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Utilization of Horse Gram Dal in the Preparation of *Laddoo*

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ABSTRACT: ***The present study was undertaken to determine the "Utilization of Horse Gram Dal in the preparation of Laddoo" was carried out with the objectives to analyse the effect of cooking methods on oxalic and phytic acid content of pulses, to evaluate the organoleptic characteristics of the developed food products, to evaluate the nutritional value of the prepared food products, to evaluate the nutritional composition of the prepared food product. The product namely "Laddoo" was prepared by incorporation of horse gram which served as treatments- T_1 (90g gram flour: 10g of horse gram), T_2 (80g gram flour: 20g of horse gram) andT_3 (70g gram flour: 30g of horse gram) respectively for each of the product prepared. T_0 (basic ingredients without incorporation of horse gram) served as control for each product prepared. The organoleptic evaluation of the product with regard to attributes of colour and appearance, body and texture, taste and flavour and overall acceptability were done using the 9-point Hedoinc Scale (Srilakshmi, 2011) based score card and their nutritional composition was assessed using the food composition table (Gopalan et al., 2011). The data obtained during the study was analyzed statistically using analysis of variance, C.D. techniques and t-test.***

On the basis of findings, result shows that Laddoo prepared by the incorporation of gram flour and horse gram in the ratio of 80:20 (T_2) was found most acceptable with regards to colour and appearance, body and texture, taste and flavour and overall acceptability. Nutritive value of prepared product indicates that protein, fiber, calcium and energy was found highest in all treatments comparatively control.

INTRODUCTION:

Horse gram [Macrotyloma uniflorum (Lam) Verde] is a dry land legume crop grown mainly on marginal soils. Although rich in proteins (20 %), due to less acceptable taste and flavour of cooked products, it is consumed only by the farming community and low-income groups. Thus, it has remained an underutilized food legume (Aiyer, 1990). Such grain legumes are however, potential sources for preparation of protein products like concentrates and isolates. The residue left over after separation of proteins can be further processed to obtain starch. The isolated legume starches have variety of applications in food industry. It is normally used to feed horses, though it is also commonly used in dishes. In traditional ayurvedic cuisine,

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horse gram is considered a food with medicinal qualities. It is prescribed for persons suffering from jaundice or water retention and as part of a weight loss diet.

Pulses are an integral part of Indian agriculture. They form an important component of the Indian diet. India produces about 14.5 million tonnes of accounting for 28.6 percent of the total world population (**ARYA 2002).**

Pulses form an important item of diet all over India, being a good source of protein especially in the vegetarian diet. The nutritional quality of a diet mainly based on cereal improves with a proper intake of pulses. The nutritional status of pulses depend upon the protein content, its biological value, digestibility and essential amino acid composition, vitamin and the mineral content. Based on these qualities, Bengal gram and black gram have been assigned a higher order of nutritive merit; green gram, lentil and soyabean being the next best. Then the best follow red gram and horse gram; the rest being comparatively inferior mainly being low in their biological value rather than their protein (**MANAY 2008**).

Like mothbean, this crop is also drought tolerant and hardy. Horse gram possesses medicinal properties also. It is extensively grown in dry areas of Karnataka, Gujarat, Madhya Pradesh and foot-hills of Uttar Pradesh (**ICAR 2008**).

The chemical composition was comparable with more commonly cultivated legumes. Like other legumes, these are deficient in methionine and tryptophan, though horse gram was an excellent source of iron and molybdenum. Comparatively, horse gram seeds have higher trypsin inhibitor and haemagglutinin activities and polyphenols than other bean seeds. Dehusking, germination, cooking, and roasting have been shown to produce beneficial effects on nutritional quality of the legumes. Though it requires prolonged cooking, a soak solution has been shown to reduce cooking time and improve protein quality. Utilization of horse gram and its flour in legume composite flours and products is limited due to the presence of antinutritional components, poor functional and expansion properties. Enzymatic treatment was used to improve the expansion and functional properties of horse gram to facilitate its use as an ingredient in food processing. Xylanase-mediated depolymerization of cell wall polysaccharides of horse gram lead to the development of a new expanded/popped horse gram. Expansion process of enzyme treated horse gram resulted in increased length (5.3-6.8

