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Alka Singh
Research Scholar, Faculty of Home Science, Kamla Nehru Institute of Physical & Social Sciences, Sultanpur, Uttar Pradesh, India

Archana Singh
Advisor, Faculty of Home Science, Kamla Nehru Institute of Physical & Social Sciences, Sultanpur, Uttar Pradesh, India

Dr. Mamta Jaiswal
Co-Advisor, Faculty of Home Science, Kamla Nehru Institute of Physical & Social Sciences, Sultanpur, Uttar Pradesh, India

Kiran Agrahari
Member, Faculty of Home Science, Kamla Nehru Institute of Physical & Social Sciences, Sultanpur, Uttar Pradesh, India

Correspondence
Alka Singh
Research Scholar, Faculty of Home Science, Kamla Nehru Institute of Physical & Social Sciences, Sultanpur, Uttar Pradesh, India

Development and sensory evaluation of low cost protein rich recipes / products

Alka Singh, Archana Singh, Dr. Mamta Jaiswal, Kiran Agrahari

Abstract
The objective of present investigation was Development and sensory evaluation of Low cost protein Rich Recipes / products. In view of the facts regarding nutritional quality of Low cost protein Rich Recipes (ICMR, 2010) was made to develop acceptable protein Rich Recipes products for disease patient. Develop Pumpkin, Flaxseed, Peanuts, Soybeans, Milk, Oats, Maize, and its products was used for development of standardized products i.e. Sev, Biscuit, Cake, Momos, Ladoo. The organoleptic evaluation of products was done by using score card method (9-Point Hedonic Scale). The result of Low cost protein rich recipes products, for Sev, Biscuit, Cake, Momos, Ladoo, (T1) was best in all treatments in case of all sensory attributes. The highest average score for all acceptability was found in experimental products made by developed Pumpkin, Flaxseed, Peanuts, Soybeans, Milk, Oats, Maize, were mostly accepted by panel member. the experimental product (T1) obtained maximum 8.8, 8.3, 8.3, and 8.8 for flavor & taste, body & texture, color &appearance and overall acceptability respectively; while control sample obtained (T0) 7.4, 7, 7.2 and 7.6 for flavor & taste, body & texture, color & appearance and overall acceptability respectively. This indicated that the control (To) Sev was found to be fallen under category of "Like Very Much to Like Extremely". The experimental (T1) obtained 9, 9, 9 and 9 maximum for flavor &taste, body &texture, color& appearance and overall acceptability respectively; while control (T0) obtained 7.5, 7.7, 7.5 and 7. 6 for flavor & taste, body & texture, color & appearance and overall acceptability respectively. This indicated that the control (To) Biscuit was found to be fallen under category of "Like Very Much to Like Extremely". The experimental (T1) obtained maximum 7.5, 7.4, 7.5 and 7.5 for flavor & taste, body & texture, color & appearance and overall acceptability; while control (T0) 8.7, 8.4, 8.6 and 8.6 obtained for flavor &taste, body & texture, color & appearance and overall acceptability respectively. This indicated that the control (To) Cake was found to be fallen under category of "Like Very Much to Like Extremely". The experimental (T1) obtained 8.7, 8.6, 8.7 and 8.6 maximum for flavor & taste, body & texture, color & appearance and overall acceptability; while control (T0) obtained 7.8, 7.9, 8.7 and 7. 8 for flavor & taste, body & texture, color & appearance and overall acceptability respectively. This indicated that the control (To) Momos was found to be fallen under category of "Like Very Much to Like Extremely".

Keywords: Low cost protein Rich Recipes, Mix products

Introduction
Along with fat and carbohydrates, protein is a "macronutrient," meaning that the body needs relatively large amounts of it. But unlike fat and carbohydrates, the body does not store protein, and therefore has no reservoir to draw on when it needs a new supply. So you may assume the solution is to eat protein all day long.

Protein is an important component of every cell in the body. Hair and nails are mostly made of protein. Body uses protein to build and repair tissues and also use protein to make enzymes, hormones, and other body chemicals. Protein is an important building block of bones, muscles, cartilage, skin, and blood. Pumpkin.

