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Studies on Production and Quality of Multi Grain Fortified Nutri Crackers

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Abstract- **Multi Grains Fortified Nutri Crackers is an innovative and highly nutritious snacks product. It is made up of rice flour, soy flour, oats flour, corn starch and it is yeast fermented baked product. Multi Grains fortified Nutri Crackers is rich source of energy, protein, carbohydrate and minerals. It is gluten free product. Oats flour is good source of protein and dietary fiber. Black cumin seeds have anti carcinogenic properties, and it is excellent source of iron. Multi Grains fortified Nutri Crackers is fat free product because of use of baking. This product has a unique combination with goodness of multigrain flour and spicy tomato flavor, which make it super tasty. The recipe for the preparation of multi grain Nutri crackers was standardised. The chemical composition of the multi grain nutri crackers was found to contain carbohydrates 52g, fat 33g, protein 4.1g and calories 517 kcal. The multi grain Nutri crackers has more acceptability due to the improved flavours and texture, nutritive values and health benefits.**

Key Words: - Multi Grains flour, Fortified, Oats flour, Fat free and Gluten free.

I. INTRODUCTION

With rapid increase in the per capita income, purchasing power along with increasing urbanization & improved standards of living give a large untapped opportunity to cater domestic consumers. In India, the culture of earning couples & nuclear family is increasing with time. The vast majority of working population with school going children extends ample opportunities for marketing of processed foods. The vast market leads to the commercialization of food products. Increasing urbanization in India, Improving standards of living & rising demands of convenience food of serving couple point out to the major market potential in food processing & marketing sectors. A health food and a health food supplements is another rapidly rising segments which is gaining vast popularity amongst the health conscious consumers. Functional foods are the growing trend. The functional food can be considered to be that whole, fortified, enriched or enhanced food that provides health benefits beyond the provision of essential nutrients, when they are consumed at efficacious levels on a regular basis. Consumer interest in healthy eating is with the eye on potential benefits of specific foods & food ingredients. Functional food industry is progressive and would widen in world including India. Consumer today looks to value for money & reason to buy the food. Recently, with rising public concern about increasing protein consumption and shortage, has stimulated research on developing new sources of protein from unexploited sources in various products

The interest in convenience foods is growing in many developed countries because of the demand for healthy foods. The multigrain flour Nutri crackers is one of the most healthy foods contents high amount of protein and carbohydrates these are widely eaten as snack. Thus, there is need to explore the potential of the multigrain flour Nutri crackers by evaluating the proximate composition, minerals and the functional properties.The use of multi grain flour to prepare the crackers has shown effects to reduce the risk of CHD and obesity. The high content of carbohydrates and protein increases the health promoting effects. Nowadays, people are busy in their work therefore they choose ready to eat foods. Also there is great demand of multigrain flour Nutri crackers. Recently the production of the product can be done easily due to availability of all kinds well equipped equipments and methods. The chemical compositions of multi grain Nutri crackers were found to have more amounts of carbohydrates and protein which can be exploited as source of calories to combat malnutrition.

II. MATERIALS AND METHODS

The raw material for production of this product was purchased from local market of Hadapsar. The process for preparation of the multi grain nutri cracks was standardised (Table 1). The raw materials such as rice flour, soy flour, oats flour, yeast ,corn starch, salt, chilli powder, cumin required for production of the product were calculated (Table 2).

Table 1: Ingredients for Preparation of

Ingredients	Quantity in g for 1 Kg total flour
Oats flour	350
Soy flour	260

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Rice flour	210
Corn starch	180
Salt	4
Yeast	2
Chili powder	6

Table 2: Raw material cost for production of Multi Grain Nutri Crackers

Particulars	**Quantity (g)**	**Cost (Rs.)**
Oats flour	350	60.00
Soy flour	260	40.00
Rice flour	210	2.1
Corn flour	180	10.8
Salt	4	0.5
Chili powder	6	1.5
Yeast	2	6
Cumin	3	1
Packaging material	100	16.5
	Total	140.5

The multi grain Nutri crackers were prepared in lots (Fig. 1). The packaging material used for the product is low density polyethylene.

Receiving of ingredients
↓
Sieving of flour
↓
Weighing of ingredients
↓
Dough kneading
↓
Sheeting of dough
↓
Cutting into small pieces
↓
Baking (at 120°C for 10 min)
↓
Packaging (LDPE)
↓
Storage (at room temperature)

Fig. 1: Flow Diagram for Preparation of Multi Grain Nutri Cracks

DETERMINATION OF PROXIMATE COMPOSITION

The proximate composition of the samples (soy flour, rice flour, oats flour) was determined using the standard methods described in the (AOAC, 2005). The parameters analysed were: moisture, ash and crude fiber.

2.2.1. Determination of Moisture Content

The determination of moisture was carried out using the hot air-oven method. The Petri-dishes were washed, dried in the oven, allowed to cool in a desiccators and the weight noted. The samples 5g was weighed into the Petri- dishes and dried in the oven at 105°C for 4 h. The sample was finally dried to a constant weight and the moisture content was calculated.

Moisture content = Weight loss ∗ 100/ Weight of sample g

2.2.2. Determination of Ash Content

One gram (1g) of sample was weighed into a clean, dry and pre-weighed crucible. The crucible was transferred into a muffle furnace at 550°C for 5h. Ashing continued until a light grey or white ash was obtained. The crucible was cooled in desiccators and weighed. The ash content was calculated.

