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## Preparation of mid-day meal premix using multigrain

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#### Abstract

Multigrain premix is an astonishing breakfast meal that is packed with minerals, vitamins, an amazing amount of protein, energy, carbohydrates and dietary fibre, due to the supplementation of soya mince and other whole legumes. Thus it is found convenient to prepare a multigrain premix for the mid-day meal of student which will provide them all nutrients with proper amount and best suited overall acceptability. The present investigation on "preparation of mid-day meal premix by using multigrain" formulated from mixture of cereals and whole legumes, were carried out in department of Food Chemistry and Nutrition, College of Food Technology, V.N.M.K.V., Parbhani MHS. The result revealed of analysis that taste of multigrain premix had significant and positive impact on the consumer with the ample amount of nutrients it supply. The premix in primarily wheat based and supported with rice, whole legumes and soya mince.

**Keywords:** Preparation, meal premix, multigrain

#### Introduction

Food scarcity is not only a major problem of our country but also prevail the world. Main reason of this problem is decreasing availability of agriculture land and day by day increasing population. Besides this malnutrition, a state of improper nutrient balance in the body; affects health. The critical period where children develop malnutrition coincides with the introduction of complementary foods, which are nutritionally inadequate in many developing countries (Khanam *et al.*, 2011) [4] India continues to have serious level of widespread hunger forcing it to be ranked a lowly 97 among 118 countries by the Global Hunger Index 2016. The International Food Policy Research Institute (IFPRI) makes the annual calculation of Global Hunger Index. Based on its reading on the most recent data, the 2016 Global Hunger Index for India was derived from fact that an estimated 15% population is undernourished lacking inadequate food intake, both in quantity and quality. The share of under 5 children who are 'wasted' is about 15% while the share of children who are 'stunted' is a staggering 39%. This reflects widespread and chronic lack of balanced food. The under 5 mortality rate is 4.8% in India, partially reflecting the fatal synergy of inadequate nutrition and unhealthy environment. (GHI 2016). Whole grains are reported to be rich in nutrients, nutraceuticals, and have number of health beneficial effects. Whole grain contains all parts of grain viz., the endosperm, germ, and bran. They have high concentration of dietary fibres, resistance starch, and oligosaccharides. They are also rich in antioxidants including trace minerals and phenolic compounds and these compounds have been linked to disease prevention. Other protective compounds in whole grains include phytate, Phyto-oestrogens such as lignan, plant stanols and sterols and vitamins and minerals. The multigrain premix is prepared by using wheat as a base ingredient. The rice and other legumes such as Bengal gram, green gram and lentil. Soya mince is also added to the premix in order to have good mouth feel and protein content. The Wheat and Rice are the prime source of carbohydrates both simple and complex where legumes are the proteins and mineral source. The flavouring of spices is added to improve the taste and acceptability of the product.

#### Materials and Methods

##### Materials

##### Raw Materials

The selected food grains such as Wheat, Rice, Lentil, Bengal gram, Green gram were procured from local market of Parbhani. The soya mince as well as the spices and condiments also bought from the local market Parbhani.

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### Equipment's and machineries

Equipment's like weighing balance, Mixer, muffle furnace and other utensils required were used from the Department of Food Chemistry and Nutrition, VNMKV, Parbhani.

### Chemicals and Glasswares

The chemicals and glasswares required for analysis purpose were taken from the Department of Food Chemistry and Nutrition, VNMKV, Parbhani.

### Methods

#### Preparation of Multigrain premix

The multigrain premix is prepared by Roasting methods of

different formulations and the most suitable method by point of view of all fronts like production, nutritional value organoleptic characteristics and durability is selected. Here the comparative study is done between the same products prepared by different formulation. The neat observation is done between each step and every parameter is comparatively studied and examined to obtain the best possible results. Once the grain premix is formed it gets blended with soya mince and spice mix is also prepared separately. First of all we took all the raw grains then sorting, cleaning and of grains were done. The grains subjected to roasting and size reduction to appropriate fraction size. The spices were cleaned and roasted and grounded to powder form and packed separately.

