

Development Of Cookies Using A Combination Of Foxtail Millet And Wheat Flour

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Abstract: In this paper, we developed three different types of cookies using a combination of foxtail millet and wheat flour. The ratio of foxtail millet flour and wheat flour changed as 60%, 50% and 45% and cookies were prepared. In order to determine consumer acceptability 9 point hedonic test was done with 32 untrained panelists serving and results were statistically analyzed to identify the best formulation. The sensory qualities, namely, appearance, texture, flavor, aftertaste, overall acceptability and proximate analysis specifically, moisture, crude protein, crude fat, crude fiber and ash of the cookies were determined. The findings indicated that the sensory evaluation 55% foxtail millet, 45% wheat flour sample was highly accepted as best formulation in terms of texture, aftertaste and overall acceptability. There was no statistically significant ($p>0.05$) difference in appearance and flavor. In the best formulation moisture content is 4.6%, crude fat is 5.7%, crude protein is 13.1%, crude fiber 0.07 % and ash 1.0%.

Index Terms: Foxtail Millet Flour, Proximate Composition, Sensory evaluation, Wheat Flour, Sensory Analysis

INTRODUCTION

Millets are small grained annual cereals cultivated for food, feed, forage and other industrial uses. Millets are major food sources for millions of people, especially those who live in hot, dry areas of the world. The term minor millets contains at least 12 to 14 species of the grass family and those with potential to become important crops in semi-arid production systems are finger millet (*Eleusine coracana*), foxtail millet (*Setaria italica*), proso millet (*Panicum miliaceum*), barnyard millet (*Echinochloa frumentacea*), little millet (*Panicum miliare*), kodo millet (*Paspalum scrobiculatum*) [8]. Foxtail millet, considered a crop for poor people, is grown mainly in India, China, and Japan. Warm weather conditions are highly suitable for foxtail millet production and the mature in the hot summer days. Successful production is due almost entirely to its short growing season: millet hay crops will mature in 65-70 days; grain varieties mature in 75-90 days [4]. Millets are rich in vitamins, minerals, sulphur-containing amino acids and phytochemicals, and hence are describes as 'nutritious millets' [3]. Millets release sugars slowly and thus have a low glycemic index. So they can be ideal food for diabetic patients, hence they are lack of gluten in their grains makes them good for coeliac- affected people [5]. According to [6], cookies are Ready-To-Eat (RET), convenient and inexpensive food products including disease resistant, tolerant to adverse conditions and with better nutritive value in terms of complex carbohydrate and high dietary fibre. They are produced as unpalatable dough that is transformed into a light porous, readily digestible and appetizing product through the application of heat. Moreover, in the present era, it is inevitable, to have the positive nutritional benefits of millets and popularized them among all sectors of the society for achieving nutritional and therapeutic food security.

PREPARATION OF BISCUITS

Here we developed cookies from the three blend formulations

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in the ratio of wheat flour, foxtail millet. Type A of cookies produced from composite flours of 40% wheat and 60 % foxtail millet flour. Cookies produced from composite flours of 55% wheat and 45 % foxtail millet flour called type B and type C cookies produced from composite flours of 50% wheat and 50 % foxtail millet flour. The other ingredients used were similar for all three types of cookies, such as, baking powder, Margarine, powdered sugar, Vanilla. All the ingredients were creamed together and about water added to prepare the dough. The dough was then placed on a cutting board, rolled out until uniform thickness and textures were obtained. Biscuit cutter was used to cut the sheet of rolled dough into desired shapes and sizes. The shaped dough pieces were then baked at about 165° C for 15 min, allowed to cool, packed and stored (see, for example [7],[8]).

SENSORY EVALUATION

The sensory attributes including appearance, texture, flavor (taste and aroma), aftertaste and overall acceptability, were evaluated by a semi trained 32-member panel, using a 9-point Hedonic scale with 1 representing the least score (dislike extremely) and 9 the highest score (like extremely). Here we performed the analysis of variance (ANOVA) test in order to find out the significant differences between the variations for different sensory characters by using R Software.

PROXIMATE ANALYSIS

The most consumer preferred sample was analyzed for moisture, crude protein, crude fat, crude fiber and ash content. In here, consumers were requested to give their individual opinion/acceptance about the three different type of developed cookies [1].

