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## A STUDY OF A GALACTOGOUGE AND PROTEIN RICH – MULTIGRAIN LADOO

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### ABSTRACT

A shelf life study was undertaken to standardize an innovative nutritious product for consumer acceptance. The product designed was a galactogogue and a nutritionally rich common food product - multigrain laddoo, made with varied kind of flours, nuts, functional food "dink" and ghee. The product provides good amounts of biological proteins, functional property, vitamins and minerals and adequate fibre and has a good satiety value. Shelf life study included sensory evaluation by scoring method based on a five point scale. Evaluation was done on sensory attributes like color, taste, texture, aroma and overall acceptability of the product. Microbial analysis was carried out to see its shelf life. The other aspects covered in the study were packing, budget, Nutritional labelling and marketing.

**Keywords:** multi-grain laddoo, galactogogue, biological proteins, sensory evaluation.

### INTRODUCTION

Laddoo is a ball shaped popular sweet in Indian subcontinent. It is made with different kinds of flour and sugar with other ingredient that vary by recipe. It is often served in festivals and occasions and is a highly acceptable product. Laddoo or Laddoo is a ball-shaped sweet popular in Indian Subcontinent as well as regions with immigrants from the Subcontinent such as Hijaz. Laddoo is made of flour and sugar with other ingredients that vary by recipe. It is often served at festive or religious occasions. Common flours used for laddoo include besan (chickpea flour), rava (wheat semolina) and ground coconut (Razan Baker, 2006).

Multi-grain laddoo is made up of different flours and a functional food ingredient 'Dink' which is also a galactogogue which is given to lactating women which helps in increasing the breast milk production. It provides high amounts of Biological Protein due to presence of different flours of pulses and cereals. Adequate amount of fiber and other nutrients are also present. The objectives of the study is to standardize an innovative nutritious product for consumer acceptance, to understand every step of entrepreneurship, to study the shelf life of the product using sensory evaluation, to design a nutritional label, to make a cost effective product by better budgeting, to select a packaging material and to market the product in an effective way.

A food product was to be designed under our course as part of Food Product Development. It was quite interesting and we were required to work on it really hard. Based on our interest highly acceptable products such as sweet Potato papad, Amla pickle, Carrot pickle, Multigrain

laddoo and Amla murabba were thought off. The idea of food products were majorly based on consumer acceptance, palatability and nutrients provided by each product.

Legumes occupy an important place in the diet of people of many countries in the tropics and sub-tropics (Singh and Singh, 1992). They are a rich source of protein and form a major component of a vegetarian diet. Their widespread usage is also because they mature rapidly, can be grown in times of drought, can be easily transported because of their low moisture content and they are less susceptible to spoilage because their seed coats are impervious to water (Rao, 2008). Bengal gram also called chickpea or gram (*Cicer arietinum* Linn), is a major pulse crop in India (Pratapa *et al.*, 2004) and accounts for nearly 40% of the total pulse production. India is the largest producer of Bengal gram in the world (FAOSTAT, 2008). Besan, the flour of Bengal gram is a popular ingredient of many dishes in India (Mridula *et al.*, 2010).

Pulse is the important food crop due to the high protein and essential amino acid content. Pulses are 20-25% protein by weight. The digestibility of protein is quite high. Due to lack of methionine, consuming it with grains which are deficient in lysine provides a complete diet of Protein it also provides complete carbohydrates, several vitamins, iron, magnesium, phosphorus and zinc. Ragi provide high amount of amino acid methionine, calcium, vitamins and fiber. Almond is a rich source of vitamin E, Fibre (12% Dietary Fiber), Protein, B vitamins. It contains phytoesterol associated with cholesterol lowering properties. Cashewnuts is the majorly good source of antioxidant selenium, Dietary trace minerals copper, iron and Zinc.

## MATERIALS AND METHOD

Multi-grain laddoo was made with different kinds of flours mainly for its protein content, Fibre, and Dink was added as a functional food mainly for lactating woman as a galactogogue, dry fruits like almonds, cashew, Raisins as a source of calcium, magnesium, iron, selenium, ghee for binding for providing satiety value.

