

Formulation of Sprouted Green Gram (*Vigna radiata*) Incorporated Cookie

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Abstract: Pulses hold an important place in our daily diet. Green grams were the most wholesome one among all the pulses that is rich in protein. Green gram sprouting in general is a good source of proteins and vitamins. Moreover, reduction of the oligosaccharides during germination process as $\alpha(1-6)$ linkages are indigestible by mammalian enzymes, helps in the reduction of flatus potential of the gram. This study investigated the formulation and acceptability of Cookies that are incorporated with Sprouted Green grams under two variations such as Sweet cookie and Masala cookie. Present study includes standardization of the cookies, organoleptic evaluation, nutrient and cost calculation of the formulated cookies. Among the variations, sweet cookie (variation 1) was found to be more acceptable comparatively. On the supplementation of sprouted green gram, protein content was increased. The cost of the formulated cookie was found to be Rs.5/- per cookie. Formulated cookies also had better micronutrient content. It can be concluded that Sprouted green gram incorporated Cookie can be prepared with good sensory, nutritional quality and it is also a cost-effective product as a means of nutrient enrichment. Hence, Sprouted Green grams could be utilized to progress the nutritional status of the people.

Keywords: Sprouted Green Gram, Cookies, Value Added Cookie, Pulse Cookie

I. INTRODUCTION

Cookies are one of the best known quick snack products (Farheena *et al.*;2015). It is a baked food that usually contains flour, sugar and fat. It can also be added with other ingredients such as raisins, nuts etc. These are good in nutrients like carbohydrate and fat, which can also be enriched with protein by addition of protein rich ingredient. Cookies are having an increased consumption rate, good palatability and relatively longer shelf life. It is predominantly based on Refined Wheat flour (RWF) which in turn when blended with pulses upgrades its nutritional content (Nehir Soni *et al.*;2018). Cookies differ from other baked food items as they have low moisture content, have longer shelf life and less microbial spoilage comparatively. Cookies are formulated functional products that are readily available, expensive should be less and should have satisfactory sensory properties. (Nidhi Chopra, *et al.*, 2018).

Pulses hold an important place in nutritional status of humans because of their rich nutritional contribution to diets especially proteins, minerals, fibers and vitamins. Along with cereals, pulses form a staple diet. Green gram or Mung bean (*Vigna radiata*) is one of the well known pulses in India and stands as the third major pulse crop in India. It is 'esteemed as the most wholesome among the pulses, free from heaviness and tendency to flatulence', which is associated with other pulses (Purseglove, 1969). Green gram are most suitable pulse for the preparation of molecules that are pharmaceutically important, this is successfully tested and found (Kumaraswamy and Ramesh, 2003).

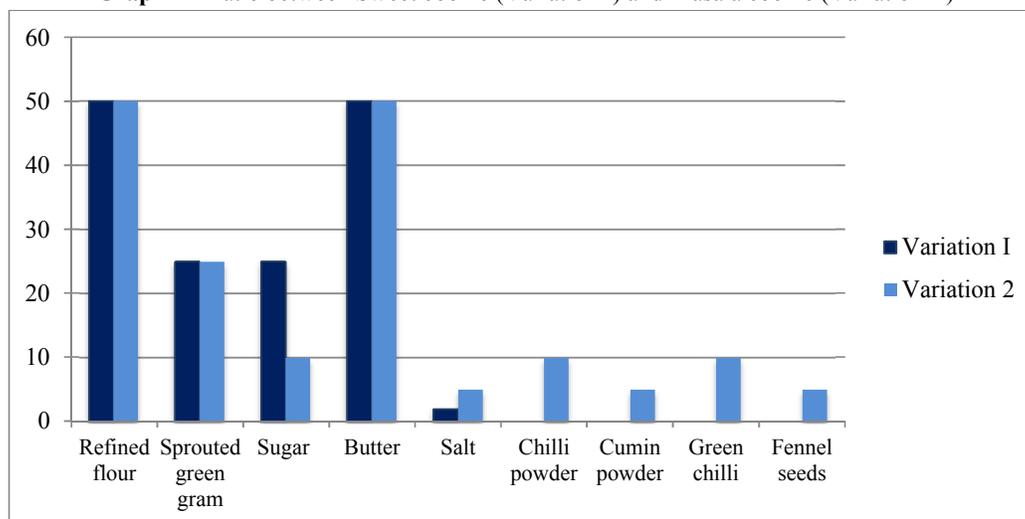
Among all the pulses, the protein content is rich in Green gram of about 23.6% which reveals its potential of protein for future. Green gram sprouting in general is a good source of proteins and vitamins. Sprouting of green gram gets affected by the soaking time variation. (Dattatray *et al.*, 2019). Germination reduces the effect of phytate in legumes and do not appear to alter the quality of protein when compared with the raw seed. During germination, folic acid content is enhanced; also for 48 hours of sprouting results in phytate and tannin reduction with consequent increase in ionizable iron. Germination was also effective in reducing fat content, antinutritional factors, total carbohydrates and total ash contents thereby increasing its protein content (Mubarak, 2005).

With the above background of study, this research aims to assess the effect of incorporating sprouted green gram in cookies and its impact on sensory acceptability and nutrient content.

II. MATERIALS AND METHODS

The required raw materials were purchased from local supermarket and pure drinking water is used for soaking purposes.

