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Development and sensory evaluation of value added products incorporating germinated horse gram (*Macrotyloma uniflorum*) powder

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Abstract
Horse gram (*Macrotyloma uniflorum*), known as *Kulthi*, is an underutilized legume and belongs to the family *Fabacea*. It is good source of protein and minerals and used for the treatment of heart diseases, kidney stone, asthma, bronchitis and urinary discharges. The present study is aimed at preparing horse gram powder using germination process followed by nutrient and antinutrient analyses. *Khakra* and *Idli* were prepared by using this germinated powder ranging from 5 to 15% incorporation. On the basis of the results, it can be observed that germination reduced fat, protein, fibre and carbohydrates content converting them into their simpler forms while increased in moisture and ash content. In terms of sensory evaluation of *Khakra* and *Idli*, the mean scores were found to be ranging from 3.5-4 for *Idli* and 3.8-4.4 for *Khakra.* On the basis of present study, it can be concluded that horse gram has great scope in the Indian diet and for making value added products by incorporating germinated horse gram powder upto 10% incorporation.

Keywords: Germination, Horse gram, Idli, Kulthi, Khakra

Introduction
Legumes are one of the world's most important source of food supplies, especially in developing countries. Recently considerable interest has been focused on the utilization of neglected legumes for human feed. Among underutilized legumes, horse gram is one of the lesser known legumes. It is extensively cultivated in Australia, Burma, India and Sri Lanka. It has 22% protein, 0.5% fat, 57.2% carbohydrates, 11.8% moisture, 5.3% fiber and 3.2% ash content (Prakash *et al*. 2008). Nutritional value of horse gram is adversely affected by the presence of antinutritional substances protease inhibitors, hemagglutinins, tannins, flatulence causing factors and polyphenols. Germination plays an important role in improving nutritive value of horse gram (Jain *et al.* 2012). It is a simple method of food processing that result in increased nutritive value and decrease the phytates, tannin level and increases the availability of iron and calcium (Borade *et al*, 1984). So the present study is aimed with objective of applying germination process on horse gram and estimating proximate content and antinutrient content followed by preparing food products (*Khakra* and *Idli*).

Methodology
Horse gram (variety K7) was procured from Dryland Farming Research Station, Arijia, Bhilwara. Procured horse gram was used for germination process. For its process, it was soaked in water for 12 hours followed by placing under wet muslin cloth and left for 48 hours in room temperature. After germination, it was dehulled, oven dried and converted into powder. Then horse gram raw (HGR) and horse gram germinated (HGG) powder was estimated for its proximate content by following AOAC methods (2005) and antinutrients were assessed by the methods given by Xu and Chang (2007). Germinated horse gram powder was used for the formulation of *Khakra* and *Idli.* Three variants of each recipe; variant A, B and C having 5%, 10% and 15% of germinated horse gram powder respectively were prepared followed by sensory evaluation using 5 point rating scale. The composition of the recipes has been mentioned in table 1 and 2.

Table 1: Composition of Idli and its variants

Ingredients	Standard	Variant A	Variant B	Variant C
Semolina (gm)	100	95	90	85
Curd (gm)	25	25	25	25
HGG (gm)	-	5	10	15
Eno (gm)	2	2	2	2
Salt	To taste	To taste	To taste	To taste
Chopped vegetables (gm)	20	20	20	20

HGG- Horse gram germinated powder

Table 2: Composition of Khakra and its variants

Ingredients	Standard	Variant A	Variant B	Variant C
Wheat flour (gm)	100	95	90	85
Ajwain (gm)	2	2	2	2
HGG (gm)	-	5	10	15
Salt	To taste	To taste	To taste	To taste
Turmeric (gm)	2	2	2	2
Oil (tsp)	1	1	1	1

