

Research Article

Development and Sensory Evaluation of Value Added Products Incorporating Partially Defatted Peanut Cake Flour and Powdered Greens

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Abstract

Partially defatted peanut cake flour (DPF), an underutilized by-product after oil extraction from peanuts has now gained more importance because of its higher availability of protein. Five value added products were developed incorporating peanut cake flour along with powdered green leafy vegetables (GLV) namely *Matthi*, *Seviyan*, *Pinni*, *Panjiri* and Biscuits with an aim to enrich the nutritive value of the same. Separate trials were carried out by replacing the flour with different proportion of DPF (5-15%) as well as GLV (0.5-2%). The samples were subjected to sensory evaluation to a trained panel. Results revealed that *matthi*, *seviyan* and biscuits were acceptable with a level of incorporation at 10% DPF and 1.5 % GLV while 15 % DPF and 2% GLV were found to be the acceptable for *pinni* and *panjiri*. The proximate analysis also revealed a significant increase in the proximate composition on the addition of partially defatted peanut cake flour in the products.

Keywords: Partially defatted peanut cake flour, High protein, Green leafy vegetables, Organoleptic evaluation, Proximate composition

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Introduction

Peanuts are one of the major oilseed crop in the world with a high nutritional profile especially in terms of protein because of which it is being used in many diets to meet appropriate protein levels in the body. They are a good source of protein (21-36.4%), carbohydrates (18%) and fats (36-54%) [4] [12]. As malnutrition is one of the major challenges the world faces today, various intervention programmes are struggling hard to find an appropriate solution to this. Peanut and its byproducts are now gaining their position to improve deficient diets. Peanut flour is a by-product of peanut oil extraction commonly is known as partially defatted peanut cake flour (DPF).

DPF, as a protein-rich, inexpensive and underutilized product that offers the same health and dietary benefits of peanut has less fat content making its wide applications in the weight watch diets [9]. DPF contains 2.55 per cent of moisture, 52.75 per cent of protein, 14.39 per cent fat, 11.02 per cent fiber, 5.2 per cent ash, 14 per cent carbohydrates, 396.91 per cent energy. It is also a source of calcium (74%) and iron (2.6%), thus making it a highly nutritious food ingredient [3]. It has been revealed that DPF can be more beneficial in different food formulations as an ingredient when compared to peanut because of its high protein availability and low fat content [5]. Although green leafy vegetables do not contribute to the major nutrient content, it contributes to the minerals and vitamin profile [11]. Hence, five value added products namely *Matthi*, *Seviyan*, *Pinni*, *Panjiri* and Biscuits were developed incorporating partially defatted peanut cake flour and green leafy vegetables to enrich their nutrient profile.

Materials and Methods

Procurement and Processing of ingredients

Raw ingredients like wheat flour, Bengal gram flour, refined wheat flour, ghee, oil, hydrogenated fat (*dalda*), sugar and salt were purchased from the local market of Ludhiana. Seasonal leafy vegetables like spinach and fenugreek leaves were purchased from the local vegetable market.

Processing of peanuts

Raw peanuts were first roasted and deskinning. Oil was extracted using an oil extracting machine (local). The cake residue was collected and dried in the oven at 65°C for 25-30 minutes. The dried cake was then ground into fine powder.

Processing of green leafy vegetables

Spinach (*Spinacia oleracea*) and Fenugreek (*Trigonella foenum-graecum*) leaves were washed and cleaned. They were then chopped and dried in the oven at 80 °C for 4 hours which was then powdered.

Formulation of products

The basic ingredient used for all the products was cereal-pulse mix flour. Pulse flour was taken in one-third amount of cereal flour. This mix was replaced for the main ingredient listed in the standard procedure. Wheat and refined flour were used as a cereal source and chickpea flour was used as a pulse source. The standard procedures used for product development were as follows:

