DEVELOPMENT OF IRON AND FIBER RICH COOKIES

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ABSTRACT:

Bakery Products like biscuits, cookies, bread, rolls, muffins, etc are highly consumed in India. Cookies are usually small, flat and sweet and there are various types like drop cookies, meringue cookies, Bar cookies, Sponge cookies. Iron fiber rich cookies are made from Oats and Aserio seeds. Aserio seeds are rich in iron, protein, calcium etc. Value for Aserio seeds per 100gm are Energy-30kcal, Iron-4 mg, Carbohydrates-5.5gm, Calcium-81mg. It has high medicinal value which cures anemia, improves lung function etc. Oats is major sources of Beta –Glucan-the soluble fiber fractions, recognized as the main functional component of cereal fibers. Oats are rich in total lipids and also contain large proportion of unsaturated fatty acids. The Formulation was baked at 150°C for 12-15 minutes in the OTG Oven with air circulation. The moisture content of cookies was measured using Hot Air Oven Method (4-5%). The colour of both sides of cookies was measured using Hunter's Lab Colour Analyser. The study indicates that the Oats and Aserio seeds could be used in ready-to-eat bakery cookies as a source of iron and Dietary fibers.

Keywords: Aserio seeds, Oats, Beta-Glucan, Medicinal, Baking.

INTRODUCTION:

The name of the cookie originally was "Newtons," taken from the town of Newton, a suburb of Boston...

In the United States and Canada, a cookie is a small, flat-baked treat, usually containing fat, flour, eggs and sugar. In most English-speaking countries outside North America, the most common word for this is biscuit; in many regions both terms are used, while in others the two words have different meanings—a cookie is a plain bun in Scotland, while in the United States a biscuit is a kind of quick bread similar to a scone. Its name derives from the Dutch word koekje or (informal) koekie which means Hide cake, and arrived in the English language through the Dutch in North America. Cookies are most commonly baked until crisp or just long enough that they remain soft, but some kinds of cookies are not baked at all.

Cookies are made in a wide variety of styles, using an array of ingredients including sugars, spices, chocolate, butter, Oats, Aserio seeds, peanut butter, nuts or dried fruits. The softness of the cookie may depend on how long it is baked.

A general theory of cookies may be formulated this way. Despite its descent from cakes and other sweetened breads, the cookie in almost all its forms has abandoned water as a medium for cohesion. Water in cakes serves to make the base (in the case of cakes called "batter") as thin as possible, which allows the bubbles - responsible for a cake's fluffiness - to form better. In the cookie, the agent of cohesion has become some form of oil. Oils, whether they be in the form of butter, egg yolks, vegetable oils or lard are much more viscous than water and evaporate freely at a much higher temperature than water. Thus a

cake made with butter or eggs instead of water is far denser after removal from the oven.

Cookies are one of the good demanding products in the market. The bakery industry in India comprises of organized and unorganized sectors. The organized sectors consist of large, medium and small-scale manufacturers who produce packaged biscuits, cookies and crackers. The unorganized sectors consist of small bakery unit's cottage and household type manufacturing their goods without packaging and distributing their goods in the surrounding areas. Categorically speaking, the baking industry is comprised of several product segments. These include breads, cookies, cakes, crackers, cereals and nutritional bars. Manufacturers tend to specialize in one or more of these segments. In India cookies are packaged in LDPE, HDPE, PP. Nearly 80% cookies are packed in plastics films such as LDPE, HDPE, PP and other plastic material. Benefits whole wheat flour is more nutritious than refined white flour, all through in a process of making the flour. Whole wheat is good source of calcium, iron, fiber, and other minerals Lille selenium.

REVIEW OF LITERATURE:

Denisa Eglantina Duta et al, Alina Culetu *et al.* (2015) Studied the Evalution of rheological, physicochemical, thermal, mechanical and sensory properties of oat-based gluten- free cookies. Oat bran is a high source with human benefits. Gluten-free cookies were prepared by incorporation of into oat flour. Gelatinization degree of oat gluten-free cookies increased with oat bran addition. Result shows that oat bran can be used to enhanced the nutritional properties of gluten free oat cookies.

Thomas *et al.* (1994) conducted a study on glycogenic foods in patients with diabetes. In this study, he reported that a food such as rye breads, cakes, cookies, breakfast cereal , potato, soup, crackers, and pasta have a low glycemic value.

Adam Drewnowski *et al.* (1998) studied the impact of replacing fat and sugar in cookies on the product quality and preference. This study showed that acceptability ratings for cookies dropped sharply following a 25% reduction in recipe sugar levels, but were relatively unaffected following a 25% reduction in recipe fat content.

E. I. Zoulias *et al*, (2002) prepared the cookies by replacing 50% of the fat by the carbohydrate or protein-based fat mimetics. They studied the effect of this replacement on the texture of cookies by compression tests. The result of the study showed that hardness and brittleness of the cookies generally increased with fat replacement, but a moderate increase was obtained by some of the fat mimetic, resulting in products with better textural characteristics than their low-fat, no mimetic-added counterparts.

