Formulation And Standardization of Horsegram Incorporated Thukada

V.Varshini[1] and Dr.K.U.Pavitra Krishna[2]
[1]*UG Student, Department of Food science and Processing Management, Subbalakshmi Lakshmipathy College of Science-Madurai*
[2]*Head and Assistant Professor, Department of Food science and Processing Management, Subbalakshmi Lakshmipathy College of Science-Madurai*

Abstract -Horsegram (*Macrotyloma uniflorum*) is the protein rich underused legume in the world. It's extensively cultivated in the regions of tropical Southern Asian countries like India, Nepal, Malaysia and Srilanka. Since ancient times it's used as a super food and a good source for maintaining diet Snack was prepared by incorporating Horsegram flour to rice flour at the position of 5%, 10% and 15% independently. It was estimated by a panel of judges using score card with five point hedonic scale standing Packaging is an essential element of the food system, assuring the safe handling and delivery of fresh and reused food products. Constructions include non-plastics factors analogous as paper, counter, cellophane or glassine but plastic films dominate this request. Snacks are the largest packaging request for OPP. The packaging material decided for packing the Thukada is OPP mugged boxed. Under shelf life analysis, a number of tests get conducted on the given products to examine. How they change with and other environmental factors .The cost of Horsegram incorporated Snack mouthfuls were analyzed by taking into account. The fixed and variable cost include during the course of processing. The sensitive outgrowth revealed that among the advanced products the overall mean score in 10% products was largely respectable. The results revealed that 10% Horsegram flour incorporated Thukada secured loftiest score in all the sensitive attributes which was more or less equal to the other advanced products.

Keywords - Horsegram, Rice flour, Thukada, Protein, Standardization, OPP (Orientated polypropylene film)

INTRODUCTION

Horsegram (*Macrotyloma uniflorum*) is the protein rich underused legume in the world. It is widely cultivated in the regions of tropical Southern Asian countries like India, Nepal, Malaysia and Srilanka. Since ancient times it is used as a super food and a good source for maintaining diet. It belongs to the Fabaceae family and Plantae Kingdom. It is known as kollu in Tamil, Kulthi in Hindi. Macrotyloma uniflorum is a climbing plant which goes up to 60cm.It is also cultivated for the use of fodder for animals. This seed contains nutrients like carbohydrate, protein, dietary fiber, calcium, phosphorous, iron and calories. In India states like Telangana and Andhra Pradesh, horsegram is suggested for Jaundice and in states like Kerala it is used in the preparation of various dishes like Khichdi. In Tamilnadu, Horsegram is used for preparing dishes like kollu porial, kollu avial, kollu sambar and kollu rasam. Horsegram is rich in polyphenols, flavonoids and major antioxidants.

Horsegram available in different states like KS-2 in Rajasthan, Pratap Kulthi (AK-42), Palem- 1,2 in Andhra Pradesh, Paiyur-2 in Tamilnadu. It is generally cultivated in extremely drought-resistant areas. It does not grow on cool climatic conditions. This crop does not need much irrigation as it grows in dry areas. Its protein value is almost equal to winged bean. M.uniflorum seeds contain common and different forms of carbohydrates. But the digestibility level of starch as a legume is lower than that of cereal. It has low glycemic index when compared to cereals. There are different varieties of Horsegram is also known as "Poor man's legume".

Horsegram should be consumed by both human and cattle only after cooking. It can be either boiled or fried. Mature seeds of Horsegram can be eaten as poached, boiled, or fried. Like other pulses or legumes Horsegram can also be eaten by sprouting which gives high nutritional benefits. Considering about its nutritional value not only protein, carbohydrates are

present it also has Phytic acid, Phenolic compounds, flatulence factors, fatty acid, dietary fiber content, micronutrients, antioxidants source respectively.

In Horsegram Phytic acid is present in the form of free acids, Phytate or Phytin. Phenolic compounds have high benefits to human's health due to the presence of antioxidant property. The amount of Protein content present in Horsegram is equal to winged bean (*Psophocarpus tetragonolobus*), gram (*Cicer arietinum*) and soybean (*Glycine max*) fibers.

