



Utilization of *Moringa* Leaves Powder as Valuable Food Ingredients in Biscuits Preparation

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ABSTRACT

Blends of wheat flour (WF) and Moringa oleifera leaf powder or flour were processed into biscuits in the following ratios 100:0; 95:5; 93:7 and 90:10. The sensory evaluation of the biscuits samples from the blends was performed. The results of the sensory evaluation showed that there were significant differences in the different attributes that were determined such as in colour, texture, aroma, taste and overall acceptability except in appearance. The sensory overall acceptability scores showed that the best Moringa flour substitution level for making biscuits was 5 % (95:5).

Keywords: *Wheat flour, Moringa oleifera, Drumstick leaves, Biscuits*

INTRODUCTION

Bakery products are important sources of nutrients viz. energy, protein, iron, calcium and several vitamins. Most bakery products can easily be enriched and fortified to meet the specific needs of the target groups and vulnerable sections of the population who are under nourished. Bakery products can also be formulated in such a way to meet specific therapeutic needs of consumers (Oduro et al., 2008).

Biscuits are a small flat, baked food product usually containing fat, flour, egg and sugar. Biscuits are mostly baked until crispy or just long enough that they remain soft, but some kind of biscuits is not baked at all.

Biscuits are made in a wide variety of styles by using an array of ingredients including sugar, spices, chocolate, butter, pea-nut butter, nuts or dried fruit. Biscuits are convenient snack product dried to a very low moisture content taken by young people and adult to provide energy. This is made from dough which is made from a mixture of flour and other ingredients, mixed together into dough which is rested for a period and passed between rollers to make a sheet (Price, 2000).

India is the largest producer of *Moringa*. The *Moringa oleifera Lam.* from Moringaceae family is of importance to food and medical industries and widely grown in tropics and sub-tropics.

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Its root, bark, pods, leaves are used in traditional medicine for the treatment of human diseases whereas pods and young leaves are used as vegetables. Every part of the drumstick tree is enriched with varieties of ingredients that contribute to its magical health benefits. The leaves are highly nutritious, being a significant source of b-carotene, Vitamin A, C, protein, iron, calcium and potassium. The leaves are cooked and used like spinach. *Moringa* leaves contains seven times the vitamin C found in oranges, four times the calcium and two times the protein found in milk, four times the vitamin A found in carrots, and three times the potassium found in bananas (Fahey, 2005).

For centuries, people in many countries have used *Moringa* leaves as traditional medicine for common ailments. They are traditionally used for the cure of asthma, catarrh, chest congestion, cholera, conjunctivitis, cough, diarrhea, eye and ear infections, fever, headaches, abnormal blood pressure, scurvy, semen deficiency, sore throat, tuberculosis etc. *Moringa* is said to cure about 300 diseases and almost have all the vitamins found in fruits and vegetables. *Moringa* is considered to be the most nutritious, rich plant on earth. *Moringa* leaves have been consumed by Asian people for millennia as healthy food products. Containing more than 90 nutrients and 46 anti-oxidants, these vivid green leaves are natural super - power food. *Moringa* was highly valued and Egyptians extracted edible perfume and skin lotion (Fahey, 2005).

In developing countries, *Moringa* has the potential to improve nutrients, boost food security, foster rural development and support sustainable landmark (Fahey, 2005).

Some of the benefits of *Moringa* include the following:

- It increases the natural defenses of the body.
- Provides nourishment to the eye and the brain.
- Promotes metabolism with bio-available ingredients.
- Promotes the cell structure of the body.
- Promotes natural serum cholesterol.

- Lowers the appearance of wrinkles and fine lines.
- Promotes the normal functioning of the liver and kidney.
- It beautifies the skin.

Indian recipes and evaluated for their acceptability among children. However, the threshold for acceptability may vary since drumstick leaves have a slightly bitter taste to many people. Thus, organoleptically acceptable recipes with drumstick leaves would be a most suitable protocol for dietary diversification or improvement. In this study, the effect of substituting wheat flour with *Moringa* leaves powder on the sensory evaluation of biscuits was determined.

MATERIALS AND METHODS

2.1 Collection of sample

Fresh leaves of *Moringa oleifera* were collected from Horticulture Department, GKVK, UAS, Bengaluru for product formulation.

