

Effect of Addition of Popped Amaranth Flour on Sensory and Nutritional Quality of *Babroo*

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INTRODUCTION

Babroo (also called ankalian or cheelai) is a popular rice based product of Himachal Pradesh. In appearance it is somewhat like dosai. Traditionally, it is prepared by making a thin batter of rice flour, spreading it on a hot greased griddle and cooking till it turns light brown. In the present study, however, a little modification was made and batter was allowed to ferment as in case of dosai. Further, popped amaranth flour was added in rice flour to improve the nutritional quality of babroo. The amaranth seeds have been reported to contain 12.54 per cent protein, 11.33 per cent moisture 7.05 per cent ether extract, 3.00 per cent total ash and 2.75 per cent crude fibre. The calcium and phosphorus contents were 210 and 570 mg/100g, respectively (Arellano et al., 1992). The protein of amaranth seeds is unusual because its balance of amino acid is closer to the optimum balance required in human diet. The lysine content of amaranth is especially high compared with other most common cereals. Keeping this in view the present study was undertaken to prepare nutritious babroo's and to ascertain the effect of addition of popped amaranth flour on its sensory quality.

MATERIALS AND METHODS

The paddy samples were procured from the Rice Research Station, Malan of Himachal Pradesh Krishi Vishvavidyalaya, Palampur (H.P.). A part of paddy was parboiled by soaking in warm water ($70 \pm 2^\circ\text{C}$) for 3.5 hour. The excess water was then drained off and paddy was autoclaved at 1.05 kg/cm² pressure for 15-25 minutes, till no white core was left. The parboiled paddy was dried in shade till 12 ± 2 per cent moisture level was attained. Then both parboiled and non-parboiled paddy samples were

dehusked in Satake Rice Sheller, polished to six per cent degree in McGill Miller No. 2 and ground to flour fineness. Amaranth seeds of variety Annapurna were procured from the seed production unit of the university. The seeds were cleaned, popped and ground to flour and were used for preparation of babroo.

Preparation of Babroo

Rice flour (100g) containing different proportions of (0.5, 10 & 15%) of popped amaranth flour was sieved. Then salt (3.0 g), chillies (4.0 g), onion (1.0 g) and compressed yeast (250 mg) dissolved in small amount of lukewarm water were added to the flour and mixed them properly. A thin batter was made using sufficient amount of water. The batter was kept in a warm place to ferment for one and half hour. Circular babroo's were then prepared by spreading the batter on hot, greased griddle and cooked till light brown from both sides.

Sensory Evaluation

The prepared babroo's were presented to a randomly selected judges for sensory scoring for different characteristics like colour, flavour, texture and taste using ten point Hedonic scale.

Nutritional Quality and Economics

The nutritional quality of babroo blends containing rice and amaranth flour was calculated by taking into consideration the nutrient content of rice and amaranth. The cost of blends was also calculated.

RESULTS AND DISCUSSION

Effect of Processing and Addition of Popped Amaranth Flour on Sensory Score of Babroo

The babroo prepared from different blends of rice and amaranth flour were tested

organoleptically and mean scores are presented in table 1. The babroo's containing 100 per cent rice flour scored the highest for colour and, as the level of amaranth flour increased, the scores decreased significantly. However, parboiling of paddy was found to have no significant effect on the colour of babroo's. The flavour, texture and taste scores also decreased significantly on addition of amaranth flour. The parboiling of paddy showed no significant effect on flavour and texture scores. While, taste was significantly affected. The colour, flavour, texture and taste scores of babroo containing 100 per cent rice flour were 7.49, 7.23, 7.00 and 7.06 ranking good on scale while, it decreased to 5.45, 5.89, 6.28 and 6.11 ranking fair on the scale, on addition of 15 per cent popped amaranth flour. In case of 100 per cent parboiled rice flour babroo's the respective scores were 7.19, 7.06, 7.17, 7.39 ranking good and decreased to 5.46, 6.06, 6.06 and 6.06, respectively rating fair on the scale when 15 per cent popped amaranth flour was added.

