

Quality evaluation of cake prepared by utilizing non-conventional millets of Himachal Pradesh

Shalini Devi and Rajni Modgil

The present study was conducted to prepare and evaluate the nutritional quality of millet cake. Millet flours were incorporated at 70 per cent level in cakes and their sensory and nutritional properties were evaluated. The results revealed that, incorporation of millet flours in cake significantly increased the contents of ash (1.27 to 4.32%), protein (10.45 to 11.13%) and fibre (2.18 to 6.95%). The cake supplemented with *Kodra (Eleusine coracana)* flour showed maximum overall acceptability after control. From the study it can be concluded that a maximum of 70 per cent millet flours can be incorporated to prepare acceptable quality of cake.

Key Words : Non-conventional millets, Cake, Proximate composition, Sensory acceptability

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INTRODUCTION

The non-conventional crops are also referred by other terms such as underutilized, neglected, alternative or local crops. Some of these crops include the millets such as the finger millet (*Eleusine coracana*), foxtail millet (*Setaria italica*), proso or white millet (*Panicum miliaceum*), barnyard millet (*Echinochloa* spp.), little millet (*Panicum sumatrense*), etc. which are resistant to adverse climate conditions and can be used to improve

the food supply as well as income. Non-conventional cereals and millets are easily digestible and rich in micronutrients particularly with regards to calcium and iron, B complex vitamins, phytochemicals and hence are termed as nutri-cereals (Passi and Jain, 2014). Depending on the species, the proximate composition varies. The fibre content of millets is higher than major cereals like wheat and rice. Barnyard millet has fifty times more fibre content than rice and has lowest carbohydrate content and energy value. These are gluten-free and therefore can be an excellent option for those who are suffering from gluten allergy and bowel disease. Millets release sugars slowly and thus have a low glycemic index. Due to these attributes of millets, these are also acceptable as functional and nutraceutical food.

Despite their better nutritional quality and ease in cultivation millets are receiving less attention. Before the green revolution, in 1965-66 millets were cultivated in 36.90 million hectares. In 2016-17 the area under millet

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Parameter	Level	Description
Product	1	Cake
Ingredients	12	Refined wheat flour (WF), rice flour (RF), maize flour (MF), <i>Kodra</i> flour (KDF), <i>Kauni</i> flour (KNF), <i>Chinoi</i> flour (CF), <i>Shounkh</i> flour (SF), condensed milk, butter, baking powder, sodium bicarbonate, milk
Samples	6	Control (WF 100g), C ₁ (RF 50g: MF 50g), C ₂ (KDF 70g: RF 15g: MF 15g), C ₃ (KNF 70g: RF 15g: MF 15g), C ₄ (CF 70g: RF 15g: MF 15g), C ₅ (SF 70g: RF 15g: MF 15g)
Analysis		Nutritional composition and sensory analysis

cultivation declined to 14.78 million hectares. Unlike other major cereals, millets have not been exploited to their full potential. Processing the not-so-popular millets into nutritious ready-to-eat food products would increase their consumption by improving their market value. Hence keeping in view the importance and versatility of non conventional millets the study was planned and carried out with the objective to develop high quality cakes to enhance the utility and market value of these millets.

METHODOLOGY

The study was carried out in the Department of Food Science, Nutrition and Technology, College of Home Science, CSK Himachal Pradesh Agriculture University, Palampur.

Raw materials:

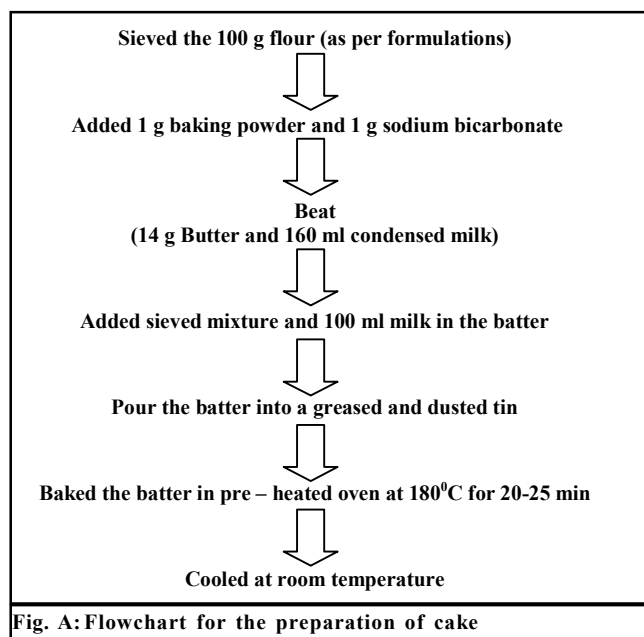
Non-conventional millets *viz.*, *kodra* (*Eleusine coracana*), *kauni* (*Setaria italica*), *chinoi* (*Panicum miliaceum*) and *shounkh* (*Echinochloa esculenta*) were procured from local farmers of Sirmaur district of Himachal Pradesh. The procured millet samples were cleaned manually for removing adhering dirt, dust and foreign particles. The grains were ground in to a fine powder with the help of stainless steel mixer grinder and stored in air tight food grade polyethylene terephthalate containers and stored in refrigerator till further analysis. All the analysis was carried out in triplicate. Other materials used to prepare the cake were purchased from local market.

