

SENSORY AND NUTRITIONAL QUALITIES OF MULTI-GRAIN COOKIES SUPPLEMENTED WITH DIFFERENT LEVEL OF RICE BRAN

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Abstract— In this study, nutritional rich multi-grain cookies using rice bran powder has been prepared. The multi-grain flour blend including wheat, pearl millet, corn flour was supplemented with different levels of rice bran (10,20,30%) powder and used for the preparation of cookies. The physical, nutritional and sensory characteristics of prepared multi-grain cookies was analysed. From the above results, it was concluded that multigrain cookies prepared with 20% level of rice bran powder are most acceptable and got the highest score in all sensory parameters. As a result, it was concluded that the treatment (T2) supplemented with 20% rice bran powder can be successfully used for the preparation of sensory acceptable and nutritional rich multi-grain cookies.

Index Terms— Rice bran, Wheat flour, Corn flour, Pearl-millet flour.

I. INTRODUCTION

Cookies are the most popular bakery product that is widely accepted and consumed by all levels of mankind. Because of the different sensorial and nutritional qualities cookies hold an important place in the baking industry (Chappalwar et al., 2005). Cookies are cost-effective, ready to eat and easy to make food products that provide a longer shelf life. Therefore, the mass production and distribution of cookies are feasible. In general, cookies are prepared from refined wheat flour (due to its gluten property), hydrogenated fat (shortening), sugar and baking powder. The refined wheat flour contains a higher proportion of starch, low dietary fibre and minerals, resulting the cookies prepared using refined wheat are low in protein, fat and mineral content (Chappalwar et al., 2013; Vajapurkar et al., 2015; Singh et al., 2019). Thus, in order to improve the nutritional properties of cookies, it is necessary to replace refined wheat flour with other flour blends which have better nutritional qualities.

Pearl millet is a gluten-free and good source of dietary fibres, polyphenol, calcium, protein and amino acids (Jha et al., 2018). Corn flour is also the major source of protein, vitamin (C, A, K), amino acid and selenium which improve the immune system (Sharma et al., 2012; Kumar et al., 2017). Rice bran is waste generated during the polishing of un-milled rice, it contains a large quantity of essential nutrients such as minerals, vitamins, fibre, amino acids and antioxidants (Gul et al., 2015; Virk et al., 2019). Supplementation of rice bran powdered with multigrain flour blend improves the nutritional properties of cookies. Therefore, in this study, efforts have been made to prepared nutritional rich multi-grain cookies using wheat flour, pearl millet, corn flour and rice bran powder.

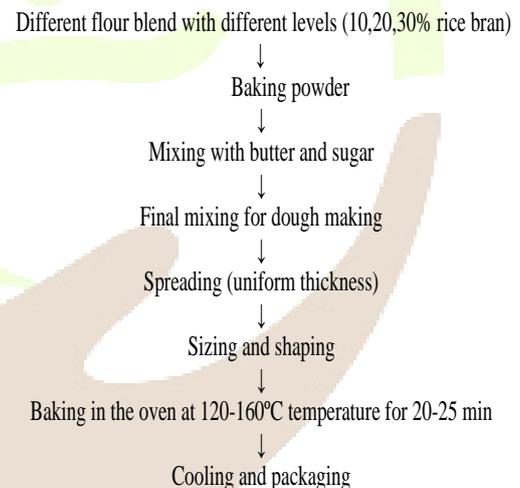
II. MATERIAL AND METHODOLOGY

A. Procurement of raw materials

The wheat, corn and pearl millet (bajara) flour and other ingredients such as rice bran powder, sugar, baking soda,

butter, milk was procured from the local market of Achrol, near Amity University Rajasthan, Jaipur India.

Procedure for preparation of multigrain cookies



B. Standardization of recipe

The cookies were prepared using the multi-grain flour including wheat, bajara, corn flour and supplemented with different level of rice bran powder. The ratio of flour and rice bran used for the preparation of cookies are shown in Table 1. All ingredient including flour, rice bran powder, baking soda was mixed and sieved twice for uniform mixing of leavening agents to the flour and also other ingredients. Butter (50g) was taken in a bowl and heated until it melts. Then powdered sugar (55g) was added to the dry ingredient and mixed properly. The soft dough was prepared by addition of the melted butter and a small amount of milk (5ml). The dough was rolled and used for the preparation of cookies. Cookies

were then kept in a baking oven for 20-25 min at 120-160°C for uniform baking.