- **Matthi**- Refined wheat flour (100g), carom seeds and salt (1/2 tsp) is mixed with 7g of dalda thoroughly. Stiff dough is prepared using water. Small balls are rolled out and flattened. They are then pricked with fork and deep fried in oil
- **Seviyan**- Basic ingredient is chickpea flour. To 100g of chick pea flour salt is added and soft dough is prepared using water and 5ml of oil. It is then filled into a seviyan machine. The dough is then extruded out into hot oil and deep fried.
- **Pinni**- Wheat flour (100g) is roasted in 50g ghee. It is then mixed well with powdered sugar.
- **Panjiri**- Wheat flour (100g) is roasted in 60 g of ghee. It is then removed from flame and mixed well with powdered sugar and rolled into small ball when warm.
- **Biscuits**- 100g of wheat flour is sieved with a pinch of baking powder and kept a side. Fat (54g) and sugar (52g) is creamed well on a flat surface. The flour is added to the cream slowly and folded in and mixed thoroughly to form soft dough. The dough is then rolled and cut out into desired shapes. These are baked in the oven at 180°C for 20 minutes

Standardisation of Products with Partially Defatted Peanut Cake Flour (DPF)

The products with varying levels of DPF and GLV were carried out separately using standardized procedures. Three variations of samples were worked out to formulate value added products with peanut flour along with a control as mentioned in **Table 1**.

Table 1 Composition of various samples for the standardization of the products with partially defatted peanut cake flour

Treatments	Ingredients for the value added products with Partially defatted peanut flour (DPF) (g)		
	Wheat flour (Refined for <i>matthi</i>)	Chick pea flour	DPF
S1 (C)	75	25	-
S2 (5%)	71.25	23.75	5
S3(10%)	67.50	22.50	10
S4(15%)	63.75	21.25	15

*For *Seviyan*: Chickpea flour was taken as the basic ingredient instead of wheat flour
C- Control, S- Sample

The samples were subjected to sensory evaluation for their acceptability using the 9 point hedonic scale [8] with trained panels. The most acceptable products of standardization 1 were then taken as the control for the second standardisation with GLV. The score were statistically analysed using Kruskal-Wallis test.

Standardisation of Selected Products with Green Leafy Vegetables

The amount of ingredients for the products in the second standardization was kept constant. As the level of incorporation of GLV was increased, the amount of cereal flour was reduced so as to bring a balance as given in **Table 2**.

Green leafy vegetable used for incorporation in *Matthi* and *Seviyan* was powdered dehydrated fenugreek leaves and were incorporated at the levels 0.5, 1.00 and 1.50 per cent while spinach powder was incorporated in the sweet recipes like *Pinni* and *Panjiri* at the level of 1.00, 1.50 and 2.00 per cent.

Table 2 Composition of various samples for the standardization of the products with partially defatted peanut cake flour (DPF) and green leafy vegetables (GLV)

Products	Ingredients			
Matthi				
Variations	Refined Wheat flour (g)	Chickpea flour (g)	DPF (g)	GLV (g)
S1(C)	67.50	22.50	10	-
S2	67.00	22.50	10	0.5
S3	66.50	22.50	10	1.00
S4	66.00	22.50	10	1.50
Seviyan				
Variations	Wheat flour (g)	Chickpea flour (g)	DPF (g)	GLV (g)
S1(C)	22.50	67.50	10	-
S2	22.50	67.00	10	0.50
S3	22.50	66.50	10	1.00
S4	22.50	66.00	10	1.50
Pinni				
S1(C)	62.50	22.50	10	-
S2	62.50	22.50	10	1.00
S3	61.00	22.50	10	1.50
S4	60.50	22.50	10	2.00
Panjiri				
S1(C)	62.50	22.50	15	-
S2	62.50	22.50	15	1.00
S3	61.00	22.50	15	1.50
S4	60.50	22.50	15	2.00
Biscuits				
S1(C)	62.50	22.50	10	-
S2	62.50	22.50	10	1.00
S3	61.00	22.50	10	1.50
S4	60.50	22.50	10	2.00
GLV – Fenugreek leaves powder were used in <i>Matthi</i> and <i>Seviyan</i> Spinach powder was used in Biscuits, <i>Pinni</i> and <i>Panjiri</i>				

Sensory Evaluation of the products

The developed products were then subjected to sensory evaluation for their acceptability using the 9 point hedonic scale [8] by a panel of 10 trained panelists.

