



DEVELOPMENT OF RAGI SWISS ROLL AND ITS NUTRITIONAL ANALYSIS

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Abstract—India consumes large amount of the bakery products and Swiss Roll is one of them which is being largely consumed by children. The improvement in living standard and awareness towards health food have diverted the people mindset of food consumption that generated immense scope in value addition of bakery products so present investigation was undertaken to prepare nutritionally rich Swiss Roll by partial replacement of maida with ragi flour which is rich in calcium, iron and fibers. The result show that Swiss Roll sample enriched with ragi flour were rich in mineral contents like calcium, iron, phosphorous and crude fiber as compared to the sample. This swiss roll cake beneficial for growing children, teenagers and pregnant and lactating women due to its high nutritive value.

Keywords— Bakery products, Ragi Swiss roll, sensory evaluation.

1. INTRODUCTION

Ragi, scientifically known as Eleusine coracana, has long been revered for its nutritional prowess and versatile culinary applications. Originating from Africa and Asia, this humble grain, also referred to as finger millet, boasts a rich array of essential nutrients, including calcium, iron, and fiber. Its earthy flavor profile adds depth to various dishes while offering a host of health benefits, making it a staple in South Asian cuisine and beyond. Bakery products are gaining much importance due to increasing demand of convenience food and so becoming popular among children as well as adults. Wheat is the most prevalent element in bakery products like bread, biscuits and cakes. Recently improvement in living standard and awareness towards health food have diverted the people mindset of food consumption that generated immense scope in value addition of bakery products like bread, biscuits, cakes etc. Swiss Roll is cake that are popular among home and commercial bakers. Initially, Swiss roll were popular in western countries only and were considered as rich men's food. However with rejuvenation of society they are acquiring importance all over the world. They are desired for brunch and/or supplementary meals and are on the other hand served with tea. Several varieties with different flavors such as strawberry, chocolate, vanilla, butterscotch etc. of swiss roll are available all over the world. Ragi (Eleusine Coracana L.), also known as finger millet is popular in India mostly consumed without de-hulling. It is vibrant millet grown in several states of India and Africa and established as a principal food for a huge section of the residents in these countries. Ragi is distinguished cereal rich in protein, fiber and minerals like iron, calcium and phosphorus along with essential amino acids and vitamins A and B. Thus ragi has proven its nutritional goodness as a functional ingredient in development of food for children, pregnant women, sick and old age people. Being a major source of calcium, dietary fibers and polyphenol, it is

also acknowledged for health benefit potential, such as anti-diabetic, antitumorigenic, atherosclerogenic effects, antioxidant and antimicrobial properties. The deliberate assimilation rate of ragi proficiently supports to regulate blood glucose levels in diabetic patients. The ragi millet grains are versatile ingredient that opens many doors for health food development inclusive with appropriate processing techniques. The present study was undertaken to develop the process technology for ragi millet supplemented Swiss roll with recipe standardization and nutritional characterization.

2. MATERIALS AND METHOD

Materials: Finger millet grain was procured from Super market in the Lucknow of Uttar Pradesh. Other ingredients such as ragi flour, castor sugar, eggs, baking powder, milk, salt, xanthan gum and vanilla essence etc. were purchased from the same Market in the Super Market, Lulu Mall, Lucknow.

1. Sample preparation

Ragi seeds were obtained from the supermarket in Lucknow. The seeds of the ragi were separated and that seeds were cleaned, washed, to remove all the fine or dust mite and then oven sun dried for 2-3 days. Drying the material helped it grow, product shelf life depending on water activity and the humidity. Product shelf life compound Swiss roll mixture temperature at 42°C. for further use in the development process.

Method

Good quality raw material were received from local market and preliminary cleaning operations were undertaken. Ragi was subjected to grinding to obtain fine texture. All dry powder ingredients were sieved properly to eliminate foreign particles and coarse material followed by weighing as per the formulation. Beating of margarine with sugar was carried out to prepare cream and batter was prepared by mixing of all dry ingredients to it. Butter paper were placed in moulds and weighed quantity of batter was spread on moulds. Thereafter moulds were kept in preheated baking oven (180°C for 15min) for baking which was followed by cooling of Swiss Roll at room temperature. Cooled Swiss Roll were packed in the polypropylene trays and covered by HDPE which were then sealed and labeled.