2.2. Processing of *Moringa* Leaves into Flour

At first the leaves were sorted to reject unwanted, over matured and insect affected portions of the leaves. Then they were thoroughly washed with water and tray dried around 60⁰C for 3 hours. Then the dried leaves were ground to fine powder and kept at airtight container.

2.3. Baking Process

The four blends of wheat/*Moringa* flours used were different ratios such as 100:0; 100:0; 95:5; 93:7 and 90:10. The biscuits were baked at 160⁰C for 10 mins.

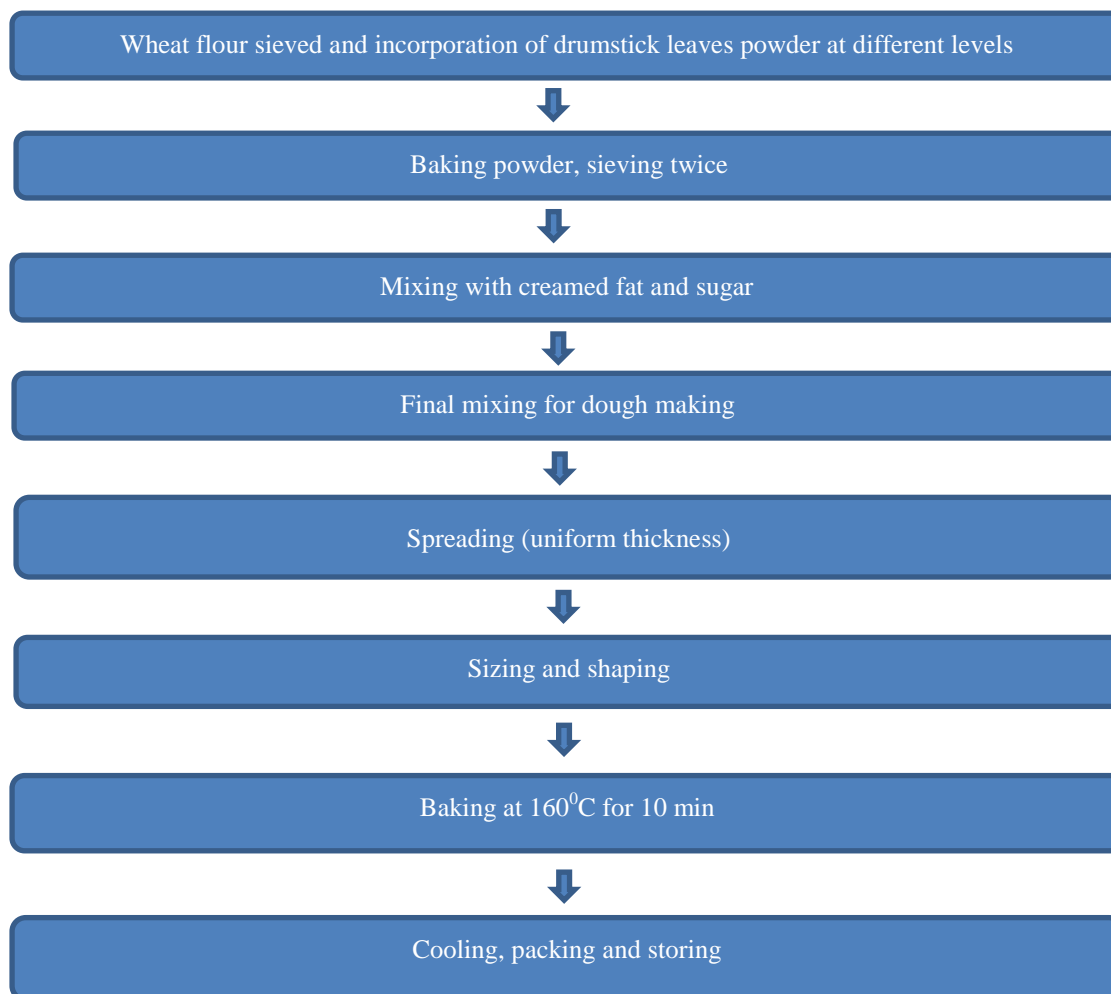
Composition and preparation of masala biscuits by incorporating drumstick leaves powder

Four variations of masala biscuits by incorporating drumstick leaves powder were developed by utilizing selected ingredients with varying amount of wheat flour, drumstick leaves powder, green masala, butter, salt, sugar and baking powder were constant. The detailed description of developed four variations is given in Table 1 and Fig 1.

