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## Delectable and wholesome 'PM 5 and PM 6'

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### Abstract

The easily digestible and low flatulence producing mungbean is an excellent source of high quality protein in the diet of Indians. The present investigation was undertaken with the objective to prepare 'Laddu', 'Daal' and 'Haryaali Sprouted Salad' from three varieties namely: Pant Mung 5 (PM 5), Pant Mung 6 (PM 6) and a local variety of mungbean grain. The foods prepared thereby viz. PM 5, PM 6 and Local variety 'Laddu', PM 5, PM 6 and Local variety 'Daal' and PM 5, PM 6 and Local variety 'Haryaali Sprouted Salad' underwent sensory evaluation using Nine Point Hedonic Scale and the Score Card methods as given by Amerine *et al.*, 1965<sup>[1]</sup> and also for evaluation of their nutritional composition. It was found that PM 6 Laddu was liked extremely by 46.67% and Local variety Laddu was liked slightly by 33.33% of panelists. Moreover the PM 5, PM 6 and Local variety of Daal was liked very much by 62%, 72% and 79% respectively. The Haryaali Sprouted Salad prepared from PM 5, PM 6 and Local variety was liked extremely by 46.67%, 53.33% and 23.33% respectively. For one serving of Laddu (33 g), one cup of Daal (110 g) and 75 g of Haryaali Sprouted Salad the crude protein content ranged from 6.54 to 12g and the calcium content was gauged to be in the range of 80.51 to 90.75 mg for PM 5, PM 6 and Local variety of mungbean grains respectively. Thus the newly evolved varieties of PM 5 and PM 6 are found to be nutritionally superior over the local variety prepared for daily consumption.

**Keywords:** Delectable, wholesome, Haryaali Sprouted Salad

### 1. Introduction

The Mungbean grain is a leguminous species, valued for its protein rich edible seeds, easy digestibility and low flatulence production. Pant Mung 5 is an early maturing (60-65 days) variety with long pods, large and shining seeds. Pant Mung 5 was released in the year 2002 for entire of Uttar Pradesh and plains of Uttarakhand for cultivation both in Kharif and Zaid seasons. It is resistant to mungbean yellow mosaic virus disease and yields 12 to 15q/ha as reported by Singh and Khulbe, 2009<sup>[6]</sup>.

Pant Mung 6 has been released in 2007 for North East Hill Zone of the country. Pant Mung-6 has small shining seeds as explained by Singh and Khulbe, 2009<sup>[6]</sup>.

In a study whole fried namkeen, dehusked fried namkeen, roasted namkeen and salad were formulated that were found to be good on the scale of 0-10 (Score Card Method) by the panel of consumers. On an average, among the products developed the fresh product salad was the best acceptable with the average overall acceptability of 8.31 followed by values of dehusked fried namkeen of 7.80, whole fried namkeen of 7.61 and roasted namkeen of 7.02.

Whole fried namkeen and dehusked fried namkeen were found to have considerable amount of good fat, protein, carbohydrate, energy content and *in-vitro* protein digestibility. Roasted namkeen was found to have low fat content (Raghuvanshi, 2009)<sup>[4]</sup>. Oligosaccharide content in mungbean as reported by Sampath *et al.* (2008)<sup>[5]</sup> was 1.25 mg per g (dm) whereas raffinose and maltotriose were not present. Ghavidel and Prakash (2007)<sup>[2]</sup> reported 46.7 g per cent total starch, 9.8 g per cent glucose released and 18.9 per cent *in-vitro* starch digestibility. Along with macronutrients, leguminous seeds contain appreciable amounts of some vitamins and minerals as well as dietary fiber (Guillon and Champ, 2002)<sup>[3]</sup>. Thus the present study was carried out to formulate products from whole and germinated mungbean varieties and evaluate the products for sensory characteristics. The emulsion capacity for mungbean grains and its protein isolates was 19.80 g/g and 31.40 g/g respectively. The oil absorption capacity of the mungbean grains showed negative correlation with nitrogen solubility index (Wenho *et al.*, 2010)<sup>[7]</sup>.

