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Research Article

Nutritional Enhancement of Bread Produced from Wheat, Banana, and Carrot Composite Flour

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The physicochemical and sensory evaluation of the bread produced from the composite flours of wheat, carrot, and banana was determined. Five bread samples were produced from the proportion of wheat/carrot/banana composite flours in the ratio 90% : 5% : 5% (blending ratio one), 80% : 10% : 10% (blending ratio two), 70% : 15% : 15% (blending ratio three), and 60% : 20% : 20% (blending ratio four), and 100% wheat was the control sample. The proximate composition of moisture, ash, crude fat, crude fiber, and beta-carotene contents of the composite bread increased significantly. The values of moisture%, ash%, crude fiber%, crude fat %, and β-carotene μg/100 g ranged from 29.92 ± 0.01–33.23 ± 0.0158, 0.67 ± 0.03–1.66 ± 0.01, 1.99 ± 0.01–6.47 ± 0.01, 1.127 ± 0.01–3.2 ± 0.01, and 0.13 ± 0.01–73.51 ± 0.01, respectively. The values of crude protein%, carbohydrate%, and caloric value (kcal) ranged from 10.02 ± 0.01–8.01 ± 0.01 and carbohydrate ranged from $47.42 \pm 0.03 - 56.27 \pm 0.01$, $47.42 \pm 0.03 - 56.27 \pm 0.01$, and 275.30 ± 0.06–250.55 ± 0.07, respectively. The mean of sensory scores varied with the increased addition of carrot and banana flours to the wheat flour. There was no significant difference in the overall acceptability of the bread for all the samples, except the control. The mean of sensory scores, however, showed that consumers preferred the bread from blending ratio four (60% : 20% : 20%) but bread from the composite flours of substitution for both carrot and banana flours was well accepted. The general objective of this project is to enhance the nutritional value of bread by adding carrot and banana flour to wheat flour. The study has shown that bread of acceptable quality can be produced from composite flour of wheat, carrot, and banana, which would increase nutrition and prevent malnutrition.

1. Introduction

Bread is a common food produced from the dough of flour and water, usually by baking. It is popular around the world and is one of the oldest artificial foods [1]. Nutritionally, bread is known as an ample source for the grain's category of nutrition. Also, bread is considered a good source of carbohydrates through whole grains, nutrients such as magnesium, iron, selenium, vitamins, and dietary fiber [2]. In developing countries including Ethiopia, where bread constitutes a significant portion of daily snacks and there is heavy dependence on imported wheat for bread production, the cost of imported wheat is, for these countries, prohibitive, hence the locally sourced composite substrate to complement wheat is imperative [3]. The composite flour was conceived primarily to develop bakery products from locally available raw materials, particularly in those countries which could not meet their wheat requirements. Composite flour technology refers to the process of mixing various flours with local raw materials to produce high-quality food products in an economical way [3].

Wheat is an important source of carbohydrates. It is a major source of vegetable protein in the human diet, with a protein content of about 13%, which is relatively high compared to other major cereals but relatively low in protein quality for supplying essential amino acids [4]. Wheat, eaten as a whole grain, is a source of many nutrients and fiber. Glutenin and gliadin are functional proteins found in wheat bread that contribute to the structure of the bread. Wheat does not contain adequate amounts of vitamin A precursors as well as minerals [5].

Carrots are root vegetables and are usually orange, but there are purple, black, red, white, and yellow varieties. Carrot is a domesticated form of the wild carrot, *Daucus carota*, native to Europe and Southwest Asia. Carrot is one of the important root vegetables rich in bioactive compounds like carotenoid and dietary fibers with appreciable levels of several other functional components having significant health-promoting properties. Consumption of carrots and their products is steadily increasing as they are recognized as an important source of natural antioxidants with anticancer properties. Carrot dietary fiber comprises mostly cellulose, with smaller proportions of hemicelluloses, lignin, and starch. Free sugars in carrot include sucrose, glucose, and fructose [6]. Carrots are an excellent source of antioxidant compounds, and the richest vegetable source of the provitamin A.

