

A Report on the Nutritional and Quality Profile of Sprouted Green Gram Incorporated Food Products



Microbiology

KEYWORDS : Green Gram, Nutrition, Food Products, Microbial Contamination, Quality assesment

Dr.C. Mabel Joshaline	Department of Microbiology, Sourashtra College, Madurai.625004, Tamil Nadu, Corresponding Author: C. Mabel Joshalinejesmabmary2512@gmail.com
Kowsalya. S	Department of Nutrition, Government College for Women, Sivagangai, Tamil Nadu, India
Subhathra. M	Department of Microbiology, Sourashtra College, Madurai.625004, Tamil Nadu, India.
Padmavathy. S	Department of Zoology and Microbiology, Thiagarajar College
Shyamala. M	Department of Microbiology, Sourashtra College, Madurai.625004, Tamil Nadu, India.

ABSTRACT

Sprouted green gram, which is good source of protein, iron and Calcium and also has lots of medicinal values. Sprouted green gram incorporated food product have high biological values, calorie dense, low dietary bulk and cost effective in reducing the nutritional problem associated with weaning age, keeping all these beneficial aspects in mind, it was planned to formulate sprouted green gram dhal incorporated food products, like sprouted green gram murukkumix, sprouted green gram burffi, sprouted green gram cookies. The organoleptic evaluation of, were analyzed by nutritional composition and microbial examination showed highly acceptable. There was a slight decrease in overall acceptability scores during the storage period. The production cost of sprouted green gram dhal incorporated food products is cheaper than other processed product, processing does not involve any costly equipments and machinerries, so it can be women entrepreneurs and also it can be started as a small- scale level business.

Introduction:

Green Gram (*Vigna radiata*) belongs to the family legiminoasea. Green Gram is one of the important pulse crops in India since ancient times. It is widely cultivated throughout the Asia, including India, Pakistan, Bangladesh, and Srilanka. (Chandrasekar and Ghosh, 2002). Green gram is the excellent source of protein it contain 25% protein and good source of protein dietary fibro. It is a good source of vitamin A,B,C,and E, Calcium, Iron, Magnesium, Potassium and Amino acids (Rebecca et al.,2003) Leginous seeds provides high fibre as well as Anti- nutrient like phytates, Tannins, Saponins and enzyme inhibitors and low risk of blood sugar that an equal amount of carbohydrates from other sources hence recommended to diabetics (Lisa et al., 2003).

Green gram also has remedies for Anti-cancer, Antipyretic, Anti hypertensive, Antidonic to toxic poisoning and nutritive tonic. It is excellent preventive against beri-beri (Rebecca et al., 2003).Green gram is used to treat piles, skin disease, bilioussness and antidysentexcia, green gram as remedy to odema, fever, head ache and generalized anxiety and as a diuretic. (Pankaj et al., 2004). Legume protein has been shown to reduce plasma low- density lipoprotein starch from cereals and produces less abrupt changes in plasma glucose and insulin upon ingestion (Philips, 2004). Sprouted Green gram dhal improved the protein, amino acids digestibility by decreasing anti- nutritional factors and increasing the true apparent protein, amino acids digestibility (Bibiet et al, 2008). Green gram dhal flour is an excellent detergent and can be used as a substitute for soap. It removes the dirt and does not causing any skin irritation. Green Gram dhal powder with curd massages it to scale and brush it on hair. This helps to prevent hair loss and dandruff. It is also increase hair growth. Mixture of Green gram flour is an excellent pack to rejuvenate facial skin and body.

Unlike other pulses, green gram is free of flatulence-causing agents. This makes it an acceptable food for convalescents and pleasant weaning food for babies. The protein is especially rich in the amino acid, lysine, but it is somewhat deficient in sulphur-containing amino acids. The seeds are rich in calcium, phosphorous, magnesium, potassium, folate and other B Vitamins. They also contain appreciable amounts of Vitamin C. Raw seeds are rich in trypsin-inhibitors that block the effects of protein digesting enzymes in the gut. Sprouted green gram has lower amounts of these inhibitors, but the best method to eliminate trypsin inhibitors is boiling. Cooking does not affect the protein profile of this seed.

Methodology:

Collection of the Samples:

After analyzing the nutritional as well as health benefits Green Gram Dhal were selected for the Present study. The Green gram dhal as well as raw ingredients (Wheat flour, Gingelly seed oil, Sugar, Hydrogenated fat, Salt, Vanilla essence, baking powder) were purchased along with green gram.

