

# Development and Quality Evaluation of Multigrain Muffins

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**Abstract:** Present work deals with the development, sensory evaluation and production of multigrain muffins. Various ingredients were used and formulated in different proportion i.e. 70:20:5:5, 70:15:10:5, 80:10:5:5 refined wheat flour, soya flour, oats flour and finger millet flour respectively. Sensory evaluation was done by semi trained panel using 9 point hedonic scale method and first formulation got highest score. Finalized formulation was further proceed and chemically analyzed. It contains protein content 13.14%, fat content 15.1% carbohydrate 59.14% and energy value 385.02Kcal/100gm. Multigrain muffins contain nutritional components that shows certain health benefits like  $\beta$  glucan found in oats that reduces the risk of heart diseases and reduces bad cholesterol level, finger millets rich in tryptophan, threonine, valine, isoleucine and methionine which suitable to people suffering from gluten allergy and celiac disease.

**Keywords:** Multigrain muffins, soya flour, carbohydrates, formulations

## 1. Introduction

The recent tendency for healthy food has influenced the development of new food products with increased nutritional value, as well as benefits to consumers. Bakery products are a type of food products characterized by their content of the wheat flour, which allows them to have a bulky structure. This kind of products includes bread, cakes and biscuits, such as crackers and cookies [1].

Muffins are a type of semi - sweet cake or quick bread that is baked in appropriate portion [2].

Soybean (*Glycine max*) seed is one of the largest sources of vegetable seed oil and protein. The feed and food industry which contain about 40% crude proteins and 20% oil. It is source of calcium, iron, carotene and ascorbic acid. Soy protein isolate (SPI) is commercial soy protein product at least 90% protein (dry basis) which has been widely applied in food industry as an important ingredient due to its nutritional value, desirable functional properties and low cost. Traditionally processing method of soybeans such as germination, soaking and dehulling are sometimes used to reduce or eliminate the ANFs that affect protein utilization [3] Soybeans contain 40% high quality protein with excellent digestibility [4].

Ragi (*Elesinacorocana*) is also known as "finger millet" which is popular millet in India consumed without Dehulling. Ragi which is cultivated in Africa and wide range in India. Millets can be cultivated in wide range of soils and climates and because of their short growing seasons. It is rich in protein, fiber, minerals viz. iron, calcium, phosphorus, and vitamin content. Traditionally Ragi is processed by germination. There is also overall improvement in flavor profile of Ragi during germination process [5].

Ingredients use in preparation of muffins such as condensed milk is to provide the tenderness, provides moisture and flavor to the product. Use of oats flour, Soya flour, and finger millet flour makes product nutritious and imparts health benefits.

## 2. Materials and Methods

### 2.1 Procurement of raw material

The ingredients use for development of multigrain muffins such as wheat flour, oats flour, Finger millet flour, soya flour, leavening agents, butter, condensed Milk, Milk were purchased from local market.

### 2.2 Processing of raw material

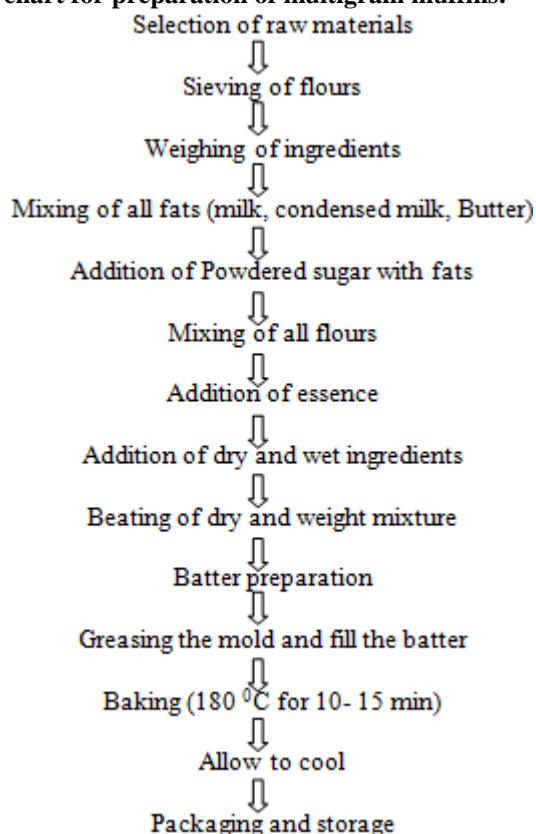
Sieving of all dry flours along with baking soda and baking powder was done to remove suspended impurities and butter, condensed milk stored at refrigeration temperature.

### 2.3 Preparation of muffins

Muffins were prepared by use of sugar batter method. In this method all fats are creamed together followed by addition of sugar during creaming process next to it addition of flour with baking powder, baking soda and essence. [6]

Firstly take the vessel, add all fats in it and creamed with hand blender followed by addition of powdered sugar. Then mix all the flours along with baking soda and baking powder into previously creamed fats. Proper beating of dry and wet mixture used to prepare batter having a proper consistency. Fix the mixing direction either clockwise or anticlockwise. After preparation of batter pour the batter in greased muffins mold and baking done at 180°C & allow the muffins to cool then packed in PET boxes and store it at ambient temperature.

**Flow chart for preparation of multigrain muffins:**



**Table 1:** Ingredients for preparation of 1 kg muffins

Sr.No	Ingredients	Amount in gm.
1	Refined Wheat Flour	183
2	Soya Flour	52.35
3	Oats Flour	13.08
4	Finger millet Flour	13.08
5	Baking Soda	2.61
6	Baking Powder	2.61
7	Condensed Milk	130.89
8	Powdered Sugar	183
9	Butter	91.62
10	Milk	377.22 ml

**2.4 Formulations**

We selected three samples for standardize the formulation of multigrain muffins.