Like other legumes it is also deficient in methioine and tryphtophan. It is used for weight loss, reducing blood sugar level, treating skin disorders and treats menstrual disorders and leucorrhoea, for improving immunity and memory power.

M.uniflorum is also used as a traditional medicine for treating asthma, bronchitis and peptic ulcer. It is consumed by many people for weight loss as it has natural properties that burs the fat. It can also minimize the LDL cholesterol level when consumed. Though it has many advantages it also have certain disadvantages like increase in uric acid level, causes allergic reaction, not recommended to people with Tuberculosis (Tb). Various recipes can be prepared using Horsegram. Some of the most common recipes made using Horsegram are pearl millet and Horsegram Dosa Soup, Horsegram upma, Kollu kanji etc.

RICE FLOUR

Rice flour is prepared by milling of Rice *(Oryza sativa).*Rice is used as a staple food in many Asian countries like India, china and Indonesia. It is a gluten-free baking or dusting powder. Rice flour is enriched with Vitamins and Minerals. It is also rich in fiber content and low in sodium. It is also used as a thickening agent in the preparation of soups etc.

In South India it is used in the preparation of famous recipes like Puttu and Murukku and also used in the preparation of main dishes like Neer Dosa and Akki roti.

Rice flour gives various nutritional benefits like, it can be chosen as a good substitute for those people who are suffering from gluten intolerance conditions. Rice flour contains Choline, which helps to prevent the fat buildup. One cup of Rice flour contains nearly 578 calories, 9.4gm Protein, Vitamin B6.

OBJECTIVE

- To formulate Thukada using Horsegram flour and rice flour
- To evaluate acceptability of Horsegram incorporated Thukada by sensory evaluation.
- To estimate the nutrient content of the developed Thukada by standard methods.

