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Development and quality evaluation of savory biscuits

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Abstract
This study aimed to develop a process for the development of savory biscuits from wheat flour, moringa powder. The two different ingredients were used in different ratio for preparation of savory biscuits. The prepare savory biscuit was analysed for its different physicochemical as well as sensory qualities by adopting 9-point Hedonic scale. Among different ratios used for prepared Biscuits, the ratio of 60:8:32 (Wheat flour, moringa powder, other minor ingredient) reached the highest sensory scores for overall acceptability.

Keywords: savory biscuits, physicochemical¸ acceptability

1. Introduction
Baked products have popularities in the populace because of their availability, ready to eat convenience and having good shelf life. Because of their low moisture content this ensures less chance of microbial spoilage, therefore large-scale production and distribution possible. Common bakery products include biscuits, cookies, pastries, muffins, cake, bread etc. Biscuits, among all the bakery products, are more significant since they are vastly used as snacks by children and adult.

Moringa oleifera Lam. is a multipurpose and exceptionally nutritious vegetable tree with a variety of potential uses. It is a sub-tropical species that is known by different regional names as benzo live, drumstick tree, kelor, marango, mulangay, nébéday, saijhan, mooringai and sajna. It has very high nutritional properties that would be useful as a food supplement, especially in those relegated communities. Besides its nutritional and medicinal applications, Moringa oleiferais very useful as an alley crop in the agro-forestry industry. It is useful not only for human beings but also for animals and also in various industrial applications. Besides *Moringa oleifera* being processed into a medicine, it contains acetone which can be prepared into herbal formulation which is an effective anti-malaria bio agent. Such trees have the potential to be a source of new drugs. It is also an effective water clarifier using the seed, thus providing millions of people with clean drinking water. The leaves, fruit, flowers and immature pods of this tree are used as a highly nutritive vegetable in many countries, particularly in India, Pakistan, Philippines, Hawaii and many parts of Africa. It is originated initially in the Northern part of India some 5000 years back and soon moved into the Southern parts as well, where it was known as 'Murungaikeerai' (Moringa leaves) and 'Murungaikaai' (Moringavegetable). The *Moringa* tree had spread to most part of Asia, nearly the whole of Africa, South America, southern part of North America and some pockets in Europe.

Drumstick leaves (Moringa oleifera) is one of the most useful tropical trees. Presently, one of the most important trends in food and pharmaceutical industries is the growing demand for valuable natural sources of nutritional compounds. Green leafy vegetables are good sources of vitamins and minerals. The leaves are also free of anti-nutritive factors such as phenols, tannins and saponins. Fellows reported that blanching which is an important pre-processing heat treatment of vegetable destined for freezing, canning or dehydration inevitably causes separation and loss of water soluble nutrients such as minerals, water soluble vitamins. Leafy vegetables occupy an important position in the Indian diet. India produce about 12% of the total world's production of vegetables but it is not enough to meet this country's requirements. Beside postharvest loss reduction, improved processing and storage of processed products can play a significant role in availability of these products.

Reduction in processing and storage costs can further increase their availability. Drying is the most commonly used method for enhancing shelf life of leafy vegetables. The utilization of dried Coriander leaves powder since a decade during unavailability or offseason. The dried green leafy vegetables were mostly used in powder form, which reduced the volume required for storage and easy to handle. During the drying process there is lot of losses takes place like nutritional, physical and chemical composition of leaves.