HGG- Horse gram germinated powder

Results and discussion:
Nutrient and antinutrient content of HGR and HGG
Proximate content of HGR and HGG was estimated and shown in figure 1. It was found that moisture content of HGR was 10.5±0.01 g/100g, and in HGG was 11.2±0.05 g/100g. It showed that during germination moisture content was increased. Its total ash content is moderate in HGR *i.e*. 3.1±0.10 g/100g. After processing, the ash content was found

to be increased in HGG with the values 3.2±0.05 g/100g. Fat content of HGR was 1.8±0.15 g/100g depicting it as prudent and healthy food especially for middle age and elderly. During germination fat content decreased to 1.6±0.05 g/100g. It has reasonably good fibre content which again makes it healthy food stuff. Crude fiber content in HGR was 5.7±0.15 g/100g and because of using dehulling after germination its content decreased in HGG. Since pulses are good source of protein and its content HGR was 22.6±0.01 g/100g. Whereas, in HGG it was found to be 21.6±0.01 g/100g. It has a good carbohydrate content *i.e.* 58.7±0.01 g/100g in HGR. While after processing, carbohydrate content decreased in HGG with the mean value of 56.6±0.01 g/100g. Tannin content of HGR and HGG was found to be 780±4.58 (mg/100g) and 550±2.46 (mg/100g) respectively which shows that tannin content decreased during germination. Same pattern was also seen in total phenol content.

In various studies, it was observed that germination process had brought about maximum decrease in the protein level and amino acid content was observed to increase in the legumes (Sharma *et al*., 2002). The hydrolysis of protein during germination probably accounts for the better digestibility of protein. Therefore, in many studies, it observed that in vitro protein digestibility increased during germination in horse gram, cowpea and mung bean (Magdi, 2007). Jirapa (2001) noticed that fat content of seeds was negatively correlated with germination. Whereas, inverse case was observed by Oloya (2004). Crude fibre and moisture content were found to be increased during the course of germination (Oloya, 2004). In this research work, fibre content was found to be decreased because of the use of dehulling process. Study on the effect of germination on ash content of seed found to be increased by Mustafa *et al*. (1987).

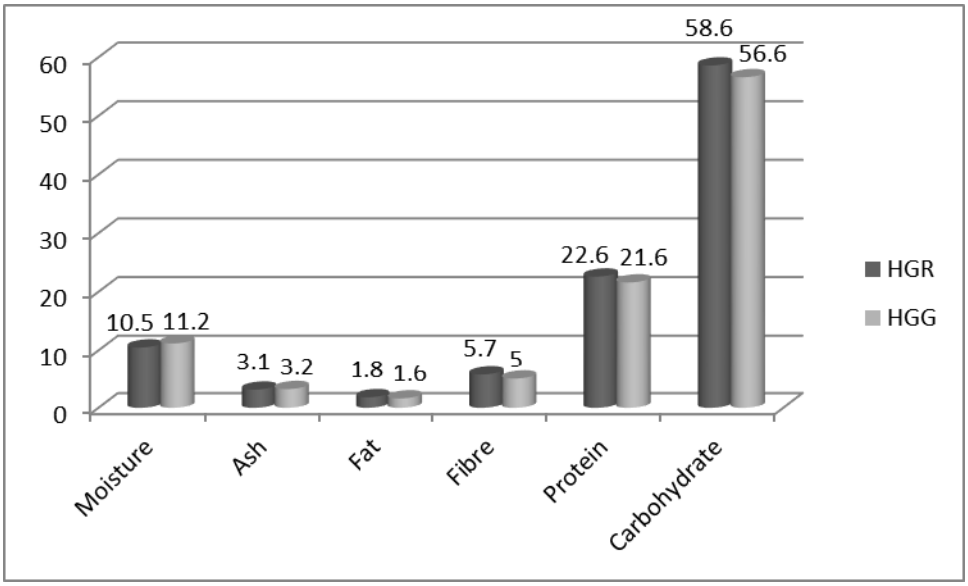

Fig 1: Proximate content (HGR) and (HGG) on dry weight basis (g/100g)

