

INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES



Research Paper**Open Access****DEVELOPMENT AND SENSORY EVALUATION OF SUPERIOR PRODUCTS WITH
FLAXSEED****Preeti Rathi¹ and Renu Mogra**

College of Home Science, Maharana Pratap University of Agriculture & Technology, Udaipur, Rajasthan

¹Corresponding author: rathi.preeti5@gmail.com**ABSTRACT**

Flaxseed (*Linum Usitatissimum*) is being used extensively for the development of functional foods. The components of flaxseed, identified to exhibit the health benefits are fiber, proteins, lignans and linolenic acid. The research work was carried out to development and sensory evaluate and acceptability of flaxseed utilization in the different recipes. Developed flaxseed flour with wheat flour in differend ratio viz., 20, 30 and 40 per cent were used. Flaxseed flour at 40 percent was unacceptable in selected recipes. At this level of incorporation of flaxseed flour, the appearance of the product was affected i.e. darker in colour and taste wise, bitterness was found by the panel where as 30 percent incorporation produced good results. Hence, in the present study flaxseed flour was incorporated at 30 percent level in the standardized recipes. However, recipes prepared with 30per cent of flour mix was acceptable and as they achieved scores in the range of 8 - 9, which depicted that the recipes fall under the category of liked very much and liked extremely.

Key Words: Flaxseed flour, Wheat flour, development flour, Sensory characteristics..**INTRODUCTION**

The consumers demand has increased for the food products with taste, safety, convenience and nutrition. Thus nutrition has emerged an added dimension in the chain of food product development (Shahidi 2002). There are many foods which are associated with health benefits and are used or sold under a variety of names like designer, novel, medical, nutraceutical and functional foods. The prospective health benefits of oil seeds such as flaxseed, especially in relation to cancer and cardiovascular disease has got more consideration by the nutrition workers and food scientists. Many researchers are conducting studies on its role in the cure and prevention of several diseases (Jenkins *et. al.*, 1999). Due to health promoting properties and excellent nutrient profile of flaxseed, it has been becoming a popular candidate for incorporation in human diet. Flaxseed is being used extensively for the development of functional foods. The components of flaxseed, identified to exhibit the health benefits are fiber, lignans and linolenic acid (Omega-3 fatty acid). Moreover, flaxseed is a good source of high quality protein, soluble fibers and phenolic compounds (Oomah 2001). Wheat is a staple food of Indian people and is a leading cereal grain produced and consumed in the country. In Indian, about 70 percent of the total wheat is processed to produce the unleavened flat bread locally

known as chapatti and its other culinary variants, “tandoori roti”, “nans”, “prathas” and “poories”. The rest of the 30percent is used for other products such as *chapatti*, *khakhra*, *biscuit*, *vegetable chilla* and *manchurian*. The quality of wheat based products can be improved by supplementing them with other cheap and healthy plant based food materials. The incorporation of flaxseed into diet can help to have a superior taste in regularly consumed dishes. The reddish brown flaxseed grains have a pleasant flavor and taste resembling nuts and its utilization is simple in different products. The products can be supplemented with whole flaxseed grains to achieve an attractive and appealing form with enhancement in the texture of final product. The grinding of flaxseed before its addition to products can be more beneficial to obtain the prospective health benefits from its active components like dietary fiber, lignans and Omega-3 fatty acids (Manthey *et. al.* 2002). Keeping in view the medicinal and nutritional benefits of the flaxseed, *chapatti*, *khakhra*, *biscuit*, *vegetable chilla* and *manchurian* were prepared from the composite flour containing varying levels of the developed flaxseed flour.

MATERIALS AND METHODS

DEVELOPMENT OF FLOUR MIX PREPARATION AND PROCESSING OF RAW MATERIAL

Wheat and flaxseed were used in the study. The wheat and flaxseed were purchased from local market of Udaipur city in bulk, to avoid varietal difference. The cleaning of flaxseed and wheat grains was performed manually to remove damaged seeds, dust particles, seeds of other grains/crops and other impurities such as metals, stones and weeds. Wheat and flaxseed were powdered separately in a mixer grinder to prepare flour.

STANDARDIZATION OF FLOUR MIX

For the purpose of standardization of flour mix, a number of preliminary trials were conducted. Different combinations of powders of wheat and flaxseed viz., 80:20, 70:30, 60:40 percent were used to prepare 100g flour mix.