Bananas (*Musa* spp.) are a rich source of energy, with carbohydrates accounting for 22–32% of the weight of the fruit. Bananas are rich in vitamins A, B6, and C and minerals, especially potassium, magnesium, phosphorus, and folic acid. Bananas are an important staple food for millions of people in developing countries. The banana mostly exposed to post-harvest loss due to the perishable nature of it. Banana flour can be prepared for a number of food applications. According to Kumari et al. [7], banana flour is used for the nutritional evaluation of indigenously developed weaning food with malted sorghum and soybean flour. The effect of banana flour on the composition and shelf life of concentrated whey-incorporated bread was investigated by Arya et al. [8]. The author summarizes that 40% banana flour and 98.78 mL concentrated whey-added bread sample score highest in most of the attributes. The effect of bread fortification with whole green banana flour on its physicochemical, nutritional, and in vitro digestibility was successfully studied by digestibility [9]. The authors concluded that it can be the use of whole green banana flour, which is used in substitution of wheat flour for up to 30%, which significantly increased the total dietary fiber, ash, and mineral content in bread. Quality evaluation of composite bread produced from wheat, defatted soy, and banana flours was investigated by Dooshima [10]. According to the authors' justification, supplementation of up to 20% defatted soy flour and banana flour was well accepted; therefore, nutritious and acceptable bread can be produced by preparation of banana flour from unripe flour, which is also reported by some researchers [11]. Therefore, it has the possibility to use banana flour for bread production.

The incorporation of carrot and banana flours in wheat flour for the production of bread would increase both the micro and macronutrient contents of the bread, diversify the use of the crops, and inspire farmers to produce local crops which would increase their economic power. The blending of wheat, carrot, and banana flour is based on the previous work. Quality evaluation of composite bread produced from wheat, defatted soy, and banana flours which was studied by Dooshima [10] was used as a reference for this work. Adding value to those crops reduces the dependence on imported wheat flour and saves foreign exchange for Ethiopia. Composite flour is considered advantageous in developing countries as it reduces the importation of wheat flour and encourages the use of locally grown crops as flour [12]. Confectioneries' market increases from time to time. Since substitution of wheat with local raw materials is better to increase the availability of bread. Apart from being readily available and cheap, both banana and carrot are chosen for their high nutrients that are complementary to each other. The aim of this research is therefore to produce bread from composite flours of wheat, banana, and carrot flours and to determine the physicochemical as well as the sensory properties of the bread.

2. Materials and Methods

2.1. Materials and Sample Collection. The raw materials such as wheat flour, carrot, banana, salt, sugar, oil, and bakery yeast were purchased from local market and transported to Bahir Dar Institute of Technology Food Engineering laboratory. After the collection of raw material, preparation of raw material for bread preparation was started. Equipment such as blender, mixer, kneader, bowl, knife, digital weighing scale, measuring cylinder, boiler, baking pans, furnace, Soxhlet, Kjeldahl, and oven was obtained in the food processing laboratory of Bahir Dar University. All other chemicals used were of analytical chemistry laboratory.

2.2. Experimental Design. The experiment was designed using one-way factorial experiments design with four levels of the blending ratio coded as blending ratio one (B1), blending ratio two (B2), blending ratio three (B3), and blending ratio four (B4). The blending contains different proportion of wheat, carrot, and banana flour. Finally, each experiment was done in triplication. Experimental design and ingredient formulation were listed in Tables 1 and 2, respectively.

2.3. Sample Preparation

2.3.1. Carrot Flour Preparation. After harvesting carrot, it was washed in portable water. The cleaned carrot was peeled and sliced into 56 mm thickness. The sliced carrots were blanched for 3 minutes in hot water (95°C) to prevent browning and discoloration. The blanched carrots were immediately cooled by exposing to air and dried in oven drier at 50°C for 12 hours. The dried carrot was grounded to fine powder and sieved with a 700 μm sieve. Finally, it was packaged in a bag for further use.

2.3.2. Banana Flour Preparation. Banana fruit was purchased from Bahir Dar market and transported into the laboratory. The fruit was washed with clean water to remove unwanted impurity. The banana was peeled with the aid of knife and the pulp was cut into uniform size. The banana was soaked in hot water (95°C for 5 minutes) to prevent browning and discoloration and was dried in the oven at the

Table 1: Formulation of flour blends of wheat, banana, and carrot in dry weight for bread production.

Treatment	Carrot flour (%)	Banana flour (%)	Wheat flour (%)
C	0	0	100
B1	5	5	90
B2	10	10	80
B3	15	15	70
B4	20	20	60

Note. 100% wheat (C), 90% wheat, 5% carrot, 5% banana (B1), 80% wheat, 10% carrot, 10% banana (B2), 70% wheat, 15% carrot, 15% banana (B3) and 60% wheat, 20% carrot, and 20% banana (B4).

temperature of 60°C for 24 hour (Kumari et al. [7]; Digestibility [9]. The dried sample was milled and sieved with a 700 μm sieve and finally banana flour was packed.