### SOURCES OF RAW MATERIALS

The raw materials such as bengal gram dhal, green gram dhal, black gram dhal, wheat flour, ragi flour, rava, almond, cashew, raisins, dink, artificial sweetner, sugar, ghee and cardamom powder were procured from the local market. Table 1 shows that the amount of ingredient used for the preparation.

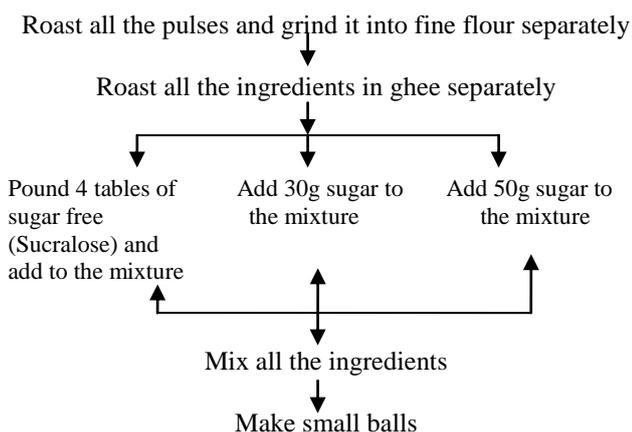
### PREPARATION OF MULTI-GRAIN LADOO

Multi-grain laddoo for type I was made with artificial sweetener Sucralose available as sugar free. After evaluating, it was found that it was not palatable and the sweetness of the product was not up to the mark and the laddoo were dry. Further, the type II product was made with adequate amount of table sugar and ghee in it but the product become quite sticky and after evaluating, it was observed that ghee was in additional amount.

**Table-1 - Ingredient for the preparation of multi-grain laddoo**

Ingredients	Type I	Type II	Standard
Bengal gram dhal	20 g	20 g	50 g
Green gram dhal	20 g	20 g	50 g
Black gram dhal	10 g	10 g	25 g
Wheat flour	10 g	10 g	25 g
Ragi flour	10 g	10 g	25 g
Rava	5 g	5 g	5 g
Almond/Cashew	3-5 pieces	3-5 pieces	5 / 5g
Raisins	-	-	5 g
Dink	5 g	5 g	10 g
Artificial sweetener (sugar free)	4 tablets	-	
Sugar	-	30 g	50 g
Ghee	30 g	40 g	40 g
Cardamom Powder	-	-	1 tsp

### Flow chart for the preparation of multi-grain laddoo



### SENSORY EVALUATION FOR STANDARDIZED RECIPE

Scoring test was done with the help of trained panelists. Attributes to be considered were Color, Texture, Taste and Aroma which were scored on a 5 point scale, where - 5 = Excellent, 4 = Very good, 3 = Good, 2 = Fair, 1= Poor.

### PROXIMATE ANALYSIS

The proximate analysis such as energy, protein, carbohydrate and fat content were determined using AOAC method. All the estimations were done in triplicates.

### PACKAGING MATERIAL: POLYPROPYLENE



It is also known as polypropylene, is a thermoplastic polymer used in a wide variety of applications including packaging and labeling, textiles, stationary and reusable containers, etc.

### NUTRITIONAL LABELING

Nutritional Labeling is an important process in the food processing chain and label is the first point of contact between a consumer and the producer. It is used to identify one product from another and to decide over which product to purchase. Nutritional Label is an important marketing tool for a product, it should be attractive and eye catching and it should also be informative.

### BUDGETING

Budgeting is an important component to achieve financial success. It makes it easier for people with incomes and expenses of all sizes with conscious decisions about the allocation of money. For the Bulk Production, food ingredients were bought from the wholesale market to reduce the expenses and increase the Profit.