Standardization of sprouted Green Gram incorporated food products:

Sprouted Green Gram Incorporated food products (Murukku mix, Burfi, Cookies) in various compositions. Preparation method were chosen from the "Art of Cooking" by Thagam Philips.

S.No	Ingredients	Amount Sample 1	Amount Sample 2	Amount Sample 3
1.	Raw rice flour	50g	25g	10g
2.	Green Gram flour	25g	50g	75g
3.	Black Gram flour	20g	20g	10g
4.	Sesame seeds	5g	5g	5g

Table: 1 Sprouted Green gram added in different Murukku Mix Sample

S.No	Ingredients	Amount Sample 1	Amount Sample 2	Amount Sample 3
1.	Green Gram flour	25g	50g	75g
2.	Coconut	20g	10g	5g
3.	Sugar	35g	30g	15g
4.	Ghee	20g	10g	5g

Table: 2. Sprouted Green gram added in different Burffi

Sample

S. No	Ingredients	Amount Sample 1	Amount Sample 2	Amount Sample 3
1.	Green Gram flour	25g	50g	75g
2.	Refined Wheat flour (Maida)	25g	20g	10g
3.	Hydrogenated Fat	15g	10g	5g
4.	Powder Sugar	35g	20g	10g
5.	Vanilla essence	Few drops	Few drops	Few drops
6.	Baking Powder	¼ tsp	¼ tsp	¼ tsp

Table 3. Sprouted green gram incorporated cookies in various compositions

Processing Method of Sprouted Green Gram incorporated food products:

Murukku mix, Sprouted green Gram flour with raw rice flour and Black gram flour and it was sieved. 5 g of gingelly seed seed also mixed with the flour and was packed in poly propylene (225 gauges) cover and sealed. It was stored in room temperature.

Burfi, Green grams were fired in slow fire. Coconut were fired in separate pan, in addition to this sugar syrup were prepared and all the fired items were mixed along with ghee, the above preparation were kept for cooling and then made into pieces, packed and stored.

Cookies, Sprouted green Gram flour and refined wheat flour were sieved, along with this creaming powder sugar, hydrogenated fat and baking powder were added, mixed and cut into small round shaped, and baked at 250°C for about 15 minutes. after baking, the cookies were cooled, then it was packed into polypropylene cover and sealed and kept stored.

Nutritional analysis of selected product

Nutrient analyses of the selected product were approximately calculated referring "The nutrient value of India foods" by NIN. Analysis of protein, iron, Vitamin A, B, C were calculated.

Organoleptic evaluation of selected product:

Sprouted Green gram incorporated Murukku Mix, burfi, and cookies were evaluated for their appearance, colour, flavours, texture or consistency and overall acceptability with 5-1 hedonic scale source card and it was done by experience panel members.

Key score:

5- Excellent, 4- Very good, 3- Good, 2- Fair, 1- Poor

Microbial Examination:

Nutrient agar was used for enumeration of Bacteria, Sabouroud Dextrose Agar medium used for enumeration of fungi, Tryptone Bromocresol purple agar was for enumerating spore forming bacteria. (Frazier, 1998).

Results:

The results of the data collected on organoleptic evaluation and self life of sprouted Green gram incorporated food products were analyzed. Nutritional composition of sprouted Green gram incorporated food product, energy content of Murukku Mix was 352 k.cal, Protein 19g, varies accordingly. The nutritional composition for sprouted Green gram Murukku Mix and cookies had showed high nutrient content.(Table:4).

Standardization level of sprouted Green Gram incorporated food products, the results representing the 50% level of Sprouted Green gram flour scored highest acceptability level com-

pared to the other percentage of incorporation level of Murukku Mix. Next to the account Burffi scored 25% incorporation level from the mean value 5 compared to 50% and 75%. For Cookies, the 50% level of incorporation showed highest score when compared to the other percentages such as 25% and 75%. (Table.5).

Organoleptic evaluation of sprouted green gram incorporated murukku mix during storage period (1st, 15th, 30th, 45th, 60th, 75th, and 90th). The results revealed the highest score of 5 on 1st till 60th day of storage; it showed decreased score around 4.5 on 75th day and 4 on 90th day of storage. Similarly for Burffi, it scored around 5 for 1st till 30th day, the score reduced slowly to 4.5 on 45th day further it showed 3.5 on 90th day, appearance colour texture taste retained till 75th day. Further evaluating the score for Cookies, the results revealed overall acceptability from 1st day till 4th day of storage slowly reduced to 3.8 on 90th day. The total results obtained were tabulated (Table: 6,7,8).