MATERIALS AND METHOD

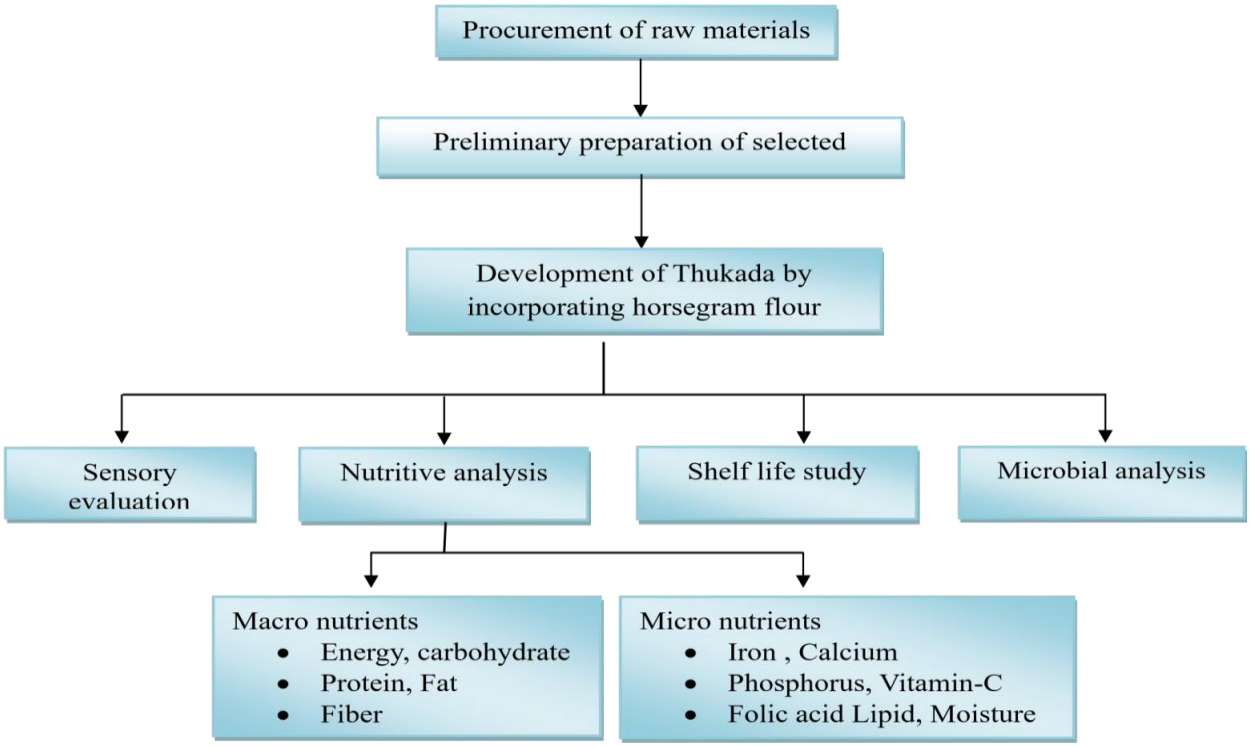
PROCUREMENT OF RAW MATERIALS

The raw materials such as horsegram, rice flour, salt, butter, cumin, asafetida, chilli powder, urad dhal, bought from local stores in Madurai.

Plate 1 (Ingredients used in the developed horsegram flour Thukada)

Method of Preparation

Figure 1 (Pattern chosen for HGFT with rice flour)



FORMULATION OF HORSEGRAM FLOUR INCORPORATED THUKADA:

Horsegram seed have high nutritive value and enormous health benefits. Horsegram seed was incorporated at the level of 5%, 7% and 10% in the formulated products respectively.