Jaspreet Singh *et al*,(2003) studied the effect of blending corn flour and potato flours at different levels (2, 4 & 6%) with wheat flour on cookies. They showed that the addition of both corn and potato flours improved the cookie spread factor and lowered cookie fracture force.

MATERIALS AND METHODS:

1. **Ingredients-** Refined Wheat flour, rolled oats, Aserio seeds, Sugar, Salt, Egg were purchased from the local market.

2. **Equipment's used**

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- **Weighing balance**: Electronic weighing balance is used for weighing raw materials.
- **Electronic blending machine (planetary mixer)**: It is used for mixing and blending of ingredients like fat, sugar, refined wheat flour, essence, etc.
- **Dough roller**: It is used for making dough sheet and obtaining uniform thickness.
- **Baking oven**: Baking of cookies is done at 150^0c for 15 minutes.

3. Methodology for preparation of cookies.

I.   **Selection of Ingredients**: Select good quality ingredients and clean them. They include Refined wheat flour, Sugar, Shortening, Oats, Aserio seeds, Tutti Frutti, Vanilla Essence, Salt, Vanaspati, etc.

II. **Weighing**: Weighing of ingredients is done with the help of Electronic Weighing Balance.

III. **Grinding**: Grinding of sugar is carried out with the help of Grinder.

IV. **Shortening**: For shortening Butter and ghee are used.

V.   **Mixing**: Powdered sugar, egg and fat is mixed to form a uniform mixture with the help of electronic Blender(beater). Refined wheat flour is added followed by the addition of Vanilla essence, Oats, Aserio Seeds, Tutti Frutti, Choco chip.

VI. **Preparation of Dough**: Mix the powdered sugar and shortening properly. Proper mixing of sugar and shortening is very important for optimum cookie spread. Then add other ingredients in dough kneader to prepare dough. Cookie dough should be mixed just enough to blend the ingredients homogenously.

VII. **Rolling of dough**: Rolling of dough is done by using bakery roller till uniform thickness is obtained as shown in **Figure 3.1**

VIII. **Molding:** Mold the Dough using cookie cutter and place them into baking trays. When the trays are greased, the cookie will spread more. To retard spreading, dust the trays with flour after they are greased.

IX. **Baking**: Cookies should be placed far enough apart on the trays to avoid sticking during baking. Bake the cookies at 180^0 C for 20 min.

X.   **Cooling Packaging and Storage**: Cool the product at room temperature then pack the cookies in packaging material (HDPE & LDPE) as shown in **Figure 3.2** and store the product at room temperature.

4. Chemical Analysis

1. **Moisture Content-** Moisture content of the eggplant flesh powder was determined using the hot air oven method (AOAC, 2000).

2. **Protein Content-** Crude protein was estimated using the micro Kjeldahl method (Pelican Equipments)

3. **Fat Content-** Fat content was estimated using soxhoplus (Pelican equipment's).

4. **Crude Fiber Content-** Crude fibre was estimated using fibroplus (Pelican Equipments)

5. **Ash Content-** The ash fraction contains all the mineral elements but it allows to nitrogen-free-extract (by difference) from dry matter

6. **Carbohydrate Content-** Carbohydrates are calculated on the basis of determination of the remaining four parameters.

7. **Iron Content-** Iron was introduced during the mixing of the cookie batter. Spectrophotometric measurement of the Iron Content of cookies was introduced in accordance with the AOAC protocol.

5. Sensory Evaluation by Nine Point Hedonic Scale

The sensory characteristics of Cookies were determined using a taste panel consisting of members from MGM College of Food Technology, Aurangabad. The sensory characteristics of the products were evaluated by using nine-point hedonic scale. A nine-point hedonic scale was used for sensory evaluation of Cookies

6. Statistical analysis

All analytical tests and experimental analyses were carried out in triplicates and expressed as mean values, coefficient of variance (CV) and standard deviation.

RESULT AND DISCUSSION:

1. Cost of Production

The amount of cookies prepared were calculated and the cost of total production was estimated.

2. Analysis

1. Proximate analysis of raw material for Cookie preparation

Chemical properties were analysed to check the quality of raw materials. The nutritional composition of Oats and Aserio seeds are mentioned below in **table no. 4.2**

As Rolled Oats and Aserio seeds are added for fortification in the product, it is analysed using various instruments to get idea about nutritional contents such as Moisture content, protein content, fat content, fibre content, potassium, magnesium The major nutrient found in Oats is Fiber and Protein. The major nutrient found in aserio seeds is **Iron** which is

4 mg, **Calcium** which is **81 mg** and **vitamin C** is **69 mg**.

3. Formulation of Cookies

The ingredients like Oats and Aserio seeds are the rich source of dietary fibre, minerals (potassium, magnesium), protein, Iron etc. To mask off the Bitter taste of Aserio seeds Roasting is done for about 10-15 minutes.