Microbial load of sprouted Green gram incorporated food products during storage was monitored. The results showing below detectable level till 30th day of storage, it reached 1×10⁵/g in 45 day further it reached 4×10⁵/g on 90th day of storage in case of Murukku mix. For evaluating the fungi load the level was 3×10⁵/g on 75th day. The bacterial and fungal load for Burffi the product retained till 15th day of storage, the bacterial load increased by 1×10⁵/g on 30th day, on 90th day it reached the level of 6×10⁵/g in case of bacteria and 5×10⁵/g in case of fungi. Next to these cookies results showed existence for about 15th day of storage slowly reached the level of 4×10⁵/g for bacteria and 5×10⁵/g for fungi on 90th day.

S.No	Samples food items	Amount (gms)	Energy (K.Cal)	Protein (g)	Calcium (mg)	Iron (mg)	Fibre (mg)	Vit A (mg)	Vit C (mg)
1.	Murukku Mix	100	352 (424.7)	19 (8.7)	163 (25.4)	4.0 (1.08)	2 (0)	39.2 (30)	0.05 (0)
2.	Burffi	100	492	7.0	37.0	1.5	2.0	132	0.2
3.	Cookies	100	434 (997)	14.0 (11.05)	68 (29)	3.0 (1.075)	20 (0)	28.25 (400)	-

Table 4. Nutritional composition of the sprouted Green Gram incorporated food products

S.No	Sprouted green gram product	Incorporation level (%)	Appearance	Colour	Flavor	Texture	Taste	Overall acceptability
1.	Murukku Mix	25%	4.4	4.2	3.9	3.9	3.9	4
		50%	5.0	5.0	5.0	5	5	5
		75%	5	5	5	5	5	5
2.	Burffi	25%	5	5	5	5	5	5
		50%	3.4	3.6	3.2	3.2	3.1	3.3
		75%	2.7	2.7	2.7	2.5	2.6	2.6
3.	Cookies	25%	4.5	4.5	4.5	5	5	4.7
		50%	5	5	4.5	5	5	4.7
		75%	3.5	3.6	3.7	3.4	3.2	3.4

Table 5. Organoleptic evaluation of various levels of sprouted Green gram incorporation food products (Murukku Mix, Burffi, Cookies)

Storage period	Appearance	Colour	Flavor	Texture	Taste	Overall acceptability
1 st	5	5	5	5	5	5
15 th	5	5	4.5	5	5	5
30 th	5	5	5	5	5	5
45 th	5	5	5	5	5	5
60 th	5	4.5	4.5	5	5	4.8
75 th	4.5	4	4	5	5	4.5
90 th	4	3.0	3.5	4.0	4.5	3.8

Table: 6. Changes in organoleptic characteristics of sprouted green gram incorporated Murukku mix during storage

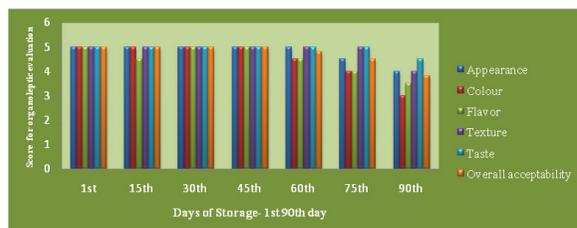


Fig: 1. organoleptic characteristics of sprouted green gram incorporated Murukku mix during storage

Storage period	Appearance	Colour	Flavor	Texture	Taste	Overall acceptability
1 st	5	5	5	5	5	5
15 th	5	5	5	5	5	5
30 th	5	5	5	5	5	5
45 th	4.2	4.4	4.2	4.4	4.5	4.3
60 th	4.2	4.2	4.0	4.2	4.2	4.1
75 th	3.8	4.0	3.9	4.0	4.0	3.9
90 th	3.5	3.5	3.0	3.3	3.8	3.4

Table: 7. Changes in organoleptic characteristics of sprouted green gram incorporated Burffi

