

Optimization and quality evaluation of nutritious soup mix

Nivedita and Rita Singh Raghuvanshi

The study was undertaken with the objective to develop soup mix which is easy to make, takes less preparation time and is nutritious. It was made from finger millet (*Eleusine coracana*), horse gram flour (*Macrotyloma uniflorum*) and regional flavouring agent *gandrani* (*Angelica glauca*). Product optimization was done with different combination of ingredients and final level *i.e.* 46.5 per cent of finger millet flour, 12.0 per cent of horse gram flour, 9.0 per cent soybean, 10.5 per cent of salt, 9.0 per cent garlic and 1.0 per cent *gandrani* and 12.0 per cent oil were selected by sensory evaluation in nine point hedonic scale and product acceptability done by score card method. The soup mix was dried for investigation of nutritional composition, calcium and iron and results revealed that it was highly nutritious in all the parameters along with being accepted by population.

Key Words : Soup mix, Flavoring agent, Finger millet, Horse gram flour, *Gandrani*

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INTRODUCTION

Soup is primarily a liquid heterogeneous category of food, predominantly served hot. Clear and thick are two main groups of soups. Clear soups are mainly prepared from the use of clear extracts of edible animal or plant parts while cereal or pulse flour, starch, cream or eggs are used for the thick soup (Singh and Prasad, 2014). It stimulates appetite and provides quick nourishment, and is responsible for the improvement of appetite and gastrointestinal responses (Cecil *et al.*, 1999) which is considered as the best nutrient vehicle for the all sections of the society. A combination of whole cereals, vegetables, pulses and milk products provide nutrients in

balanced form. Thick soups supply a large proportion of energy needed, carbohydrate, protein, dietary fibre, amino acids and mineral. In the present study thick soup was made by incorporating millet (finger millet) and pulses (horse gram) in different combination called as soup mix.

Finger millet (*Eleusine coracana*) is taken as a major component in soup mix and provides good taste. It is nutritionally rich as it contains high levels of protein and minerals such as calcium, iron and manganese (Upadhaya *et al.*, 2006). Quality of protein is mainly a function of its essential amino acids. Finger millet contains 44.7 per cent essential amino acids (Mbithi-Mwikya *et al.*, 2000) of the total amino acids, which is higher than the 33.9 per cent essential amino acids in FAO reference protein (FAO, 1991). Singh and Srivastava (2006) analysed 16 finger millet varieties and found out that it ranged from 4.88 to 15.58 per cent with a mean value of 9.728 per cent. It also good source of non- available carbohydrate with low glycemic index and high proportion of fibre. Another ingredient of soup mix from pulses namely horse gram (*Macrotyloma uniflorum*) known as the cheapest source of vegetable protein. The nutrient

MEMBERS OF RESEARCH FORUM

Author for correspondence :

Nivedita, Department of Foods and Nutrition, College of Home Science, G.B. Pant University of Agriculture and Technology, Pantnagar, U.S. Nagar (Uttarakhand) India
(Email : nivedita2310@gmail.com)

Associate Authors' :

Rita Singh Raghuvanshi, College of Home Science, G.B. Pant University of Agriculture and Technology, Pantnagar, U.S. Nagar (Uttarakhand) India

profile of horse gram seeds shows protein–22 per cent, carbohydrate– 57 per cent, phosphorus–311 mg /100 g, iron – 7 mg/100 g, calcium–287 mg / 100g with calorific value–321 (Kadam and Salunkhe, 1985). This legume crop is in high demand recently due to its increased medicinal usage as traditional medicine for kidney stone. It possesses many health beneficial components (Viswanatha *et al.*, 2006). A black colour soybean (*Glycine max*) is used in soup mix. Soybean, with its protein content, could be substitute for expensive meat products, as there is a worldwide shortage of affordable protein. It is reported that soybean has a hypoglycemic effect, hence it can be used for diabetic patients (Manay and Shadaksharaswamy, 2008). Londhe *et al.* (2014) reported garlic (*Allium sativum*) gives unique aroma, flavour and taste to the soup mix, due to these properties soup mix become more palatable. Garlic contains at least thirty three sulfur compounds, several enzymes, seventeen amino acids, and minerals such as selenium. It contains a higher concentration of sulfur compounds than any other *Allium* species. The sulfur compounds are responsible both for garlic’s pungent odor and many of its medicinal effects.