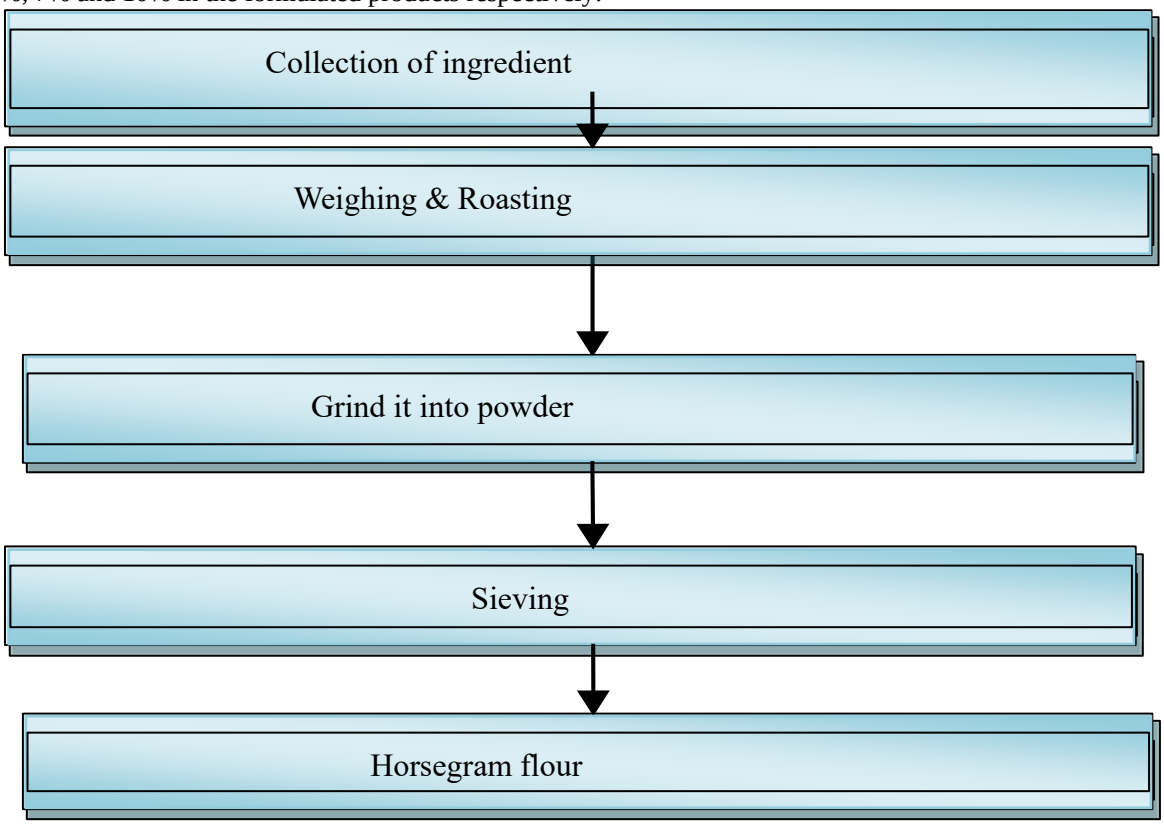


Figure 2- Flowchart for preparation of Horsegram flour

Preparation of horsegram flour incorporated Thukada

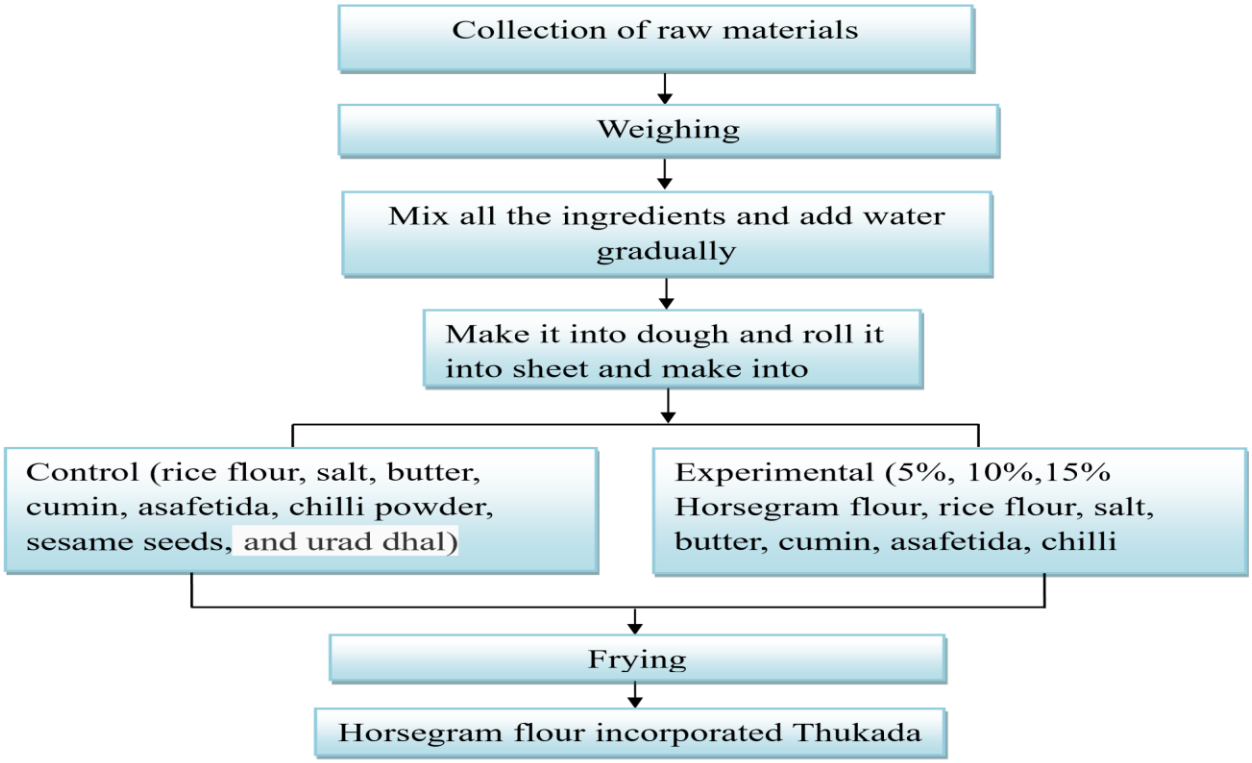


Figure 3- Flowchart for Preparation of Horsegram flour incorporated Thukada

Plate2- Control and Horsegram flour Incorporated Thukada

PROCEDURE

- Sieve the rice flour. Heat a pan and fry the flour in medium flame until you see steam coming out from the flour. Just for a minute.
- Fry the urad dhal in medium flame with stirring every now and then until golden in color. Cool down completely and grind to a flour.
- Sieve it and store in an airtight container to use in various snacks. Just fry till excess moisture is gone.
- Now sieve again both the roasted flours together and add the prepared horsegram flour.
- Mix rice flour, urad flour, sesame seeds, melt butter, asafetida and salt well. Add water and make it to soft pliable dough. Take small pinch and make into ball, try not to make it perfect round or not to give pressure while rolling. Do it gently.
- Make them into flat sheet and cut into small required shapes. Let it be for 15 minutes.
- Heat oil in kadai and add the cut pieces.
- Divide and cook it in 3-4 batches. Cook in medium flame. Stir in between to ensure even cooking. Cook until the sounds ceases.
- Drain in paper towel. Store in airtight container after cooled down.
- Control, 5%, 7% and 10% horsegram incorporated Thukada were developed and evaluated for its acceptability, the flow chart for the development of control and horsegram incorporated Thukada

ORGANOLEPTIC OR SENSORY EVALUATION

A Scientific discipline used to elicit measure, dissect and interpret responses to those characteristics of food and accoutrements as they're perceived by senses of sight, smell, taste, touch and hail. Sensory analysis also appertained to as organoleptic evaluation, is a scientific system that provides objective information on how products are endured by the consumers. It can be used to assess food and libation beyond nonsupervisory conditions or general safety and quality enterprises using the senses. Snack was prepared by incorporating Horsegram flour to rice flour at the level of 5%, 7% and 10% respectively. It was

