JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

"PRODUCTION AND SENSORY EVALUATION OF LOW-FAT BREAD SPREAD – A RESEARCH"

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Abstract *:* Nowadays the popularity of the delicious fat-rich products has decreased immensely due to the consumers becoming increasingly aware of their calorie intake and health consciousness. In today's generation people are getting so many diseases mainly Diabetes, PCOS which should be curable in a natural way through the food we take which should be clean and nutritious yet less in calories to support diabetes etc. Traditional butter and margarine have higher cholesterol ranging from 60-80 percent and preferably from animal origin. However, this study was developed as the replacement for high fat instant foods and the selection of the ingredients is purely based on their nutritional profile through valorisation. The ingredients are fully derived from plant sources and found to be beneficial for vegans also. These ingredients are rich in omega 3,6-fatty acids and also rich in micronutrients such as phosphorus, potassium, magnesium, calcium etc., and maintain the proper sleep cycle, reduce the cholesterol, manage blood pressure level and enhance the health of women with PCOS, lowering the risks of heart diseases and obesity also. The Sensory attributes of developed product was analyzed using 9-point Hedonic Scale and (Developed product) T2 has the high sensory score than control samples.

Key words : *Low – Fat, Bread spread, Valorisation, Nutririch, Sensory evaluation, Hedonic Scale*

I. INTRODUCTION

The present research work aimed to develop the value-added nutritious bread spread with techno-economic feasibility. Spreads are food products that are typically plastic in nature and could be spread as thin coating on the foods like bread slices, pizza bases, chapati and other foods. Traditional butter and margarine have the higher cholesterol ranged from 60 to 80 per cent and preferably animal origin. The consumption of saturated fatty acids leads to metabolic syndrome (Ebbesson *et al*., 2007)

Hence, this research work concentrated on the new product development, which meet out the consumer's need in all the aspect including low-cost, low fat, low-calorie and entirely from plant origin. The selection of ingredients is purely on the basis of their nutritional profile and utilization of waste by converting into healthy value-added product. The ingredients used for the development of the new product are Pumpkin seeds *(Cucurbita maxima)* which contains magnesium, zinc, calcium and omega 3 and 6 fatty acids, protein and fibres can help to reduce cholesterol, manage blood pressure levels and enhance the health of women with PCOS (Dong *et al*., 2021). Flax seeds *(Linum usitatissimum)* (Kajla *et al*.,2015) contains Omega-3 fatty acids, protein, dietary fibre, energy, essential vitamins (A, C, thiamine, E, B6), the anti-oxidants present provide protection form the oxidation reactions and minerals including calcium, iron, phosphorus, magnesium, potassium, sodium and zinc. Chia seeds *(Salvia hispanica L.)* are low in calories and high in good fats that further facilitate in losing weight. These seeds are the

richest plant-based source of omega-3-fatty acid, antioxidants fight against free radicals that contribute to damage cell molecules, the aging process and deadly diseases like cancer (Biczok *et al*., 2020) Peanuts *(Arachis hypogaea)* has resveratrol is a poly-phenolic antioxidant found in peanuts that boost the immune systems of the body and prevents cancers, folic acid present in peanuts can help to lower the risk of severe tube defects in the fetus by 70%. Manganese in peanuts helps to enhance calcium absorption in the body, improve the metabolism of carbohydrates and fats also regulate the sugar levels in the blood (Arya *et al*., 2016). Coconut oil *(Cocos nucifera.L.)* added with brown sugar for sweetness and vanilla essence for flavour. Brown sugar has no fat, richest source of nutrients and it suppress the inflammatory symptoms of asthma (Azlan *et al*., 2020).

The nutritional composition, sensory evaluation and shelf-life study of the resultant product will be analyzed in the time intervals and compared with commercially available reference sample (Sithole *et al.,* 2022). However, because the new product is entirely plant-based, everyone, including vegans, can consume it. Additionally, because it is low in calories and fat, people of all ages can enjoy it without any reservations. As a result, the new product will have strong marketability among customers because it satisfies their needs for nutrition and affordability.

II. MATERIALS AND METHODOLOGY

2.1 MATERIALS REQUIRED

The following are the ingredients were used for the development of low-fat nutririch bread spread.

