African bread fruit composite flour breads were investigated. The blends of millet and African bread fruit flour (90: 10, 80: 20, 70:30 and 60: 40) were used in the production of composite bread samples with 100% wheat flour bread as control. The bread samples produced were evaluated for proximate, mineral and sensory properties using standard methods. The moisture, crude protein, fat, ash and crude fibre contents of the bread samples increased significantly ($p < 0.05$) with increase in substitution with African bread fruit flour from 8.81-9.31%, 9.79-12.55%, 2.84-3.59%, 3.75-4.16% and 2.99-3.78%, respectively, while the carbohydrate decreased from 71.81- 66.61%. The mineral content of the samples showed that the calcium, phosphorus, potassium, iron and magnesium contents of the bread loaves ranged from 10.30- 13.27mg /100g, 4.53-6.39mg/100g, 5.09-7.57mg/100g, 3.97-6.11mg/100g and 3.82-5.76mg/100g, respectively. The control (100% wheat flour breads) and the composite bread samples made with 60% millet flour and 40% African bread fruit flour had the least and highest values for all the minerals evaluated. The sensory properties of the bread samples also showed that the level of likeness of the sensory attributes: crust colour, taste, crumb colour, flavour, texture and overall acceptability decreased gradually with increased substitution of African bread fruit flour. The study, however, showed that the macro and micronutrient contents and sensory properties of millet-African bread fruit composite breads could be improved by supplementing millet flour with African bread fruit flour at the levels of 10-30%, thus extending the use of non-conventional flours in the production of bread loaves.

Keywords: bread, millet flour, African bread fruit flour, proximate composition, mineral content, sensory properties

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1. Introduction

Millet is an indigenous small seeded cereal that, unlike wheat or rice can be cultivated in semi-arid and subtropical agronomic conditions throughout the world. They are hardy crops which are quite resilient to a variety of agro-climatic adversities, such as, poor soil fertility and limited rainfall. Millets have served as the staple food of the people from lower economic strata and are also considered as food security crop. Millet grains are nutritionally comparable and even superior to major cereals with respect to protein, energy, vitamins and minerals. Besides, they are a rich source of dietary fibre, phytochemicals and micronutrients and hence they are rightly described as "nutri cereals" [1]. Although millets are nutritionally superior to major cereals, their utilization in the production of food products such as breads, biscuits, cakes, doughnuts, sausages and flakes in Nigeria and other developing countries of the world is not wide spread. They are mostly used in the preparation of traditional dishes and hence they play an important role in local food culture [2].

The consumption of bread is increasing throughout the world and is considered as one of the most convenient bakery products in both developed and developing countries. An excellent way to increase the nutritional value of wheat-based foods is through the use of composite flour. The use of composite flours in bread making is also a recent development across the globe owing to some health, economic and social reasons as well as increased demand for nutritious bread. Breads incorporated with millet flour had low glycemic indices and were acceptable and nutritious [3,4]. One possible way of extending the utilization of millets could be by blending them with African bread fruit flour after suitable processing. African bread fruit (*Treculia africana*) is an important food crop in Nigeria. Bread fruit is a species of flowering tree which belongs to the mulberry family known as *Moraceae*. It grows throughout the Southeast Asia, Pacific Ocean Islands and also in tropical countries such as Malaysia and Nigeria. Its name is derived from the texture of the cooked fruit, which has a potato-like flavour that is similar to fresh-baked bread. Some varieties have been studied and are appreciated for their nutritional potentials because they are rich in carbohydrates, fats,

proteins, vitamins and minerals [5]. The amino acid profile of African bread fruit is characterized by low concentration of sulphur containing amino acids such as methionine, tryptophan and cystine but is rich in lysine, arginine and histidine [6]. The seeds of African bread fruit can be processed into flour which can be also used as soup thickener or in the preparation of pastries, cookies, biscuits, breads and other confectionery products. African bread fruit (*Treculia africana*) flour has a good potential for use as a functional ingredient agent in bakery and confectionery products because of its high water absorption capacity, solubility index, foam capacity, bulk density and rapid viscosity characteristics [7,8]. This shows that the flour is rich in protein and fat and can improve the pasting characteristics and also serve as a protein supplement.

