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Development of nutri-rich bread (Fortified with moringa leaves)

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Abstract

The effect of *Moringa oleifera* leaf powder supplementation on some physico-chemical and sensory properties of bread was determined. Bread was prepared from varying proportions of 79%, 78% and 77% refined wheat flour supplemented with 1%, 2% and 3% *Moringa oleifera* leaf powder, respectively. The bread samples were allowed to cool at room temperature and analyzed for physical characteristics and sensory attributes. Physical characteristics of nutri-rich bread fortified with moringa leaf powder found that, length, width, thickness, volume, mass, density. Sensory evaluation showed that, need of improvement in texture of bread and the overall acceptability of all bread samples decreased with increasing level of moringa leaf powder supplementation. Addition of 3% moringa leaf powder in bread production gives good attention towards sensory attributes. This implies that, despite of high nutrient content of *Moringa oleifera* powder, concern of people towards sensory attributes higher rather than the quality and nutritional aspects.

Keywords: Nutri-rich, bread, fortification, sensory evaluation

1. Introduction

Bread is an important staple food in Nigeria. Bread is an excellent source of complex carbohydrates that gives energy to our body and plays an important role in balancing the levels of glucose in the blood. Certain types of bread have vegetal proteins of low nutritional value and very few fats. They also contain B vitamins which contribute to the metabolism of proteins, as well as to cell substitution. Vitamin E is an efficient antioxidant capable of dissolving clots forming in the blood, also like iron, potassium, calcium and selenium, which benefit our health in many different ways: iron plays an important role in cell development and oxygenation, potassium contributes to the balanced operation of the cells, calcium contributes to the density of the bones and to their overall firmness and health, while selenium is a powerful antioxidant^[9].

Moringa is a fast growing, drought resistant tree of the family Moringaceae, native to the subcontinent. Moringa originated from the southern hills of the Himalayas and was introduced in many tropical and subtropical areas, largely by migrant Asian populations. The drumstick tree (*Moringaoleifera*) referred to as the “miracle plant”. The leaves are outstanding as a source of vitamin A, B groups and C (when raw), and are among the best plant sources of minerals. They contain more iron than “kontonmire” (stew made from cocoyam leaves, commonly prepared in the home), seven times the vitamin C in oranges, four times the calcium in milk, four times the vitamin A in carrots, two times the protein in milk and three times the potassium in bananas. They are excellent sources of protein, but poor in carbohydrates and fats, thus making them one of the best plant foods available in nature. The leaves are beneficial in the treatment of many ailments due to their various medicinal properties such as blood pressure, treat cancer and diabetic and retina problems^[4].

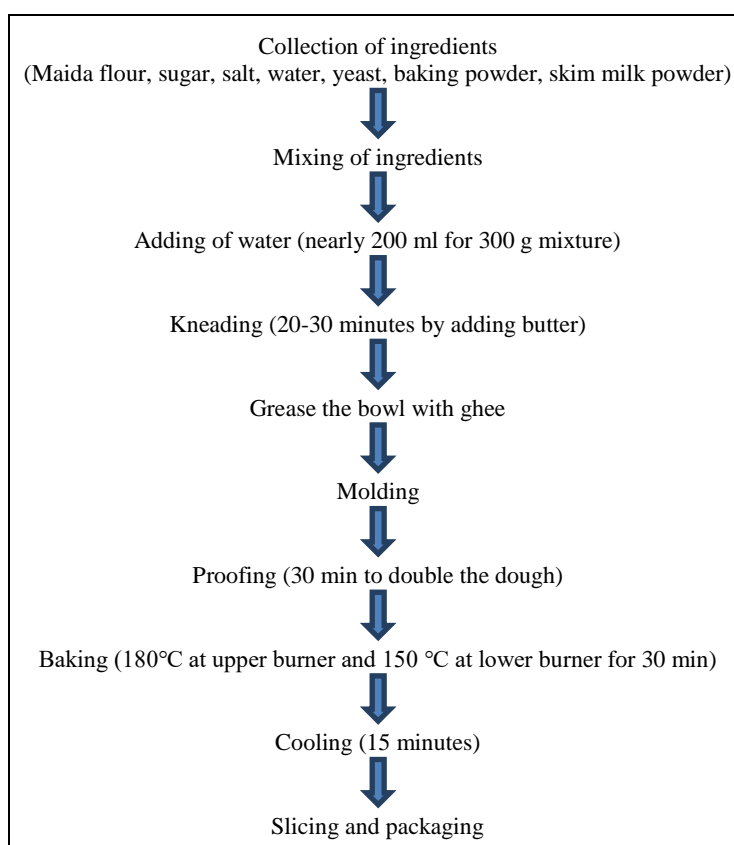
2. Materials and Methods

2.1 Sample Preparation

Wheat flour and all ingredients for baking (sugar, fat, salt, yeast,) used for this work were purchased from local Market, while matured *Moringa oleifera* leaves were obtained from College of Agricultural Engineering, Madakasira. Destalking, washing, drying and grinding of the leaves were all carried out. Wheat flour (WF) and *Moringa* leaf powder (MLP) were then formulated in the following Table. 1.