Effect of Processing and Addition of Popped Amaranth Flour on Nutritional Quality and Cost of Babroo Blends

The data presented in table 2 shows that the addition of popped amaranth flour in rice flour increased the protein, fat, fibre, lysine, calcium, phosphorus and iron contents. The respective values in case of 100 per cent raw rice flour blends increased from 8.24g to 9.55g, 1.32g to 2.39g, 0.20 g to 0.47 g, 317.40 mg to 405.87 mg, 11.31 mg to 29.11 mg, 157.17 mg to 208.59 mg and 2.66 mg to 7.51mg, on addition of 15 per cent popped amaranth flour. In case of parboiled rice flour babroo blends the protein(g), fat(g), fibre(g), lysine (mg), calcium (mg), phosphorus (mg) and iron (mg) contents increased from 8.29 to 9.60, 0.75 to 1.69, 0.20 to 0.47, 317.40 to 405.87, 16.68 to 33.68, 201.79, 246.52 and 3.62 to 8.33, respectively on addition of 15 per cent popped amaranth flour in rice flour. The thiamin and riboflavin contents also increased slightly but niacin content decreased due

Table 1: Effect of processing and addition of popped amaranth flour on sensory score of babroo

Parameters	Substitution level of raw rice flour with popped amaranth flour				Substitution level of parboiled rice flour with popped amaranth flour			
	0%	5%	10%	15%	0%	5%	10%	15%
Colour	7.49	6.67	6.14	5.45	7.19	6.87	5.98	5.46
Flavour	7.23	7.02	6.24	5.89	7.06	6.67	6.26	6.06
Texture	7.00	6.28	6.33	6.28	7.17	6.83	6.27	6.06
Taste	7.06	6.72	6.39	6.11	7.39	7.11	6.56	6.06
C.D. (0.05)	Colour	Flavour	Texture	Taste				
Processing Method	NS	NS	NS	0.15				
Substitution Level	0.22	0.15	0.25	0.21				

Table 2: Effect of processing and addition of popped amaranth flour on nutritional quality and cost of babroo blends (per 100 g flour blend)

Parameters	Substitution level of raw rice flour with popped amaranth flour				Substitution level of parboiled rice flour with popped amaranth flour			
	0%	5%	10%	15%	0%	5%	10%	15%
Protein (g)	8.24	8.68	9.12	9.55	8.29	8.73	9.16	9.60
Fat (g)	1.32	1.60	2.12	2.39	0.75	1.06	1.38	1.69
Fibre (g)	0.20	0.29	0.38	0.47	0.20	0.29	0.38	0.47
Lysine (mg)	317.40	346.38	376.38	405.87	317.40	346.89	376.38	405.87
Calcium (mg)	11.31	17.24	23.18	29.11	16.68	22.35	28.01	33.68
Phosphorus (mg)	157.17	174.31	191.45	208.59	201.79	210.70	231.16	246.52
Iron (mg)	2.66	4.28	5.89	7.51	3.62	5.19	6.76	8.33
Thiamine (mg)	0.06	0.06	0.07	0.07	0.21	0.21	0.20	0.20
Riboflavin (mg)	0.06	0.07	0.09	0.10	0.05	0.06	0.08	0.09
Niacin (mg)	1.90	1.86	1.81	1.71	3.80	3.66	3.52	3.38
Cost (Rs./100g flour)	1.52	1.49	1.47	1.44	1.48	1.45	1.43	1.41

to addition of amaranth flour. Sanchez et al. (1987) also found significant improvement in the nutrient quality of amaranth enriched corn tortilla without any significant effect on appearance, aroma, texture, flavour and after test of corn tortilla. Pederson et al. (1987) reported that the addition of amaranth to cereal flour is an effective source of protein improvement.

The cost of babroo blends was also calculated. The addition of amaranth flour decreased the cost of babroo blends. The cost of parboiled rice flour blends was lesser than raw rice flour blends because on milling parboiled rice gave better grain recovery than raw rice.

KEY WORDS Traditional Recipe. Sensory Evaluation. Substitution. Nutritional Quality.

ABSTRACT Babroo - a traditional rice based product of Himachal Pradesh, also known as ankalian or cheelai

was prepared. An attempt was also made to improve its nutritional quality through the addition of popped amaranth flour. The results revealed that the addition of popped amaranth flour into rice flour reduced the colour, texture and taste scores. But, they still scored fair on the ten point hedonic scale. The addition of popped amaranth flour into raw and parboiled rice flour increased the protein, fat, fibre, lysine, calcium, phosphorus, iron and riboflavin contents but niacin content was decreased.

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