- Pumpkin Seeds (*Cucurbita maxima*)
- Falx Seeds (*Linum usitatissimum*)
- Chia Seeds (*Salvia hispanica L.)*
- Peanuts (*Arachis hypogaea*)
- Coconut oil (*Cocos nucifera.L.*)
- Brown sugar
- Weighing Balance
- Sterilized glass wares/ Utensils
- Mixer - Grinder
- Others

2.2 SELECTION AND PREPARATION OF INGREDIENTS

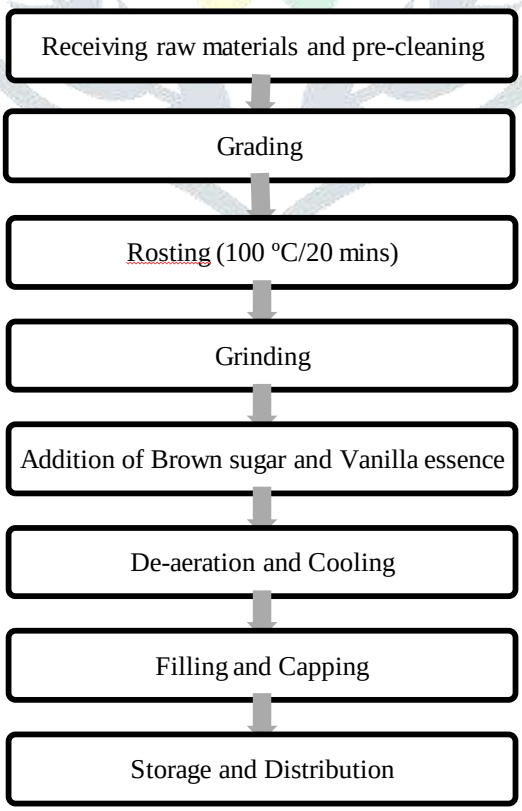

Figure - 2.1 Flowchart for the development of new product

Plate No.2.1 – Low Fat Nutritious Bread Spread

2.2.1 PRE-CLEANING

The Raw materials that are used for the processing are received from the local shop or from the supermarket. The selection of the material is highly based on the quality standards and the seeds are pre-cleaned for the further processing, In the pre-cleaning process the dirt and other foreign particles that are present in the seeds are removed.

2.2.2 GRADING

Grading of the seeds are based on the quality and colour. Here the damaged seeds are rejected for processing. Seeds grading is a process that helps to reduce the likelihood of planting poorer quality seed and selecting the larger seed that have a better chance to produce stronger seedlings with improved vigor.

2.2.3 ROSTING

This process helps to increase the flavors, aroma and texture, roasting also increases the amounts of antioxidants available. The temperature used for roasting differs for each seed.

2.2.3.1 Chia seeds

Roasting chia seeds makes sense, however, as they develop their flavor in the same way as oat flakes. The temperature used for roasting chia seed: 160–200 °C/5–30 min

2.2.3.2 Flaxseeds

To roast flax seeds, spread them evenly on a baking sheet and bake in a preheated oven at around 350°F (175°C) for about 5-10 minutes. Keep a close eye on them and stir occasionally to ensure even roasting. The seeds should turn golden brown and release a nutty aroma and Roasting enhances the flavor of flax seeds.

2.2.3.3 Peanuts

The time and temperature for peanut roasting can vary, but a common guideline is roasting at 350°F (177°C) for around 15-20 minutes, stirring occasionally for even browning.

2.2.3.4 Pumpkin seeds

Roasting pumpkin seeds involves cooking them in an oven or on a stovetop with dry heat until they become crispy and golden brown. This process enhances their flavor, creating a crunchy and savory snack. The seeds are typically seasoned with spices or salt before roasting to add additional taste. The temperature used for roasting pumpkin seeds: 170-200 °C/12-15 min

2.2.4. Grinding

Grinding of seeds involves the process of breaking down seeds into paste like consistency in grinder or mill. Grinding can enhance flavor release, improve digestibility, and make nutrients more accessible.

2.2.5. Addition of Brown sugar and Vanilla essence

Addition of brown sugar takes place at the time of grinding of the seeds. This helps to enhance the taste and flavour of the bread spread and brown sugar are having fat free sugar. Adding of vanilla essence helps to improve the aromatic flavour of the bread spread.

2.2.6 De-aeration and Cooling

The definition of De-aeration is the process of removal of air or gas present in the food sample. Here the de-aeration and cooling of the bread spread is done by placing the food material in the room temperature.

2.2.7. Filling and Capping

Transfer the prepared food product to the containers to keep the product safe from contamination and used for consumption.

2.2.8 Storage and Distribution

The storage of the food helps in the preserving of the product. Normally the storage should takes place at cool or dry place . Direct to the sun must be avoided. Further the distribution of the bread spread takes place in an air tight container.

2.3 SENSORY ANALYSIS OF DEVELOPED PRODUCT

The sensory attributes namely color and appearance, taste, flavor and over all acceptability were analysed using 9-point Hedonic Scale. (Srivastava *et al*., 2012) The highest score of T2 showed that consumers preferability is high on that developed product than that other samples.