Table 1: Composition of masala biscuits by incorporating drumstick leaves powder

Sl no	Ingredients	A	B	C	D
1	Wheat flour (g)	51	46	44	41
2	Drumstick leaves powder (g)	-	5	7	10
3	Green masala (g)	20	20	20	20
4	Butter	20	20	20	20
5	Sugar (g)	5	5	5	5
6	Salt (g)	3	3	3	3
7	Baking powder (g)	1	1	1	1
	Total	100	100	100	100

A - Control, B- 5 % incorporated drumstick leaves powder, C- 7 % incorporated drumstick leaves powder, D- 10 % incorporated drumstick leaves powder

**Fig. 1: Flow chart for preparation of masala biscuit by incorporating drumstick leaves powder**

3.1. Powder Blending and Biscuits Production

The wheat flour blended with *Moringa* leaves powder at various proportions of 100:0; 100:0; 95:5; 93:7 and 90:10. The measurements were carefully weighed. The measured quantities of shortening (fat) and granulated sugar were mixed well in a rubber bow to a creamy consistency. The wheat flour and *Moringa* leaves powder, baking powder, green masala and salt were mixed together. This was then

added to the creamy mixture and kneaded. The kneading continued for 5mins to obtain smooth dough. The dough was rolled out on a rolling pin and the desired shapes were given to the cut out dough. The biscuits was baked, allowed to cool and packaged well.

3.2. Sensory Evaluation

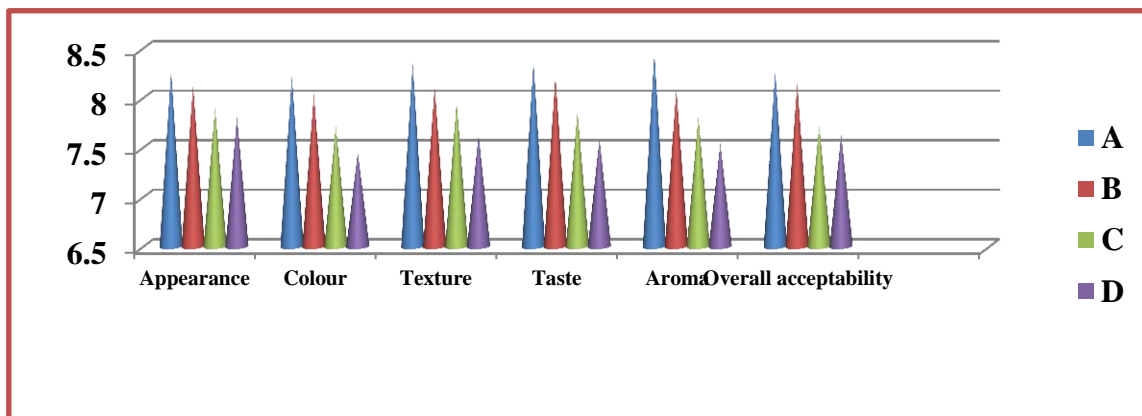
21 panelists made up of males and females were selected from the Department of Food Science and Nutrition, UAS, GKVK, Bengaluru. The panelists were educated on

testing terminologies and requested to evaluate the various cookies samples for appearance, texture, colour taste, aroma, taste and overall acceptability using a 9-point Hedonic scale where 9 was equivalent to like extremely and 1 meant dislike extremely as described by Ihekoronye and Ngoddy (1985). The samples were presented in a well packaged material, coded with different random alphabets. It was served simultaneously to ease possibility of

panelist evaluating the sample. Necessary precautions were taken to prevent bias of panelist. The water were given to rinse their mouth after each stage of sensory evaluation and by ensuring that the panelists were ignorant of the actual sample represented by a code.

The sensory evaluation data were analyzed using analysis of variance (ANOVA) as described by Iwe (2002).

RESULTS AND DISCUSSION



A- Control, B- 5 % incorporated drumstick leaves powder, C- 7 % incorporated drumstick leaves powder, D- 10 % incorporated drumstick leaves powder

Fig. 2: Mean sensory score of masala biscuit prepared by incorporating drumstick leaves powder

Table 2: Mean sensory scores of masala biscuits prepared by incorporating drumstick leaves powder.