Wheat is considered good source of protein, minerals, B-group vitamins and dietary fibre i.e. an excellent health-building food. Thus, it has become the principal cereal, being more widely used for the making of bread than any other cereal because of the quality and quantity of its characteristic protein called gluten. Gluten makes bread dough stick together and gives it the ability to retain gas. Wheat has several medicinal virtues; starch and gluten in wheat provide heat and energy; the inner bran coats, phosphates and other mineral salts; the outer bran, the much-needed roughage the indigestible portion that helps easy movement of bowels; the germ, vitamins B and E; and protein of wheat helps build and repair muscular tissue. The wheat germ, which is removed in the process of refining, is also rich in essential vitamin E, the lack of which can lead to heart disease. The loss of vitamins and minerals in the refined wheat flour has led to widespread prevalence of constipation and other digestive disturbances and nutritional disorders. The whole wheat, which includes bran and wheat germ, therefore, provides protection against diseases such as constipation, ischaemic, heart disease, disease of the colon called diverticulum, appendicitis, obesity and diabetes. To enhance the quality as well as the quantity of proteins/starches, and the content of vitamins, essential amino acids, minerals and other healthy components of wheat, it is essential to understand the molecular and genetic control of various aspects of plant growth and development.

2. Materials and Methods

2.1 Procurement of raw materials

Good quality of Wheat flour, Moringa powder and other major ingredients that is Margarine, Butter, Chilli powder, Salt, Sugar, baking powder, cumin was purchased from local market of Nashik

2.2 Preparation of savory biscuits

First take weight of all ingredients for preparation of Savory Biscuit. Then sieve all dry ingredients then Blend Margarine and Butter properly after that add all sieve ingredients and mixed them properly, add water as per needed. The dough will form put it on sheeter and mould the biscuit base by moulder. Placed the biscuit on the tray and Put in baking oven at 180^{o}C for 20 to 25 minutes. After 25 minutes biscuit is ready. Remove the tray from oven and cool at room temperature. And packed in polythene bag then stored it.

Table 1: Standardized procedure for savory biscuits (per 1Kg)

S. No.	Ingredients	Quantity
1.	Wheat flour	600gm
2.	Moringa powder	80gm
3.	Margarine	180gm
4.	Butter	26gm
5.	Chilli Powder	12gm
6.	Salt	20gm
7.	Sugar	40gm
8.	Baking powder	25gm
9	Cumin	20gm
10.	Water	220ml

Table 2: Formulation of raw material (per 1Kg)