Table 1: Ratio of flour blends with different level of rice bran powder

Treatment	Wheat Flour	Pearl millet Flour	Corn Flour	Rice bran (%)
T ₀ (Control)	75g	25g	25g	0
T ₁	75g	25g	25g	10%
T ₂	75g	25g	25g	20%
T ₃	75g	25g	25g	30%

C. Physical Parameters

Physical parameters like width, thickness, spread factor and weight of prepared cookies were determined by using a similar procedure described by Florence et al. (2014).

D. Chemical Analysis

The prepared multi-grains cookies were analysed for moisture content, ash, crude protein, fat, fibre, carbohydrates according to the methods described by AOAC (2005).

E. Sensory Analysis:

The prepared multi-grains cookies supplemented with rice bran powdered were evaluated by sensory parameters such as colour, flavour, taste, texture and overall acceptability. The sensory evaluation was carried out by ten semi-trained panellists from Amity Institute of Bio-technology department of Amity University Rajasthan, Jaipur using 9-Point Hedonic Scale.

F. Statistical Analysis

The following outcomes of the experimental results were recorded in triplicates and obtained data were analysed using mean and standard deviation (Gupta et al., 2019).

III. RESULTS AND DISCUSSION

A. Physical analysis of cookies

The prepared cookies with different levels of rice bran powdered were analysed for physical characteristics such as diameter, thickness and spread factor and weight. The obtained results are shown in Table 2.

Table 2: The physical analysis of prepared multi-grains cookies supplemented with different level of rice bran.

Physical characteristics	Control	T ₁	T ₂	T ₃
Diameter	58.69±0.21	58.29±0.31	58.48±0.32	58.62±0.32
Thickness	6.66±0.42	6.55±0.44	6.48±0.43	6.63±0.45
Spread factor	55.66±0.22	55.75±0.32	56.20±0.35	56.54±0.39
Weight	8.32±0.32	8.42±0.42	8.51±0.43	8.31±0.45

B. Chemical analysis of cookies

Rice bran supplemented multigrain cookies were analysed for their moisture content, ash, protein, fibre and carbohydrate content. The obtained results of the chemical analysis of prepared cookies are presented in Table 3.

Table 3. The chemical analysis of prepared multi-grains cookies supplemented with different level of rice bran.

Chemical Parameters	Control	T ₁	T ₂	T ₃
Moisture	5.02±0.14	6.13±0.17	6.68±0.19	6.84±0.21
Ash	14.80±0.41	15.91±0.51	19.40±0.53	19.20±0.54
Protein	10.62±0.22	11.59±0.26	13.85±0.27	14.29±0.25
Fat	2.36±1.01	2.42±1.22	2.55±1.25	2.67±1.32
Fiber	12±0.42	18.76±0.49	19.5±0.52	19.72±0.61
Carbohydrates	55.2±0.12	35.19±1.4	38.02±1.49	37.28±1.9

C. Sensory analysis of prepared cookies

The prepared multi-grains cookies supplemented with different level of rice bran were analysed by the ten members of the semi-trained panel and the score were given by evaluating the various sensory aspects such as colour, taste, texture, flavour and overall acceptability. The given results of various sensory parameters were presented in Table 4. The results showed that the cookies prepared (T₂) with 20% rice bran were got a higher score in terms of all sensory parameters as a comparison to the control, T₁ and T₃ treatment. Therefore, it was stated that the cookies prepared using 20% rice bran powdered are the best formulation for preparation of multigrain cookies.

Table 4. The sensory analysis of prepared multi-grain cookies supplemented with different level of rice bran.

Sensory Parameters	Control	T ₁	T ₂	T ₃
Colour	8.7±0.42	8.3±0.82	8.9±0.64	7.5±0.12
Flavor	8.6±0.42	8.5±0.67	9.2±0.67	8.3±0.12
Taste	8.5±0.69	7.2±0.75	8.7±0.57	7.9±0.82
Texture	8.5±0.69	8.5±0.89	9.4±0.84	7.5±0.42
Overall acceptability	8.5±0.48	8.1±0.15	9.05±0.42	7.8±0.16

CONCLUSION

From the above study, it was concluded that rice bran powder can be successfully used for supplementation of multi-grain cookies. It was observed that the prepared multi-grain cookies using rice bran powder improved the nutritional characteristics of cookies. According to the sensory analysis results, the treatment (T₂) supplemented with 20% bran powder prepared multigrain cookies has scored a maximum score in almost all the sensory parameters. Therefore, it was suggested from above results that rice bran could be a good source for preparation of nutritional rich cookies and in future it must be incorporated with other baked products to provide the value-added products to the consumer.

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