### SENSORY EVALUATION FOR SHELF LIFE STUDY

To study the shelf life of Multigrain Laddoo, sensory evaluation was conducted every week which was done by trained panel members (total no.= 7). Scoring test was done with the help of trained panelist. Attributes to be considered were Color, Texture, Taste and Aroma and scored out of 5 where 5 = Excellent, 4 = Very good, 3 = Good, 2 = Fair, 1= Poor.

**MICROBIAL TESTING FOR SHELF LIFE STUDY**

Microbial testing was done to study the shelf life of Multigrain Ladoo as the food is subjected to many changes over its lifespan.<sup>[6]</sup> Microbial testing was done in the second week.

Pour Plating method was used for microbial testing. The Multigrain Ladoo was diluted twice and mixed with liquefied Nutrient Agar in such a way that the colonies formed on the plates are countable/ not countable.

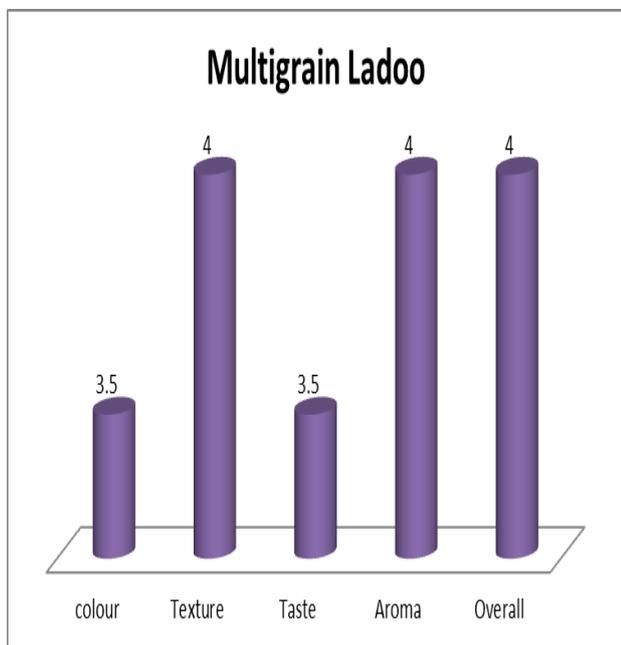
**RESULT AND DISCUSSION**

**DEVELOPMENT OF THE MULTI-GRAIN LADOO**

After assessing the drawbacks of the products the final product was made by adding flour in proper ratio , sugar and ghee in adequate amount, Dink as per the need as the functional food along with the other Ingredients and thus the product was Standardized. Flour sugar ratio is approximately 6:10.

**SENSORY EVALUATION OF MULTI-GRAIN LADOO**

The sensory evaluation of the multi-grain ladoo was shown in figure 1.



**Figure-1- Sensory Evaluation of Multigrain ladoo**

It can be observed that taste and aroma of multi grain ladoo scored very well and Color and texture scored well. Thus the product had a good acceptability and was finalized to continue the shelf life study.

**PROXIMATE ANALYSIS**

Table 2 shows that the proximate analysis of the multi-grain ladoo. About 295gm of ladoo (12 Nos) was

determined as energy 1267kcal, protein 35.41g, carbohydrate 120g and fat 49.49g respectively.

**Table-2 - Nutrient content of the multi-grain ladoo**

Nutrients	Amount
Energy (kcal)	1267
Protein (g)	35.41
Carbohydrate (g)	120.1
Fat (g)	49.49

**PACKAGING MATERIAL: POLYPROPYLENE**



**Plate-1 - Polypropylene packed multi-grain ladoo**

It is normally tough and flexible, often opaque. It has a good resistance to sunlight, air, relative humidity. During Processing of polymer, Antioxidants (Vitamin E) are added to avoid degradation. The main idea to use this packaging material is because it is cost-effective and as resistant to other sources.

**BUDGETING**

Packaging material was also bought in bulk, as to reduce cost. Table-3 shows the cost calculation for the ingredients used for multi-grain ladoo.

