Asian Journal of Home Science, **Vol. 3 Issue 2 : 115-117 (December 2008 to May, 2009)**

Quality characteristics of Navarathna Nutri mix and its substitution in food preparation

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Accepted : *July, 2008*

ABSTRACT

Value addition by incorporating millets and pulses in daily food preparations seem to be a current trend to provide needed nutrients for maintaining health status. Considering this, a study was undertaken to develop Navarathna Nutri mix (NNM) and analyze its physico-chemical and nutrient characteristics and shelf-life. The mix was prepared with a cereal, three kinds of millets, four types of pulses and an oilseed. The mix possessed optimum levels of moisture and ash and provided 65.4, 15, 3.04 g per cent of carbohydrates, protein and fat, respectively. The total bacterial and yeast count in the mix were well within the permissible level on 30 days of storage. Organoleptic characteristics of mix were tested by substituting it at different levels (10-50 per cent) in fermented batter, wheat flour and rice flour for the preparations of idli, dosa, chapatti and puttu. Sensory evaluation conducted with five point hedonic scale showed that the scores attained for higher level of substitution (50 per cent) were maximum and well acceptable. The results highlighted that the substitution of nutri blend would improve the quality, palatability, add variety and strengthen the nutritional value of the traditional food preparations.

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Key words : Cereal-pulse mix, Quality, Acceptability, Shelf-life.

Traditional foods are an expression of culture, history and lifestyle. In addition, traditional foods are frequently palatable and this combined with reputed positive health effects, makes them attractive to the food industry (Trichopoulou *et al*., 2007). Challenges ahead in the development of heritage foods are value addition, convenience and health promotion. Value addition to our daily preparations seems to be essential for maintaining normal health. Nutritional quality of a food can be increased by incorporating mixed cereals (Gopalan, 1992). No one legume or cereal can provide adequate amounts of all nutrients to meet the nutritional requirements. However, even before knowledge on protein content, protein quality, digestibility and the nutrient requirements of human became available, it was recognized that mixing legumes with cereals in the diet could improve overall nutrition (www.fao.org). Vimala *et al*. (1990) suggested various infant mixes based on sorghum and pearl millet and fortified with soybean, green gram, red gram or Bengal gram flour. Cereal-pulse combination and fermentation improve the bioavailability of iron (Malhireddy and Agte, 1992). Hence, a study was undertaken with the aim to develop a Nutri Mix with cereals and pulses, providing better scope for convenience, quality, variety and nutritional value.

METHODOLOGY

The raw materials chosen for the present study were cereals and pulses commonly consumed by all kinds of people *viz.* bajra, jowar, ragi, wheat whole, bengal gram dal, black gram dal, green gram dal, horse gram and soy bean. These grains were purchased from the local market at Coimbatore city. The samples were cleaned to remove dust and other foreign particles. A weighed amount (Table 1) of each of the grains were taken, mixed and ground to a fine powder.

Table 1 : Composition of Navarathna Nutri mix (100g)

Ingredients	Quantity(g)
Bajra	15
Jowar	15
Ragi	10
Wheat whole	10
Black gram dal	15
Bengal gram dal	10
Green gram dal	10
Horse gram	10
Soybean	5

Quality evaluation in terms of phsico-chemical characteristics and nutrient content of the Navarathna Nutri mix were analyzed using standard procedures *viz.*, moisture and total ash (IS2234:1989) carbohydrate (Anthrone method), protein (KELPLUS), estimation of fat and fibre – (SOCSPLUS and FIBRAPLUS).Total bacterial count and yeast and mould count of the NNM were assessed following the standard procedure to

understand the keeping quality of the mix. Organoleptic evaluation of the mix was done by substituting it at different levels *viz.,* 10,20,30,40 and 50 per cent in fermented batter, wheat flour and as a whole in the place of rice flour for the preparation of idli, dosa, chapatti and puttu, respectively. Sensory evaluation for the made products was carried out with a set of panel members (N=20) using five point hedonic scale.

RESULTS AND DISCUSSION

Physico-chemical characteristics are the indicators to determine the quality of the product. The developed Navarathna mix possessed optimum levels of moisture (10.69g) and total ash (1.0 g). Phsico chemical and nutrient content of Navarathna Nutri mix are given in Table 2

Table 2 : Physico chemical and Nutrient content of Navarathna Nutri mix

Criteria	*Navarathna Nutri mix* (100g)
Moisture (g)	10.6
Ash(g)	1.0
Carbohydrate (g)	65.5
Energy (Kcal)	341
Protein(g)	15.4
Fat (g)	2.0
Iron (mg)	4.24
Fibre (g)	1.8

The mix provided 15.4g and 65.5g of protein and carbohydrate, respectively and minimum amount of fat (2g). The moisture content (10.6g) was less than (12g) BIS Standard (IS2234:1989).The total bacterial count of the mix was found to be 14.5×10^{1}cfu/g and yeast and mould count was 1.5×10^{1}cfu/g by the end of fourth week, which was well within the permissible level and proved that the mix can be stored safely free from any bacterial contamination for a period of four weeks.