Nutritional analysis of the developed products

Proximate composition like protein, fat, fiber as well as energy of the developed value added products were also assessed using standard procedures [2].

Statistical Analysis

The scores for each sensory parameter were then statistically analysed by Kruskal-Wallis test to select the best final acceptable formulation for each of the five products. The proximate composites of the value added products with its control were compared using paired t-test.

Result and Discussion

The organoleptic evaluation for all products revealed a significant difference for all parameters as presented in **Table 3**. In the case of *Matthi*, *Seviyan*, *Panjiri* and biscuits, the level of incorporation of partially defatted peanut flour showed significant differences for all parameters like appearance, colour, texture, flavour, aroma, taste and overall acceptability while for *Pinni*, an insignificant difference was obtained for taste as the level of incorporation increased. The developed products are revealed in **Figure 1**.

Table 3 Organoleptic Evaluation of Products Incorporated with Partially Defatted Peanut flour (DPF)

Proportions	Parameters					
	Appearance	Colour	Texture	Aroma	Taste	Overall Acceptability
Matthi						
S1(C)	7.80	8.00	7.70	7.40	7.50	7.67
S2	7.20	7.20	7.60	7.50	7.60	7.48
S3	7.60	7.70	7.40	7.60	7.60	7.58
S4	5.90	5.90	6.10	6.20	6.20	6.06
χ^2 value	23.57**	27.53**	17.34**	18.40**	15.39**	21.66**
Seviyan						
S1(C)	8.00	8.00	8.00	8.00	8.00	8.00
S2	7.60	7.00	8.00	7.00	8.00	7.52
S3	7.60	7.00	8.00	7.30	8.00	7.52
S4	6.30	6.30	7.60	6.00	6.00	6.24
χ^2 value	25.63**	34.62**	20.65**	30.50**	38.07**	34.73**
Pinni						
S1(C)	8.00	8.00	7.90	7.60	8.00	8.00
S2	7.70	6.70	7.30	7.30	7.60	7.56
S3	7.30	7.40	7.30	7.30	7.60	7.42
S4	7.70	7.40	7.30	7.00	7.60	7.62
χ^2 value	11.00*	21.69**	10.64*	8.36*	5.57 ^{NS}	18.68**
Panjiri						
S1(C)	8.00	8.00	7.80	7.80	8.00	8.00
S2	7.70	7.30	7.20	7.30	7.50	7.54
S3	7.70	6.70	7.20	7.00	7.50	7.16
S4	7.30	7.30	7.20	7.30	7.50	7.54
χ^2 value	11.00*	22.91**	11.57**	14.14**	10.64*	18.63**
Biscuits						
S1(C)	8.00	8.00	7.70	7.50	7.80	7.84
S2	7.50	7.30	7.20	7.00	7.40	7.28
S3	7.50	7.70	7.50	7.20	7.50	7.38
S4	6.60	7.20	6.90	5.60	6.20	6.25
χ^2 value	14.37**	24.63**	9.06*	24.23**	23.09**	28.39**

** Significant at 1% level of significance, *Significant at 5% level of significance

NS- Non significant

Highest scores for all the parameters of the products were obtained for S1 which is the Control (cereal-pulse mix-75:25). Among the samples of *Matthi* which were incorporated with partially defatted peanut cake flour, sample 3 (S3) received the highest score for appearance, colour and taste. Sample 3 (10% DPF) obtained the highest score for the overall acceptability (7.58). In the case of *Seviyan*, although there was a significant difference between the levels for all the parameters, the scores were the highest for Samples 2 and 3 (S1- 5% & S2- 10%) for all the parameters with an overall acceptability (7.52).

Among the samples incorporated with DPF of *Panjiri and Pinni*, with increase in DPF there was an increase in the scores of parameters. Sample 4 (15% DPF) obtained highest scores for all the characteristics with an overall acceptability of 7.54 and 7.62 for *Panjiri and Pinni* respectively. In the case of biscuits, Sample 3 (10% DPF) received the highest scores for all the parameters as well as overall acceptability of 7.38. Yadav and his co workers [14] have also reported that incorporation of deoiled peanut flour in biscuits was most acceptable at 5 per cent (8.60) and was acceptable upto 15 per cent but more amounts had a negative effect.