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## Materials and Methods

The study was conducted in Food Product Development Laboratory, Department of Foods and Nutrition, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand.

## Procurement of Raw Materials

The ingredients of ghee, sugar powder, whole Mung, oil, cumin seeds, salt, asafetida, turmeric powder onion and tomatoes were adequately purchased from local market Pantnagar.

## Formulation of Products

The mentioned ingredients were utilized to formulate 'Laddu', 'Daal' and 'Haryaali Sprouted Salad' represented in (Table 1, 2 and 3) respectively. For preparation of Laddu ghee was heated in a yoke and flour was added to it. The flour was shallow fried till it became light brown in colour. Thereafter the powdered sugar was added and the mixture was removed from the fire finally. After cooling it was hand molded into small balls called as Laddu. Similarly for preparation of Daal whole Mungbean grains were pressure cooked with salt and turmeric added to it until it became soft in consistency. Oil

was heated in a pan and asafetida and cumin seeds were added to it. Finally the pressure cooked Daal was added to it and cooked for about 3 minutes till it acquired the consistency of a thick soup. The Haryaali Sprouted Salad was prepared by utilizing sprouted mungbean grains, onion, tomato and salt. The aforesaid ingredients were mixed together and lemon juice was added to it.

**Table 1:** Ingredients and Amounts of Ingredients to prepare 'Laddu'

Ingredients	Amount (in g)
Flour	100
Ghee	50
Sugar powder	80

**Table 2:** Ingredients and Amounts of Ingredients to prepare 'Daal'

Ingredients	Amount
Whole Mungbean grains	30 g
Oil	1 tsp.
Cumin seeds	¼ tsp.
Salt	¼ tsp.
Asafetida	1 pinch
Turmeric powder	1 pinch
Water	250 ml

**Table 3:** Ingredients and Amounts of Ingredients to prepare 'Haryaali Sprouted Salad'

Ingredients	Amount
Sprouted mungbean	60 g
Onion	20 g
Tomato	20 g
Salt	¼ tsp.
Lemon juice	1 tsp.

## Sensory Evaluation

The formulated products namely Laddu, Daal and Haryaali Sprouted Salad were evaluated for sensory quality characteristics by Nine Point Hedonic Scale and Score Card method by fifteen semi-trained panelists (Amerine *et al.*, 1965)<sup>[1]</sup>.

## Nutrient Composition of Formulated Products:

Nutrient composition of prepared products was computed by calculation method.

## Results and Discussion

In the present study Laddu, Daal and Haryaali Sprouted Salad prepared from the three varieties namely Pant Mung 5, Pant Mung 6 and a local variety were gauged for parameters of colour, flavour, texture, taste, appearance, and overall

acceptability (Table 4). Consistency was solely evaluated for Daal prepared from the aforesaid varieties.

## Sensory Evaluation for 'Laddu'

The mean sensory score of colour of the three varieties were 7.06 for Pant Mung 5, 7.67 for Pant Mung 6 and 7.93 for local variety. A significant difference was recorded for colour between Pant Mung 5 and the local variety. Pant Mung 5 differed significantly from Pant Mung 6 and the local variety in terms of taste, overall acceptability and texture. The results obtained from Nine Point Hedonic scale revealed that 6.67 per cent panelists liked the product very much, 33.33 per cent panelists liked it moderately, 46.67 per cent panelists liked it slightly and 13.33 per cent panelists neither liked nor disliked the Laddu prepared from Pant Mung 5 (Table 5).