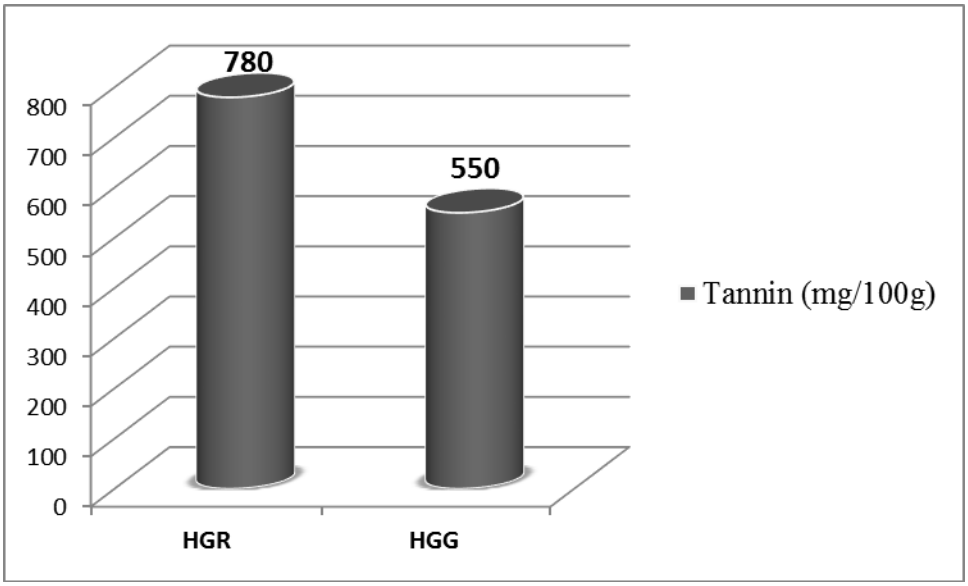

Fig 2: Tannin content of HGR and HGG

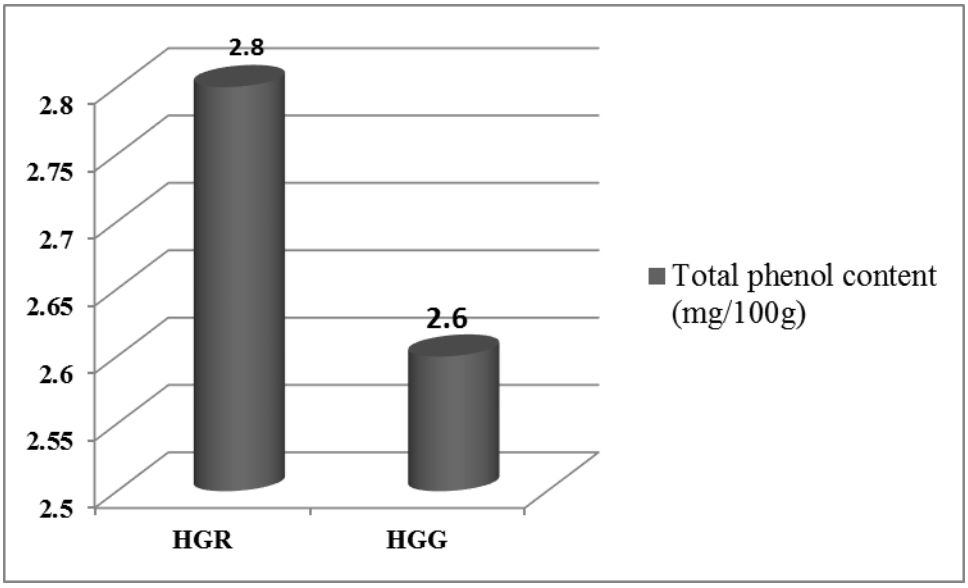

Fig 3: Total phenol content of HGR and HGG

Acceptability evaluation scores of *Idli* and *khakra* with their variants

In terms of organoleptic evaluation of *Idli*, standard was the best one. Among variants, the most acceptable variant was variant A followed by variant B and variant C. Same trend was also observed in *Khakra* and its variants. On the basis of sensory evaluation, up to 10% of HGG was found acceptable in both recipes. Some authors have used horse gram