Thus, highly acceptable samples selected were Sample 3 in case of *Matthi, Seviyan* and biscuits while Sample 4 for *Pinni and Panjiri* which was then later subjected to the second standardization with green leafy vegetables. Similar study by Bansal [3] also reported that product like *Matthi* and Biscuits were highly acceptable with an incorporation of 10 per cent DPF while up to 20 per cent DPF was acceptable in *Seviyan* and 50 per cent in *Panjiri*.

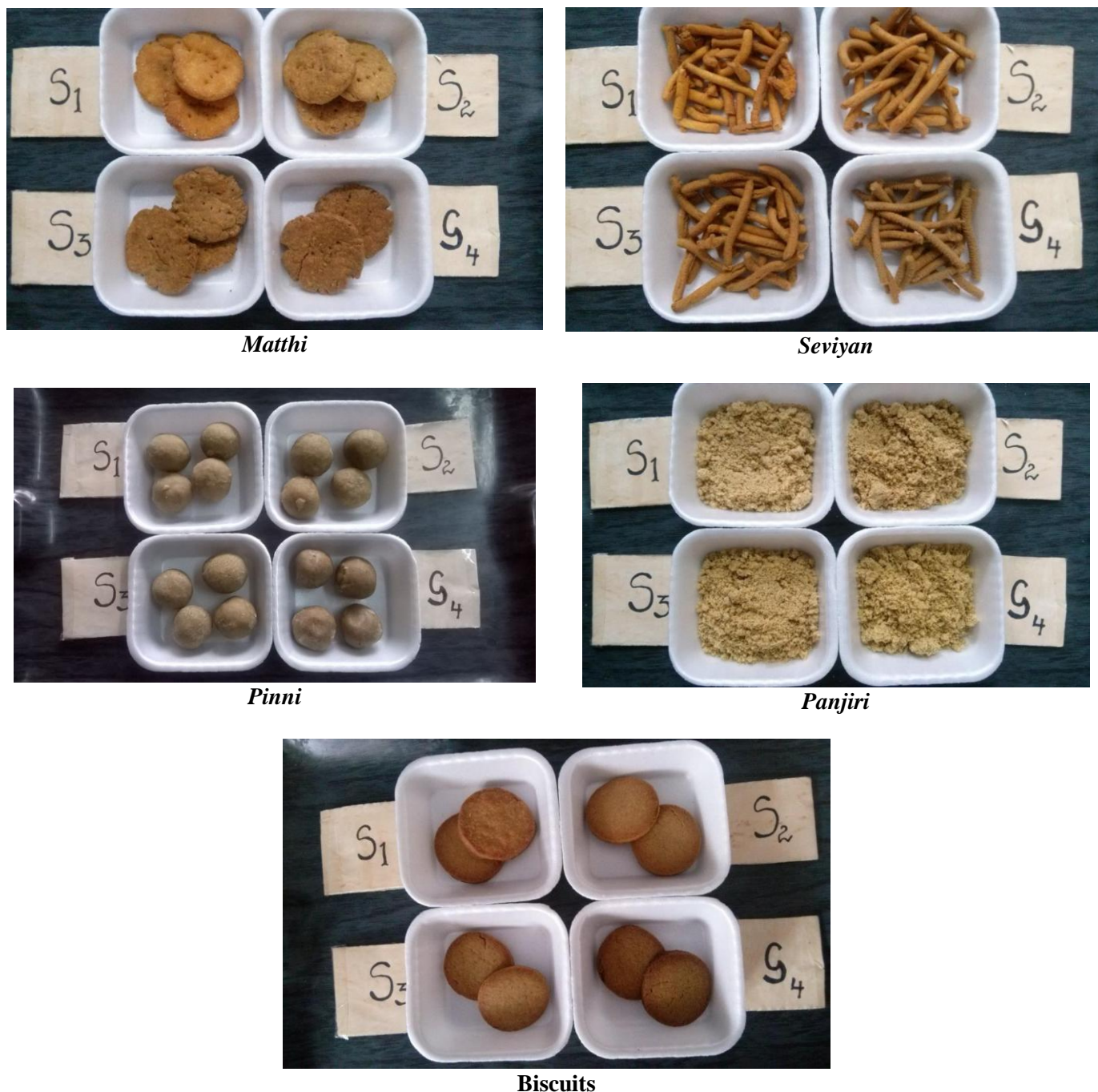


Figure 1 Value Added Products developed with different levels of incorporation of Partially defatted peanut cake flour (DPF)