% Ash content = Weight of Ash ∗ 100 / Weight of sample g

2.2.3. Determination of Crude Fat

Two grams (2g) of the samples was weighed in filter paper and folded neatly, was inserted into a Soxhlet apparatus where extraction was carried out for 4h using n-hexane (40-60°C). At the end of the extraction, the filter paper was placed in the oven for 30 min to evaporate the solvents. This was cooled in a desiccators and weight was noted. The fat extracted from the given quantity of the sample was calculated.

% Fat content = Weight of fat extracted g ∗ 100 / Original weight of sample

2.2.4. Determination of Crude Protein

The crude protein was determined using the micro Kjeldahl method, sample 0.2 g was weighed into a Kjeldahl flask. Catalyst containing sodium sulphate, selenium, and copper was added to the sample along with 10 ml of concentrated sulphuric acid in order to speed up the rate of digestion. The flask was swirled and gently clamped in an inclined position and heated electrically in a fume cupboard. This was heated until a clear solution was obtained. The clear solution was cooled and transferred into a 100 ml volumetric flask and made up to mark with distilled water. The resulting mixture (10 ml) was measured into the distillation set through the

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funnel. About 5 ml of 2% boric acid was transferred into a 100 ml conical flask containing 2 drops of screened methyl orange and placed at the receiving end of the distillation apparatus. Sodium hydroxide (40%) was used to liberate ammonia from the digest under alkaline condition during distillation. As soon as the contents became alkaline, the pink colour changed to green showing sodium hydroxide to be in excess. Steam was generated into the distillation set and ammonia was trapped in the boric acid solution and about 50 ml of the solution collected into the conical flask. The solution in the flask was titrated against 0.1 M HCl until the first permanent pink colour change was observed. A blank sample was carried through the procedure and the titre value of the blank was used to correct the titre of the samples. The nitrogen content was determined using the equation.

% N = Molarity of HCl ∗ 0.014 ∗ titre ∗ dilution factor ∗ 100 / Weight of sample used

The percentage of nitrogen was converted to crude protein by multiplying with 6.25.

2.2.5. Estimation of Carbohydrate

Carbohydrate content of each sample were determined by difference by adding % (moisture, ash, fat, protein and crude fiber) and subtracted from 100. 2.3. Determination of Mineral Elements Minerals was determined by the method described by AOAC (2005). A dried and ground sample (2 g) was pre-ash on a Bunsen flame for 20 min. Thereafter, the sample was subjected to dry ashing in well cleaned porcelain crucibles at 550°C in a muffle furnace. The resultant grayish-white ash was dissolved in 0.1 M HCl solution (10 ml) was added to the crucible to break up the ash and leach the metals. The crucible was washed three times with 0.1 M HCl and made up to 100 ml with distilled water. Standard stock solutions were prepared for each metal using salts of each metal to prepare a standard curve.

III. RESULTS AND CONCULSIONS

The chemical composition of the multi grain flour nutri cracks was found to contain carbohydrates 49g, fat 1.5g, protein 23.2g and calories 460.2kcal. Further the carbohydrates and protein content were more which can be exploited as source of calories to combat malnutrition. Similarly additions of flavours help in enhancing the keeping quality of multi grain nutri cracks to the great extent at ambient temperature.

Innovations & Trials

Table 3: Trial recipe

Ingredients	Sample 1(g)	Sample 2(g)	Sample 3(g)
Rice flour	46.8	46.8	21
Corn starch	9.3	-	18
Soy flour	9.3	23.4	26
Oats flour	31.2	31.2	35
Salt	1	0.5	1
Sugar	1	0.5	1

Sample (S1):- Corn flour: soy Flour (1:1)
Sample (S2):- Rice flour: Soy flour: oats flour (2:1:1.5)
The sample (S3) was found to have a very good texture and had a good nutritional value.
Observation: Thus, the sample (S3) was finalized from the respective trials.

Sensory characteristics (1-9 point hedonic scale was used for sensory evaluation)

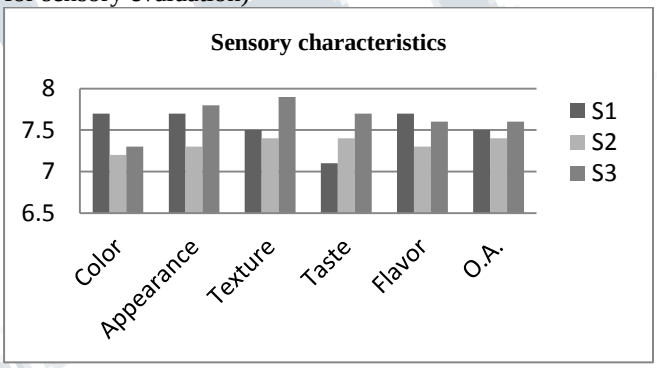

Fig.2 Graphical representation of Sensory characteristics (1-9 point hedonic scale was used for sensory evaluation)

The average score of overall acceptability of S1 was 7.5, S2was 7.4 and S3was 7.6 with the reference of above score S3 was selected for mass production as it scored more than other 3 samples.
Hence, S3 was selected for mass production.

Table 4: Chemical Composition of Multi Grain Nutri Cracks

Parameter	Chemical composition
Protein	4.1g
Fat	33g
Carbohydrate	52g
Moisture	3%
Calories	517 kcal

Finally it can be concluded that sample 3 has more sensory quality due to its different flavors and improved appearance, nutritive values and health benefit such as higher dietary

intake of carbohydrates and protein would be beneficial for all susceptible population groups, such as children, women and men and also old people can too consume it. This product is very focused and complete, which will help the business stay on course.

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