2.4. Bread Making Process. The principles of bread making have been established for thousands of years. The basic ingredients are flour, yeast, salt and water. All bread making processes rely on four key steps but bread making requires different steps inside the main step. The use of good quality ingredients is crucial for making good quality bread. All ingredients including dry yeast, salt, sugar, fat, and water collected for bread production process. The amount needed for all those recipes is shown in Table 2. All of the ingredients were measured in standard measuring scale and mixed. The flours and ingredients involved were hydrated and blended for dough development. The mixed dough was subjected to fermentation for 20 minutes at room temperature to obtain light aerated porous structure of fermented product. Fermentation was achieved by yeast beaker yeast (*Saccharomyces cerevisiae).* The yeast contained in the dough breaks down the sugar into carbon dioxide and ethanol. The gases produced during fermentation cause the dough to make foam.

The dough pieces were placed in the baking pans. Panning was carried out so that the seam of the dough was placed on the bottom of the pan. Proof refers to the rest time of the dough during fermentation. The dough was proofed in baking pan for desired dough height. It was carried out for 1 hour. During proofing, the dough was increased in volume. After proofing, the dough was subjected to heat in a baking oven. Baking was done at a temperature of 180°C for 30 minutes.

2.5. Data Collection

2.5.1. Proximate Chemical Analysis. Proximate analysis was carried out on the bread and flour to determine the moisture, ash, crude fiber, fat, protein, and carbohydrate content.

(1) Moisture Content. The moisture content was determined by hot air oven method as described by [13]. A 2 g of sample was transferred into the weighed crucible. This was taken into the hot air oven and dried for 24 hours at 103°C. The crucible and its contents were cooled in the desiccators and their weights were taken. Finally, the percentage moisture content is calculated as follows:

Table 2: Ingredient formulation to produce wheat, banana, and carrot-based breads.

Ingredients	Compositions
Flour (g)	57
Yeast (g)	1
Sugar (g)	2
Salt (g)	1.5
Fat (g)	2
Water (mL)	55

$$\%\,\text{moisture content} = \left(\frac{\text{W1} - \text{W2}}{\text{W1} - \text{W}}\right)100. \quad (1)$$

Note: mass of empty dish (W), mass of dish + sample before drying (W_1), and mass of dish + sample after drying (W_2)

(2) Ash Content. Ash content was determined using the method of [13]. About 5 g of each sample was weighed into crucibles, and then the sample was incinerated in a muffle furnace at 550°C until a light grey ash was observed and a constant weight obtained. The sample was cooled in the desiccators to avoid absorption of moisture and weighed to obtain ash content. Finally, the percentage of ash is calculated as follows:

$$\%\,\text{ash} = \left(\frac{W2 - W}{W1 - W}\right)100. \quad (2)$$

Note: weight of empty crucible (w), weight of crucible with sample (w_1), and weight of crucible with sample after drying (w_2).

(3) Crude Protein Determination. The micro-Kjeldahl method as described by [13] was used to determine crude protein. A 2 g of sample was added into the digestion flask. One gram of copper sulphate and sodium sulphate (catalyst) in the ratio 1 : 10, respectively, and 5 mL concentrated sulphuric acid were also added to the digestion flask. The flask was positioned into the digestion block in the fume cupboard and heated until frothing ceased giving clear and light blue green coloration. The mixture was then allowed to cool and diluted with 30 mL distilled water and 30 mL of 40% NaoH was added. Distillation apparatus was connected. The released ammonia by boric acid was then treated with 0.01 mL of hydrochloric acid until the green color changed to purple. The percentage of nitrogen in the sample was calculated using the formula as given as follows:

$$\%\,\text{nitrogen (N)} = \left(\frac{VHClxNHClx14}{\text{Sample weight}}\right)100. \quad (3)$$

Note: volume of HCl consumed to the end point of titration (V), normality of HCl used often is about 0.01 N (N), and molecular weight of nitrogen (14)

Conversion of nitrogen percentage into % protein = F^{*} % N, where F in the conversion factor in most cases is 6.25

(4) Crude Fat. The Soxhlet extraction method described by [13] was used in determining fat content of the samples as

shown in Figure 1. About 2 g of the sample was weighed and the weight of the flat bottom flask taken with the extractor mounted on it. The thimble was held far way into the extractor and the weighed sample. Extraction was carried out with a boiling point of 40–60°C. The thimble was plugged with cotton wool. At completion of extraction which lasted for 3 hours, the solvent was removed by evaporation in an oven, and the remaining part in the flask was dried at 70°C. The fat was dried in an oven for 30 minutes and then cooled in desiccators. The mass of the flask was reweighed and the percentage fat is calculated as

$$\% \text{ fat content} = \left(\frac{\text{weight of fat}}{\text{weight of sample}}\right)100, \quad (4)$$

