Development of Healthy Lady Finger Biscuit Supplemented with Barnyard Millet (Tiramisu)

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Abstract-Millets are one of the most ancient crops, which were domesticated about 10000 years ago. In this study lady finger biscuits were prepared by partial replacement of refined wheat flour with barnyard millet flour using different types of fats and its sensory quality was analysed. The nutritional quality of refined wheat flour lady finger biscuit was improved with supplementation of barnyard millet flour. The barnyard millet lady finger biscuits were prepared using butter, with an increasing proportion of barnyard millet flour from 50 percent to 70 percent. It was found that 70 per cent incorporated barnyard millet lady finger biscuits were more acceptable and tasty compared to other variations. Acceptability index of biscuit prepared using butter 87%We tried making tiramisu with 50% and 80% variations, but the results weren't very good. Further, we experimented with different ratios of 60% and 70%, and both worked well. But the preference for 70%was more when compared to 60%, Therefore, we will be further using 70% barnyard millet in our tiramisu (ladyfinger biscuits). %). The proximate composition of lady finger of variation 1 which was taken for further study prepared by incorporating all these raw materials was reported as moisture (24.01%), crude protein (9.39%), crude fat (1.78%), and ash (19.78%) content. Total minerals such as calcium were observed as 140 mg/100g.

Keywords: Barnyard millet, Lady Finger biscuit, Maida

1. INTRODUCTION

Millets are one of the oldest food grains known to mankind and possibly the first cereal grain used for domestic purposes. Millets comprise of sorghum, pearl millet, finger millet (major millets) foxtail, little kodo, proso and barnyard millet (minor millets).These are one of the several species of coarse cereal grasses in the family Poaceae, cultivated for their small edible seeds. Minor millets are the best source of micronutrients; the bran layer of millets also consists of B-complex vitamins and rich in micronutrients viz., Thiamine, riboflavin, folic acid and niacin. Millets vary largely in composition of carbohydrates as proportion of amylose and amylopectin content which varies from 16-28 per cent and 72-84 per cent, respectively. Snacks food market, is one of the largest market in the world, continuous innovations in the new flavours and new products are expected to score huge gains in the upcoming years.

Among the snacks food market, the baking industry occupies a wide area and demand is increasing for bakery products at the rate of 10.07% annually, so bakery products are the best vehicle to incorporate the small millets to enhance the nutritive value and for better health [6]. (Salunke et.al. 2019) reported that barnyard millet and wheat flour in ratio of 80:20 gave highest overall acceptability of 9.0, and with Maida 70:30 gave highest overall acceptability of 9.0 with vanaspati. (Sangram et.al., 2021) reported that 20% finger millet incorporated cookies scored higher overall acceptability of 7.89 compared to 10 and 30 % incorporated cookies with margarine. The main objective of the study was to prepare lady finger cookies by partial replacement of refined wheat flour with barnyard millet flour using different types of fats and analyse its sensory quality.

1.1 OBJECTIVES:

Nutritional Enhancement: Millets are nutritious grains, rich in fiber, protein, and various vitamins and minerals. By incorporating millets into ladyfinger biscuits, the aim could be to enhance the nutritional profile of the snack.

Gluten-Free Alternative: Millets are naturally gluten-free, making them suitable for individuals with gluten intolerance or celiac disease. The objective could be to provide a gluten-free alternative to traditional ladyfinger biscuits.

Diversification of Ingredients: Incorporating millets into ladyfinger biscuits allow for the diversification of ingredients, adding variety and novelty to the product.

Appealing to Health-Conscious Consumers: With the growing trend towards healthier eating, the objective

could be to appeal to health-conscious consumers by offering a snack option that is perceived as healthier due to the inclusion of millets.

Promotion of Sustainable Agriculture: Millets are environmentally sustainable crops, requiring less water and resources compared to other grains. The objective could be to promote sustainable agriculture by using millets as a key ingredient in the biscuits.

Overall, the objective of making millet-based ladyfinger biscuits could be to create a healthier, more diverse, and environmentally sustainable snack option that appeals to a wide range of consumers.

1.2 Materials and methods

Ingredients used in the development of ladyfinger biscuits were of good quality and free from contamination. All the ingredients were procured from the local market of Chennai. The main ingredients used were Barnyard millet flour, Maida, Milk, Sugar, Butter. The main equipment used are an electronic weighing balance, soxhlet extractor and Hot air oven. The equipments used were from Department of Food Science laboratory at M.O.P. Vaishnav College for Women, Chennai

Three types of biscuit were developed namely Standard, 70% millet flour based (Variation 1) and 80% barnyard millet flour (Variation 2). In all the three types of biscuit the amount of sugar (25 gm) and fat (25 gm) were kept constant. For development of plain cookies, Maida at the levels of 100%, was taken. Two variations of millet biscuit were developed. Each variation comprised of barnyard millet flour and Maida in the ratio of 70:30(variation 1) and 80:20(variation 2) The value added barnyard millet cookies were evaluated for organoleptic quality attributes by 9 hedonic scale of sensory evaluation by a panel of 20-25 judges from Department of Foods Science At MOP Vaishnav College for Women.

2. PROCEDURE FOR THE PREPARATION OF LADY FINGER BISCUIT

Draw margins on a sheet of parchment to get even size lady fingers. Turn it over so the lead pencil marking is not in contact with the batter. Place it on a baking sheet.

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Fit a piping bag with a large 1A round piping nozzle. You could just snip off an end to the desired cut if you don’t have a round nozzle.