powder for value addition. Bhokre *et al*. (2012) [3]. prepared buns fortified with germinated horse gram flour. Results revealed that incorporation up to 15% of germinated horse gram flour in buns was found to be acceptable. In the same line, Thirukkumar and Sindumathi (2014) [9]. prepared *Chapatti* incorporated with processed horse gram flour, the results showed that *Chapatti* prepared from wheat flour incorporated up to 15% roasted horse gram was highly acceptable.

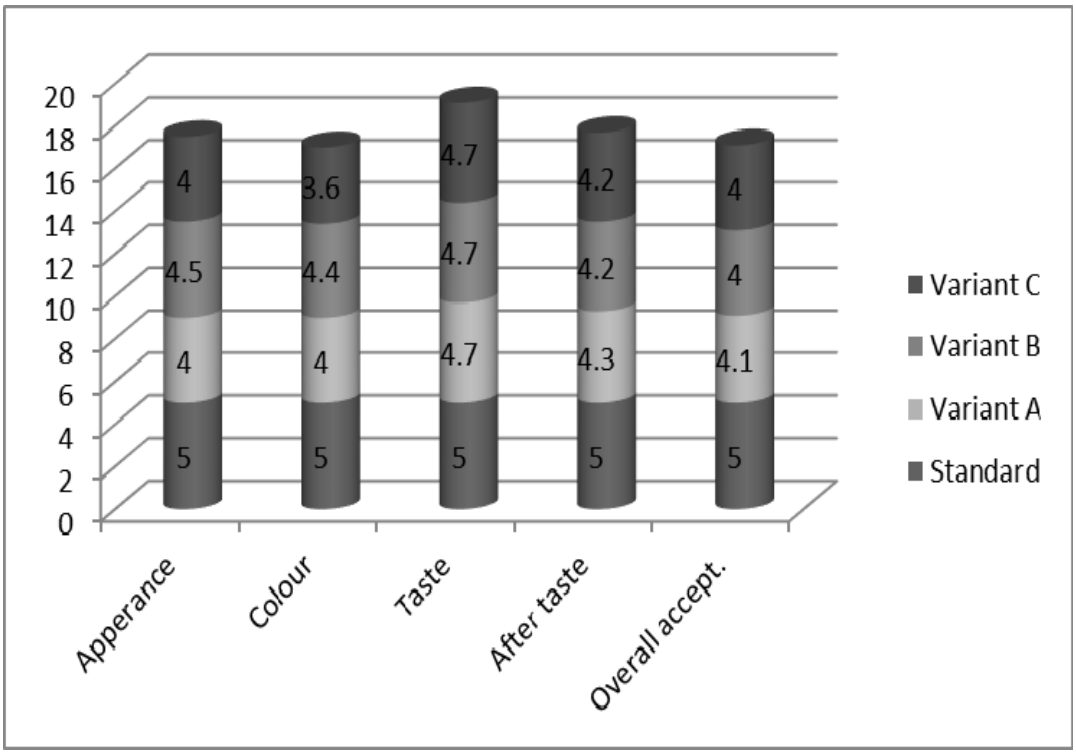

Fig 4: Sensory evaluation scores of *Idli* and its variants (A, B and C)