S. No.	Ingredients	Sample A	Sample B	Sample C
1.	Wheat Flour	80gm	70gm	60gm
2.	Moringa Powder	8gm	8gm	8gm

2.3 Experimental Plan

Figure shows the flow chart for the preparation of Savory Biscuits

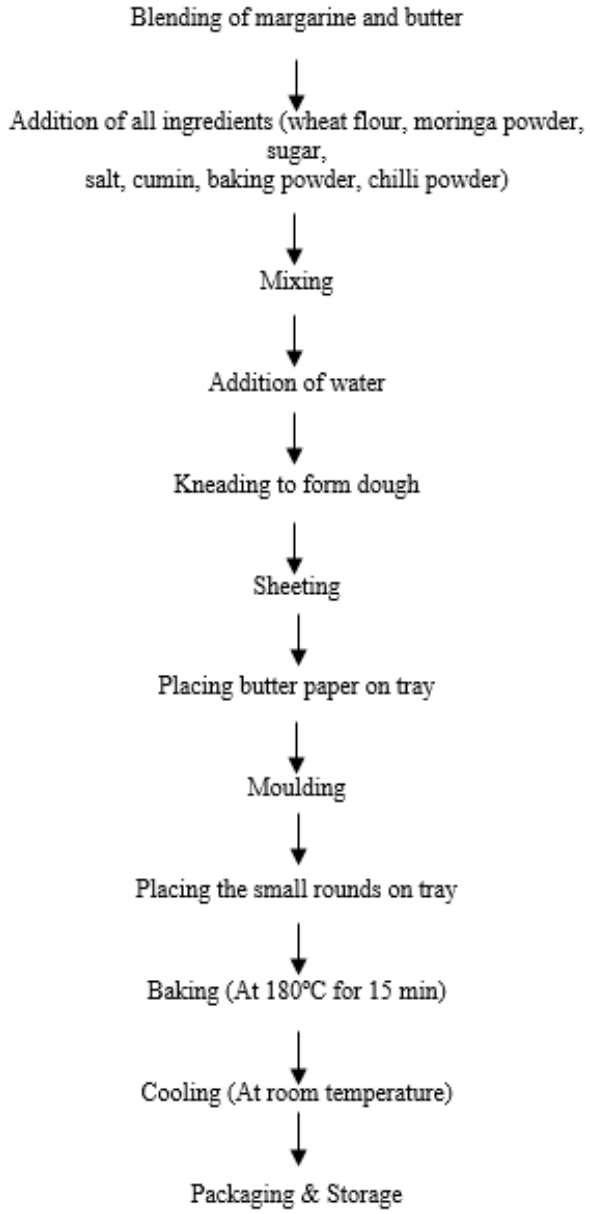


Fig 1: Process flow chart of Savory Biscuits

2.4 Proximate analysis

The moisture content of the developed was determined by the method described in [3.2.2]. Ash is non-organic compound containing mineral content of food and nutritionally it aids in the metabolism of the organic compounds such as fats and carbohydrates. Ash content was determined as per the method given by [3.2.1]. Fat plays a significant role in the shelf life of a food product and such relatively high fat content could be undesirable in baked food product this is because fat can promote rancidity in food, leading to development of unpleasant and odorous compound. It contributes to the appearance of savory biscuits, improves the flavour and gives a good feeling in mouth. The fat content was determined by the method described in [3.2.3]. The total carbohydrate

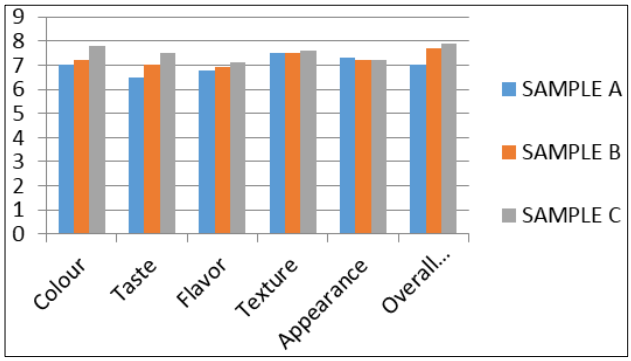
content was estimated using method of [3.2.5]. The estimation of nitrogen was done by kjeldahl method whereas the protein content is obtained by multiplying the nitrogen value with 6.25 [3.2.4].

2.5 Sensory evaluation
Sensory evaluation of savory biscuits samples from various flour blends was conducted using a trained panellist drawn from the general public. The test was conducted while the samples were still fresh. The panellists were required to observe the sample, taste and score. Then rinse their mouth with water before tasting another sample/product. The products were analysed based on the following parameters of colour, appearance, texture, taste, flavour and overall acceptability using a nine-point hedonic scale of 9 = liked extremely down to 1 = disliked extremely.

3. Results and Discussion
3.1 Sensory Evaluation of Savory Biscuits.
The result of the sensory evaluation is shown in Table. Colour is an important sensory attribute of any food because of its influence on acceptability. The saying that the eye accepts the food before the mouth is very true. The brown colour resulting from Maillard reaction is always associated with baked goods. The savory biscuits scored between 7 to 7.9 on the 9 point-hedonic scale indicating that the Savory Biscuits was at least like moderately. There were significant differences among the savory biscuits samples.

Table 3: Sensory scores

Sample	Organoleptic score					
	Colour	Taste	Flavour	Texture	Appearance	Overall acceptability
Sample 1	7.0	6.5	6.8	7.5	7.3	7.0
Sample 2	7.2	7.0	6.9	7.5	7.2	7.7
Sample 3	7.8	7.5	7.1	7.6	7.2	7.9



Graph 1: Sensory analysis

3.2 Chemical analysis
The chemical parameters viz. Ash, moisture, fat, protein, carbohydrate, energy value was measured by laboratory analysis.