Another ingredients used as a flavouring agent *gandrainsi* (*Angelica glauca*) is a perennial and thick, aromatic rootstock. Roots of this plant yield essential oils which bring high prices due to multiple utility in modern medicine including aromatherapy (Butola and Vashistka, 2013)

The present investigation was carried out to optimize the recipe of soup mix using millet, pulses and regional flavoring agent as ingredient and to evaluate the sensory and nutritional quality of the developed product.

METHODOLOGY

Main ingredients (finger millet flour, horse gram, black soybean) and other raw materials (refined oil, garlic, common salt, flavouring agent *Gandrainsi*) used for the preparation of this nutritious soup-mix were purchased from the local market (haat) of Pantnagar.

Pretreatment of raw material for soup mix:

Finger millet flour was sieved manually, using 60 mesh sieve size. Horse gram was cleaned to remove dust and dirt, stones and other impurities manually and roasted in a pan and ground to make roasted horse gram flour. Garlic

and *Gandrainsi* were cleaned and crushed.

Product formulation:

Ingredients:

Finger millet, roasted horse gram, soybean, salt, garlic, *Gandrainsi*, oil.

Black soybean and *Gandrainsi* were fried and kept aside. In lukewarm water, finger millet flour, roasted horse gram flour and crushed garlic was added and it was boiled. Salt was added then fried *Gandrainsi* and soybean was added to mixture and it cooked about 15 minutes to achieved thick consistency.

To get final product several combinations were prepared and tested for sensory quality. In first step finger millet flour and roasted horse gram flour were taken in equal proportion (experiment A), in second the proportion was 4:1 (experiment B), in third the proportion of these 1:4 (experiment C) were cooked at 3 levels of water *i.e.* 650ml,700ml and 750ml. The best combinations with respect to thickness of soup were taken for further experiments. The best combination was tested for two levels of salt. Sensory evaluation done, there after the better combination was used for 2 levels of garlic and

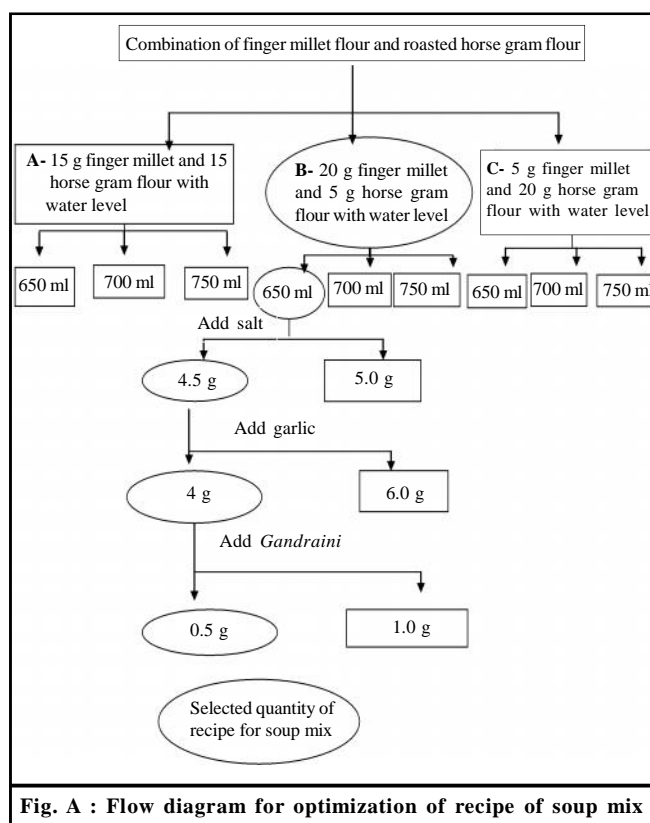


Fig. A : Flow diagram for optimization of recipe of soup mix

selected level of garlic was seasoned with 2 levels of *Gandrani*. In the final product 4 g of fried soybean were added. The final product for sensory evaluation was made of finger millet 20 g, roasted horse gram 5 g, soybean 4 g, salt 4.5, garlic 4 g, *Gandrani* 0.5 g, oil 5 g (Fig. A).