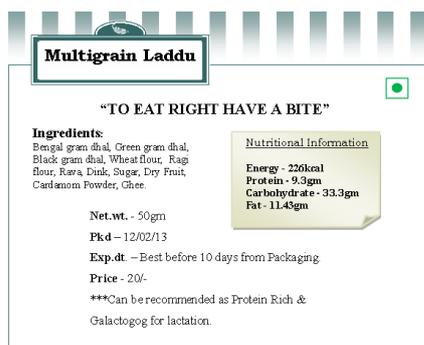
**Table-3 -Cost calculation for the ingredients used for multi-grain ladoo**

Ingredients	Wholesale Price(Rs.)
Ghee	180
Semolina	6
Almond	30
Cashew	40
Cardamom powder	20
Dink	10
Raisins	20
Green Gram Dhal	56
Bengal gram dhal	56
Red gram dhal	28
Ragi flour	16
Wheat flour	10
Packaging material	10
Label Printout	20
Gas	100
Electricity	50
Labour	100
<b>Total</b>	<b>752</b>

Total 55 packets were made out of which 50 packets were sold & remaining 5 were kept for sensory evaluation & microbiology test of Multigrain Ladoo. Total cost for production of Multigrain Ladoo was Rs.752/-, per packet price was Rs.20/-. After selling the product total gain was Rs.1000/- out of which profit was Rs.248 /-. As the ingredients were purchased at wholesale rates profit was more.

### NUTRITIONAL LABELING

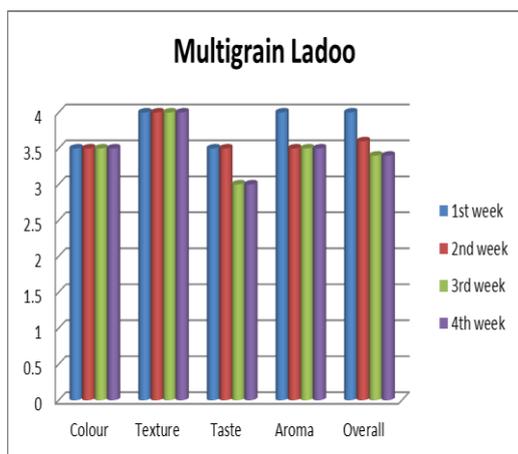
It consists of ingredients, Nutritional Information, Net Weight, Manufacturing or packaging date, Expiry Date, Price, benefits or special recommendations. Nutritional Labeling for multi-grain ladoo shown in figure 2.



**Figure-2 - Nutritional Labeling for multi-grain ladoo**  
Food label: "To Eat Right Have a Bite"

### SENSORY EVALUATION OF MULTI-GRAIN LADOO FOR 4 WEEKS AFTER BULK PRODUCTION

The Sensory Evaluation of Multi-grain Ladoo for 4 weeks after Bulk production was shown in figure 3.



**Figure-3 - Sensory Evaluation of Multi-grain Ladoo for 4 weeks after Bulk production with the help of Scoring Test**

It can be observed that colour and texture remained constant throughout the 4 weeks. There is a slight decline in taste and aroma which may be due to oxidative changes being brought by nuts and ghee which might have developed some oxidative changes. May be the

product may have to be stored in better packaging systems. Overall the product remained good.

### MICROBIAL TESTING FOR SHELF LIFE STUDY

Microbial testing was done to study the shelf life of Multi-grain Ladoo in the second week using pour plate method.

**Table-4 -Microbial testing of Multi-grain Ladoo**

Dilution	No. of Colonies
10 <sup>-1</sup>	3-4
10 <sup>-2</sup>	1-2

From the above table-4, it was found that the numbers of colonies formed were in acceptable range & thus the product was safe for consumption.

### CONCLUSION

Multi-grain ladoo is a product providing variety of nutrients and can be recommended for all age groups as it has good biological value proteins and can be specially recommended as a galactogog for lactating women. It has a shelf life of ten days as microbial analysis proved that it is safe for consumption. The shelf life could be improved with use of less amount of fat.

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