Score card for Horsegram flour incorporated Thukada

NAME: PRODUCT NAME:

DATE:

INSTRUCTIONS: Take the given samples, and then give the marks accordingly.

S.NO	Sensory attributes	Sample A	Sample B	Sample C	Sample D
1	Appearance				
2	Colour				
3	Flavor				
4	Texture				
5	Taste				

Table 1-Scorecard for HGFT

NOTE:

5- Likes extremely

4-Likes moderately

3-Neither like nor dislike

2- Dislikes moderately

1-Dislikes extremely

Cost Analysis

The cost of Horsegram incorporated Snack bites were anatomized by taking into account. The fixed and variable cost include during the course of processing. Cost benefit analysis of the expression of Horsegram flour snack were done and it's given below in table 3

COST OF HORSEGRAM FLOUR INCORPORATED THUKADA

S.NO	INGREDIENTS	AMOUNT	QUANTITY (g)
1	Rice flour	10	75
2	Horsegram flour	5	10
3	Salt	3	2
4	Butter	10	4
5	Cumin seeds	3	2
6	Urad dhal	5	2
7	Asafetida	5	2
8	Chilli powder	5	2
9	Sesame seeds	4	1
	Total	50	

Table 2- Cost analysis

Profit =5

Total amount = 55

RESULTS AND DISCUSSION

The data collected from the present disquisition entitled Horsegram flour incorporated Thukada was consolidated graphically represented under the following title

Acceptability of the developed Horsegram flour Thukada and its variation

Nutrient analysis of the standardized Horsegram flour Thukada

Acceptability of the developed horsegram flour Thukada of its variation

The result of the acceptability trial of developed Horsegram flour Thukada is given below. Mean score obtained for the overall acceptability of Horsegram flour incorporated Thukada

Sensory attributes	Appearance	Colour	Flavour	Texture	Taste	Overall mean score
Control	4.6	4.2	3.9	4	3.9	4.1
HGFT 1	4.1	4.2	3.9	4.0	3.0	3.8
HGFT 2	4.7	4.6	4.7	4.8	4.9	4.7
HGFT 3	3.9	4.2	4.1	4.6	3.9	4.1