Bread is one of the most widely consumed baked products in the world and bread making technology is probably one of the oldest technologies known [9]. Bread may be described as a fermented confectionary product produced mainly from wheat flour, water, yeast and salt by a series of process involving mixing, kneading, proofing, shaping and baking [10]. African bread fruit flour can be used in composite with other flours in the preparation of baked products [11]. Composite flour is a mixture of different flours from cereals, nuts, oil seeds, legumes, root and tuber crops and fruits that is created to satisfy specific functional characteristics and nutrient composition. It refers to the process of mixing wheat flour with cereal and legume flours for the production of baked products like breads, biscuits, cookies, doughnuts, sausages and cakes. The use of non-conventional flours, such as, millet and African bread fruit flours in bread making could not only be an avenue for the utilization of these rarely used nutrient dense food ingredients but will also help to enhance the nutritional value of the products. The study was therefore, undertaken to develop and evaluate the proximate, mineral and sensory properties of breads produced from millet -African bread fruit composite flours.

2. Materials and Methods

The pearl millet (*Pennisetum americanum*) and African bread fruit (*Treculia africana*) used for the study were purchased from Abakpa Market, Enugu, Enugu State, Nigeria. Commercial wheat flour and other ingredients (fat, sugar (sucrose), milk, salt and yeast) used for the production of bread were also purchased from the same market.

2.1. Preparation of Malted Millet Flour

The malted millet flour was prepared according to the method of Elemo *et al.* [12]. One kilogramme (1kg) of millet grains were sorted to move dirt and other extraneous materials. The grains were thoroughly cleaned and steeped in 3.5 litres of potable water in a plastic bowl at room temperature ($29\pm 2^\circ\text{C}$) for 24 h with a change of water at every 8 h to prevent fermentation. The steeped grains were drained, rinsed and immersed in 2% sodium hypochlorite solution for 10min to sterilize the grains. The grains were rinsed for five consecutive times with excess

water and cast on a damped jute bag, covered with a polyethylene bag and left for 24 h to fasten sprouting. The grains were carefully spread on the jute bag and allowed to germinate in the germinating chamber at ambient temperature ($29\pm 2^\circ\text{C}$) and relative humidity of 95% for 120 h. During this period, the grains were sprinkled with water at intervals of 10 h to facilitate germination. Non-germinated grains were handpicked and discarded. The germinated grains were spread on the trays and dried in a cabinet dryer (Model HR 6200, UK) at 60°C for 20 h with occasional stirring of the grains at intervals of 30 min to ensure uniform drying. The dried malted grains were cleaned, rubbed in-between palms and winnowed to remove the roots and the sprouts. The millet malts were milled in a hammer mill and sieved through a 400 micron mesh sieve. The flour produced was packaged in a lidded plastic container, labeled and kept in a freezer until needed for further use.

2.2. Preparation of Malted African Bread Fruit Flour

The malted African bread flour was prepared according to the method of Makinde and Ladipo [13] with slight modifications. One kilogramme (1kg) of African bread fruit seeds were sorted to remove the dirt, stones and other extraneous materials. The sorted seeds were thoroughly cleaned and steeped in 3.5 litres of potable water in a plastic bowl at room temperature ($29\pm 2^\circ\text{C}$) for 24 h with a change of water at every 6 h to prevent fermentation. The steeped seeds were drained, rinsed and immersed in 2% sodium hypochlorite solution for 10 min to sterilize the seeds. The seeds were rinsed for five consecutive times with excess water and cast on a damped jute bag, covered with a polyethylene bag and left for 24 h to fasten sprouting. The seeds were carefully spread on the jute bag and allowed to germinate in the germinating chamber at ambient temperature ($29\pm 2^\circ\text{C}$) and relative humidity of 95% for 120 h. During this period, the seeds were sprinkled with water at intervals of 12 h to facilitate germination. Non-germinated seeds were handpicked and discarded. The germinated seeds were spread on the trays and dried in a cabinet dryer (Model HR 6200, UK) at 60°C for 16 h with occasional stirring of the seeds at intervals of 30 min to ensure uniform drying. The dried malted African bread fruit seeds were cleaned, rubbed in-between palms and winnowed to remove the roots and the sprouts along with the hulls. The dehulled malted seeds were milled in a hammer mill and sieved through a 400 micron mesh sieve. The flour produced was packaged in a sealed plastic container, labeled and kept in a freezer until needed for further use.