mm) and higher yield of expanded grains (63-98%). The expanded horse gram had lower bulk density, higher protein digestibility and more resistant starch compared to the control raw grains. Dietary fibre content of raw and processed horse gram was in the range of 14.57-16.14%. High temperature short time (HTST) conditions used during expansion process lowered the levels of phytic acid, tannins and protease inhibitors by 46%, 61% and 92%, respectively. The flour obtained from Xylanase treated and horse gram had higher water (204.3 g/100 g) and oil absorption capacities (98.4 g/100 g) than unprocessed flour, which had 135.8 g/100 g and 74.6 g/100 g, respectively at ambient conditions. There was a decrease in foaming capacity and foam stability in expanded gram flour. However, emulsion stability increased significantly in the processed samples. Thus, the study indicated that nutritional value and flour functionality of horse gram could be improved by processing it into a new expanded product that can be used as an ingredient in food processing.

METHODS AND MATERIALS:

The present study entitled **"Utilization of horse gram dal in different food products"** was conducted in the Nutrition Research Laboratory, Department of Food **Nutrition** and Public Health, Ethelind **College of Home Science, Sam Higginbottom University of Agriculture, Technology & Sciences, Allahabad, U.P.** The development of ***Laddoo*** is done by using the **ROASTING METHOD** of cooking. The food is cooked uncovered on heated metal or a frying pan at medium flame. It reduces the moisture content of the food and improved the keeping quality. By using this method ***Laddoo*** is made. The basic recipe was standardized and served as control (T_0). Horse Gram Dal which was roasted (horse gram flour) used for preparing dish. The horse gram flour was then incorporated at T_1, T_2 and T_3 respectively for each of the one product. Each treatment was replicated 3 times respectively.

Ingredients	Control(%)	Treatments(%)		
	T_0	T_1	T_2	T_3
Main ingredient	100	90	80	70
Horse gram	-	10	20	30

Control and treatment	Colour and appearance	Body and texture	Taste and flavour	Overall acceptability
T_0	7.5 ± 0.1	7.5 ± 0.1	7.5 ± 0.05	7.5 ± 0.08
T_1	7.6 ± 0.09	7.6 ± 0	7.4 ± 0.1	7.4 ± 0.05
T_2	8.4 ± 0.09	8.3 ± 0.01	8.3 ± 0.1	8.3 ± 0.04
T_3	6.9 ± 0.05	6.8 ± 0.1	6.6 ± 0.08	6.7 ± 0.05

1. **Colour and Appearance**

   F = 29.75 (4.76), Significant, P≤0.05, CD = 0.39

2. **Body and Texture**

   F = 12 (4.76), Significant, P≤0.05, CD = 0.59

3. **Taste and Flavour**

   F = 26 (4.76), Significant, P≤0.05, CD = 0.48

4. **Overall acceptability**

   F = 61 (4.76), Significant, P≤0.05, CD = 0.27

The table shows the mean scores of ***Laddoo*** in relation to colour and appearance which indicates that T_2 (8.4) had the highest score followed by T_o(7.5), T_1 (7.6) and T_3(6.9).
The ANOVA table shows that the calculated value of F (29.75) was higher than the table value (4.76) at 5% probability level. This shows that there is significant difference between the control and treatments of colour and appearance indicating that the addition of different proportions of horse gram affects the colour and appearance of the prepared products, the colour and appearance becomes darker but is best accepted till T_2 after which the acceptability decreases.