Graph 1 - Ratio between Sweet cookie (Variation I) and Masala cookie (Variation II)



For the preparation of Sweet cookie (Variation I), the refined flour is sieved and added with the cream made of fat and powdered sugar, then the sprouted green gram were roasted, powdered and mixed along with it. It is then kneaded to form a dough along with a pinch of salt and made into sheet of ½ inch thickness after which it is cutted into desired shape and baked at a temperature of 180°C for 15-20 minutes in a pre-heated oven. Cooled and stored in an air-tight container.

For the preparation of Masala cookie (Variation II), the sieved refined flour, salt, chilli powder, green chilli and cumin powder, fennel seeds are added with the cream made of fat and powdered sugar, then the sprouted green gram were roasted, powdered and mixed along with it. It is then kneaded to form a dough along with a pinch of salt and made into sheet of ½ inch thickness after which it is cutted into desired shape and baked at a temperature of 180°C for 15-20 minutes in a pre-heated oven. Cooled and stored in an air-tight container.

Scientific methods of organoleptic evaluation of formulated products were analyzed using 5 point hedonic scale where 5 represent like extremely and 1 represents dislike extremely. Sprouted green gram cookies were evaluated by 20 semi-trained members based on the variables such as colour and appearance, texture, flavour, taste and overall acceptability.

The physico-chemical characteristics of the developed cookies were determined by Alpha labs and technologies, a food testing laboratory in Coimbatore.

The cost of the product was calculated using the cost of raw materials, packaging materials, overhead charges and profit percentage in order to obtain the selling cost.

III. RESULT

3.1 Mean Sensory Score for Control and Formulated Cookies

Sensory evaluation of the formulated cookies is done with twenty semi-trained panel members. The mean scores for colour, texture, taste, flavour and overall acceptability of the samples are presented in Table 1. Sensory evaluation was carried out with 5-point hedonic scale where 5 being highly acceptable and 1 being unacceptable.

The colour of Variation II was found to be darker comparatively, due to the spices added. Texture plays an important role in cookies; here the texture of both the variations came out well. Taste of Variation I was better whereas of Variation II was little more spicy. Green gram flavour was tend to be present in both the variations and the level was acceptable. Overall results shows that Variation I is highly acceptable than Variation II.

Table 1: Mean sensory scores of the Formulated Cookies

Criteria	Control	Variation I	Variation II
Colour and Appearance	4.9±0.30	4.8±0.41	4.6±0.59
Texture	4.85±0.36	4.75±0.44	4.3±0.57

Taste	4.8±0.41	4.75±0.44	4.4±0.59
Flavour	4.85±0.36	4.7±0.47	4.25±0.55
Overall acceptability	4.8±0.41	4.75±0.44	4.2±0.52

3.2 Nutritive Value of Variation I

The highly accepted cookie i.e., Variation I were tested for its nutritive value by Alpha labs and technologies, a food testing laboratory in Coimbatore. The results of the analysis were given in Table 2.

Table 2: Result of the analysis

S. No	Test parameters	Unit	Test protocol	Result
1.	Moisture	g/100g	IS 12711:1989 RA 2014	11.61
2.	Total Ash	g/100g	IS 12711:1989 RA 2014	0.90
3.	Fat	g/100g	IS 12711:1989 RA 2014	4.32
4.	Total Protein	g/100g	IS 7219:1973 RA 2014	5.61
5.	Carbohydrates	g/100g	IS 1656:2007 RA 2015	77.56
6.	Energy	KCals/100g	ALT/SOP/03/01	376.49
7.	Magnesium	mg/100g	IS 966:1999	4.12
8.	Iron	mg/100g	AOAC 20 th edition 944.02	0.42
9.	Total Bacterialcount	cfu/ml	IS 5401(PART1) : 2002/ISO 4832:1991	1.5

3.3 Cost Calculation

Cost of the Sprouted green gram incorporated cookie has been calculated using a standard price list from the local market where the ingredients were purchased. The selling cost of the formulated cookie was finalized as Rs.5/- per cookie. Though the cost of this nutrient enhanced cookie will be affordable by all categories of people, we can build a Healthy Nation that is free from malnutrition. The formulated cookies are also considered superior in terms of micronutrients comparatively.

IV. DISCUSSION

Among the formulated sprouted green gram incorporated cookies – Variation I was highly acceptable because of its good sensory score (4.75±0.44) and also have appreciable amount of micronutrient content. Products were found to be rich in energy, carbohydrate, protein and magnesium. Finally, it is a product that is nutritious with an affordable cost.

V. CONCLUSION

Formulated cookie was standardized, nutritive value and the cost of the product was calculated. The sensory evaluation was done with 20 people in the basis of 5 hedonic scales. By comparing the variations, organoleptic characteristics of Variation I were highly acceptable and were evaluated for their physical, nutritional and sensory attributes. The nutritive value also proved that the cookies were prepared using healthy alternatives and also sprouted green gram which had high nutritional benefits. Hence, the formulated cookie will be a healthy snack for all age groups as well as a nutritive product at minimum cost. The bakeries in India are growing at a very fast rate and the demand for health snack products is increasing rapidly. The bakeries and other branch of food industry can exploit green gram that is sprouted as a natural and inexpensive source of nutrients to produce nutritionally superior food products.

VI. ACKNOWLEDGEMENT

I would like to thank god, parents, teachers, family and friends who have directly and indirectly helped me in completion of my research study. I extend my sincere thanks to my guide Dr. S. J. Cynthia M.Sc., Ph.D. Assistant Professor, Department of Food Processing Technology for her support and guidance to do this research study.

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