2.3. Formulation of Flour Blends

Millet flour (MF) was mixed together with African bread fruit flour (ABFF) at varying graded proportions of A - 100:0, B - 90:10, C - 80:20, D - 70:30 and E - 60:40 in a Kenwood mixer (Mini-Processor, Model E80 CD, Kenwood Ltd Havant, Hampshire, UK) to produce composite flours. The composite flours produced were separately packaged in lidded plastic containers, labeled and stored in a freezer until needed for further use.

2.4. Preparation of Bread Loaves

The bread samples were prepared according to the straight dough development method of See *et al.* [14]. The recipe used for the preparation of the breads contained 100% flour, 60% fat, 40% sugar (sucrose), 15% dried yeast, 5% salt and 150mL distilled water. During preparation, all the ingredients with the exception of the yeast were thoroughly mixed together in a heavy-duty dough mixer (Kitchen Aid-KSM 900, USA) to form hard consistent dough. Thereafter, the yeast was activated by putting 15g of yeast in a lidded plastic container containing 25mL of warm distilled water, 20g of sugar and 10g of flour and allowed to rest at room temperature ($29\pm 2^\circ\text{C}$) for 20 min to form the yeast-in-water dispersion. The dough produced was transferred into a plastic bowl and pierced quietly at the centre. The yeast-in-water dispersion was poured into the pierced hole and the dough containing the yeast-in-water dispersion was repeatedly kneaded manually for 10 min to introduce oxygen for vigorous fermentation and to encourage the development of gluten.

The kneaded dough was carefully divided and moulded manually into uniform shapes of similar sizes. The moulded doughs were placed separately into baking pans smeared with vegetable oil and covered with greased bread wrapper. The bread doughs were allowed to ferment at room temperature ($29\pm 2^\circ\text{C}$) for 1 h. The fermented doughs were proofed at 40°C in a cabinet proofer for 90 min and baked in an electric oven (Salva, USA) at 220°C for 40 min. The loaves were removed from the oven, taken out of the baking pans and allowed to cool at ambient temperature for 1 h. The cooled bread loaves were divided into two (2) lots. The first lot was wrapped with aluminum foils and used for sensory evaluation after 2 h. The second lot was packaged in low-density polyethylene bags and stored in a refrigerator until needed for analysis. The bread loaves produced from 100% wheat flour were used as control.

2.5. Proximate Analysis

The moisture, crude protein, fat, ash and crude fibre contents of the bread samples were determined in triplicate according to standard analytical methods [15]. Moisture was determined by drying 5g of the milled bread samples in an air oven at 105°C for 4 h. Protein content (%N x 6.25) was determined by the Kjeldahl method. Fat was determined by Soxhlet extraction method with petroleum ether at 50°C . The ash content was determined gravimetrically after incineration in a muffle furnace at 500°C for 24 h. Crude fibre was determined by difference after the incineration of the ash-less filter paper containing the insoluble materials from the hydrolysis and washing of moisture-free defatted sample (1g). Carbohydrate content was calculated by difference on dry sample weight by subtracting the summation of the percentage moisture, protein, fat, crude fibre and ash contents from 100%.

2.6. Mineral Analysis

The minerals were extracted by dry-ashing of the samples at 500°C to constant weight followed by the

dissolution of the ash in volumetric flask by the addition of 50mL of de-ionised water and a few drops of concentrated hydrochloric acid. The calcium, phosphorus, potassium, iron and magnesium contents of the samples were determined by the use of the atomic absorption spectrophotometer (Pertin-Elmer, 2380, Germany) according to the standard methods of AOAC (2006). All determinations were carried out in triplicates.

2.7. Sensory Evaluation

The wheat and composite flour bread loaves produced were cooled for 2 h at room temperature ($29\pm 2^\circ\text{C}$) after baking. The loaves were then cut separately into small slices using a bread knife. Twenty (20) semi-trained consumer taste panelists comprising of staff and students of the Department of Food Science and Technology, Enugu State University of Science and Technology, Enugu, Nigeria were selected and used for the sensory test. The samples were evaluated for the attributes of crust colour, taste, flavour, texture, crumb colour and overall acceptability using a nine-point Hedonic scale with 1 and 9 representing dislike extremely and like extremely, respectively [16]. The sensory evaluation was performed in the Food Research Laboratory of the Department of Food Science and Technology, Enugu State University of Science and Technology, Enugu, Nigeria. The panelists were arranged in such a way that they could not influence the scoring of each other. The samples were randomly coded and presented in plain coloured plastic plates and each panelist was provided with a glass of potable water to rinse his/her mouth after testing each sample to avoid residual effect. The panelists were instructed to evaluate and score the bread samples based on their degree of preference and acceptance of each of them.