III. RESULTS AND DISCUSSION

Table.3.1 shows the mean sensory scores of color and appearance, taste, flavor and overall acceptability of the control and developed product. The average sensory scores were 7.50, 6.67, 6.00 and 6.00; 8.50, 8.67, 8.67 and 8.50; 8.83, 8.33, 8.33 and 8.67; 7.33, 7.17, 6.17 and 6.83 of C, T_1, T_2 and T_3 respectively (Table 3.1) (Kharb *et al*., 2022)

Statistical analysis showed that a highly significant ($p<0.0.1$) difference was observed between the control and treatments with regard to color and appearance, taste, flavor and overall acceptability. The highest mean value for overall acceptability was recorded in T_2 when compared to the control and other treatments. Plate No.2.2 represents the chart for sensory evaluation of Control and Standardized Products.

TABLE 3.1 SENSORY ANALYSIS OF (MEAN ±SE)@ DEVELPOED PRODUCT AND CONTROL SAMPLES

PARAMETERS	C	T_1	T_2	T_3	T VALUE
COLOR AND APPEARANCE	7.50^{a}±0.342	8.50^{b}±0.224	8.83^{c}±0.167	7.33^{a}±0.442	**5.846****
TASTE	6.67^{a}±0.211	8.67^{b}±0.211	8.33^{c}±0.211	7.17^{a}±0.307	**15.732****
FLAVOR	6.00^{a}±0.365	8.67^{b}±0.211	8.33^{c}±0.211	6.17^{a}±0.401	**20.556****
OVERALL ACCEPTABILITY	6.00^{a}±0.258	8.50^{c}±0.224	8.67^{d}±0.211	6.83^{b}±0.167	**35.686****

Where,

@- Average of six trials (Different superscripts in a same row differs significantly)

**-Highly Significant (P<0.01)

C – Control; T1, T2 and T3 – Treatment 1,2 and 3 of newly developed product with different ratio.

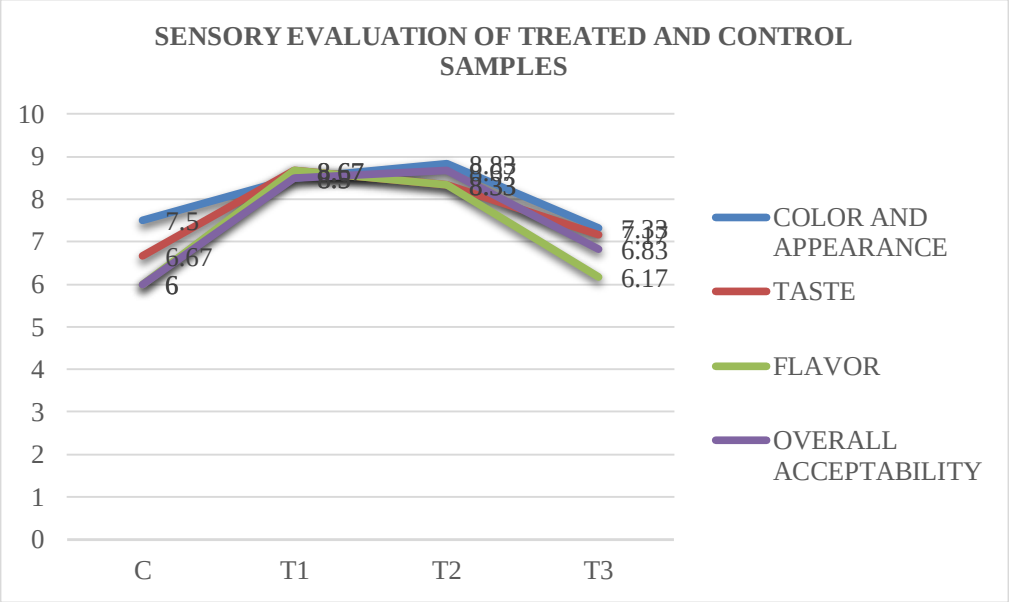

Plate No.2.2 – SENSORY ANALYSIS OF DEVELPOED PRODUCT AND CONTROL SAMPLES

IV. CONCLUSION

- ✓ By developing an attractive and cost-effective bread spread, affordable to all people even below Poverty Line. The developed product has medicinal and functional properties and recommended to all.
- ✓ Selling the bread spread product which is less in calories and high in nutrients, fibre and protein with low glycemic index comparing with the products that are already available in the market.
- ✓ The Bread spread contains only 20-22 % of fat content especially with essential vitamins and minerals. It can help enhance the health of women with PCOS and reduce the blood sugar level.
- ✓ Reduces the risk of stomach cancer, stroke, carcinogenic disease, improve the metabolism, protect the cells from damage etc.
- ✓ Moreover, unlikely other bread spreads, the developed product has ingredients from purely plant sources and thus Vegans can also enjoy it.

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