A pumpkin is a cultivar of a squash plant, most commonly of Cucurbita pepo that is round, with smooth, slightly ribbed skin, and deep yellow to orange coloration. The thick shell contains the seeds and pulp. The name pumpkin originated from "pepon"-the Greek word for large melon."

Classification of plant
Kingdom – plantae

Order – Curcubitales
Family – Cucurbitaceae
Subfamily – Curcurbitoideae
Trible – Curcurbiteae
Genus – Curcurbita

Nutritive value

Raw pumpkin	Nutritional value per 100 g(3.5oz)
Energy	109 kj (26kcal)
Carbohydrates	6.5g
Fat	0.1g
Protein	1g
Vitamin A equiv.beta carotene lution Zeaxanthin	(53%) 426ug(29%)3100ug 1500ug
Potassium	(7%)340mg

Flaxseed

Flax Seed belongs to the family Linum usitatissimum. Flax Seed flour is used in bakery product and provides a nutty flavour, nutritional and health benefits to the final product. It is a good source of @-3 fatty acids. It is rich in lignin which prevents cancer.

Classification of plant

Kingdom – plantae
Order – Malpighiales
Family – Linaceae
Genus – Linium
Species – L. usitatissimum

Nutritive Value

Flax Seed	Nutritional value per 100g (3.5oz)
Energy	2,234kj (534kcl)
Carbohydrates	28.88g
Dietary fiber	27.3g
Fat	42.16g
Protein	28.29g

Peanuts

Also known as groundnuts earthnuts and monkey nuts. Groundnuts are infact of a leguminous plant. The major proteins of groundnut are arachin and conarachin II. They are exceptionally rich in niacin. Groundnut protein lacks methionine and its qulity can be improved by either adding these amino acids of foods rich in the same. Groundnuts are rich in the antioxidant flavonol. Reseveratrol is a naturally occurring antioxidant Present in the pink skin of groundnuts.

Classification of Plant

Kingdoom- Plantae
Order - Fabales
Family -Fabaceae
Subfamily -Faboideae
Genus-Arachis

Nutritive Value

Peanuts	Nutritive Value(Per 100 g)
Energy Kcal	567
Protein g	25.3
Fat g	40.1
Carbohydrates	26.1
Niacin mg	19.9

Soybeans

Though soybean belongs to leguminous family, the whole dry grain contains about 40 percent protein (Twice as much as in most other pulses) and also up to 20 percent fat. Soyabean is rich in lysine and can be used to supplement a staple rice diet. Soyabean is rich in iron and B-vitamin like thiamine, riboflavin and niacin and folic acid.

Classification of plant

Kingdom – plantae
Order – Fabales
Family – Fabaceae
Subfamily – Faboideae
Trible – Phaseoleae
Subtrible – Glycininae
Genus – Glycine

Nutritive value

Soyabean	Nutritive value(per 100 g)
Energy kcal	432
Protein g	43.2
Fat g	19.5
Carbohydrates	20.9
Calcium mg	240
Niacin mg	3.2

Milk

Milk is one food for which there seems to be no adequate substitute. The cow is the most important of all the animals as supplier of food. Buffalo and goat milk is also used.
Milk is a complex mixture of lipids, carbohydrates, protein and many other organic compounds and inorganic salts dissolved or dispersed in water. The most variable component of milk is fat followed by protein.
Buffalo's milk contains 6.5 percent fat. Cow's milk contains 4.1 percent fat.

Nutritive value

Buffalo's Milk	Nutritive value (per 100 g)
Moisture g	81.0
Energy kcal	117
Protein g	4.3
Fat g	6.5
Carbohydrates g	5.0
Calcium mg	210
Phasphorus mg	130
Iron mg	0.2
Vitamin A IU	160
Thiamine mg	0.04
Riboflavin mg	0.10
Niacin mg	0.1
Vitamin B-12 Ug	0.14

Oats

The oat (Avena sativa), sometimes called the common oat, is a species of cereal grain grown for its seed which is known by the same name (usually in the plural, unlike other cereals and pseudocereals). While oats are suitable for human

consumption as oatmeal and rolled oats, one of the most common uses is as livestock feed.