SENSORY EVALUATION

Sensory evaluation refers to the evaluation of recipes by sense organs. All the sense organs are used in the appraisal of food. Acceptability of flour mix was assessed by preparing commonly consumed products like *Chapatti*, *Khakhra*, *Biscuit*, *Vegetables Chilla*, *Manchurian* and evaluating these recipes for sensory qualities (Plate 1).

Plate 1: Selection of panel members for sensory evaluation



ASSESSING SENSORIAL ACCEPTABLE LEVEL OF FLAXSEED FLOUR IN THE STANDARDIZED RECIPES

The acceptable level of flaxseed flour in flour mix was assessed by incorporating 20 to 40 percent of flaxseed flour in wheat flour and standardized for the sensory characteristics. During preliminary trials, it was noticed that incorporation of flaxseed flour at 40 percent was unacceptable in selected recipes. At this level of incorporation of flaxseed flour, the appearance of the product was affected i.e. darker in colour and taste wise, bitterness was found by the panel where as 30 percent incorporation produced good results. Hence, in the present study flaxseed flour was incorporated at 30 percent level in the standardized recipes.

STATISTICAL ANALYSIS

The difference in mean acceptability scores of recipes, assessing the acceptability of products (Mean value).

RESULTS AND DISCUSSION

STANDARDIZATION OF RECIPES BY SELECTED RATIO OF FLOUR MIX

The most acceptable ratio of wheat flour and flaxseed flour was found to be 70:30. The products viz., *chapatti*, *khakhra*, *biscuit*, *vegetable chilla* and *manchurian* were repeatedly prepared till consistently highly acceptable scores were obtained (Table 1).

CHAPATTI

Mean score and standard deviation for different sensory characteristics of *chapatti* have been given in Table 1.

It is evident from the scores assigned by panel members for individual sensory attribute that the recipe could secure values in the range of 7.1 to 8.7 which permitted us to draw conclusion that the recipes varied from liked moderately too as high as approaching a point of liked very much excellence. Kadam *et. al.* (2012) developed composite flour of chapatti. The most acceptable flour mix contained wheat flour, chickpea, and soybean and *methi* leaves powder in the ratio of 75: 10: 10: 05 respectively. Kumudini (2011) studied the “sensory evaluation of sorghum *chakali* enriched with different levels of soyabean flours”. Results revealed that *chakli* prepared with 20 percent soyabean flour highest overall acceptability score (8.7).

BISCUIT

Sensory evaluation of *biscuit* for the last three consecutive trials during standardization has been presented in Table 1. The overall mean scores of trials ranged from 7.9 to 8.1. Further, it can be discerned from the mean value of sensory attributes viz., colour (7.8), appearance (8.1), texture (7.73), Aroma (8.4), taste (8.13) and overall acceptability (8.04) that the *biscuits* were highly acceptable by the panel members. Horsfall *et.al.* (2007) suggested that the breads can be prepared from composite flours containing 5, 10, 15, 20 and 30 percent plantain flour in wheat flour. The quality of breads based on sensory attributes is described by appearance, aroma, texture, flavor and organoleptically acceptable. Alpaslan and Hayta (2006) evaluated the sensory quality of bakery products prepared with corn, soybean, and flaxseed flours. Cake formulations by substitution of wheat flour with flaxseed flour (30%) flour were very well acceptable.

VEGETABLE CHILLA

Evaluation of the organoleptic properties of *vegetable chilla* revealed that the general mean scores obtained for colour, appearance, texture, aroma, flavor and overall acceptability were 7.36, 8.13, 7.76, 7.63, 7.76 and 8.13 respectively. These score fall under the category of liked very much to like moderately. Kumar *et. al.* (2004)

incorporated powder of amaranthus leaf powder and onion stalk in *mathri* and *chilla* at three different levels: 5, 10 and 15 percent. They reported that *mathri* and *chilla* were liked the most with 5 percent incorporation of the dried amaranthus leaf and onion stalk, however, incorporation at 10 and 15 percent were also in highly acceptable zone.

MANCHURIAN

Table 1 presented sensory evaluation scores (Mean±SD) of *manchurian*. The overall mean scores ranged from 7.83 to 7.86. Further, mean value of 7.2 (colour), 8.16 (appearance), 7.73 (texture), 8.16 (aroma), 8.16 (taste) and

7.7(overall acceptability) revealed that *manchurian* was highly acceptable by the panel members. Pitiporn *et. al.* (2011) developed unripe banana flour as an ingredient to make dried noodles of high nutritional quality .The effect of wheat flour substitution with unripe banana flour was investigated in terms of the textural, cooking and sensory qualities of dried noodles. Five additional dried noodles were prepared by substituting wheat with 10, 20, 30, 40, and 50 percent banana flour. Results indicated that as the amount of banana flour increased, the stickiness of the noodles decreased but the appearance was darkened.