These formulations are made on the basis of few trails in making the dough and observing its colour, appearance, texture. The formulation C3 (with 30: 55: 15 proportion) was selected based on taste, colour and texture. The quantity of aserio seeds taken is based on the bitterness and the quantity of refined wheat flour is decreased and the quantity of oats is increased as shown in **Table No. 3.**

4. Organoleptic Evaluation of Cookies

The sensory characteristics of cookies was determined using a taste panel consisting of members from Department of MGM College of Food Technology, Aurangabad. The sensory characteristics of the products were evaluated by semi-trained panel using nine-point hedonic scale. A nine-point hedonic scale was used for sensory evaluation of Cookies. The acceptability statements and their marks given in Table No. 4

Mean acceptability scores obtained by the sensory evaluation of Cookies with content of iron as a source of aserio seeds and fiber as a source of oats are given in Table. No 4 Regarding the colour attributes the highest score 8.6 is obtained by C_3 followed by C_0, C_2, C_1 and C_4 where scores are 8.5, 8.0, 7.6 and 7.5. The texture attributes were found to be maximum in C_3 with score of 8.7 followed by C_0, C_4, C_1 and C_2 having score of 8.6, 7.8, 7.7 and 7.6. Regarding the flavour attributes the lowest for C_1, C_2, C_4 and C_0 samples with

scores 7.2, 7.4, 7.5 and 8.3 compared to C_3 with the highest score of 8.4. The taste attributes have the highest score is 8.5 obtained by C_3 sample followed by C_0, C_2, C_1 and C_4 with scores of 8.4, 8.2, 7.1 and 7.0 respectively. The overall scores of C_3 Cookies sample were found to be slightly higher 8.55 than the C_0 sample with the score of 8.45 and the lowest was obtained by C_1, C_4 and C_2 with score of 7.4, 7.45 and 7.8 in cookies samples.

CONCLUSION:

1) The organoleptic score of the **C_3 sample** was better than C_0, C_1 and C_2, C_4 samples.
2) Oats and Aserio seeds were analysed and were found to increase the fibre, Iron and Protein content of the formulated product.

1. Future Scope

Refined Wheat flour affects the health and so it can be replaced by wheat flour or enriched wheat flour to increase the nutritive value of the product.

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Table 1: Cost of Production for 70 kg of Fortified Cookies

		Quantity	Unit	Rates(Rs)	Value (Rs.)
1	Raw materials	Quantity	Unit	Rates(Rs)	Value (Rs.)
	Refined Wheat Flour	59.5	Kg	25/kg	1487
	Sugar	42	Kg	50/kg	2100
	Vanaspati Ghee	17.5	Kg	85/kg	1487
	Butter	14	Kg	450/kg	6300
	Oats	7.35	Kg	190/kg	1396
	Aserio seeds	3.15	Kg	200/kg	630
	Water	500	Ml	20/l	15
	Tutti Frutti	5.6	Kg	20/g	112
	Salt	70	G	-	2
2	Additives				
	Color/flavor	50	Ml	-	125
3	Packing Material				
	LDPE/Plastic Bag	1020	no.	0.2	204
	HDPE/ Plastic Tray	170	no.	4	612
	Labeling paper	1190	no.	68/kg	4760
	Total cost Rs				19230/-
4	Administrative expenses				
5	Salary				
6	Labor / baking cost	70	Kg	30/kg	2100
8	Electricity				0
9	Water				0
10	Mislenious				0
11	Depreciation				0
12	Transportation				200
13	Total cost				21530
14	Selling cost	70	Kg	425/kg	29750
15	Distributer cost@10%				0.0
16	Retailer cost @15%				0.00
17	Total selling cost				29750
18	Profit				8220
19	profit %				38.17%

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Table 2: Proximate analysis of raw materials

Sr. No.	Parameters / Sample	Moisture (%)	Ash (%)	Fat (%)	Fiber (%)	Protein (%)	Carbohydrate (%)
1	Rolled Oats	5.5	5.4	2	17	9.5	60.6
2	Aserio Seeds	6.7	2.5	5	36	20	29.8

Table No. 3: Formulation of Cookies

Sr. no.	Oats (gm)	Refined Wheat Flour (gm)	Aserio seeds (gm)
C_0	0	100	0
C_1	10	85	5
C_2	20	70	10
C_3	**30**	**55**	**15**
C_4	40	40	20

Table No. 4- Sensory Evaluation of Cookies

Sample	Parameters				
	Colour	Texture	Flavour	Taste	Overall acceptability
C_0	8.5	8.6	8.3	8.4	8.45
C_1	7.6	7.7	7.2	7.1	7.4
C_2	8.0	7.6	7.4	8.2	7.8
C_3	8.6	8.7	8.4	8.5	8.55
C_4	7.5	7.8	7.5	7.0	7.45
Std. Dev.	0.50	0.52	0.55	0.73	0.54
Mean	8.04	8.08	7.76	7.84	7.93
CV%	6.21	6.43	7.0	9.3	6.8

Figure No. 3.1 Cookie Dough after rolling

Figure No 3.2 Packaging of Cookies

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