2. Ingredients of Ragi Swiss roll cake:-

- Ragi flour
- Refined castor sugar
- Eggs
- Xanthan gum(binding property)
- Vanilla essence
- Baking powder
- Salt

Filling:

- Whipped cream
- Mixed fruit jam
- 2 tbs milk

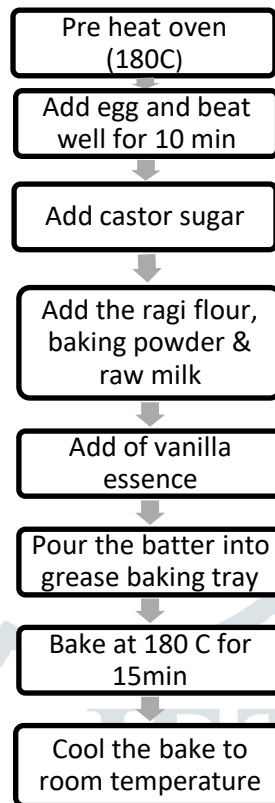


Fig. : Flow diagram for the preparation of Swiss roll cake

NUTRITIONAL ANALYSIS OF SAMPLE

1. Determination of moisture content

Moisture content of sample (ragi swiss roll) was determined by using hot air oven according to Rangana method, 10g of sample was taken in clear and dried dish. The dish was placed in the hot air oven at 80-90°C for 2 hours then the dish was placed to desiccator for allow to cool. The dish containing dried sample was weighed by using electronic weighing balance.

$$\text{The loss weight} = \frac{\text{Initial weight} - \text{Final weight}}{\text{weight of the sample}} \times 100$$

Determination of fat

Fat content was determined by using Soxhlet Apparatus. Soxhlet method is a popular method used for extracting lipid in different food. 2gm of sample was taken in thimble and placed in thimble holder; 250ml of petroleum ether was added. After 4 hours extraction, the heater and water tap were turned off. The ether was obtained by placing it in a flexible oven at 70°C for 30 minutes. The weight of the beaker and fat it contains was weighed.

$$\text{Fat (\%)} = \frac{W1 - W2}{W} \times 100$$

Determination of Ash

The determination of the ash composition is carried out with the help of muffle furnace. The dried crucible was removed from the oven and 3g of sample placed in the crucible. Ignition is complete by holding in the muffle furnace at 550°C until gray ash forms. Cool the dish in a desiccator and weigh. The amount of ash is calculated according to the formula-

$$\text{Ash (\% dry basis)} = \frac{M2 - M}{M1 - M} \times 100$$

Determination of crude fiber

The percentage of crude fiber was measured by the method of S. Ranganna. A 2g of fat-free sample was taken from the well. Wash with distilled water for 10minutes on a hot plate at 60°C . After treating with 1.25% dilute sulphuric acid for 15minutes on a hot plate, washing with distilled , the sample was placed in an oven with muffle furnace at 550°C for 2 hours.

Determination of Protein

The percentage of protein in the sample was determined by the Kjeldahl method. The percentage of protein was calculated from the amount of nitrogen in the sample.

Determination of Carbohydrates

Percentage of carbohydrates as a nitrogen (NFE) was calculated by using formula-

$$\text{NFE} = 100 - (\% \text{ protein} + \% \text{ fat} + \% \text{ ash} + \% \text{ moisture})$$

RESULTS

Nutritional Analysis of sample

Moisture: Determined using the Rangana method, the Swiss roll showed a moisture content of 24.37%, which is within the typical range for bakery products.

Fat content: Extracted using the Soxhlet method, the fat content of the Swiss roll was found to be 3.2%. This indicates a moderate fat content, which is typical for cakes.

Aah content: Ash content, indicating the mineral content, was found to be 1.23%. Higher ash content suggests higher mineral content, which is desirable for nutritional value.

Crude fiber: The Swiss roll demonstrated a significant crude fiber content of 23.12%, attributed to the inclusion of ragi flour. High fiber content is beneficial for digestive health.

Protein content : Determined by the Kjeldahl method, the protein content was found to be 7.73%. This is crucial, especially for individuals needing adequate protein intake.

Carbohydrate content: Calculated as nitrogen-free extract (NFE), the carbohydrate content was found to be 43.23%. This constitutes a significant portion of the caloric content of the Swiss roll

| Proximate composition | Ragi Swiss roll |
|-----------------------|-----------------|
| Moisture (%) | 24.37 |
| Ash (%) | 1.23 |
| Crude Fiber (%) | 23.12 |
| Fat (%) | 3.2 |
| Protein(%) | 7.73 |

Table 3.1. Proximate composition of Swiss roll

DISCUSSION

The Swiss roll enriched with ragi flour offers enhanced nutritional benefits compared to traditional Swiss rolls made solely with refined flour. Ragi contributes to increased levels of minerals like calcium, iron, and phosphorus, as well as dietary fiber, which are

essential for various bodily functions. The study highlights the potential of ragi-based bakery products in catering to diverse consumer needs, including children, pregnant women, and those seeking healthier food options.

The methodology used for nutritional analysis adheres to standard protocols, ensuring the reliability of the results. Overall, the study underscores the importance of incorporating nutrient-rich ingredients like ragi flour into bakery products to enhance their nutritional profile and cater to the evolving dietary preferences of consumers.

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