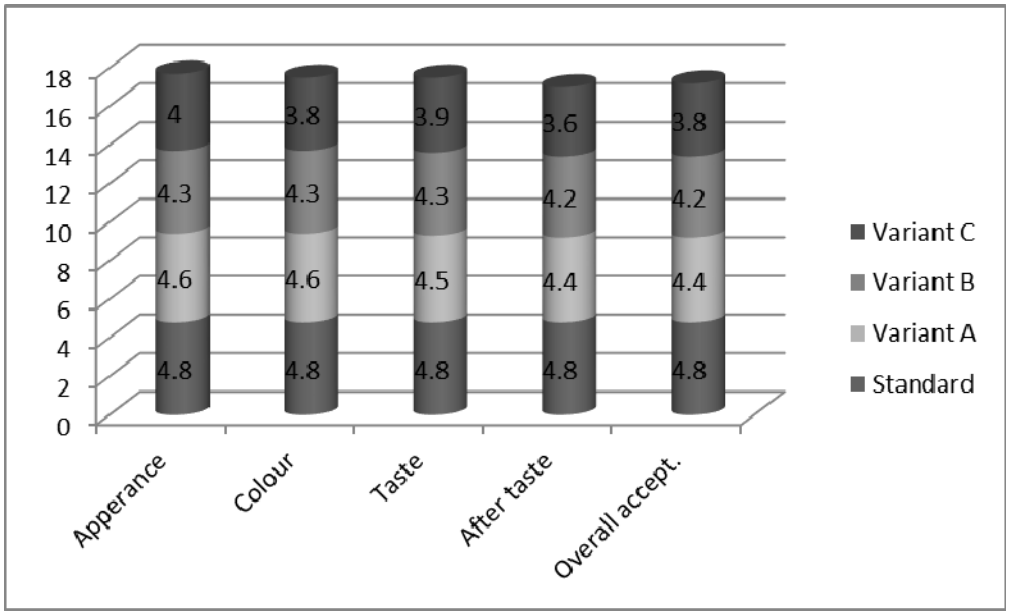

Fig 5: Sensory evaluation scores of *Khakra* and its variants (A, B and C)

Conclusion

Results of the study indicate that horse gram is a good source of protein, carbohydrates, fibre and minerals. Germination (48 hours) reduced the anti-nutrient profile at significant level and increased in vitro digestibility of nutrients. Sensory evaluation scores of *Instant Idli* and *Khakra* indicate that all the variants were found to be acceptable except variant C of *Khakra*. On that basis, it can be concluded that upto 10% HGG can be used for value addition of the food products.

References

1. Blumenthal MJ, Staples IB. Origin, evaluation and use of *Macrotyloma* as forage. A Review Tropical Grasslands, 1993; 29:16-29.
2. Bravo L, Siddhuraju P, Saura-Calixto F. Composition of underexploited Indian pulses. Comparison with common legumes. Food Chem. 1999; 64:185-192.
3. Bhokre C. Studies on preparation of buns fortified with germinated horse gram flour, 2012; 2:228.
4. Ghani A. Medical plants of Bangladesh: Chemical and uses (2nded). Dhaka: Asiatic Society of Bangladesh, 2003.
5. Kataria A, Chauhan BM. Anti-nutritional and protein digestibility of horse gram as effected by domestic processing and cooking. Food Chemistry. 1989; 32:9-17.
6. Kadam SS, Salunkhe DK. Nutritional composition, processing, and utilization of horse gram and moth bean. Crit. Rev. Food Sci. Nutr. 1985; 22:1-26.
7. Marimuthu M, Krishnamurthy K. Nutrients and functional properties of horse gram (*Macrotyloma Uniflorum*), an underutilized south Indian food horse gram, Journal of Chemical and Pharmaceutical Research. 2013; 5(5):390-394.
8. Sreerama YN, Sashikala VB. Nutrients and anti-nutrients in horse gram flours in comparison evolution of flour functionality. Food Chemistry. 2012; 131:462-468.
9. Thirukkumar S, Sindumathi G. Studies on preparation of processed horse gram (*Macrotyloma Uniflorum*) flour incorporated chapatti. International Journal of Scientific Research. 2014; 3(3):110-111.