(5) Determination of Crude Fiber. The crude fiber was determined using the method of [13]. A 5 g of sample was weighed into a 500 mL Erlenmeyer flask, and 100 mL of TCA digestion reagent was added. It was boiled and refluxed for 40 minutes after boiling. The flask was removed from the heater, cooled a little, and then filtered through a 15.0 cm number 4 Whitman paper. The residue was washed with hot water and transferred to a porcelain dish. The sample was dried at 105°C. overnight. After drying completed, it was transferred to a desiccator and weighed as W_1. It was then burnt in a muffle furnace at 500°C for 6 hours, allowed to cool, and reweighed as W_2.

$$\% \text{ crude fiber} = \left(\frac{W1 - W2}{\text{weight of sample}}\right)100. \quad (5)$$

Note: crucible weight after drying (W_1) and crucible weight after ash (W_2).

(6) Carbohydrate Analysis by Difference. % CHO = 100 − (% moisture + % ash + % protein + % fat + % crude fiber).

(7) Determination of Total Caloric Value. Caloric value = 4* CHO + 4* protein + 9* fat.

Figure 1: Soxhlet extraction of fat.

Figure 2: β-Carotene determination.

(8) Determination of β-Carotene Content. As shown in Figure 2, β-carotene was determined using the method of [14]. A 5 g of bread crumbs were weighed into a separatory funnel (250 mL) and 2 mL of NaCl solution was added and shaken vigorously, followed by the addition of 10 mL of ethanol and then 20 mL of hexane. The mixture was shaken vigorously for 5 minutes and allowed to stand for 30 minutes after which the lower layer was run off. The absorbance of the top layer was determined at a wavelength of 460 nm using a spectrophotometer.

$$\text{Total carotenoid } \mu\text{g}/100\text{g} = \frac{\text{Absorbance}}{\text{specific extinction coefficient} * \text{path length of cell}}. \quad (6)$$

Not: molar extinction coefficient (∑) (15^*10^{-4}), specific extinction efficient (∑ * molar mass of beta-carotene), molar mass of β-carotene (536.88 g/mol), and path length of cell (1 cm)

2.5.2. Sensory Analysis. The sensory evaluation was performed by 25 untrained panelists using seven hedonic scales. The panelist evaluates for each sample sensorial parameter including taste, aroma, texture, appearance, color, and overall acceptance based on their degree of liking (1 = dislike very much; 2 = dislike moderately; 3 = dislike slightly; 4 = neither like nor dislike; 5 = like slightly; 6 = like moderately; 7 = like very much) [2].

2.6. Ethical Consideration. The study was reviewed and approved by the Institutional Review Board (IRB) of Bahir Dar institute of Technology. Written permission was also obtained from faculty of food and chemical engineering. Informed written consent was obtained from the panelists before actual sensory data were collected. The purpose and importance of this study were explained to all panelists. The responses of each panelist were kept confidential by coding. The data were collected and analyzed using SAS software.

2.7. Statistical Analysis. All analyses were subjected to ANOVA (analysis of variance) to obtain the significance difference between the mean value using last significance

Table 3: Proximate composition for raw material.

Sample	Moisture (%)	Fat (%)	Ash (%)	Fibre (%)	Protein (%)	β-Carotene (μg/100 g)	CH (%)	Energy (kcal)
Wheat flour	13.00 ± 0.02^{c}	1.90 ± 0.21^{a}	0.70 ± 0.01^{a}	2.00 ± 0.22^{a}	12.9 ± 0.30^{c}	0.67 ± 0.04^{a}	69.5 ± 0.00^{c}	346.7 ± 0.00^{c}
Banana flour	11.10 ± 0.11^{a}	1.10 ± 0.00^{c}	5.12 ± 0.32^{b}	11.2 ± 0.31^{c}	9.99 ± 0.05^{b}	1.27 ± 0.05^{b}	61.49 ± 0.02^{a}	295.82 ± 0.00^{a}
Carrot flour	12.30 ± 0.21^{b}	2.72 ± 0.10^{b}	4.82 ± 0.00^{c}	10.36 ± 0.00^{b}	6.77 ± 0.00^{a}	410.84 ± 0.55^{c}	63.03 ± 0.01^{b}	303.68 ± 0.01^{b}

Mean values not followed with the same letter in a column are significantly different at $p < 0.05$. The significance for variables a, b, and c are at $p < 0.05$.