Table 1: Formulation of nutri rich moringa bread

| Constituents | Control | T ₁ | T ₂ | T ₃ |
|-------------------------|---------|----------------|----------------|----------------|
| Refined wheat flour (%) | 80 | 79 | 78 | 77 |
| Yeast (%) | 1 | 1 | 1 | 1 |
| Baking powder (%) | 1.33 | 1.33 | 1.33 | 1.33 |
| Sugar (%) | 6.67 | 6.67 | 6.67 | 6.67 |
| Salt (%) | 1 | 1 | 1 | 1 |
| Butter (%) | 6.67 | 6.67 | 6.67 | 6.67 |
| Oil (%) | 1.67 | 1.67 | 1.67 | 1.67 |
| Skim milk powder (%) | 1.67 | 1.67 | 1.67 | 1.67 |
| Moringa leaf powder (%) | - | 1 | 2 | 3 |

**Fig 1:** Process flowchart for the preparation of Nutri-rich bread

2.2 Equipment's used for the preparation of moringa bread

2.2.1 Manually Operated Baking Oven (gas)

Manually operated baking oven is an enclosed cavity or tunnel where dough is surrounded by a hot environment and becomes baked and transformed into bread, cookies and other products.

2.2.2 Hot air oven

The moisture of the sample is lost by volatilization caused by heat. The amount of material left after the removal of the moisture is the dry matter. Hot air oven is used for the determination of moisture content of bread sample.

$$\text{Moisture content (\% (w.b.))} = \frac{\text{Weight of the fresh sample} - \text{weight of dry sample}}{\text{weight of fresh sample}} \times 100$$

2.2.4 Vernier Calipers

The Vernier calipers uses the principle of alignment of line segments to determine more accurate reading.

$$\text{Least count of Vernier caliper} = \frac{\text{smallest reading on main scale}}{\text{No. of divisions on main scale}}$$

2.2.5 Weighing Balance

Weighing balance is used to weigh the mass samples between 0.001g to 1.5 kg.

It is also used to weigh the crust and crumb of bread samples.

$$\text{Crumb to crust ratio} = \frac{\text{mass of crumb}}{\text{mass of crust}}$$

2.2.6 Sensory Evaluation

Sensory evaluation method is used to evaluate the bread made from Moringa leaf powder. Panel of 25 members with different age groups were chosen at College of Agricultural Engineering, Madakasira. A nine (9) point hedonic scales with rating ranging from 1 which is dislike extremely to 9 like extremely. Appearance, color, texture, flavor, taste and

overall acceptability were the attributes selected for sensory evaluation.

3. Results and Discussion

3.1 Drying method of Moringa leaves

The reduction in moisture content was observed during drying of moringa leaves under hot air oven. The initial moisture content was observed as 73.33 percent (w.b.) and final moisture content as 0 percent (w.b.) at temperature of 105°C for 15 minutes of interval Fig. 2.

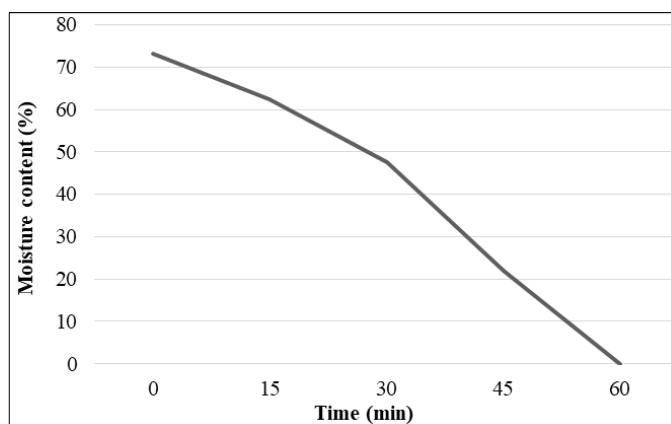


Fig 2: Reduction in moisture content of Moringa leaves

3.2 Physical characteristics of bread

Physical characteristics of different bread samples is depicted in (Table 1 and Fig 6). The sample T₁, T₂, T₃ had equal length of 18.5 cm and width of 8.5 cm. Control sample had more thickness and volume of 7 cm and 1183 cm³ than T₁ sample had 6 cm and 943.5 cm³. The sample T₂ had high mass of 396 g than T₃ had 361 g. The sample T₁ had the more density of

0.39 g/cm³ than control sample of 0.32 g/cm³.