Table 1: Overall acceptability score of standardized recipes by using flour mix

Sensory Characteristics	Mean				
	Chapatti	Khakhra	Biscuit	Vegetable chilla	Manchurian
Colour	7.33±0.88	7.53±0.50	7.8±0.59	7.36±0.86	7.2±0.83
Appearance	8.1±0.67	7.63±0.57	8.1±0.85	8.13±0.55	8.16±0.80
Texture	8.26±0.65	7.76±0.37	7.73±0.84	7.76±0.57	7.73±0.70
Aroma	8.3±0.76	7.7±0.64	8.4±0.77	7.63±0.55	8.16±0.59
Taste	8.1±0.47	7.5±0.75	8.13±0.68	7.76±0.63	8.16±0.6
Overall acceptability	8.56±0.55	7.63±0.58	8.1±0.73	8.13±0.77	7.7±0.64

Incorporation of unripe banana flour (30%) was found acceptable. The statistical analysis of the data reveals that there was significant difference in texture, flavor, taste at p<0.01 appearance and overall acceptability at p<0.05 in all the recipes. However, recipes prepared with 30per cent of flour mix was acceptable and as they achieved scores in the range of 8 - 9, which depicted that the recipes fall under the category of liked very much and liked extremely. Since 30 per cent ratio will provide the maximum requirement of omega -3 fatty acid on daily basis.

CONCLUSION

Flaxseed should be included in daily diet plan through its incorporation into wheat flour used for production of chapattis and other products. The formulations made with up to 30 percent flaxseed flour as partial replacement of wheat flour had good acceptance, and the product presented good acceptable scores classified as excellent source of dietary fiber and linolenic acid. Flaxseed supplemented should be advised for diabetic and heart patients. Active ingredients from flaxseed should be extracted and used as nutraceuticals in different food products including chapattis and other traditional products.

REFERENCES

- Alpaslan M and Hayta M. 2006.The effect of flaxseed, soy and corn flours on the textural and sensory properties of a bakery product. *Journal of Food Quality*; 29: 617-627.
- Elayath N and Iyer U. 2012. Wheatgrass (Triticum Aestivum L.) as functional food – bridging the translational research gap in nutrition. <http://www.inventi.in/Article/pnc/103/11.aspx>

- Horsfall D, Mepba LE and Nwaojigwa SU. 2007. Chemical composition, functional and baking properties of wheat-plantain composite flours. *African J. Food Agric. Nutr. Develop.* 7(1).
- Jenkins DJA, Kendall CWC, Vidgen E, Agarwal S, Rao AV, Rosenberg RS,. Diamandis EP, Novokmet R, Mehling CC, Perera T and Griffin LC. 1999. Health aspects of partially defatted flaxseed including effects on serum lipids oxidative measures and *ex vivo* androgen and progestin activity: A controlled crossover trial. *Am. J. Clin. Nutr.*; 69: 395-402.
- Kadam ML, Salve RV, Mehrajfatema ZM, More SG. 2012. Development and Evaluation of Composite Flour for Missi roti /chapatti. *J Food Process Technol*; 3:134.
- Kumar S, Shah A, Gupta Das, DK and Bawa AS. 2004. Development of shelf stable ready to use condiment paste for use in service kitchen. *XVIII Indian Convention of Food Scientists and Tachnologists*; 88.
- Kumudini R. 2011. Sensory Evaluation of Sorghum Chakali enriched with different levels of Soyabean flours Inventi Impact: Nutraceuticals. *International Referred Research Journal*; 29954:VoL.III: ISSUE-31.
- Manthey F, Lee R and Hall C. 2002. Processing and cooking effects on lipid content and stability of alpha-linolenic acid in spaghetti containing ground flaxseed. *J. Agric. Food Chem.*; 50: 1668-1671.

- Oomah BD. 2001. Flaxseed as a functional food. *J. Sci. Food Agric*; 81: 889-894.
- Pitiporn Ritthiruangdej, Sompit Parnbankled, Sawitri Donchedee and Rungtiwa Wongsagonsep Kasetsart. 2011. Physical, Chemical, Textural and Sensory Properties of Dried Wheat Noodles Supplemented with Unripe Banana Flour. *Journal of natural science*; 45:500 – 509.
- Shahidi F. 2002. Nutraceuticals and functional foods: Research addresses bioactive components. *Food Technol*; 56: 23.