Table 4: Proximate composition of bread produced from wheat, banana, and carrot flour.

Blending ratio	Moisture (%)	Ash (%)	Crude fiber (%)	Crude fat (%)	Crude protein (%)	β-Carotene (μg/100 g)	CHO (%)	Caloric value (kcal)
C	29.92 ± 0.01^{e}	0.67 ± 0.03^{e}	1.99 ± 0.01^{e}	1.13 ± 0.01^{e}	10.02 ± 0.01^{e}	0.13 ± 0.01^{e}	56.27 ± 0.01^{e}	275.30 ± 0.06^{e}
B1	30.32 ± 0.01^{d}	0.85 ± 0.01^{d}	3.36 ± 0.01^{d}	2.15 ± 0.01^{d}	9.02 ± 0.01^{d}	24.53 ± 0.01^{d}	54.33 ± 0.03^{d}	272.79 ± 0.07^{d}
B2	30.66 ± 0.01^{c}	1.24 ± 0.01^{c}	4.52 ± 0.01^{c}	3.07 ± 0.01^{c}	8.81 ± 0.01^{c}	40.76 ± 0.01^{c}	51.70 ± 0.01^{c}	269.64 ± 0.01^{c}
B3	31.26 ± 0.02^{b}	1.44 ± 0.01^{b}	5.33 ± 0.01^{b}	3.13 ± 0.01^{b}	8.42 ± 0.01^{b}	59.75 ± 0.01^{b}	$50.41\ 0.02^{b}$	263.52 ± 0.12^{b}
B4	33.23 ± 0.02^{a}	1.66 ± 0.01^{a}	6.47 ± 0.01^{a}	3.2 ± 0.01^{a}	8.01 ± 0.01^{a}	73.51 ± 0.01^{a}	47.42 ± 0.03^{a}	250.55 ± 0.07^{a}

Mean values not followed with the same letter in a column are significantly different at $p < 0.05$. *Note.* 100% wheat (C), 90% wheat, 5% carrot, 5% banana (B1), 80% wheat, 10% carrot, 10% banana (B2), 70% wheat, 15% carrot, 15% banana (B3) and 60% wheat, 20% carrot, and 20% banana (B4). The significance for variables a, b, and c are at $p < 0.05$.

difference (LSD) ($p < 0.05$). The statistical analysis was done by using SAS software.

3. Result and Discussion

3.1. The Proximate Compositions of Flours. As shown in Table 3, there are different flours which have different compositional values. The proximate composition of moisture, protein, fat, ash, crude fiber, beta carotene, carbohydrate content, and energy value of wheat, banana, and carrot flours is presented.

As observed from the result, wheat flour had the highest protein content due to the high gluten content of wheat. But the fat content of wheat is the least and the carrot has the highest fat content than the other composite flour. The ash content of banana flour was the highest due to the presence of minerals. The fiber content of the carrot was the highest due to the fact that carrot is a tuber plant. As shown from the result, the beta carotene content of carrot is higher than the other composite flour due to the fact that carrot is an excellent source of carotenoid. Wheat and banana flour have a lower content of carotenoids compared to carrot flour. This justification can be supported by investigators. According to Sharma et al. [15] report, carrot flour contains 23 mg/100g of beta carotene. However, banana flour contains 0.42–0.47 mg/100 g [16], whereas wheat flour contains 0.3 mg/100 of beta carotene [17].

3.2. Proximate Composition of Bread Produced from Wheat, Banana, and Carrot Flour Blend. The proximate composition of the bread samples is shown in Table 4. The ash, fiber, moisture, fat, and beta carotene contents of the bread samples increased significantly ($p < 0.05$) with increased substitution of banana and carrot flours from 5–20% of each flour. The ash content varied from 0.669–1.6633% and the fiber varied from 1.99–6.4713%, while the moisture ranged from 29.92–33.22%, respectively. The protein and carbohydrate contents on the other hand decreased significantly with increased banana and carrot flour substitution.

The increased ash and fiber contents could be attributed to the banana flour which is rich in minerals and fiber [2]. The moisture content could be increased due to the hydrophilic molecule provided by banana flour. This can be supported by Dooshima [10]. Quality evaluation of composite bread produced from wheat, defatted soy, and banana flours was done. According to the authors' justification, the increase moisture content could be due to increased hydrophilic molecules provided by the banana flour.