**Table 4:** Sensory Evaluation of 'Laddu' prepared from three varieties using Score Card

Sensory Characteristics	PM 5	PM 6	LV	F value	Difference	Comparison at 5%
Colour	7.06	7.67	7.93	4.25	S	1 2ns 3* 2 3ns
Flavour	6.93	7.73	8.06	5.50	S	1 2* 3* 2 3ns
Taste	6.73	7.80	8.13	8.20	S	1 2* 3* 2 3ns
Texture	6.47	7.87	7.87	9.10	S	1 2* 3* 2 3ns
Appearance	6.8	7.70	8.06	7.92	S	1 2* 3* 2 3ns
Overall acceptability	6.67	7.73	8.00	9.15	S	1 2* 3* 2 3ns

Note: PM 5= Pant Mung 5, PM 6= Pant Mung 6, LV= Local variety

## Sensory Evaluation of 'Daal'

Results obtained from Nine Point Hedonic scale revealed that 13.33 per cent panelists liked extremely, 6.67 per cent panelists liked very much, 46.67 per cent panelists liked moderately and 33.33 per cent panelists liked slightly the Daal prepared from Pant Mung 5.

The results also depicted that there was no significant difference between the three varieties with reference to colour of the prepared Daal. Pant Mung 5 differed significantly from Pant Mung 6 with respect to flavour. Pant Mung 5 differed significantly from Pant Mung 6 and the local variety in terms of taste and texture.

**Table 5:** Sensory Evaluation of 'Laddu', 'Daal' and 'Haryaali Sprouted Salad' prepared from three varieties using Hedonic Scale method

Hedonic Scale	Laddu			Daal			Haryaali Sprouted Salad		
	PM 5 (%)	PM 6 (%)	LV (%)	PM 5 (%)	PM 6 (%)	LV (%)	PM 5 (%)	PM 6 (%)	LV (%)
Like extremely	0	6.67	13.33	13.33	33.33	20.00	46.67	53.33	26.67
Like very much	6.67	33.33	33.33	6.67	46.67	20.00	40.00	40.00	53.33
Like moderately	33.33	46.67	40.00	46.67	20	46.67	13.33	6.67	20.00
Like slightly	46.67	6.67	6.67	33.33	0	13.33	0	0	0
Neither like nor dislike	13.33	6.67	6.67	0	0	0	0	0	0

Note: PM 5= Pant Mung 5, PM 6= Pant Mung 6, LV= Local variety

**Table 5:** Sensory Evaluation of 'Daal' prepared from the three varieties using Score Card Method

Sensory Characteristics	PM 5	PM 6	LV	F value	Difference	Comparison at 5%
Colour	8.40	7.70	7.80	1.77	NS	-
Flavour	8.40	7.27	8.00	4.11	S	1 2* 3ns 2 3ns
Taste	8.60	7.67	7.80	3.88	S	1 2* 3* 2 3ns
Texture	8.60	7.53	7.80	4.65	S	1 2* 3* 2 3ns
Appearance	8.53	7.60	8.00	3.18	S	1 2* 3ns 2 3ns
Consistency	8.33	7.20	7.73	4.98	S	1 2* 3ns 2 3ns
Overall acceptability	8.53	7.33	7.87	4.86	S	1 2* 3ns 2 3ns

Note: PM 5= Pant Mung 5, PM 6= Pant Mung 6, LV= Local variety

### Sensory Evaluation of 'Haryaali Sprouted Salad'

The Nine Point Hedonic Scale depicted that 46.67 per cent panelists liked extremely, 40 per cent panelists liked very much and 13.33 per cent panelists liked moderately the salad prepared from Pant Mung 5.

The mean sensory of colour of the three varieties were 7.73 for Pant Mung 5, 6.93 for Pant Mung 6 and 7.67 for the local

variety taken. There was no significant difference amongst the three varieties with reference to colour, texture, appearance and overall acceptability. As a matter of fact Pant Mung 5 differed significantly from local variety in terms of flavour and taste. Pant Mung 5 scored the highest and Pant Mung 6 and the local variety scored the same for their respective appearance (Table 6).