Organoleptic Evaluation of Products Incorporated with Green Leafy Vegetables

The scores for the organoleptic evaluation of all the products with increasing level of incorporation of GLV are presented in **Table 4**. It was observed that too high and too low incorporation of GLV was not acceptable for *Matthi*, *Seviyan* and Biscuits. While increasing the GLV content was found to be acceptable in case of *Pinni* and *Panjiri*. The developed products are depicted in **Figure 2**.

The scores for all the parameters were significant for all products except for texture in biscuits, *pinni* and *panjiri*. Highest scores were obtained for the Control (10% DPF- *Matthi* and *Seviyan* & 15% DPF- *Pinni* and *Panjiri*) of all the products. Among the samples, Sample 2 (1% GLV) of *Matthi* and *Seviyan* received the highest scores for all parameters with an overall acceptability of 7.18, 7.48 and 7.50 respectively. Gupta and Prakash [6] reported that an incorporation of 'Keerae' (*Amaranthus paniculatus*) upto 4 per cent level in products like *Mathri* and *Thalipeeth* was acceptable.

Table 4 Organoleptic Evaluation of Products Incorporated with Green Leafy Vegetables

Proportions	Parameters					
	Appearance	Colour	Texture	Aroma	Taste	Overall Acceptability
Matthi						
S1(C)	7.30	7.30	7.60	7.5	7.40	7.42
S2	7.10	7.20	7.50	7.1	7.40	7.16
S3	7.00	7.20	7.50	7.20	7.40	7.18
S4	5.70	5.90	6.10	5.70	6.40	5.86
χ^2 value	27.13**	24.34**	19.08**	28.50**	15.78**	24.97**
Seviyan						
S1(C)	7.70	7.00	8.00	7.70	8.00	7.68
S2	7.70	7.00	7.70	7.00	7.20	7.40
S3	7.00	7.00	8.00	7.00	7.30	7.48
S4	6.30	5.30	7.40	5.40	5.00	5.84
χ^2 value	30.72**	38.33**	30.59**	34.13**	29.16**	30.89**
Pinni						
S1(C)	7.80	7.80	7.80	7.60	7.80	7.80
S2	7.50	6.90	7.60	7.00	7.60	7.44
S3	7.50	6.90	7.60	7.00	7.60	7.50
S4	7.30	6.00	7.50	7.00	7.30	7.62
χ^2 value	7.49 ^{NS}	24.41**	5.09 ^{NS}	20.65**	5.69 ^{NS}	13.55**
Panjiri						
S1(C)	7.90	7.90	7.90	7.60	7.90	7.90
S2	7.60	7.00	7.60	7.00	7.60	7.36
S3	7.60	7.00	7.60	7.00	7.60	7.26
S4	7.30	7.00	7.60	7.00	7.60	7.36
χ^2 value	7.31 ^{NS}	33.97**	7.31 ^{NS}	20.65**	7.49 ^{NS}	16.09**
Biscuits						
S1(C)	7.70	7.30	7.30	7.30	7.80	7.68
S2	7.80	7.30	7.30	7.00	7.80	7.30
S3	7.30	7.30	7.30	7.00	7.40	7.50
S4	6.10	5.60	7.10	5.90	5.60	5.60
χ^2 value	24.41**	26.13**	0.62 ^{NS}	22.36**	27.87**	25.41**

** Significant at 1% level of significance, *Significant at 5% level of significance

NS- Not Significant

In the case of biscuits, highest scores were obtained for the Control (10%DPF) and among the samples; Sample 3 (1% GLV) received the highest scores for all parameters with an overall acceptability of 7.50. *Matthi* and Biscuits prepared incorporating dehydrated *palak* (*Beta vulgaricus* L.) was reported acceptable at 4 per cent level by Kaur and her co workers[7]. *Pinni* and *Panjiri*, the scores obtained were insignificant for taste and appearance while Sample 4 (2% GLV) had the highest scores with an overall acceptability of 7.62 and 7.36 respectively.