The ANOVA table shows that the calculated value of F (12) was higher than that of tabulated value F (4.76) at 5% probability level. This shows that in the parameter of body and texture there is a significant difference between the control and treatments which indicates that the addition of different proportions of horse gram affects the body and texture of the prepared products, the body and texture becomes little harder but is best accepted till T_2 after which the acceptability decreases.

The ANOVA table shows that the calculated value of F (26) was higher than the table value F (4.76) at 5% probability level. This shows that there is significant difference between the control and treatments of taste and flavour indicating that the addition of different proportions of horse gram affects the body and texture of the prepared products, the taste and flavour becomes little off taste or bitter but is best accepted till T_2 after which the acceptability decreases.

The ANOVA Table 4.14 shows that the calculated value of F (61) was higher than the table value F (4.76) at 5% probability level. The overall acceptability shows there is a significant difference between the control and treatments indicating that addition of different proportions of horse gram affects the prepared products, as the colour and appearance, body and texture, taste and flavour everything changes as the amount of horsegram increases.

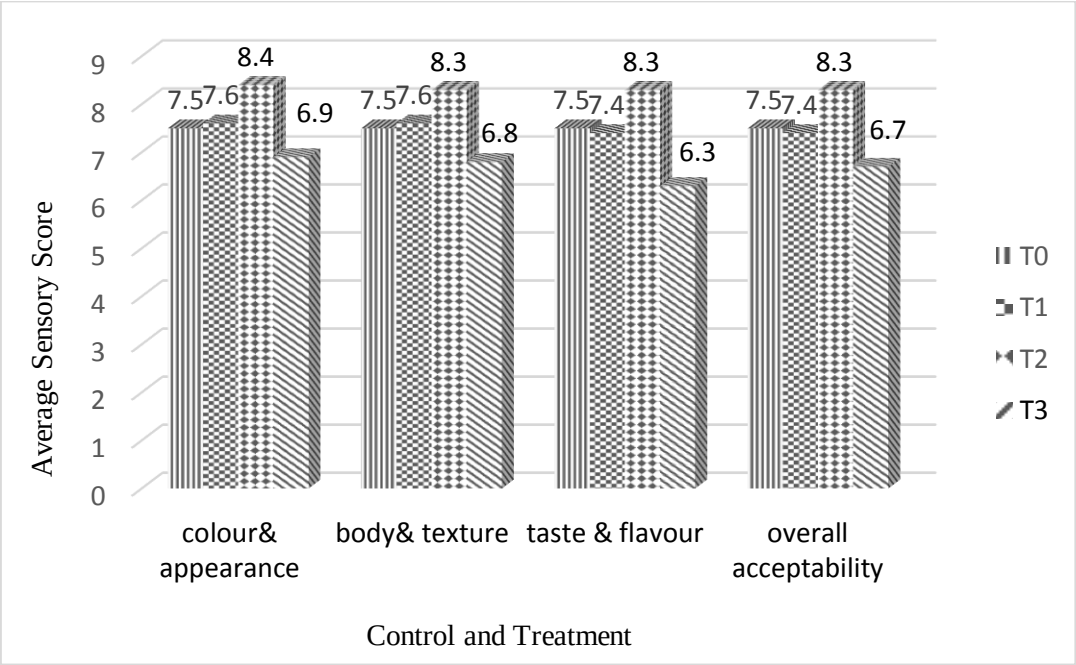

Figure: Effect of incorporation level of *Horse gram dal* at different level on Sensory Attributes of *Laddoo.*

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NUTRITIONAL COMPOSITION OF THE PRODUCT:

NUTRIENTS	T_0	T_1	T_2	T_3
Energy(kcal)	658.9	654.1	649.3	644.5
Protein(g)	22.50	22.45	22.40	22.35
Fat(g)	35	30.05	34.2	30.15
Carbohydrate(g)	58.1	58.01	57.92	56.93
Fiber	1	1.23	1.86	2.29
Calcium(mg)	58	80.9	103.8	126.7
Phosphorus(mg)	340	337.1	334.2	331.3
Iron(mg)	9	9.22	8.95	8.68