**Table 6:** Sensory Evaluation of 'Haryaali Sprouted Salad' prepared from three varieties using Score Card method

Sensory Characteristics	PM 5	PM 6	LV	F value	Difference	Comparison at 5%
Colour	7.73	6.93	7.67	1.65	NS	-
Flavour	8.06	8.06	7.20	5.21	S	1 2ns 3* 2 3*
Taste	8.20	7.73	7.20	4.18	S	1 2ns 3* 2 3ns
Texture	7.73	7.53	7.80	0.20	NS	-
Appearance	8.13	7.53	7.53	2.27	NS	-
Overall acceptability	8.33	7.80	7.73	1.40	NS	-

Note: PM 5= Pant Mung 5, PM 6= Pant Mung 6, LV= Local variety

### Nutritive Value of Formulated products

The products prepared from Pant Mung 5, Pant Mung 6 and the local variety were calculated for their proximate composition (i.e. crude fiber, crude fat, carbohydrate), physiological energy, minerals (calcium and iron).

#### Nutritive value of 'Laddu'

The results revealed that one serving (i.e. 33 g) of Laddu prepared from Pant Mung 5 contained 8.78 g of protein, 17.18 g of fat, 2.17g of fiber, 46.04 g of carbohydrate and 370.70 kcal of energy. The mineral content of the Laddu was reported to be 80.51 mg of calcium and 1.77 mg of iron per

serving. The protein content was found to be highest in case of Laddu prepared from Pant Mung 5. The Laddu prepared from Pant Mung 6 for one serving of 33 g contained 8.14 g of protein, 17.16 g of fat, 2.04 g fiber, 46.47 g of carbohydrate and 373 kcal of energy (Table 7).

#### Nutritive Value of 'Daal'

The results revealed that Daal prepared from Pant Mung 5 for one serving (i.e. 110 g) contained 7.89 g of protein, 5.46 g of fat, 1.96 g of fiber, 17.43 g of carbohydrate and 125.60 kcal of energy. The calcium content was recorded to be 72.45 mg and that of 1.6 mg of iron respectively.

**Table 7:** Nutritive Value of the products prepared from the three varieties

	Laddu (33g)			Daal			Haryaali Sprouted Salad		
	PM 5	PM 6	LV	PM 5	PM 6	LV	PM 5	PM 6	LV
Per serving									
Crude protein (g)	8.78	8.14	7.30	7.89	7.32	6.54	12.60	12.00	10.60
Crude fat (g)	17.18	17.16	17.20	5.46	5.44	5.48	0.70	0.70	0.60
Crude fiber (g)	2.17	2.04	1.75	1.96	1.83	1.58	2.91	2.73	2.73
Carbohydrate (g)	46.04	46.47	47.13	17.43	17.82	18.42	27.90	28.74	28.74
Physiological Energy (kcal)	370.70	373.00	372.33	125.60	124.70	124.10	165.45	166.00	218.20
Calcium (mg)	80.51	83.78	78.89	72.45	75.39	71.01	85.50	90.75	83.40
Iron (mg)	1.77	1.96	1.76	1.60	1.80	1.60	2.16	2.14	2.14

Note: PM 5= Pant Mung 5, PM 6= Pant Mung 6, LV= Local variety

### Nutritive Value of 'Haryaali Sprouted Salad'

The results showed that 75 g of Haryaali Sprouted Salad

prepared from Pant Mung 5 contained 12.60 g of protein, 0.7 g of fat. 2.91g of fiber, 27.90g of carbohydrate, 165.45 kcal of

energy, 85.50 mg of calcium and 2.16 mg of iron content. The protein content was highest in Haryaali Sprouted Salad prepared from Pant Mung 5. The calcium content was highest in Haryaali Sprouted Salad prepared from prepared from Pant Mung 6. On the other hand the calcium and protein content were lowest for Haryaali Sprouted Salad prepared from the local

### Conclusion

It can be therefore, concluded that the newly developed varieties should be incorporated in daily recipes to making the diets more delectable and wholesome.

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