Proximate analysis of the value added products

The analysis revealed that the proximate composition of all the value added products increased significantly compared to its control which was not supplemented with partially defatted peanut cake flour or leafy vegetable powder as revealed in **Table 5**.

The protein content for the value added salty snacks like *matthi* and *seviyan* was found to be 16.58 and 23.49 per cent which increased from that of its control which was only 11.59 and 16.04 per cent respectively. While the sweet products like *pinni*, *panjiri* and biscuits, the protein content significantly ($p < 0.01$) increased from 11.02 to 20.18 per cent, 11.27 to 18.97 per cent and 12.44 to 17.94 per cent respectively. The fat content in the value added products were found to be 20.92, 18.06, 27.05, 26.96 and 19.35 per cent for *matthi*, *seviyan*, *pinni*, *panjiri* and biscuits respectively while the fat content for their control ranged from 16.28 per cent in *seviyan* to 25.11 per cent for *pinni*. High protein, fat and ash content in *pinni* prepared from the blend of wheat and chickpea flour was reported by Talwar and Brar [13] in comparison with the nutrient content of *pinni* prepared from wheat flour and *suji* as well as wheat flour alone.

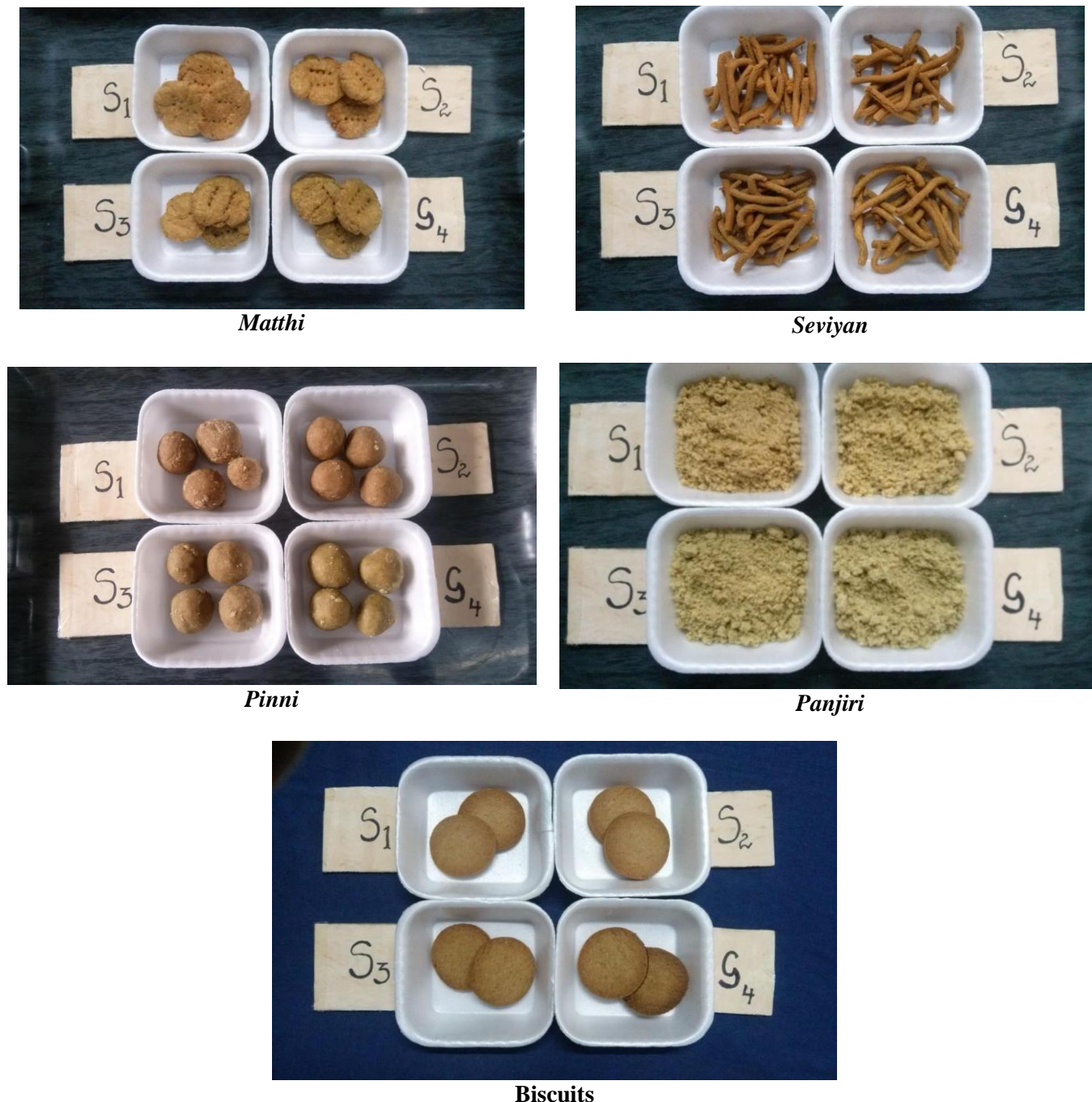


Figure 2 Value Added Products developed with different levels of incorporation of Partially defatted peanut cake flour (DPF) and Powdered green leafy vegetables (GLV)

The fiber content for all the value added products increased significantly ($p < 0.01$, $p < 0.05$) and ranged 1.43 to 3.86 per cent. The total energy content of developed value added products increased significantly and ranged from 463.24 per cent in *seviyan* to the highest content of 492.85 per cent in *pinni*. The increase in the energy content can be attributed by the significant increase in protein and