The table shows that Energy (kcal) content was high in T_0(658.9) followed by T_1 (654.1) then T_2 (649.3) and then with T_3 (644.5). Protein (g) was high in T_0 (22.50) followed by T_1 (22.45) then T_2 (22.40) and then with T_3 (22.35). Fat (g) was high in T_0 (35) followed by T_1 (30.05) then T_2 (34.2) and then with T_3 (30.15). Carbohydrate (g) was high in T_0 (58.1) followed by T_1 (58.01) then T_2 (57.92) and then with T_3 (56.93). Fiber was high in T_3 (2.29) followed by T_2 (1.86) then T_1 (1.23) and then with T_3 (1). Calcium (mg) was high in T_3 (126.7) followed by T_2 (103.8) then T_1 (80.9) and then with T_0 (58). Phosphorus (mg) was high in T_0 (340) followed by T_1 (337.1) then T_2 (334.2) and then with T_0 (331.3). Iron (mg) was high in T_1 (9.22) followed by T_0 (9) then T_2 (8.95) and then with T_3 (8.68). The control T_0 contained the highest amounts of these nutrients in composition. As the incorporation levels of horsegram dal in ***Laddoo*** increased, the nutrients also decreased.

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The findings of **Chrastil (1987),** shows the nutrient content of ***Laddoo*** with the incorporation of horse gram flour at three different levels 10% (T_1), 20% (T_2) and 30% (T_3). With the increase in addition level the nutrients like energy, fiber and calcium gradually increased whereas protein, fat, carbohydrate, phosphorus and iron decreased.

CONCLUSION AND RECOMMENDATION:

On the basis of the findings, it is concluded that gram flour and horse gram flour can be successfully incorporated in the preparation of the product such as ***laddoo***.

Organoleptically, it was found that the treatment T_2 of ***laddoo*** (gram flour 80% and horse gram 20%) was found to be most acceptable as compared to other treatments.

Nutritionally, it was found that the nutrients content of best treatment T_2 for ***laddoo*** was significantly higher with regards to protein, fibre, energy, calcium, iron, phosphorus, carbohydrate and fat activity as compared to the control T_0.

"Utilization of horse gram dal in the preparation of *Laddoo*" can be gainfully utilized in enhancing the nutritive value of traditional recipes improving their, macronutrient and micronutrient contents of the food product. In addition to their nutritional benefit, they can provide a variety in the daily dietaries and also can be used out of season. Thus development of value added product (***Laddoo***) increases the nutritive value and functional properties. It can be utilized in various food products in the diets of people of all age group for health related benefits.

REFERENCES:

Arya, S. and Radaramma (2002) "Change in thiamine, riboflavin and niacin during processing and storage of quick cooking dal processed by different methods". *The Indian Journal of Nutrition and Dietetics* 39, 7:321-336.

Chrastil J., (1987) Carbohydrate Research (5)5: 159,154-158

ICAR (2008) "Pulses", *Handbook of Agriculture* 5; 913-941.

Mana Shakuntala, N. and Shadaksharaswamy, M. (2008) "Cooking of pulses", Food Facts and Principles 3; 387-388.

ISSN: 2348-1358
Impact Factor: 6.057
NAAS Rating: 3.77

Manay Shakuntala, N. and Shadaksharaswamy, M. (2008) "Pulses", Food Facts and Principles 3; 256-257.

AOAC Official method of analysis. 14th edition Association of Official Analytical Chemists, Washington, D.C. 1995.

Srilakshmi B.,(2008) "Food science" fourth edition. New age International (p) Limited published: New Delhi-286-287.

Sudha N., Begum J.M., Shembuling K.G., and Babu C,K.,(1995) Nutrients and antinutrients in horsegram (*Macrotyloma Uniflorum (Lam.) Verdc.*) Food and Nutrition Bulletin, 16 81-83.