3.3 Moisture content of bread

The moisture content of sample T₂ had high moisture content of 1.3 percent and T₁ had low moisture content of 1.10 percent.

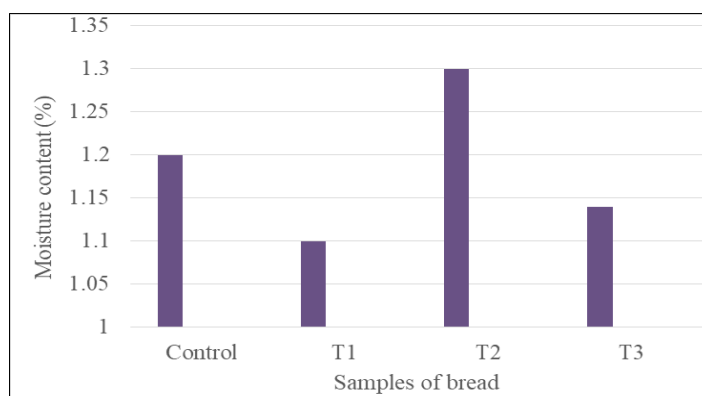


Fig 3: Graphical representation of moisture content of bread

3.4 Crumb to Crust Ratio

The crumb to crust ratio was determined by separating crumb using sharp blade and weigh each pieces of bread.

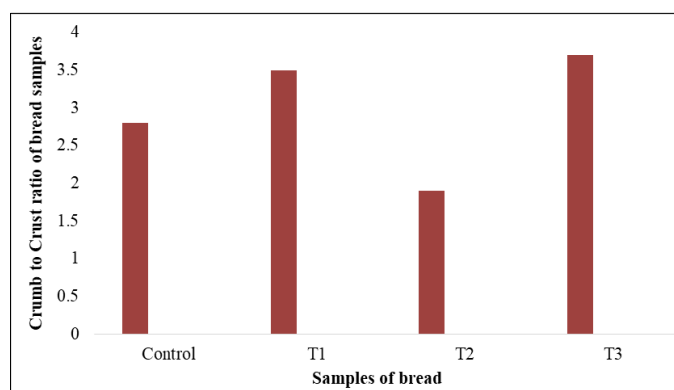


Fig 4: Graphical representation of crumb to crust ratio of bread samples

3.5 Sensory evaluation of bread

Statistically the sample T₃ was found to be most significantly acceptable as compared to T₁ and T₂ because addition of the taste of the moringa leaf powder with refined wheat flour and it gives soft texture to the bread.

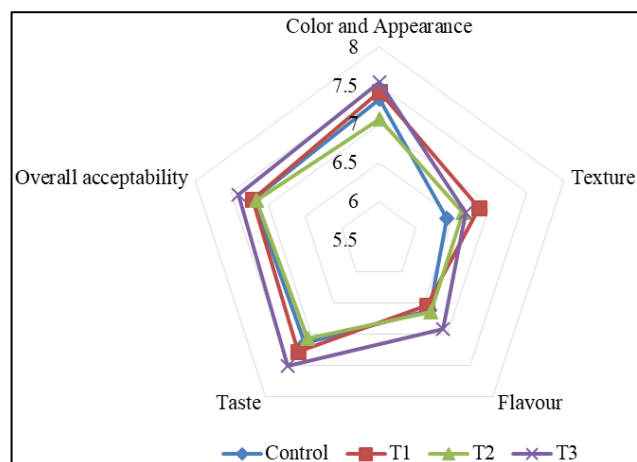


Fig 5: Graphical representation of sensory evaluation of Moringa bread



Fig 6: Moringa bread

4. Conclusion

The results obtained during present study on utilization of Moringa leaf powder and refined wheat flour for the preparation of bread are as follows. The physical characteristics of bread samples, length of T₃ sample has 18.5cm, width 8.5cm, thickness 6.5 cm, mass 361 g, volume 1022 cm³ and density 0.38 g/cm³. Moisture content of T₃ sample has 1.14 percent. The sample T₃ has highest crumb to crust ratio as 3.7 and T₂ has lowest as 1.9. The bread samples; control, T₁, T₂ and T₃ has tested for sensory evaluation with sensory panelists by using 9-point hedonic scale overall acceptability 7.41 for T₃ sample. It can be concluded that bread prepared by the moringa leaf powder imparts color and flavor. The bread obtained by adding 3% moringa leaf powder and 77% refined wheat flour (T₃) were found best formulation compared to other formulations.

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