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In a large bowl, whisk together the butter, sugar, baking powder, baking soda and salt until smooth.

↓

Whisk in the buttermilk a tablespoon at a time. The mixture might look slightly curdled and that’s ok.

↓

Add all the flour together and stir with a spatula to get smooth pastry dough. We're looking for a firm churro like dough that holds shape when piped out.

↓

If the dough is too runny and pipes out of the bag with no pressure required, you might need to add another tbsp of flour. On the other hand if it is too firm and tough to pipe out, please add a tsp of buttermilk at a time to loosen the dough.

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Transfer the dough to the piping bag and gently pipe out 3″ fingers.

↓

Dip your fingertip into water and shape the piped out fingers around the tops and bottoms to get even shapes.

↓

Sift over castor sugar and place the baking sheet in the freezer while you preheat the oven.

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Preheat the oven to 170C for 20 minutes.

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Bake the fingers for 18-20 minutes until light golden brown and firm to touch.

↓

Once done, place the baking sheet on a cooling rack and allow to cool completely.

Fig: 1 Process of making millet based lady finger

VARIATION 1

Fig 2: Types of biscuits

VARIATION 2

Fig2 Types of biscuit

CONTROL

3. STANDARDISATION OF BARNYARD MILLET LADY FINGER BISCUITS

Barnyard millet lady finger biscuits were standardised by varying proportions of barnyard millet flour at 50, 60 and 70 & 80 per cent using oil, ghee and butter. Sensory evaluation of the developed products: Semi - trained panellists (10) evaluated barnyard millet lady finger cookies for sensory parameters using 9 point hedonic scale, where 1- dislike extremely, 2- dislike very much, 3- dislike moderately, 4- dislike slightly, 5- neither like nor dislike, 6- like slightly, 7- like moderately, 8- like very much and 9- like extremely for the appearance, texture, flavour, taste and overall Acceptability. Lady finger Cookies variation with an overall acceptability means score above 5 were considered as Acceptable. Acceptability index was calculated by summing up of all the sensory scores of appearance, texture, flavor, taste and overall acceptability and it was divided by maximum score and multiplied by 100.

Acceptability Index□AI□=$^{\text{Total scores} \times 100}$

Maximum score ….. (1) 100.

3.1 Standardisation table of recipe

INGREDIENTS	STANDARDISED RECIPE	VARIATION 1	VARIATION 2
MAIDA	60g	18g	12g
BARNYARD MILLET FLOUR	-	42g	48g
BUTTER	25g	25g	25g
SUGAR	25g	25g	25g
SALT	0.5g	0.5g	0.5g
BUTTERMILK	30ml	30ml	30ml
BAKING POWDER	0.5g	0.5g	0.5g
BAKING SODA	0.5g	0.5h	0.5g

Note:Variation 1 70 % millet flour used

Variation 2 80% millet flour used

Control 100 % maida

4.ORGANOLEPTIC ACCEPTABILITY OF DEVELOPED VALUE-ADDED MILLET BISCUITS

All the developed value added food products were organoleptically evaluated for their colour, texture, appearance, taste and overall acceptability by using 9-point Hedonic scale. On the basis of organoleptic acceptability, acceptable value-added healthy snacks were further evaluated for their proximate composition.

5. PROXIMATE COMPOSITION

The proximate composition of food products were determined by employing the standard methods of analysis AOAC, (2000). Crude protein was estimated by standard method of (AOAC 2000) using KEL PLUS Automatic Nitrogen Estimation System. The micro Kjeldahl method was employed to determine the total nitrogen and the crude protein (N x 5.95). Crude fat was extracted using petroleum ether using the Automatic SOCS Plus Solvent Extraction System. The ash and crude fibre contents were determined based on methods outlined in AOAC, (2000).

6. SENSORY EVALUATION:

We used a hedonic scale of nine to conduct a small-scale sensory examination with about ten participants.

Initially, we tried making tiramisu with 50% and 80% variations, but the results weren't very good. Further, we experimented with different ratios of 60% and 70%, and both worked well. But the preference for 70%was more when compared to 60%, Therefore, we will be further using 70% barnyard millet in our tiramisu (ladyfinger biscuits)

RESULT OF PROXIMATE ANALYSIS

CHEMICAL CONSTITUENT	CONTROL (100%)	VARIATION 1 (70%)	VARIATION 2 (80%)
Moisture (%)	23.337	24.013	23.759
Protein (%)	71.60	9.39	10.50
Crude fiber (%)	66	38	86
Fat (%)	1.84	1.78	30.36
Carbohydrates (%)	66	48	86
Calcium (mg/100g)	150	140	160
Ash (%)	0.14	19.78	7.48

CONCLUSION

In conclusion, our study has shown that healthy millet biscuits can be developed with barnyard millet flour. However, 18% out of 20% of sensory evaluators preferred variation 1, which contained 70% millet flour and 30% maida. Acceptability index of biscuit made with butter 87%.We tried creating tiramisu with 50% and 80% variations, but the results were unsatisfactory. Furthermore, we tried alternative ratios of 60% and 70%, and both worked well. However, 70% was preferred over 60%. As a result, we will continue to include 70% barnyard millet in our tiramisu. The proximate composition of lady finger of variation 1 which was taken for further study prepared by incorporating all these raw materials was reported as moisture (24.01%), crude protein (9.39%), crude fat (1.78%), and ash (19.78%) content. Total minerals such as calcium were observed as 140 mg/100g.

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