Sensory evaluation:

To identify best combination 'nine point hedonic scale' was used (Table 1) and the final product was again tasted by semi trained population using score card method (Table 2) (Amerine *et al.*, 1965).

Chemical analysis:

For sample preparation, soup mix was dried in oven at 55 - 60°C for 24 hr. Then dried soup mix was ground and subjected to proximate analysis, calcium and iron estimated. The chemical analysis of soup mix flour was done in triplicates.

Nutritional composition:

This includes the determination of the percentages of total ash, crude protein, crude fibre, carbohydrate by differences and energy (Kcal) in food. Ash content was determined as per AOAC (1995) procedure. Nitrogen content was determined by the Kjeldahl method of AOAC (1984). Crude fat was estimated by SOCS plus (Pellican equipments) method, crude fibre were estimated by the method describe by (AOAC, 1995), carbohydrate content was determined by difference *i.e.*, by subtracting the sum of the values (per 100 g) for moisture, total ash, crude fat, crude fibre and crude protein from hundred, while Physiological energy value (Kcal/100g) of sample was calculated by summing up the product of multiplication of per cent crude protein, crude fat and carbohydrate present in the sample by 4, 9 and 4, respectively. The ash obtained after combustion in the muffle furnace was used to prepare ash solution, which was in turn used for

the estimation of minerals contents such as calcium (AOAC, 1975) and iron content (Ranganna, 1986).

Statistical analysis:

The data obtained on sensory evaluation (score card) was subjected to Airthmetic mean. Student t- test was applied in Microsoft excel to evaluate the significant difference of major nutrients of soup mix and commercial soups.

OBSERVATIONS AND ASSESSMENT

Combination having 4:1 ratio of finger millet with roasted horse gram flour cooked in 650 ml water was a preferred consistency of a soup. Among the 2 levels of salts 4.5 and 5.0, 4.5 was preferred and 4.0 crushed garlic and 0.5 g *Gandrani* combination was liked the most. Using 9 point hedonic scale the liked product is given in Table 1.

Sensory and consumer acceptability of soup mix:

Score card method was used with a population of 20. The nutritional quality of the developed soup mix was enhanced due to addition of 20g finger millet and 5 g roasted horse gram flour and also contribute in sensory attributes *viz.*, colour and appearance, overall acceptability and obtained good mean score. Incorporation of 4 g garlic and 0.5 g *Gandrani* improved the sensory attributes namely natural taste and flavour. The texture quality of soup mix was improved using 650ml water with combination of standardized millet and pulses and obtained good score (Table 2).

Final recipe of the product was as following:

- Take black *bhatt* (20 in no.) and *Gandrani* (0.5 g), fry with oil (5ml) in a pan and keep aside
- Take 650ml water in a pan, heat it.
- Add 20 g *Madua* flour and 5 g roasted *Gahat*

Table 1: Sensory evaluation of soup mix recipe with their selected ingredients by hedonic scale

	Experiment 1	Experiment 2	Experiment 3	Experiment 4
Hedonic scale	20 Finger millet flour + 5g roasted horse gram flour) and water (650 ml)	Salt (4.5g)	Garlic (4g)	<i>Gandrani</i> (0.5 g)
Like extremely	20 per cent	20 per cent	20 per cent	-
Like very much	40 per cent	50 per cent	50 per cent	70 per cent
Like moderately	20 per cent	20 per cent	30 per cent	20 per cent
Like slightly	20 per cent	10 per cent	-	10 per cent

powder with continuous stirring (to avoid lumps).

– Add crushed garlic (4.0g) and common salt (4.5g).

– Add fried *Bhatt* and *Gandrains* to mixture; bring the mixture to a boil.