**Table 2:** Formulations in %

Ingredients	Ratios in %		
	70	75	80
R.W.F	20	10	05
S.F	05	10	05
F.M.F	05	10	05
O.F	05	10	05

Where **R.W.F** - Refined Wheat Flour **S.F.** Soya Flour **F.M.F** - Finger millet Flour **O.F**- Oats Flour

**2.5 Chemical Analysis**

Total energy was calculated by using formula method **Energy**=(Carbohydrate)×4+(fat)×9+(protein)×4.[9]Estimation of total ash was carried out using muffle furnace at 550<sup>0</sup>C for 4 Hrs.[7] moisture content was determined by using standard oven drying method [7] The protein estimation was done by Kjeldhal method and it is obtained by multiplying

nitrogen value with 6.25[8] Fat estimation was done by Soxhlets extraction process using petroleum ether, as a solvent evaporated and the residues remains are weighted[8]Carbohydrate content calculated by formula method .

**2.6 Sensory Analysis**

Sensory analysis of multigrain muffins was done according to 9 point hedonic scale parameter by semi trained panel in Dr.Ulhas Patil College of food technology Jalgaon in Department of FST, FTBM, FIM, and FCN by professors. Sample A having proportion of 70:20:5:5 gains highest score on semi trained panel .A color, texture, taste, flavor and overall Acceptability was evaluated by 9 point hedonic Scale.

**3. Result and Discussions**

**3.1 Sensory evaluation**

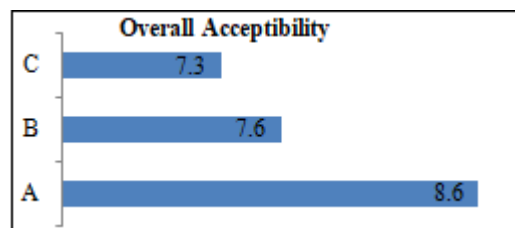
A result of sensory evaluation of multigrain muffins with 9 point hedonic scale shows that sample A having highest Score than sample B and Sample C. The higher scores for color were found in Sample A that contains 5% of Finger millet Flour that imparts Reddish Brown Color to Muffins. Evaluation with respect to texture shows that sample A got higher score than other samples because texture was obtained good by incorporation of 5% oats Flour and 5% Finger millet Flour. Taste and appearance of Sample A was better than Sample B and Sample C. Sample A has color, texture, flavor, taste, Appearance was 8, 7, 7.1, 8.5, 8.2, 8.6 Respectively so the sample A used for the further formulation.

**3.2 Chemical analysis**

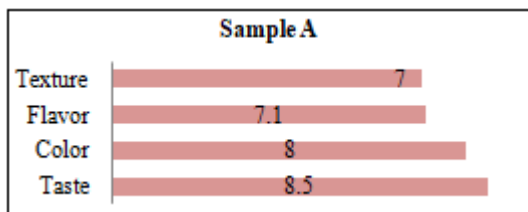
The results of chemical analysis show that the multigrain muffins were good source of energy, carbohydrates also provides protein and fiber in certain amounts. Following table shows the results of chemical analysis of multigrain muffins.

**Table 3:** Results of chemical Analysis

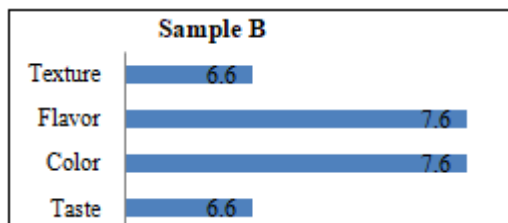
Test	Unit	Result
Total energy	Kcal/100gm	385.02
Fat	%	15.1
Protein	%	3.14
Carbohydrate	%	59.14
Fiber	%	1.020
Ash	%	2.3
Moisture	%	19.3



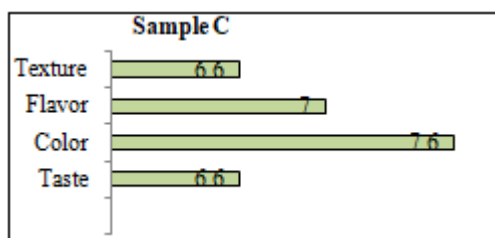
**Graph 1:** Overall Acceptability of sampleA, B, C.



Graph 2: Sensory Score of Sample A



Graph 3: Sensory Score of Sample B



Graph 4: Sensory Score of Sample C

Table 4: Results of sensory evaluation

Attributes	Sample A	Sample B	Sample C
Color	8	7.6	7.6
Texture	7	6.6	6.6
Flavor	7.1	7.6	7
Taste	8.5	6.6	6.6
Appearance	8.2	7.3	7.3
Overall Acceptability	8.6	7.6	7.3

#### 4. Conclusion

Formulation of muffins with soya flour, oats flour, refined wheat flour and finger millet flour in appropriate proportions makes product nutritive and increases the overall acceptability of product. The flours combinations could be use to prepare good quality of multigrain muffins with a good sensory property. Multigrain muffins are the good source of fiber, carbohydrate, protein, energy as well as fats which are important to maintain health and provide certain health benefits such as  $\beta$ -glucan found in oats that reduces the risk of heart diseases and reduces bad cholesterol level, finger millets rich in tryptophan, threonine, valine, isoleucine and methionine which suitable to people suffering from gluten allergy and celiac disease.

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