Experimental plan:

The experimental plan used for the present research is given in Table A and Fig. A shows the flow chart for the cake preparation.

Nutritional composition:

The proximate analyses of sample for moisture,



crude fat, crude fibre and total ash were carried out in triplicate according to the methods of Association of Official Analytical Chemists (AOAC, 2010). Nitrogen was determined by the micro-Kjeldahl method (AOAC, 2010) multiplied by the factor of 5.83 for converting it in to crude protein. The total carbohydrate content was determined by difference (AOAC, 2010). Energy content was estimated by the method of O'shea and Maguire (1962). The experiments were carried out in triplicate and the data so obtained data were subjected to Analysis of Variance (ANOVA) using statistical method of Sheoran *et al.* (1998).

Organoleptic evaluation:

The prepared products were evaluated organoleptically by the 10 non-trained panelists using a 9 point hedonic scale (Rosa *et al.*, 2005). One end corresponded to the qualification 'disliked extremely' the center to 'neither liked nor disliked' and the other end to

'liked extremely'. The parameters on which the prepared products evaluated were colour, taste, flavour, texture and overall acceptability. The index of acceptance (IA %) was calculated using the following equation (Schumacher *et al.*, 2010).

$$\text{Index of Acceptance (\%)} = \frac{M}{9} \times 100$$

where M indicates the average of the evaluations carried out by sensory panel. Cutoff level for index of acceptance was 45 per cent.

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Nutritional evaluation of Cake supplemented with Millets:

The data for nutritional evaluation for cake is given in Table 1. As is clear from the data significantly ($P \leq 0.05$) higher moisture content was present in C_1 *i.e.* cake prepared by using maize and rice flour and minimum in C_4 *i.e.* cake prepared by using maize, rice and *Chinoi* flour. The ash content of cake prepared by different formulations of rice, maize and millet flour ranged between 1.27 – 4.32 per cent. The protein content was highest in C_4 (*Chinoi* flour cake) and fat content was highest for C_5 (cake prepared by using *Shounkh* flour) *i.e.* 11.13 and 23.92 per cent whereas, lowest in C_1 and

C_4 (10.31 and 23.14 %). The moisture, ash, fat, protein, fibre and energy content increased significantly ($P \leq 0.05$) with the addition of respective millet flour.

However, carbohydrate content decreased ($P \leq 0.05$) significantly with the addition of different millet flours. The variations are attributable to the differences in chemical composition with respect to these constituents present in various ingredients used in preparation of cake. The nutritional composition of cake significantly increased with supplementation of millets, due to the reason that selected millets were found to be good sources of protein, fibre, fat etc.

Organoleptic evaluation and index of acceptance of cake supplemented with millets:

As clear from the Table 2, the addition of different millets had significant effect on colour, flavour, texture, taste and overall acceptability of cake with maximum score for control followed by C_2 , C_3 , C_5 , C_3 and C_4 , respectively on the basis of 9.0 hedonic scale. The index of acceptance for cake is given in Fig. 1. As clear from the figure that maximum overall acceptability was found in control sample (96.67%) whereas, overall acceptability of cake supplemented with millets ranged from 76.94 to 89.4 per cent showing that the index of acceptance decreased with the addition of millet in the cake. Index of acceptance of cake prepared by using *Kodra* was maximum *i.e.* 89.44 per cent. The index of acceptance of the cake for various parameters *viz.*, colour, taste, flavor, texture and overall acceptability was above 73.33