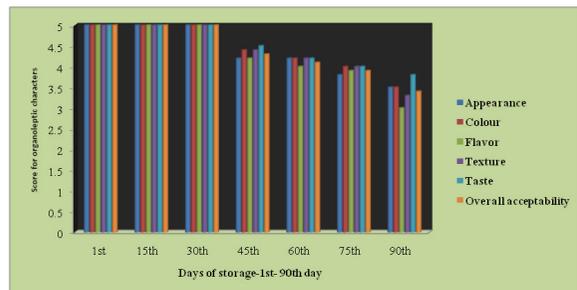


Fig:2. Organoleptic characteristics of sprouted green gram incorporated Burffi during storage

Storage period	Appearance	Colour	Flavor	Texture	Taste	Overall acceptability
1 st	5	5	5	5	5	5
15 th	5	5	5	5	5	5
30 th	5	5	5	5	5	5
45 th	5	5	5	5	4.9	4.9
60 th	4.4	4.2	4.2	4.0	4.2	4.2
75 th	4.2	4.2	4.2	3.9	4.2	4.1
90 th	4.0	4.0	3.9	3.5	3.8	3.8

Table: 8. Changes in organoleptic characteristics of sprouted green gram incorporated Cookies during storage

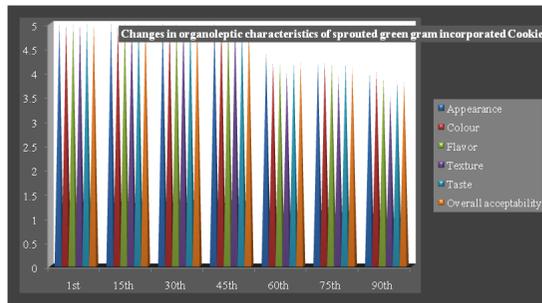


Fig:3. Changes in organoleptic characteristics of sprouted green gram incorporated Cookies during storage

Day evaluation	Sample					
	Murukku Mix		Burffi		Cookies	
	Bacterial count 10 ⁻⁵ CFU/g	Fungal count 10 ⁻⁵ CFU/g	Bacterial count 10 ⁻⁵ CFU/g	Fungal count 10 ⁻⁵ CFU/g	Bacterial count 10 ⁻⁵ CFU/g	Fungal count 10 ⁻⁵ CFU/g
1 st	BDL	BDL	BDL	BDL	BDL	BDL
15 th	BDL	BDL	BDL	BDL	BDL	BDL
30 th	BDL	BDL	1	1	1	1
45 th	1	1	2	2	1	1
60 th	1	2	3	2	2	3
75 th	3	3	4	4	3	3
90 th	4	3	6	5	4	5

Table: 9. Microbial load evaluation of Sprouted Green gram incorporated food products

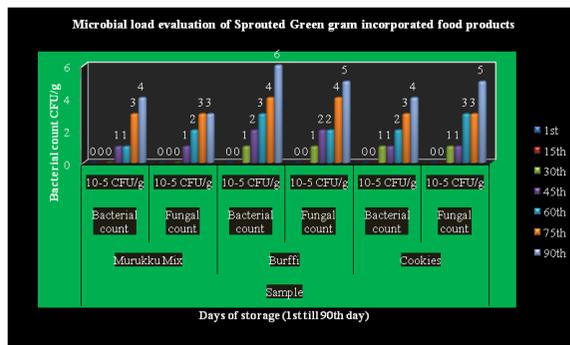


Fig: 4. Microbial load evaluation of Sprouted Green gram incorporated food products

Summary:

Nowadays instant food mix are becoming more popular additional to this the product of our interest has high nutritional sources including, vitamins, rich protein, calcium, antioxidant properties and much more leading to snacks level for all age groups. Sprouted green gram contains iron, fiber that prevent from constipation, reduce blood sugar level etc., the production cost was cheaper and machineries charges also cheap and can be easily processed in home level for small scale by women entrepreneurs.

REFERENCE

1. Bibie (2008). Protein rich germinated green gram, pp: 742-752. | 2. Fielder R.M. (2003). Journal of food preservation and technology vol:22, pp: 312. | 3. Chandrasekhar and Ghosh (2002). Rich germinated green gram. The American journal of food technology vol (6), pp:722-736. | 4. Kulkarni D.N (2002). Sorghum malt based weaning food formulation, preparation functional properties and nutritive value food and nutrition bulletin vol: 133, pp: 136. | 5. Lawrence. Role of dietary fiber in cereals and legumes. Colleges of agricultural and environmental sciences caliform pp:63. | 6. Raj B.A (2001). Evaluation of protein of sprouted green gram on albino rat. Nutrition society of India vol: 78, pp24. |