According to Iya (2006) quality of the product is not merely the preservation or keeping quality but even more importantly characteristics of flavor, taste and the acceptability of the product. Mean sensory scores of Navarathna Nutri mix incorporated dosa (Table3) revealed that, of the different variations, 50 per cent incorporation seems to secure highest score.

In preparation of idli upto 30 per cent substitution was acceptable as the higher level of substitution alters the texture, flavour and appearance (Table 4) of the prepared idli.

Sweet puttu prepared with 100 per cent Navarathna Nutri mix (Table 5) was found to be well acceptable when compared to seasoned one and the former was comparable with the standard.

Table 3 : Mean sensory scores of Navarathna Nutri mix incorporated dosa

Critreia	Standard	10%	20%	30%	40%	50%
Appearnce	4.0±0.82	4.0±0.00	4.0±0.95	4.0±0.00	3.9±0.32	4.0±0.47
Flavour	4.3±0.52	4.1±0.48	3.9±0.20	3.6±0.12	3.6±0.17	3.7±0.95
Texture	4.2±0.48	4.0±0.63	3.7±0.92	3.7±0.48	3.7±0.82	3.7±0.67
Taste	4.5±0.73	4.2±0.94	3.9±0.57	3.8±0.92	3.9±0.73	4.0±0.94
Overall acceptability	4.1±0.47	4.1±0.67	4.1±0.48	4.0±0.67	4.0±0.82	4.1±0.57

Table 4 : Mean sensory scores of Navarathna Nutri mix incorporated idli

Critreia	Standard	10%	20%	30%	40%	50%
Appearnce	4.5±0.00	3.8±0.00	3.7±0.95	3.7±0.48	2.1±0.56	1.7±0.47
Flavour	4.4±0.52	4.6±0.70	4.6±0.67	4.6±0.51	3.6±0.73	2.5±0.52
Texture	4.6±0.73	3.8±0.51	3.7±0.12	3.7±0.48	3.6±0.52	2.6±0.67
Taste	4.6±0.68	4.5±0.00	4.7±0.63	4.5±0.58	2.5±0.63	1.8±0.68
Overall acceptability	4.5±0.57	3.8±0.95	4.1±0.19	4.0±0.12	2.6±0.51	1.8±0.51

Table 5 : Mean sensory scores of Navarathna Nutri mix puttu

Critreia	Standard	100 %	
		Seasoned	Sweet
Appearnce	4.5±0.00	4.1±1.19	4.4±0.96
Flavour	4.7±0.70	3.9±0.87	4.0±0.60
Texture	4.4±0.63	4.2±0.63	4.4±0.51
Taste	4.5±0.51	3.8±0.63	4.5±0.44
Overall acceptability	4.5±0.70	3.8±0.54	4.2±0.78

Navarathna Nutri mix substituted at 10-50 per cent level in wheat flour was used for the preparation of chapatti. The organoleptic scores for chapatti showed that 20 per cent incorporated one secured better score with respect to flavour, texture and taste, whereas 10 per cent incorporated one secured better score for appearance and overall acceptability (Table 6).

Navarathna Nutri mix substituted composite flour

Table 6 : Mean sensory scores of Navarathna Nutri mix incorporated chapatti

Critreia	Standard	10%	20%	30%	40%	50%
Appearnce	4.9±0.70	4.8±0.44	4.4±0.89	4.2±0.83	4.0±0.70	3.6±0.89
Flavour	4.5±0.44	4.8±0.44	4.8±0.67	4.2±0.70	4.0±0.89	3.0±0.00
Texture	4.8±0.54	4.0±0.71	4.6±0.54	3.4±0.54	4.2±0.09	2.2±0.67
Taste	4.8±0.00	4.6±0.44	4.8±0.71	4.0±0.71	4.5±0.70	3.0±0.70
Overall acceptability	4.8±0.63	4.8±0.44	4.6±0.54	4.0±0.70	4.0±0.51	2.8±0.91

Table 7 : Nutrient contribution of NNM substituted composite flour

Nutrients	Standard	10%	20%	30%	40%	50%
Carbohydrates (g)	69.4	69.01	68.62	68.23	67.84	67.45
Protein (g)	12.1	12.43	12.73	13.09	13.42	13.75
Energy (kcal)	341	339	339	339	336	336
Fat (g)	1.70	1.73	1.76	1.79	1.82	1.85
Fiber (g)	1.90	1.89	1.88	1.87	1.86	1.85
Iron (mg)	4.90	4.83	4.77	4.70	4.69	4.57

provided higher amount of protein but equal amount of energy when compared to 100 per cent wheat flour (Table 7).

Conclusion:

Results clearly indicate the suitability, in terms of quality and acceptability of developed NNM substitution in our traditional food products. Food industry innovation strategies need to be based on the total technology in the food system and concerned not only with the technological changes but also with the social and environmental changes, so as to produce food that satisfies the nutritional, personal and social needs and wants of all communities. Traditional foods scientifically standardized with modern knowledge in product upgradation, quality, nutrition and health promotion will play a major role in the future food industries.' Healthy and Palatable' combination is very attractive to the evergrowing need of the consumer and food industry, and hence traditional foods could potentially be mass produced.

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