Classification of plant
Kingdom – Plantae
Order – Poales
Family – Poaceae
Genus – Avena

Nutritive value

Oats	Nutritive value per 100g(3.5oz)
Energy kcal	1,628kj(389 kcal)
Carbohydrates g	66.3
Dietary fiber g	10.6
Fat g	6.9
Protein g	16.9

Maize
Maize, scientific name Zea mays, also known as corn or mielie / mealie, is one of the most extensively cultivated cereal crop on Earth. More maize is produced, by weight, than any other grains and almost every country on Earth cultivates maize commercially for a variety of uses. In addition, maize is heavily genetically modified, and the crop has been used as a rallying point by the anti- genetically Modified Organisms (GMOs) community. The exact domestication point for maize is unknown, but it is estimated that the crop is at least 5,000 years old.

Classification of plant
Maize (Zea Mays) is an annual plant which belong to family gramineae and Genus Zea.
Kingdom Plants – Plants
Order Cyperales
Family Poaceae – Grass family
Genus Zea L. – corn
Species Zea mays L. – corn

Nutritive value
Apart from satisfying the taste buds of users, maize is also a good source of vitamins, minerals and dietary fiber.

Maize Nutritional Information – Vitamins Proteion

Vitamin	Amount per 100 grams
Vitamin A	310 IU
Vitamin B1(Thiamine)	0.085mg
Vitamin B2(riboflavin)	0.085mg
Vitamin B6	0.071mg
Vitamin C	7.3mg
Vitamin E	0.11mg
Vitamin K	0.5mcg
Niacin	1.9 mg
Folate	54 mg
Pantothenic Acid	1.036mg

John E. Bronlund *et al* (2015) [1] studied that Pumpkin is widely used as a valuable food source and is gaining the attention of healthcare consumers. Dried powdering pumpkin is an alternative way to increase the consumption. For these reasons, a sound knowledge of the processes for drying and powdering of pumpkin is needed. The study focused mainly on various processes of dried pumpkin powder, including pre-treatment techniques which can influence the quality of dried product. Impacts of drying and storage methods on quality changes were also revealed in dried pumpkin powder such as the loss of color, changes in texture or an off-flavor and decreases in carotenoids or other nutrients. Moreover, this review also collected the basic information about characterization of pumpkin fruit and also chemical characteristics and nutritional values of pumpkin.
Banziger, M, *et al* (2008) [3] analyzed consumers' awareness and attitudes towards yellow maize products in Zimbabwe and suggested intervention strategies that will ensure increased production and consumption of the crop, which is rich in provitamin A to prevent the incidence of vitamin A deficiency prevalent among vulnerable groups. Data showed that yellow maize is known to all but few are aware of its nutritional qualities or consume it. The main source of supply is imported food aid. Rich in oils, carotenoids and fructose, yellow maize easily undergoes chemical changes to produce unacceptable organoleptic properties (or bad taste) if poorly handled during importation. These two factors are responsible for it being perceived inferior to white maize by consumers. Quality assurance during importation can improve consumer confidence but a long-term strategy will be vigorously to promote domestic production of yellow maize varieties rich in high levels of β-carotene that meet the preferences of consumers. Drawing from a probability model regression analysis, nutritional education can potentially promote yellow maize consumption, especially if targeted at low income households. Domestic production and consumption of yellow maize will decrease vitamin A deficiency among vulnerable groups and improve food insecurity through reduced grain prices and increased incomes for farmers. These results draw attention to the need for policy makers in developing countries to review their agricultural policies to ensure that they do not undermine the local production and consumption of nutritionally valuable crops.

Objective
- To develop low cost protein rich products.
- Organoleptic evaluation of developed products.

