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RESEARCH ARTICLE

DEVELOPMENT OF GERMINATED WHEAT FLOUR (TRITICUM AESTIVUM L.) PRODUCTS FORTIFIED WITH PUMPKIN SEED AND BEET GREEN POWDER AND THEIR ORGANOLEPTIC EVALUATION.

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Abstract

Germination enhances the quality of nutrients and bioactive compounds of cereals thereby increasing the content in proteins, amino acids, sugars, and vitamins as well as the anti-nutritional factors are reduced with the increment of mineral availability. Hence, the consumption of sprouted cereals is becoming popular in the world. Fortification of food products to enhance the nutritive value has become the major focus in the field of new product development, owing to the consumer need for products having high nutritive and sensorial properties. The aim of the study was to develop germinated wheat flour products with the fortification of pumpkin seed and beet green powder and to evaluate their organoleptic properties.

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Introduction:-

Cereal grains form a major source of dietary nutrients for all the people, particularly those in the developing countries. However, the nutritional quality of cereal grains and sensory properties of their products are inferior due to lower protein content, deficiency of certain essential amino acids, lower protein and starch availabilities, presence of certain anti-nutrients, and the coarse nature of the whole grains. Today, where women and men both are at equal level of each and every aspect, everyone wants to be fit and healthy to make their personality more effective and dynamic. But, due to busy schedule and even after having so much knowledge about healthy eating, people are not able to do so and end up on consuming junk foods, processed foods, etc. which is the ultimate reason of increasing risks of constipation, obesity, diabetes, cardiovascular disease, heart disease, etc. worldwide. Constipation is the most common among all. To combat with various harmful life – threatening diseases, people must follow healthy eating habits. They must consume home-cooked food on a daily basis instead of junk food. People must use whole grain cereals and whole grain flour as they are packed with good amount of fiber which is necessary to maintain a healthy digestive system. Whole grains are enriched with nutrients like; protein, carbohydrates, vitamins and minerals and also fiber good for the health of the individuals. But when the flour is prepared, its nutritional value reduces during processing. So, for maintaining it, the process of germination is used. Sprouting is the process whereby seeds are germinated and eaten either raw or cooked. Seeds of many kinds, including grasses, grains and beans, are used for sprouting. Health and nutritional benefits of sprouted wheat flour are improved digestion, prevention of type 2 diabetes, helps in weight loss, reduced risk of metabolic syndrome and protection against breast cancer. Fortification of beet green was done as it contains good amount of nutrients which helps to reduce dietary

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deficiencies. Beet greens are young, leafy tops of beetroot plant. While many people discard greens and only consume their round root portion, beet greens are actually the most versatile and nutrient-rich part of the plant and provide amazing health benefits if consumed regularly. Beet greens can also be used in the powdered form after sun drying for up to 3 months and various healthy food products can be prepared by using the powder. Combinations can also be made. Drying vegetable is a safe, and long- lasting method of preserving them. One of the greatest benefits is that the nutritional content of the dried vegetables is left relatively unchanged and can be used to meet daily intake. Health benefits of beet greens are; aids digestion, prevents blood clotting, strengthens bones, boosts immune system and prevents night blindness. Nuts and seeds make up part of a healthy and balanced diet. Pumpkin seeds boosts intake of several essential nutrients. While both raw and roasted pumpkin seeds offer health benefits, raw pumpkin seeds offer more nutritional value because some nutrients are destroyed during the roasting process. Pumpkin seeds are packed with full of valuable nutrients providing fats, magnesium and zinc. Health benefits of pumpkin seeds are; reduction in inflammation for arthritis, prevents kidney stone formation, improves prostate and bladder health, prevents constipation and provides restful sleep.

Materials and Methods:-

Procurement of raw materials

Raw materials for the development of products were procured from different places. Wheat was procured from Section of Rabi Cereals, EBR department of Chandra Shekhar Azad University of Agriculture and Technology, Kanpur. Beet greens were procured from local market of Kanpur. Pumpkin seeds were procured online.

Preparation of flour and powder

Wheat was collected, cleaned, washed and soaked for 24 hours. After soaking, wheat seeds were kept in cloth for 48 hours for germination. After the germination process, it was kept for sun drying for 48 hours and cleaned by using sieve to remove dirt. Wheat was then ground properly in mixer for preparing flour. Beet greens were cleaned, washed thoroughly and sun-dried for 48 hours. After sun-drying, greens were cleaned by using sieve to remove dirt or any other extraneous material. Beet greens were then ground properly in an electronic mixer and beet green powder was obtained. Raw, de-shelled pumpkin seeds were ground in an electronic mixer and pumpkin seed powder was prepared.