RESULTS AND DISCUSSION

Table 1.1: Sensory attributes of wheat flour and foxtail millet composite flour cookies

Types of Cookies	Mean Value of Sensory Score				
	Appearance	Texture	Flavor	Aftertaste	Overall acceptability
Type A	6.50	6.00	6.50	6.00	6.25
Type B	6.97	6.81	7.00	7.28	7.38
Type C	6.81	6.50	7.00	6.69	7.03

Mean	6.76	6.44	6.83	6.66	6.89
CD	0.23	NS	0.21	NS	NS
SE	0.04	0.07	0.05	0.11	0.10

increased, which means the preparation of cookies in a combined flour made a nutritional benefit [2]. There is an increase in the level of Crude fat because of the incorporation of wheat flour. Crude fiber level increased by the wheat flour addition.

CONCLUSION

From our study, it is clear that composite flour of 55% wheat and 45 % foxtail millet flour cookies were highly acceptable compared with other two types of cookies. This study further illustrated that the quality of cookies could be improved with foxtail millet flour, in terms of crude fiber and ash. The use of foxtail millet flour in cookies making, and other food products, would greatly enhance the utilization of this crop in developing countries like Sri Lanka. The nutritional quality of refined wheat flour cookies could be improved with supplementation of foxtail millet flour. Foxtail millet is preferred as it has a higher glycemic index. Further work is necessary in terms of microbiological qualities and shelf life. That will help in improvement in the product and then to determine long term effects of consumption of foxtail millet biscuits on blood lipid profile and glycosylated haemoglobin of diabetic and cardiovascular patients.

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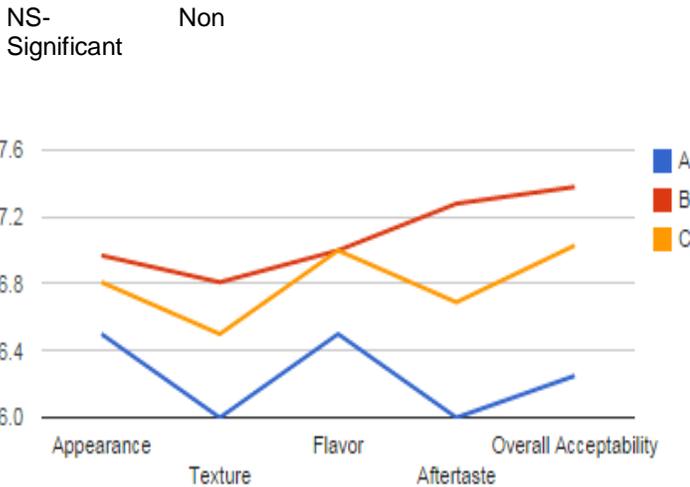


Fig. 1: Sensory Characteristics scores for all type of cookies

Table 1.1 shows that the mean scores ranged from 6.00 to 7.38. The lowest score was noted in texture and aftertaste parameters while highest score for overall acceptability. Further, it can be clearly seen that there was no significant difference in sensory attributes such as texture, aftertaste and overall acceptability among three different types of cookies prepared with different variations of foxtail millet and wheat flour. Moreover, the sensory scores of type B cookies had higher score compared with other two types of cookies in all parameters and it was found to be highly acceptable at higher level of wheat flour incorporation Fig.1. In addition to this type A cookies scored least acceptability over type B and type C probably due to more percent of incorporation of foxtail millet flour. And also type A cookies scored least marks in all the sensory characters. This is further supported to our opinion resulted that less incorporation of wheat flour. Therefore, according to these findings we can conclude that incorporation of 55% wheat flour and 45 % foxtail millet flour cookies is desirable and better acceptability compared with other two compositions, whereas, wheat flour and foxtail millet flour in equal proportions at 50% level of cookies resulted in moderate overall acceptability.

Table 1.2: Proximate composition of wheat flour and foxtail millet composite flour cookies

Parameter	Value		
Crude protein (%)	13.10		
Crude fat (%)	5.70		
Moisture content (%)	4.60		
Crude Fiber (%)	0.07		
Ash	1.00		

Table 1.2 shows the proximate values of the cookies chosen with consumer acceptance. The crude protein value is slightly