The decrease in protein content could be the addition of carrot and banana flour and the reduction of wheat flour because wheat flour is an excellent source of protein. The fiber content of the bread increased as we substitute the flour with carrot and banana flour due to the fact that carrot has the highest content of fiber because carrot is a tuber plant and tuber plant is a source of fiber. The beta carotene content of bread increases when the substitution of carrot flour is increased because carrot has the highest source of carotenoid. However, banana and wheat have a low source of carotenoid. It increases with increasing carrot proportion from 0.24–73 mg/100 g. The value is high compared to the one reported by [2] which ranges from 0.14–0.45 mg/100 g.

Therefore, it is necessary to add carrots to enhance the carotene content. Wheat contains far from adequate amounts of vitamin A precursors [2]. Carrots, on the other hand, are rich sources of β-carotene, which is the most active form of carotenoids, which acts as provitamin A which was used to fortify. The increased mineral content is an indication of the supplementation of carrot and banana flour and improves the nutritional quality of bread. Thus, the enriched bread would be used to solve the malnutrition problem.

3.3. Sensory Property of the Composite Bread. Sensory properties are one of the quality indicators of bread. Since taste, flavour, texture, and overall acceptability are the

Table 5: Sensory property of the composite bread.

Blend ratio	Taste	Flavour	Color	Texture	Overall acceptability
C	5.46 ± 0.92^{b}	4.66 ± 0.62^{b}	4.73 ± 0.70^{b}	4.60 ± 0.50^{b}	5.06 ± 0.70^{b}
B1	5.80 ± 0.86^{a}	5.80 ± 0.67^{a}	5.80 ± 1.01^{a}	5.80 ± 0.77^{a}	6.53 ± 0.52^{a}
B2	5.66 ± 1.04^{a}	5.60 ± 0.83^{a}	5.73 ± 0.88^{a}	5.60 ± 0.73^{a}	6.26 ± 0.70^{a}
B3	5.80 ± 1.01^{a}	5.46 ± 0.99^{a}	5.66 ± 0.97^{a}	5.93 ± 0.96^{a}	6.46 ± 0.74^{a}
B4	5.93 ± 0.88^{a}	5.60 ± 1.05^{a}	5.73 ± 0.79^{a}	5.80 ± 1.14^{a}	6.60 ± 0.63^{a}

Mean values not followed with the same letter in a column are significantly different at $p < 0.05$. *Note.* 100% wheat (C), 90% wheat, 5% carrot, 5% banana (B1), 80% wheat, 10% carrot, 10% banana (B2), 70% wheat, 15% carrot, 15% banana (B3) and 60% wheat, 20% carrot, and 20% banana (B4). The significance for variables a, b, and c are at $p < 0.05$.

critical one. The result of sensory attributes in terms of color, flavor, taste, texture, and overall acceptability is presented in Table 5.

The blend four (B4) bread shows maximum taste mean score of 5.93, which was the highest obtained among the sample of bread. This may be due to the increasing of carrot and banana flour in the blending matrix. The scores for overall acceptability and taste varied from 5.066–6.600 and 5.466–5.93, respectively. There was an increase in the scores as carrot and banana flours were added; however, the increase was not significant ($p > 0.05$). The result revealed that the texture, flavor, and color of the bread varied significantly ($p < 0.05$) between the (control) sample A with 100% wheat and the other samples B1 to B4 incorporated with carrot and banana flours. In general, all the bread samples compared well with the control sample and were well accepted.

4. Conclusion

The study has shown that bread of acceptable quality can be produced from composite flour of wheat, carrot, and banana. The bread sample produced has increased nutrient of fiber, ash, fat, and β-carotene precursor of vitamin A, which are all desirable for good health and wellbeing. Among all sample 60 : 20 : 20, wheat, banana, and carrot composite flour bread are selected based on their acceptable nutritional composition. The use of carrot and banana in bread production would promote production, value addition, and diversification of utilization of perishable crop in Ethiopia. This would be great for wealth and enhance food security. The bread supplemented with carrot and banana flour was well accepted. This would not only save foreign exchange used on wheat importation, provide nutritious bread, and prevent malnutrition but would also reduce the postharvest loss of carrot and banana by value addition, i.e., bread.

Abbreviations

ANOVA: Analysis of variance
°C: Degree centigrade
NaCl: Sodium chloride
β: Beta

Data Availability

The data used to support the study are available upon request from the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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