Materials and method
The present investigation entitled "standardization and development of low cost protein rich products, was carried out to standardize the products developed by using Pumpkin seeds, Flaxseeds, Peanuts, Soybeans, Milk and Oats. The study was conducted in department of Food and Nutrition, Faculty of Home Science, KNIPSS sultanpur.
Justified, judicious and scientific methodological consideration is indispensable for any investigation to deduce meaningful interferences concerning the objectives of the study. The study design reflects to the logical manner in which units of the study were assessed and analyzed for the purpose of drawing generalizations. Thus, 'with the view of available resources, the best procedures for taking correct observation should be first sorted out in a logical manner so that unbiased interference can be drown. This chapter delineates information pertaining to the research design and methodological steps used for investigation. The research procedure has been distinctly described as under in the following heads:

Procurement of material
For the present investigation material s, were purchased from the local market of sultanpur city. The procuring was done in single a lot to avoid variation compositional differences so that the quality differences should be ruled out.
Processing of raw material

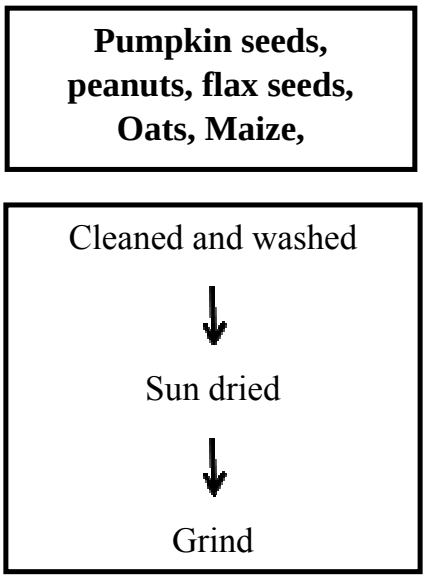

Fig 1: Flow chart of processing of raw material.

Processing of pumpkin seeds, flaxseeds, Peanuts, Soybeans, Milk, Oats, Maize.
These materials were subjected to cleaning, washing and drying in the following manner.

Cleaning and washing
Pumpkin seeds, flaxseeds, Peanuts, Soybeans, Oats, Maize were washed with tap water and then rinsed with water to remove dirt, dust and other adhering impurity.

Drying
Pumpkin seeds, flaxseeds, Soybeans, Oats, Maize were spread on polythene sheet in shade and covered with muslin cloth to protect from foreign particles at room temperature(27±3℃) for 2-3 days till they become brittle. soybeans were steamed and dried in oven.

Powder making
The dried Pumpkin seeds, flaxseeds, Peanuts, Soybeans, Oats, Maize were powdered separately through grinder and sieved to get uniform powder.

Sensory evaluation of developed products
Standardization of the developed products was carried out through organoleptic evaluation. Developed products were evaluated for their sensory characteristics like color, flavor, texture and overall acceptability by selected 10 panel members.

Selection of panel members
Threshold test was use for selection of panel members. Convenience, experience, knowledge, willingness, interest and sincerity on the part of panel members were also considered. Thus, ten members were enlisted in the panel comprised of staff members of the college of Home Science, KNIPSS.

Preparation of score card
For assessing acceptability of samples, a score card was developed on the basis of certain qualities looked for in food preparation such as color, aroma, appearance, texture, taste and overall acceptability. Nine point hedonic rating scale (Appendix-A) provided to judges for scoring.

Method of evaluation
The processed samples were served to the panelists separately in similar containers with different codes for sensory evaluation. Care was taken to conduct the evaluation in an undistributed environment as the environment may distract or influence the evaluation of judges.

Calculation of nutritive value of developed protein rich products
The nutritive value of the most acceptable protein rich products were calculated by using food composition table given by ICMR (2010).

Statistical analyses
Observations collected on the various aspects of the study have been statically analyzed (Appendix-B).

Formula
Average= n/N *100
Where,
n= Sum of the observations
N= total number of observation

Result and discussion
The data were collected on different aspects per plan, tabulated and analyzed statistically. The result from the analysis presented and discussed in the chapter in the fallowing sequence.

Organoleptic evaluation of protein rich products.
Calculation of nutritive value of developed products.
Organoleptic evaluation of protein rich products.

- Flavor and taste.
- Body and texture.
- Color and appearance.
- Over all acceptability.