**Table 1:** Standardization of formulation for development of mid-day meal premix ingredient multigrain premix (%)

Ingredients	Multigrain premix (%)				
	Control	F1	F2	F3	F4
Wheat	100	70	60	50	40
Rice	0	10	20	30	40
Bengal gram	0	2.5	2.5	2.5	2.5
Green gram	0	2.5	2.5	2.5	2.5
Lentil	0	2.5	2.5	2.5	2.5
Soya mince	0	12.5	12.5	12.5	12.5
Spice mix	5	5	5	5	5

#### Proximate composition of multigrain premix

Chemical constituents like moisture, protein, fat, and ash content of multigrain premix were determined by AOAC, (2003). Reducing and non-reducing sugar were determined as per methods given by (Ranganna 1986) [7].

#### Sensory evaluation of multigrain premix

Multigrain premix were evaluated for sensory characteristics like colour and appearance, flavour, texture, taste and overall acceptability. Judgments were made through rating the products on a 9 point Hedonic Scale with corresponding descriptive terms ranging from 9 'like extremely' to 1 'dislike extremely'. According to sensory score card evaluation, the best sample was chosen for the further study.

#### Statistical analysis

The obtained data in the present investigation was statistically analysed. The analysis of variance of the data obtained was done by using Completely Randomized Design (CRD). The analysis of variance revealed at significant of  $P < 0.05$  level, S.E. and C.D. at 5% level were mentioned whenever required.

### Results and Discussion

#### Sensory evaluation of multigrain premix.

**Table 2:** Sensory evaluation of multigrain premix

samples	Color and appearance	texture	taste	flavour	Overall acceptability
Control	8.2	8.5	8.4	8.4	8.5
F1	8.3	8.2	8.5	8.2	8.4
F2	8.2	8.3	8.4	8.2	8.3
F3	7.1	6.5	7.2	7.0	7.0
F4	6.1	6.2	6.4	6.5	6.5
Mean	7.5	7.5	7.7	7.6	7.7
SE	0.0907	0.0856	0.0907	0.0775	0.1047
CD	0.2730	0.2578	0.2730	0.2232	0.3152

The premix prepared with incorporation different levels of *wheat to rice ratio* were subjected to sensory evaluation. The multigrain premix prepared in this way was evaluated for

sensory quality with respects to various sensory attributes such as colour, taste, flavor, texture and overall acceptability and the results obtained are shown in Table 2. Control – wheat (100%), F1 – wheat (70%), rice (10%), legumes each (2.5%), soya mince (12.5%); F2 - wheat (60%), rice (20%), legumes each (2.5%), soya mince (12.5%); F3- wheat (50%), rice (30%), legumes each (2.5%), soya mince (12.5%); F4 - wheat (40%), rice (40%), legumes each (2.5%), soya mince (12.5%);

Data obtained from the Table 2, it was recorded that the overall acceptability score awarded for sample F1 was found higher than other samples (8.4) whereas F4 received the lowest (6.5). The acceptance of samples depends on the ingredient variation. The sample F1 was also reported as statistically at par with F2 and F3 samples and significantly superior than the F4 sample. The next parameter i.e., color and appearance serves as important parameter for the acceptance of food samples. The highest score for colour of multigrain bar (F1) was obtained as (8.3). The lowest score found in the sample F4 score (6.1). The sample F1 was significantly superior than the other samples.

There was no significant difference between the samples in context to color. More or less the similar results were observed by Rana *et al.* (2015) [8]. An appraisal of table 2 showed that, the formulation F2 got the highest value in texture (8.3) against F4 (6.1). However the most overall scored overall formulation F1 got (8.2) for its texture. The data depicts in table 2 revealed that, the mean score for taste ranged from 6.4 to 8.5. The mean scores for taste of multigrain premix were above the acceptance limit with lowest score (6.4) obtained from F4 multigrain premix against the highest score (8.5) in F1 formulation of multigrain premix. The control wheat sample had got means score value (8.4) it was at par with F4 and F2. Flavor is one of the important sensory parameter.

The flavor of multigrain bar was influenced by addition of spice mix and oil. Sample F1 obtained the maximum value (8.2) for flavour. The overall acceptability of F1 sample of multigrain premix was significantly superior (8.4) than the other samples. The score of sample F2 (8.3) was followed by

F3 (7.0). F1 sample was statistically at par with F2 and F3 samples significantly superior than F4 sample.