Preparation of Products

Development of healthy fortified food products is necessary as people are getting more conscious about health today and are giving importance to healthy eating. The research was conducted to develop laddu, cookies and mathri because these are Indian foods and so their acceptance is more as compared to that of any new product. Products were prepared in four variants (T_0, T_1, T_2 and T_3) using germinated wheat flour with the fortification of pumpkin seed and beet green powder in the ratio of 100:0:0, 90:5:5, 80:10:10 and 70:15:15. Pumpkin seed powder was obtained from cucurbita spp. seeds containing 49.05g/100g fat, 30.23g/100g protein and 10.71g/100g of total carbohydrates. Beet green powder was obtained from leaves of beta vulgaris L. containing 0.1g/100g fat, 2.2g/100g protein and 4.3g/100g of total carbohydrates.

Organoleptic evaluation of Laddu, mathri and cookies:-

Three products i.e. laddu, mathri and cookies were developed using germinated wheat flour. For each product, control samples were prepared using basic ingredients and three test samples were prepared with 10%, 20% and 30% fortification levels of both pumpkin seed powder and beet green powder. The developed products were organoleptically evaluated by a semi- trained panel of 8 judges. The judges were served each preparation with one control sample and three experimental samples. Products were served in coded plastic containers randomly. The judgment was done on the basis of sensory attributes i.e., appearance, taste, flavor, texture and color and the scoring were done on the basis of 9 point hedonic scale.

9 Point hedonic scale

A nine point hedonic scale was used with 1= dislike extremely, 5= neither like nor dislike and 9= like extremely.

Results and discussion:-

Table 1:- Mean Score of organoleptic evaluation of germinated wheat flour laddu fortified with pumpkin seed and beet green powder

Parameters	Treatments				SE (diff.)	CD
	T_0	T_1	T_2	T_3		

Appearance	7.2	7.25	7.3	7.9	0.29	NS
Taste	7.1	7.2	7.4	7.9	0.04	0.08
Flavor	7.1	7.3	7.4	8.1	0.21	0.43
Texture	6.82	6.86	7.03	8	0.35	0.71
Color	7.07	7.41	7.45	8.2	0.18	0.36

Table 2:- Mean Score of organoleptic evaluation of germinated wheat flour mathri fortified with pumpkin seed powder and beet green powder

Parameters	Treatments				SE (diff.)	CD
	T_0	T_1	T_2	T_3		
Appearance	7.1	7.4	7.45	7.9	0.18	0.36
Taste	7.2	7.45	7.48	8.2	0.18	0.36
Flavor	7.2	7.3	7.4	7.9	0.18	0.36
Texture	7.3	7.4	7.45	8	0.18	0.36
Color	7.2	7.3	7.5	7.9	0.18	0.36

The experiment was laid out in Factorial Completely Randomized Design (CRD). The experiment compares the value of a response variable based on the different levels of that primary factor. Mean score with standard error and critical difference of laddu and mathri is given in table 1 and 2. Results revealed significant differences in sensory attributes of products. Mean score of sensory attributes of laddu, cookies and mathri increased with increase in levels of fortification. Sensory evaluation of fortified products revealed that products (laddu, mathri and cookies) with 30% level of fortification were highly accepted in terms of appearance, taste, flavor, texture and color.Organoleptic evaluation of germinated wheat flour laddu, cookies and mathri fortified with pumpkin seed and beet green powder revealed that products i.e, laddu, cookies and mathri with 30% level of fortification was liked extremely, laddu, cookies and mathri with 20% level of fortification was liked very much and laddu, cookies and mathri with 10% level of fortification was liked moderately as compared to that of control product.

Conclusions:-

On the basis of results of the present study, it was concluded that pumpkin seed and beet green powder can be supplemented in wide range of food products. It adds variety as well as new taste in Indian foods. All the products i.e. laddu, mathri and cookies fortified with pumpkin seed and beet green powder were highly accepted on the basis of organoleptic evaluation. Fortification level of 30% pumpkin seed and beet green powder was found to be better as compared to that of 10% and 20% levels of fortification in terms of appearance, taste, flavor, texture, color and overall acceptability.

Recommendations:-

On the basis of conclusions, pumpkin seed and beet green powder at 30% level of fortification in the preparation of various healthy recipes can be recommended to improve the nutritional value of diets to eradicate malnutrition in children. These products can also be included in supplementary feeding programmes. Education can be imparted to village women regarding use and importance of pumpkin seeds and beet greens which are commonly discarded as waste. Keeping in view the nutritional value of pumpkin seeds and beet greens, it can be recommended to food industries to fortify their foods with pumpkin seed and beet green powder to improve nutritional value of products.

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