3.2.1 Determination of ash content
A crucible and its lid are pre-weighed after thorough drying. The sample is added to the completely dry crucible and lid and together they are weighed to determine the mass of the sample by difference. The sample is placed in the hot furnace long enough so that complete combustion of the sample occurs. The crucible, lid and ash then are re-weighed.

3.2.2 Determination of moisture
Weigh 10 gm sample accurately and subjected to oven drying at 110oC for 4-5 hour. Oven dried samples were cooled in desiccators and weighed. The drying was repeated until the constant weights were obtained or until the difference between two successive weighing was not more than 0.002g. The resultant loss in weight was calculated as percent moisture content.

3.2.3 Determination of fat content
Weigh the 10 gm of sample. Transfer the sample into the thimble and plug the top of the thimble with fat free cotton. Attach the thimble to the Soxhlet flask. Pour approximately 2 ½ cycle of Acetone into the tube in cycle to dip the sample during pouring it. With heating mantle attached to the flax maintain temperature at 55˚C.Extract the sample for 4 hrs of continuous heating. Remove the thimble from the apparatus and distil off the ether. Collect the extract in flax and evaporate the excess ether from fat collected by steam bath. Cool the sample and weigh it.

3.2.4 Determination of Protein Content
The ammonia is collected in boric acid and titrated with standard H2SO4. (AOAC 2005) The organic nitrogen from the protein and other nitrogenous compounds is converted to inorganic nitrogen (ammonium sulphate) by complete oxidation of sample with conc. H2SO4. The digest is treated with excess of 50% NaOH to liberate ammonia from ammonium sulphate.

3.2.5 Determination of carbohydrate content
Carbohydrates are dehydrated with concentrated H2SO4to form “Furfural”, which condenses with Anthrone to form a green colour complex which can be measured by using calorimetrically at 620nm (or) by using a red filter. Anthrone react with dextrin, monosaccharide, disaccharides, Polysaccharides, starch, gums and glycosides. But they yield of colour where is to form carbohydrate.

Table 4: Results of Chemical Analysis

S. No.	Parameter	Result
1.	Ash	1.9%
2.	Moisture	6.72%
3.	Fat	33.1gm
4.	Protein	8.12gm
5.	Carbohydrate	48.5gm

Conclusion
Nowadays wide ranges of biscuits are available. To avoid health diseases, consumption of healthy and nutritious food is necessary. As a source of carbohydrates, protein and fats in the moringa was used in preparation of biscuits. Healthy eating is not about strict dietary limitations, staying unrealistically thin, or depriving yourself of the foods you love. Rather, it’s about feeling great, having more energy, and stabilizing your mood. After the study we decided to prepare moringa powder incorporated biscuit with combination of wheat flour together. Foods containing proteins and minerals can provide many health benefits as well, such as helping to

maintain weight and lowering your risk of diabetes, cancer and heart disease.

The influence of moringa powder incorporation on the nutritive value of wheat flour biscuit was investigated in this study. Moringa powder incorporated biscuit contained more protein and ash content as compared to control sample. It may be concluded from the present work that moringa powder at 15% level is acceptable for all sensory attributes and can be successfully used for incorporation without adverse affect on baking performance or eating quality. It is obvious from the findings of this research work that certainly it can improve the nutritional status of the population dependent on plant protein to combat malnutrition problems.

It was concluded that sample C was found accepted during sensory evaluation than sample A and sample B. Wheat flour and moringa powder can be mixed in the ratio of 85: 15 to get most acceptable taste. Proximate composition revealed that sample C contains (8.12%) proteins, (48.5%) carbohydrates and (33.1%) fat and was stored satisfactorily for the period of more than 60 days. Thus, mixing of flours can be recommended for production at commercial level to make nutritious and healthy biscuits.

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