fat. A significant increase in the moisture, protein, fat, ash and energy content with a decrease in carbohydrate content was also observed by Purohit and Rajyalakshmi [10] when products like *laddoo*, biscuits, extruded products, fryms and chutney were incorporated with defatted groundnut cake flour. Agarwal and Sharma [1] noted a significant increase in *matthri* fortified with garden cress seed flour with respect to protein and fat while the difference in other proximate parameters were found to be insignificant. Similar study conducted by Bansal [3] reported that the proximate composition of *matthri*, *seviyan*, *panjiri* and biscuits increased significantly for all proximate parameters except for moisture and ash. Yadav and his co workers [14] also observed an increase in all parameters except carbohydrate in biscuits incorporated with deoiled peanut cake flour.

Table 5 Proximate composition of developed products (dry weight basis) (g /100 g)

Products	Crude Protein	Crude Fat	Crude Fiber	Energy (Kcal/100g)
<i>Matthi</i> (control)	11.59±0.02	18.86±0.04	0.23±0.01	477.67±0.19
Acceptable 10%DPF+1%FLP	16.58±0.02	20.92±0.04	1.43±0.16	483.56±0.13
t-value	175.09**	46.64**	7.27*	80.03**
<i>Seviyan</i> (control)	16.04±0.10	16.28±0.04	1.75±0.02	461.53±0.36
Acceptable 10%DPF+1%FLP	23.49±0.28	18.06±0.03	2.94±0.02	463.24±0.09
t-value	19.94**	36.39**	77.90**	6.28*
<i>Pinni</i> (control)	11.02±0.05	25.11±0.05	1.41±0.01	494.64±0.08
Acceptable 15%DPF+2%SLP	20.18±0.03	27.05±0.02	3.84±0.01	492.85±0.61
t-value	418.91**	66.65**	120.18**	16.30**
<i>Panjiri</i> (control)	11.27±0.02	24.49±0.06	1.42±0.01	489.29±0.84
Acceptable 15%DPF+2%SLP	18.97±0.06	26.96±0.02	3.86±0.04	487.82±0.14
t-value	166.13**	28.65**	48.31**	9.94**
Biscuit (control)	12.44±0.31	18.91±0.03	0.27±0.03	483.31±0.44
Acceptable 10%DPF+1.5%SLP	17.94±0.02	19.35±0.09	1.36±0.02	473.51±0.29
t-value	18.64**	5.10*	51.88**	34.88**