– Keep it on slow flame for 15 min to achieve thick consistency.

– Serve hot in a bowl (around 250 ml).

Nutritional evaluation of soup mix:

The highly accepted variation of soup mix was analyzed for its nutritional composition (Table 3). It contained 15.01g per cent protein, 5.62g per cent fat, 4.95g per cent crude fibre, 387kcal /100g energy, carbohydrate 69.28 g per cent, 5.14g per cent ash, 586.8 mg per cent calcium and 1.51mg per cent iron. Nutritional values mainly get influenced by composition of the raw ingredients. Soup mix was prepared with millet and roasted pulses which contribute to enhance improved protein quality by their complementary amino acid composition. Soybean provides good quality fat whereas finger millet provides very high calcium content. Use of garlic and *Gandrains* provide several enzymes, sulphur compounds essential oil and acceptable odor with medicinal effect of this entire makes the product highly nutritious. Roasting and grinding processes render the grain digestible, without the loss of nutritious components (Krantz *et al.*, 1983).

When soup mix (per 100g) compared with commercially available chicken soup it was found that

nutritional content of soup mix was better than commercial one and found significantly higher in all nutritional parameters ($p \leq 0.05$) (Table 3). Commercial chicken and vegetable soup per serve made with 11 g of dried powder. For preparation of commercial soups various type of thickening agent like corn starch used and one unit of corn starch thickens about twice as much liquid as an equal unit of flour (www.gnbvt.edu/staff/teacherpages/Wilkinson/Mr...5-6/Thickening_agents). While soup mix per serving (250 ml) prepared with 15 g of mixes ingredient which is free from thickening agent, and more nutritious than commercial chicken soup.

Conclusion:

In this study firstly for sensory evaluation nine point hedonic scale was used to optimized the basic recipe of soup mix with their ingredients *viz.*, finger millet flour, roasted horse gram flour, salt, garlic for flavour and regional flavour of Uttarakhand *Gandrains*. For acceptability of optimized product used sensory scoring method and it was found good in all parameters. The soup mix was dried and nutritional composition was analyzed and results are calculated per 100g flour and per serving 250 ml. When millets, pulses and flavouring agent (garlic and *Gandrains*) based soup mix (per serving) compared with commercially available product (Chicken soup) and found that soup mix was rich in all major nutrients (protein, fat, carbohydrate and energy) because

Table 2: Acceptability of soup mix in using score card method

Formulated product	Colour	Appearance	Taste	Texture	Flavour	Overall accept ability
Soup mix	7.75±0.716	7.6±0.88	7.45±0.88	7.3±0.65	7.6±0.59	7.45±0.94

Scoring scale: 1-2; Very poor; 3-4 Poor; 5-6 Fair; 7-8 Good; 9-10 Very good

Table 3: Nutrient composition of dried soup mix flour and commercial soup

Nutrient components	Soup mix (Dry wt basis) (per 100g)	Commercial soup chicken (per 100g)	P -value	Soup mix (per 15g)	Commercial soup	
					(Chicken soup per serve=11 g)	(Vegetable soup per serve=11 g)
Total ash (g)	5.14±0.21	-----	-----	0.82	-----	-----
Crude protein (g)	15.01±0.49	13.5	0.033	2.25	1.5	1.0
Crude fat (g)	5.62±0.13	3.1	0.001	0.84	0.4	0.01
Crude fibre (g)	4.95±0.27	-	-	0.74	-	-
Carbohydrate (g)	69.28±0.81	61	0.003	10.39	6.7	6.0
Energy (kcal)	387.7±1.87	329	0.0003	58.15	36	34
Calcium (mg)	586.8±1.80	-	-	88.02	-	-
Iron(mg)	1.51±0.01	-	-	0.22	-	-

Soup mix per serve= 15 g, Commercial soup per serve= 11g. Moisture content of soup mix (as is basis) was obtained 7.98 ±0.12

of their raw ingredients and found significantly higher than chicken soup. So it can be say that soup mix will be useful to popularize these as nutrient rich soup mix, particularly for children of growing age as it high in calcium content and helpful for bone growth.

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