2.8. Statistical Analysis

The data generated in this study were subjected to one-way analysis of variance (ANOVA) using Statistical Package for Social Sciences (SPSS, version 16.0) software. Means were separated using Turkey's Least Significance Difference (LSD) test at $p < 0.05$ and the results were expressed as mean \pm standard deviation of triplicate determinations.

3. Results and Discussion

3.1. Proximate Composition of Millet-African Bread Fruit Bread Samples

The proximate composition of the bread samples are shown in Table 1. The moisture content increased significantly ($p < 0.05$) with increase in the level of African bread fruit flour in the products. This might be attributed to the higher water absorption capacities of millet-African bread fruit composite flours compared to the wheat flour which is in agreement with the report of Giami *et al.* [11]. High moisture content in foods has been shown to encourage microbial growth. The low residual moisture in a food product is advantageous in that

microbial proliferation is reduced and shelf life extended [17]. The protein content of the 100% wheat flour bread (control) was the least, while the breads made with millet-African bread fruit composite flours had higher protein contents. The increase in protein content of composite flour breads could be due to relatively higher protein content of individual flour components namely malted millet and sprouted African bread fruit that were incorporated in composite flour formulation. Protein plays a significant role in building and maintenance of body cells and tissues [18]. The fat content of the wheat flour bread was 2.84% and that of the composite flour breads ranged from 3.07 – 3.59%. The difference in numerical values of the fat content of composite flour breads were statistically significant ($p < 0.05$) when compared to the control sample. It was observed from the result that the increase in fat content of the composite flour breads was due to the incorporation of high proportion of African bread fruit flour which has high fat content compared to the millet flour. Fat is important in the diets of young children and adults as it provides essential fatty acids and facilitates the absorption of fat soluble vitamins [19]. The ash content of the wheat flour bread which was found to be 3.75% was observed to increase significantly ($p < 0.05$) in composite flour breads from 3.99 to 4.16%. The values obtained in the study were higher than the ash content (2.12 – 3.02%) of wheat-soybean-mango kernel composite flour breads reported by Menon *et al.* [20]. The crude fibre content of the standard wheat bread was 2.99% and that of the millet-African bread fruit composite breads varied between 3.05 and 3.78% for samples with 10 and 40% African bread fruit flour substitution, respectively. The increase in crude fibre content could be due to the incorporation of high amount of African bread fruit flour. Fibre helps in the promotion of excretion of bile acids, fats and sterols which have been implicated in the etiology of certain diseases in man [21]. The carbohydrate content of the samples was found to decrease significantly ($p < 0.05$) in the composite flour breads compared to the standard wheat flour bread. The carbohydrate content of the wheat bread was 71.81% and that of the composite flour breads ranged from 70.37 to 66.61%. Thus, it can be probably stated that the carbohydrate content was significantly ($p < 0.05$) lower in composite flour breads due to the presence of African bread fruit flour, since African bread fruit has been reported to be a poor source of carbohydrate [8]. The substitution of millet flour with African bread fruit flour in bread making greatly improved the protein, fat, ash and crude fibre contents of composite flour bread loaves.