On comparison of different parameters by organoleptic evaluation, the formulation F1 was selected because of its high acceptability than other samples.

**Table 3:** Proximate composition of product trials

Trials	Parameters (g/100gm)					
	Moisture	Fat	Protein	Carbohydrates	Crude fibre	Ash
Control	7.52	2.41	12.91	63.64	11.31	2.07
F1	7.74	2.02	17.41	62.62	8.37	1.88
F2	7.92	1.85	16.69	64.61	7.32	1.78
F3	8.22	1.73	15.88	66.87	6.42	1.71
F4	8.47	1.61	14.06	69.98	5.44	1.60
SE	0.0943	0.0931	0.8563	0.6831	0.6242	0.0771
CD	0.2838	0.2802	2.5779	2.0564	1.8790	0.2321

\*Each value is an average of three determinations

The data presented in Table 3 describes the proximate composition of various formulations used in the preparation of multigrain premix. The minimum moisture content was found in control sample (7.52%), whereas maximum was found in F4 formulated multigrain premix (8.47%). Other formulation F1, F2 and F3 observed to contain moisture amount of (7.74%), (7.92%) and (8.22%) respectively. Where the formulation F1 found to have nearest moisture content with the controlled sample. The moisture content may be lower to higher from control to progressive formulations due to high fibre content. Similar findings have been supported by Sharma and Chawala (2011) [9] in oat-supplement product. The fat content of samples observed variations from top to bottom in table 3. Controlled sample was observed to have fat (2.41%) which is nearer with formulation F1 (2.02%). The fat content of control wheat sample decreased gradually among supplemented multigrain premix. However the significant decrease was observed in F4 where wheat contributed 40% and rice 40%. The fall in fat content may be due to increasing amount of rice to wheat in formulation keeping all other things constant. The result obtained are in order with Rana *et al.*, (2015) [8]. The protein content increased with incorporation of legumes and soya mince. Result showed that maximum protein content was found in F1 (17.41%) formulated multigrain premix whereas minimum was found in F4 (14.06%) multigrain premix. The control wheat sample reported to have (12.71%) of protein content. Other formulations have observed to possess moderate level of protein amount in between control sample and F1 formulated premix. Combination of multigrain premix with 70% wheat, 10% rice, 7.5% legumes and 12.5% soya mince was significantly superior than other formulated multigrain premixes. This could be due to the wheat to rice ratio and legumes contribution towards protein. Similar pattern was observed in Rana *et al.*, (2015) [8].

The data showed that carbohydrate content was increased with formulation of high rice and other legumes in various multigrain premixes. Maximum was found in F4 (69.98%) whereas minimum was F1 (62.62%). Carbohydrate content have been increased may be due to increase in rice percentage in different formulations, as rice is among richest source of carbohydrates. Whereas the formulation F1 has lowest contribution of rice (10%) thus it could have lesser amount of carbohydrates as compare with other formulation. Similar findings have been supported by donkor *et al.*, (2012) [3]. The table showed that fibre content of the premixes have been seen falling from top to bottom. The highest fibre amount was observed in control sample (11.31%) then lower followed by

F1 (8.37%) which is nearer to the control sample among other formulations, F2 (7.32%) and F3 (6.42%) are moderate in fibre whereas the least fibre amount was seen in F4 (5.44%). The trend of decreasing fibre amount in various formulations have observed due to the contribution of fibre into the product by its raw material used. Here wheat is dominant in fibre content than rest of the ingredient thus control sample is lead in fibre amount followed by F1 which is having 70% of wheat portion and it goes on reducing as the portion of wheat is gradually curtailed from rest of the formulations. The ash content of control wheat sample was maximum and it did not remained almost same in various multigrain premixes at all level while control wheat sample and F1 formulation were significantly closer to each other. The control sample had (2.07%) ash while F1 formulation had (1.88%) of ash amount. This might be due to the higher wheat contribution to its formulation and lesser rice and constant legumes. As the rice contribution increases the ash amount decreases as lowest ash found in F4 (1.60%) which have 40% of rice contribution.

### Conclusion

It may concluded that the superior quality of multigrain premix (F1) incorporated with wheat 70% and rice 10% is found suitable at all fornts of analysis to the overall acceptance and was highest in all the parameters.

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