Table 1: Organoleptic evaluation of protein rich sev-

Product	Flavor& taste	Body \ texture	Color & appearance	Overall acceptability
T0(controlled)	7.4	7	7.2	7.6
T1(experimental)	8.8	8.3	8.3	8.8

Table 1 shows that the experimental product (T1) obtained maximum 8.8, 8.3, 8.3, and 8.8 for flavor & taste, body & texture, color &appearance and overall acceptability respectively; while control sample obtained (T0) 7.4, 7, 7.2 and 7.6 for flavor & taste, body & texture, color & appearance and overall acceptability respectively. This indicated that the control (To) Sev was found to be fallen under category of "Like Very Much to Like Extremely".

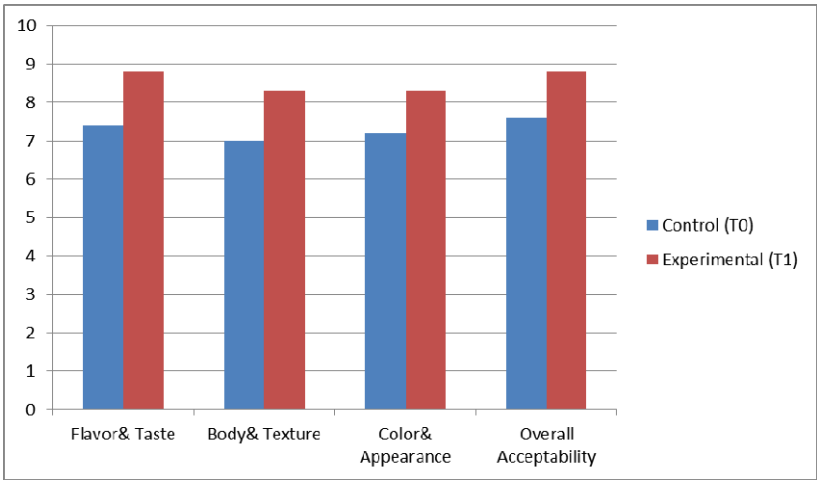

Fig 1: Mean overall acceptability of Sev-

Table 2: organoleptic evaluation of protein rich Biscuit-

Product	Flavor& taste	Body \ texture	Color & appearance	Overall acceptability
T0(controlled)	7.5	7.7	7.5	7.6
T1(experimental)	9	9	9	9

Table 2 shows that the experimental (T1) obtained 9, 9, 9 and 9 maximum for flavor &taste, body &texture, color& appearance and overall acceptability respectively; while control (T0) obtained 7.5, 7.7, 7.5 and 7. 6 for flavor & taste, body & texture, color & appearance and overall acceptability respectively. This indicated that the control (To) Biscuit was found to be fallen under category of "Like Very Much to Like Extremely".

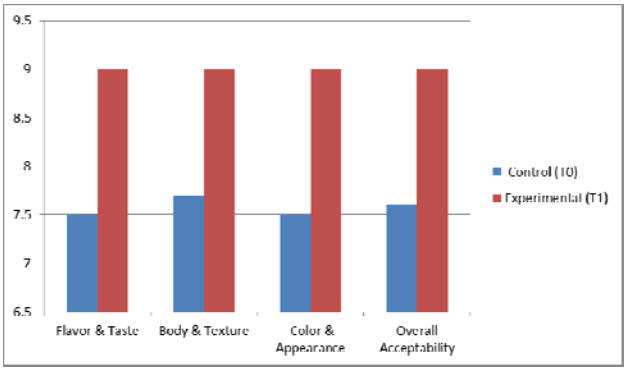

Fig 2: Mean overall acceptability of Biscuit-

Conclusion

Protein rich of Pumpkin seeds, Flaxseeds, Peanuts, Soybeans, Milk, Oats, Maize, in the combination. Of T1 protein rich flour which was used in these amount T0 (control 100%) T1 (pumpkin seeds 10%, Flax seeds 15%, peanuts 20%, soyabeans 20%, oats 15%, Maize 20%). Development and sensory evaluation of low cost protein rich products. i.e. Sev, Biscuit, Cake, Momos, Ladoo. Organoleptic evaluation of developed product was done by a panel of 10 judges by the method of hedonic test. In which flavour & taste, body & appearance, colour & texture and overall acceptability were determined. The result of protein Rich products for Sev, Biscuit, Cake, Momos, Ladoo, T0, and T1, was best in all of treatment in case of all sensory attributes.

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