3.2. Mineral Composition of Millet-African Bread Fruit Composite Bread Samples

The mineral composition of the bread samples are shown in Table 2. The calcium, phosphorus, potassium, iron and magnesium contents of the millet-African bread fruit composite flour breads increased with increased level of supplementation of African bread fruit flour compared to the standard wheat bread. This increase in the mineral contents of the composite flour bread loaves confirms the beneficial effect of supplementation [21]. The calcium content of the bread samples ranged from 10.30 to 13.27mg/100g. The control sample (100% wheat bread) had the least value (10.30mg/100g), while the millet bread substituted with 40% African bread fruit flour had the highest calcium content (13.27mg/100g). The increase in calcium content observed in all the samples of the millet-African bread fruit composite flour bread could be due to substitution effect caused by the high level of calcium in African bread fruit flour as reported by Ojokoh *et al.* [5]. The phosphorus content of the bread loaves varied from 4.53 to 6.39mg/100g with the control and the millet bread supplemented with 40% African bread fruit flour having the least (4.53mg/100g) and highest (6.39mg/100g) values, respectively. The increase in the phosphorus content of the samples is an indication that African bread fruit is a good source of phosphorus [22]. The potassium content of the bread samples which ranged from 5.09 to 7.57mg/100g increased significantly ($p < 0.05$) as the proportion of the African bread fruit flour increased. This showed that African bread fruit has high potassium content. The iron content of the samples increased significantly ($p < 0.05$) from 3.97mg/100g in the control sample (100% wheat bread) to 6.11mg/100g in the millet bread substituted with 40% African bread fruit flour. The values obtained in the study (3.97-6.11mg/100g) were higher than the iron content (3.22-5.64mg/100g) of wheat-African bread fruit composite flour cookies reported by Okoye and Obi [8]. The magnesium content of the samples varied significantly ($p < 0.05$) from each other. The millet bread substituted with 40% African bread fruit flour had the highest magnesium content (5.76mg/100g), while the control sample had the least value (3.82mg/100g). The observed increase in the magnesium content of millet-African bread fruit composite breads could be attributed to substitution effect caused by the high content of magnesium in African bread fruit flour as reported by Osabor *et al.* [23]. Minerals are vital to the proper functioning of the nervous system, other cellular processes, water balance and structural systems such as skeleton and muscles. They also play critical role in cell division, protein synthesis, bone formation and blood clotting [18].

Table 1. Proximate composition (%) of millet- African bread fruit composite breads

Sample ID	% Substitution WF: MF:ABFF	Moisture	Protein (N x 6.25)	Fat	Ash	Crude Fibre	Carbohydrate
A	100 : 0 : 0	8.81 ^d ±0.21	9.79 ^e ±0.09	2.84 ^e ±0.16	3.75 ^e ±0.09	2.99 ^e ±0.04	71.81 ^a ±0.64
B	0 : 90 : 10	8.82 ^d ±0.21	10.70 ^d ±0.07	3.07 ^d ±0.07	3.99 ^d ±0.09	3.05 ^d ±0.05	70.37 ^b ±0.67
C	0 : 80 : 20	9.05 ^c ±0.23	11.04 ^c ±0.11	3.19 ^c ±0.03	4.05 ^c ±0.04	3.29 ^c ±0.07	69.38 ^c ±0.22
D	0 : 70 : 30	9.26 ^b ±0.22	11.59 ^b ±0.32	3.38 ^b ±0.05	4.11 ^b ±0.01	3.49 ^b ±0.04	68.17 ^d ±0.39
E	0 : 60 : 40	9.31 ^a ±0.19	12.55 ^a ±0.18	3.59 ^a ±0.04	4.16 ^a ±0.02	3.78 ^a ±0.08	66.61 ^e ±0.24

Values are mean ± standard deviation of triplicate determinations. Means in the same column with different superscripts are significantly different ($p < 0.05$). WF - Wheat Flour, MF – Malted millet flour, ABFF – Malted African bread fruit flour

Table 2. Mineral composition (mg/100g) of millet-African bread fruit composite breads

Sample ID	% Substitution WF: MF:ABFF	Calcium	Phosphorus	Potassium	Iron	Magnesium
A	100 : 0 : 0	10.30 ^e ±0.02	4.53 ^e ±0.01	5.09 ^e ±0.10	3.97 ^e ±0.07	3.82 ^e ±0.05
B	0 : 90 : 10	11.76 ^d ±0.28	5.04 ^d ±0.11	5.82 ^d ±0.16	4.85 ^d ±0.01	4.04 ^d ±0.11
C	0 : 80 : 20	12.17 ^c ±0.07	5.43 ^c ±0.15	6.43 ^c ±0.08	5.15 ^c ±0.06	4.72 ^c ±0.05
D	0 : 70 : 30	12.75 ^b ±0.15	5.99 ^b ±0.18	7.09 ^b ±0.18	5.61 ^b ±0.17	5.13 ^b ±0.04
E	0 : 60 : 40	13.27 ^a ±0.21	6.39 ^a ±0.09	7.57 ^a ±0.12	6.11 ^a ±0.18	5.76 ^a ±0.14

Values are mean ± standard deviation of triplicate determinations. Means in the same column with different superscripts are significantly different ($p < 0.05$). WF - Wheat Flour, MF - Malted millet flour, ABFF - Malted African bread fruit flour.