Table 1 : Nutritional composition of cake prepared by supplementing millets

Parameters	Control	C_1	C_2	C_3	C_4	C_5	C.D. ($P \leq 0.05$)
Moisture (%)	20.12±0.03	20.36±0.08	20.20±0.03	20.24±0.03	20.01±0.19	20.30±0.01	0.16
Crude ash (%)	1.27±0.01	2.95±0.05	3.86±0.03	3.98±0.03	4.26±0.02	4.32±0.02	0.05
Crude fat (%)	23.75±0.05	23.68±0.02	23.26±0.02	23.76±0.07	23.14±0.02	23.92±0.03	0.07
Crude protein (%)	10.45±0.05	10.31±0.04	10.69±0.02	10.52±0.02	11.13±0.003	10.98±0.01	0.05
Crude fibre (%)	2.18±0.02	4.00±0.06	6.23±0.01	4.53±0.02	6.95±0.01	4.96±0.01	0.05
Carbohydrate (%)	42.23±0.03	38.70±0.12	35.75±0.005	36.96±0.03	34.50±0.16	35.52±0.02	0.15
Energy (kcal)	424.48±0.10	409.16±0.82	395.13±0.29	403.78±0.43	390.82±0.76	401.29±0.29	0.91

Table 2 : Organoleptic scores for cake supplemented with millets

Treatment	Control	C_1	C_2	C_3	C_4	C_5	C.D. ($P \leq 0.05$)
Colour	8.80±0.27	8.30±0.27	7.80±0.45	8.20±0.27	7.20±0.27	8.20±0.27	0.41
Taste	8.80±0.27	7.20±0.27	8.30±0.27	8.20±0.27	6.80±0.45	8.10±0.22	0.40
Flavour	8.40±0.55	6.60±0.55	7.90±0.22	7.70±0.27	7.10±0.22	7.10±0.22	0.49
Texture	8.80±0.45	8.30±0.45	8.20±0.27	7.30±0.27	6.60±0.55	8.20±0.27	0.52
Overall acceptability	8.70±0.11	7.60±0.22	8.05±0.26	7.85±0.14	6.92±0.27	7.90±0.15	0.26

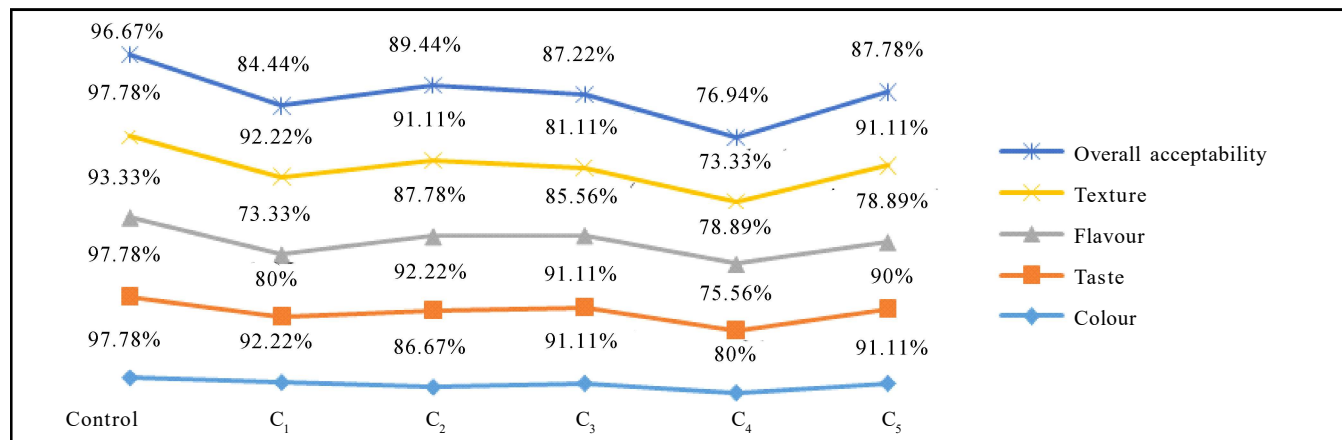


Fig. 1 : Index of acceptance for Cake prepared by supplementing millets

per cent for all cakes indicating that the index of acceptance of the cake was good.

Conclusion:

The study conclusively indicated that nutritional quality particularly fibre and protein increased in millet supplemented cakes as compared to the control cake. Moreover cake can be made by using non-wheat flours such as: *Kodra* flour, *Kauni* flour, *Chinoi* flour and *Shounkh* flour. These cakes can be used in the diets of celiac disease patients. Maximum preference was given to sample C₂. Addition of millet flours upto 70 per cent leads to cake with good nutritional and sensory properties.

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