Table 3 - Acceptability of the developed HGFT and its variation

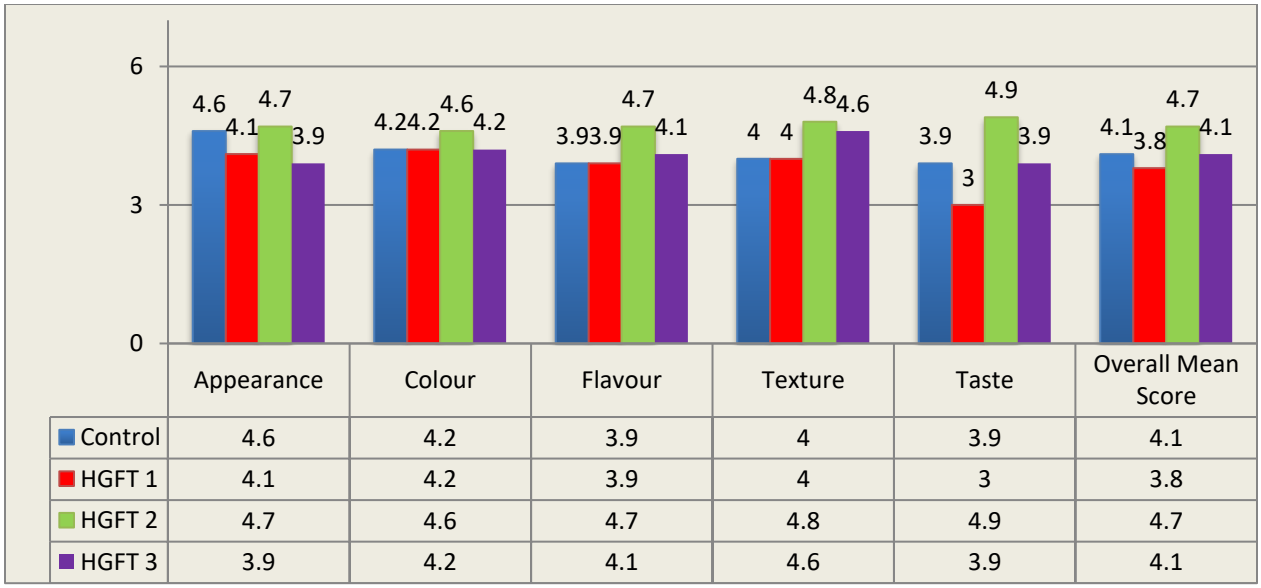


Figure 4- Overall mean score for acceptability of developed HGFT

Among the formulated products, the overall mean score in HGFT 2 was highly acceptable and the results revealed that HGFT 2 secured highest score and the sensory attributes which was more or equal to the other developed products

Nutrient analysis of Horsegram flour incorporated Thukada
The nutrient content of 7% Horsegram flour incorporated Thukada is given in below

S.no	Nutrients	HGFT 2
1	Moisture	6.10
2	Crude protein	5.6
3	Fat	22
4	Crude fibre	25.5
5	Total ash	0.4244
6	Acid insoluble ash	0.0041
7	Carbohydrate	70.5
8	Energy	488.3

Table 4-Nutrient analysis of HGFT

SUMMARY AND CONCLUSION

A summary of the result of the study carried out to analyze the "Formulation and Standardization of Horsegram flour incorporated Thukada" are dealt in this chapter. The data in sensory evaluation and nutrient analysis of the standardized products have been summarized and concluded.
Acceptability of control and its variations 5%,7%,10% Horsegram flour incorporated Thukada.
Nutrient analysis of control and its variations 5%,7%,10% Horsegram flour incorporated Thukada.