Values are expressed as Mean±SE (Standard Error), NS- Not significant

** Significant at 1% level of significance, *Significant at 5% level of significance

DPF- Partially defatted peanut cake flour, FLP- Fenugreek leaves powder, SLP- Spinach leaves powder

Conclusion

Partially defatted peanut cake flour, a byproduct of peanut oil extraction is a very interesting ingredient rich in protein and has an increase bioavailability compared to whole peanut. The addition of partially defatted peanut cake flour and green leafy vegetables in traditional Indian snacks and sweets as well as biscuits were found to be organoleptically acceptable. Partially defatted peanut cake flour being rich in protein may improve the nutritive value of these products. For products like *Matthi*, *Seviyan* and biscuits, DPF incorporation was acceptable at 10 per cent level while for *Pinni* and *Panjiri*, it was acceptable at 15 per cent. With an addition of powdered fenugreek leaves (1%) in *Matthi* and *Seviyan* and spinach powder (1%) in biscuits as well in *Pinni* and *Panjiri* (2%), the organoleptic qualities of the products were acceptable. It was observed that protein, fat, fiber and energy content increased significantly in the products on value addition with partially defatted peanut cake flour. Hence, the products being inexpensive and highly nutritious, they can surely be a promising solution to eradicate malnutrition by recommending these products to be supplemented through various nutrition intervention programmes.

References

- [1] Agarwal N and Sharma S. Garden Cress : A non-conventional traditional plant item for food products. Indian J of Traditional Knowledge, 2013, 12(4), 699-706
- [2] AOAC. Official Method of Analysis Association of Official Analytical Chemist, 17th ed. Washington DC, 2000
- [3] Bansal P. Development of value added products with peanut flour for nutritional and health benefits. M.Sc. thesis (Food and Nutrition). Punjab Agricultural University, Ludhiana, Punjab, 2013, 129p.
- [4] Devi KB, Vidhya R and Jaganmohan R. Determination and isolation of protein from different fractions of defatted groundnut oil cake. Afr. J. Plant Sci, 2013, 7(8), 394-400.
- [5] Fekria A M, Isam A M A, Suha O A and Elfadil E B. Nutritional and functional characterization of defatted seed cake flour of two Sudanese groundnut (*Arachis hypogaea*). Intl. Food Res. J, 2012, 12, 629-37.
- [6] Gupta S and Prakash J. Nutritional and sensory quality of micronutrient-rich traditional products incorporated with green leafy vegetables. Intl. Food Res J, 2011, 18, 667-75
- [7] Kaur P, Dahiya S and Rana R. Development and Nutritional evaluation of Beta-carotene rich products using beet leaf (Palak) and Carrot. Intl. J Res, 2015, 2(2), 1324-32
- [8] Larmond E. Methods of sensory evaluation of food. Can Deptt Agric Pubs, 1970, s1284.
- [9] Liu DC, Hu XH, Zhang WN, Wang Y and Liu YF. Research on preparation and functional properties of peanut flour and peanut protein concentrate. China Oils Fats, 1996, 21(3), 5-11

- [10] Purohit C and Rajyalakshmi P. Quality of products containing defatted groundnut cake flour. *J. Food Sci. Tech*, 2011, 48, 26-35
- [11] Settaluri V S, Al-Mamari K M K, Al-Balushi S I M, Al-Risi M K Z and Ali M B. Review of biochemical and nutritional constituents in different green leafy vegetables. *Biomed Life Sci*, 2015, 6(9), 765-69
- [12] Stephens AM, Dean LL, Davis JP, Osborne JA and Sanders TH. Peanuts, peanut oil and fat free peanut flour reduce CVD risk factors and the development of arteriosclerosis in Syrian golden hamsters. *J. Food Sci*, 2010, 75, H116-22.
- [13] Talwar G and Brar SK. Study of Physiochemical, Sensory and Color Properties of Pinni Variants. *Ind J Sci Technol*, 2015, 8(7), 629-34
- [14] Yadav D N, Thakur N and Sunooj K V. Effect of partially de-oiled peanut meal flour (DPMF) on the nutritional, textural, organoleptic and physico chemical properties of biscuits. *Food Nutr Sci*, 2012, 3, 471-76.

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