Level of drumstick leaves powder corporation (%)	Quality characters					
	Appearance	Colour	Texture	Aroma	Taste	Overall acceptability
A	8.27	8.22	8.35	8.36	8.45	8.27
B	8.13	8.04	8.11	8.22	8.09	8.15
C	7.90	7.72	7.95	7.86	7.81	7.72
D	7.81	7.45	7.63	7.59	7.54	7.63
F-value	NS	*	*	*	*	*
SEm±	0.03	0.02	0.04	0.04	0.05	0.03
CD at 5 %	0.09	0.06	0.12	0.12	0.15	0.09

*Significant at 5 per cent level, NS- Non significant, A- Control, B- 5 % incorporated drumstick leaves powder, C- 7 % incorporated drumstick leaves powder, D- 10 % incorporated drumstick leaves powder

Table 2 and Fig 2 depicts the mean sensory scores of masala biscuits by incorporating drumstick leaves powder. The A sample showed highest scores for appearance (8.27), colour (8.22), texture (8.35), aroma (8.36)

taste (8.45) and overall acceptability (8.27) compared to the other treatments. Sample B had sensory scores of 8.13, 8.04, 8.11, 8.22, 8.09 and 8.15 for appearance, colour, texture, aroma, taste and overall acceptability

respectively. The lowest scores were obtained for Sample D *i.e.*, appearance (7.81), colour (7.45), texture (7.63), aroma (7.59) taste (7.54) and overall acceptability (7.63). The increase in the drumstick leaves incorporation decreased the overall acceptability because biscuits showed hard texture, glitter mouth feel and bitter taste.

Significant difference was observed between the treatments for all sensory parameters at five percent level except for appearance.

Similarly the results are in good agreement with the studies conducted by Dachana et al (2010); Kar et al (2013) and Nwakalor and Chizoba (2014).

CONCLUSION

The *Moringa* leaves can be readily selected and utilized as a remarkable food ingredient to formulate a wide range of products. In order to explore rich nutritional source of *Moringa* leaves in biscuits, *Moringa* leaves powder at the level of 5, 10 and 15% was used in biscuits making. The incorporation of *Moringa* powder in the production of biscuits because of its health benefits. *Moringa* powder in the appropriate ratio, the use of ratio 95:5 in the production because it was the best accepted sample in all sensory attributes. *Moringa* has been reported to possess some medicinal properties and therefore its inclusion in the diet as nutritional supplements or in the process of fortification of foods is highly promising.

REFERENCES

Dachana, K. B., Rajiv, J., Indrani, D., & Prakash, J., (2010). Effect of

dried *Moringa* (*Moringa oleifera* Lam) leaves on rheological, microstructural, nutritional, textural and organoleptic characteristics of cookies. *Journal of foodquality*. 33(5), 660-677.

Fahey, J.W. (2005). *Moringa oleifera*: A review of the medical evidence for its nutritional, therapeutic, and prophylactic properties. Part 1. *Trees for Life J. 1*, 1–15.

Ihekoronye, A. I., & Ngoddy, P.O. (1985). Integrated Food Science and Technology for the Tropics. *Macmillan Publishers Ltd*. 180-189.

Iwe, M.O., (2002). Handbook of Sensory methods and Analysis. *Rojoint Communication Services Ltd*. 51-62.

Kar, S., Mukherjee, A., Ghosh, M., & Bhattacharyya, D.K. (2013). Utilization of *Moringa* leaves as valuable food ingredients in biscuit preparation, *IJASE*, 1(1), 29-37.

Nwakalor & Chizoba, N. (2014). Sensory evaluation of cookies produced from different blends of wheat and *Moringa oleifera* leaf flour. *International Journal of Nutrition and Food Sciences.*, 3(4): 307-310.

Oduro, I., Ellis, W.O. Ow., & Usu, D. (2008). Nutritional potential of two leafy vegetables: *Moringa oleifera* and *Ipomoea batatas* leaves. *Sci Res. Essay*. 3(2), 57–60.

Price, L.L., (2000). The *Moringa* tree. www.echonet.org. Accessed on 14/11/2010.