Acceptability of control and its variations 5%,7%,10% Horsegram flour incorporated Thukada

- The acceptability level of control and its variations 5%,7%,10% Horsegram flour incorporated Thukada were evaluated by colour, texture, taste, flavour, appearance.
- The 7% Horsegram flour incorporated Thukada was highly acceptable among other variations.

Nutrient analysis of control and its variations 5%,7%,10% Horsegram flour incorporated Thukada

- The major nutrients like carbohydrates, protein, fat etc., were analyzed in 7% Horsegram flour incorporated Thukada.

REFERENCE

[1] Preeti Singh, Ali Abas Wani, Horst-Christian Langowski, 2016, Food Packaging Materials (Testing & Quality Assurance), Boca Raton, Pg no 234-235.
[2] ICMR, 2020, RDA Estimated Average Requirement, Pg no 6-8
[3] Henry A, Vishwanatha KP, Sharma SK, Thakur HL (2006) Genetic Improvement. In: Kumar D (ed) Horse gram in India. Scientific Publishers, India, pp 29–51
[4] Herath HMT, Tharuka KG, Gunathilake Eashwarage IS, Sivakumaran K, Ranathunga RAA (2018) Physico-chemical and in vitro glycemic indices of popular pulse varieties grown in SriLanka. IntJ Food Sci Nutr 3(5):137–143
[5] Hirakawa H, Chahota RK, Shirasawa K, Nagano S, Nagasaki H,nSharma TR, Isobe S (2017) Draft Genome Sequence of Horsegram (Macrotyloma *uniflorum*). In: PAG-Asia 2017, Plant and Animal Genome conference, Seoul, May 19–21
[6] Jansen PCM (1989) *Macrotyloma* pulses. In: Maesen LJGV and Somaatmadja S (ed) Plant resources of South-East Asia. Pudoc/Prosea, Wageningen, The Netherlands, pp 53–54
[7] Jayraj AP, Tovery FI, Lewin MR, Clarck CG (2000) Deuodenal ulcer prevalence: experimental evidence for possible role of lipids.Gastroenterol Hepatol Res 15:610–616
[8] Luliana B, Georgeta S, Sorina IV, Iuliana A. Effect of the addition of wheat bran stream on dough rheology and bread quality. The Annals of the University Dunarea de Jos of Galati. Fascicle VI-Food Technology. 2012; 36(1):39-52.
[9] Singh B, Bajaj M, Kaur A, Sharma S, Sidhu JS. Studies on the development of high-protein

biscuits from ~ 1656 ~ Journal of Pharmacognosy and Phytochemistry composite flours. Plant Foods for Human Nutrition. 1993; 43(2):181-189.
[10] Gandhi AP, Kotwaliwale N, Kawalkar J, Srivastav DC, Parihar VS, Nadh PR. Effect of incorporation of defatted soyflour on the quality of sweet biscuits. Journal of Food Science and Technology. 2001; 38:502-503.
[11] Hooda S, Jood S. Organoleptic and nutritional evaluation of wheat biscuits supplemented with untreated and treated fenugreek flour. Food Chemistry. 2005; 90(3):427-435.
[12] Thongram S, Tanwar B, Chauhan A, Kumar V. Physicochemical and organoleptic properties of cookies incorporated with legume flours. Cogent Food & Agriculture. 2016; 2(1):1172389.
[13] Tiwari BK, Brennan CS, Jaganmohan R, Surabi A, Alagusundaram K. Utilisation of pigeon pea (*Cajanus cajan* L) byproducts in biscuit manufacture. LWT-Food Science and Technology. 2011; 44(6):1533-1537.
[14] Zucco F, Borsuk Y, Arntfield SD. Physical and nutritional evaluation of wheat cookies supplemented with pulse flours of different particle sizes. LWT-Food Science and Technology. 2011; 44(10):2070-2076.

WEBLIOGRAPHY

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4397296/
2. https://www.jocpr.com/articles/nutrients-and-functional-properties-of-horse-gram-macrotyloma-uniflorum-an-underutilized-south-indian-food-legume-2589.html
3. https://dpd.gov.in/Horse_gram.pdf