Table 3. Sensory properties of millet-African bread fruit composite breads

Sample ID	% Substitution WF: MF:ABFF	Crust Colour	Taste	Crumb Colour	Flavour	Texture	Overall Acceptability
A	100 : 0 : 0	8.60 ^a ±0.41	8.73 ^a ±0.59	7.62 ^a ±0.56	8.88 ^a ±0.21	7.32 ^a ±0.17	7.93 ^a ±0.22
B	0 : 90 : 10	8.53 ^b ±0.63	8.66 ^b ±0.81	7.48 ^b ±0.62	8.53 ^b ±0.63	7.22 ^b ±0.13	7.53 ^b ±0.60
C	0 : 80 : 20	8.46 ^c ±0.76	8.53 ^c ±0.63	7.36 ^c ±0.70	8.40 ^c ±0.73	6.64 ^c ±0.14	7.46 ^c ±0.63
D	0 : 70 : 30	8.26 ^d ±0.88	8.33 ^d ±0.72	7.18 ^d ±0.73	8.12 ^d ±0.76	6.40 ^d ±0.12	7.18 ^d ±0.73
E	0 : 60 : 40	7.93 ^e ±1.43	7.68 ^e ±0.89	6.88 ^e ±0.79	7.66 ^e ±0.10	6.24 ^e ±0.11	6.80 ^e ±0.79

Values are mean ± standard deviation of twenty (20) semi-trained panelists. Means in the same column with different superscripts are significantly different ($p < 0.05$). WF - Wheat Flour, MF - Malted millet flour, ABFF - Malted African bread fruit flour

3.3. Sensory Properties of Millet-African Bread Fruit Composite Bread Samples

The sensory scores of the bread samples are shown in Table 3. There were significant differences between the control (100% wheat bread) and millet-African bread fruit composite flour breads in crust colour, taste, crumb colour, flavour, texture and overall acceptability. Overall acceptability was determined on the basis of the scores obtained after the evaluation of taste, texture, flavour, crust and crumb colour. It was observed from the result that 100% wheat bread was the most acceptable to the judges followed by millet-African bread fruit composite breads with 10, 20, 30 and 40% levels of African bread fruit flour substitution, respectively. This could be attributed to the unique quality of wheat flour in the production of bread. The colour of the bread was strongly affected by the addition of African bread fruit flour. The change in colour occurred from light-brown (control) to darker-brown (millet bread substituted with 40% African bread fruit flour). This condition may be attributed to Maillard browning caused by the reaction between the amino acids of the proteins and the added sugar [14] and caramelization which are influenced by the distribution of water and the reaction of added sugars and amino acids [24,25]. According to Gallagher *et al.* [26], Maillard browning reaction, is related to temperature, time and the presence of water (moisture). Colour appeared to be a very important criterion for the initial acceptability of baked product by the consumer. Moreover, as the development of colour occurs classically during the later stages of baking, it can be used to determine the completion of baking process. Surface colour depends on both the physico-chemical properties of the raw dough (i.e. moisture content, pH, reducing sugars and amino acid content) and the operating conditions applied during baking (i.e. temperature, air speed, relative humidity and modes of heat transfer) [27]. The use of millet-African

breadfruit flour blends in the production of bread generally produced good and appreciable results.

4. Conclusion

The study showed that it is feasible to produce breads with high nutrient density and good sensory characteristics from composite flours of millet and African bread fruit. Even though, the 100% wheat flour bread (control) was organoleptically more acceptable, the composite flour bread samples were more nutritious. The substitution of millet flour with African bread fruit flour greatly enhanced the protein, fat, ash, crude fibre and mineral contents of the composite bread samples compared to the control. With the present cost of wheat, it is better to seriously explore the possibility of using millet-African bread fruit composite flours for commercial production of bread. This will reduce the cost of production and as well create a novel use for millet and African bread fruit.

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