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Development of Gluten free multigrain and beetroot (*Beta vulgaris* L.) paratha premix

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ABSTRACT

The aim of the study was to create a beetroot paratha and gluten-free multigrain premix for those with gluten sensitivity. In North Indian cuisine, paratha is a traditional breakfast food that is consumed every day with a variety of meals. Since multigrain flour adds so many health advantages to paratha, it's a great pick for an ingredient. The ingredients for the gluten-free multigrain and beetroot paratha premix are sorghum flour (35g), ragi flour (20g), beetroot powder (10g), and foxtail millet flour (25g). High amounts of betalains, a class of phenolic secondary plant metabolites, are responsible for the vibrant red colour of beetroots. In addition to being utilised as natural colourants, betalains are gaining popularity because of potential health advantages for people, particularly because of their anti-inflammatory and antioxidant properties. Addition of foxtail millet is help to increase kidney functionality, helps in development of body tissue and energy metabolism.

Key Words : Paratha premix, Beetroot, Multigrain, Gluten sensitivity, Foxtail flour, Sensory analysis

INTRODUCTION

Foods that are easy to prepare and need minimal effort are becoming more and more popular with consumers worldwide. Because they are already prepared and need less time to prepare, quick dinner options are becoming more and more popular worldwide. The instant meal aisle of any supermarket these days is stocked with goods. In North Indian cuisine, paratha is a traditional breakfast food that is consumed every day with a variety of meals. Since multigrain flour adds so many health advantages to paratha, it's a great pick for an ingredient. The idea of incorporating a variety of grains into our diets is as old as humanity itself, as it provides the body with a range of nutrients and is essential to overall health.

Malnutrition encompasses both excessive and insufficient nourishment. It plays a significant role in infant mortality (Mohajan, 2014). malnutrition in children, the elderly, and nursing mothers brought on by insufficient dietary intake (Ragaee *et al.,* 2006). The creation of a multi-flour that is high in nutrients could lower the rate of malnutrition. Due to their widespread use, stability, and adaptability, cereals are a strong source of protein and can be used to provide protein to populations that are at risk (Bulusu *et al.,* 2007). Nutraceutical qualities of sorghum include waxes that decrease cholesterol and antioxidant phenolics. Numerous goods, including cakes, cookies, pasta, items resembling parboiled rice, and snack items, are made from sorghum (Taylor *et al.*, 2006). Finger millet (*Eleusine coracana* L.) is also known as ragi (Wandhekar *et al.*, 2020). India is largest producer of finger millet and contributes 60% of global production (Kamini and Sarita, 2011). In India Karnataka, Tamil Nadu, Andhra Pradesh and parts of North India are the top producers of finger millet (Vijayakumari *et al.*, 2003). Finger millet contains the lowest fat and rich source of calcium. Finger millet per 100g contains carbohydrates (65–75g), dietary fiber (18g), protein (6–13g), minerals

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(2.5–3.5g) and calcium (0.38g) (Devi *et al.,* 2014). Finger millet helps in strengthening bone and reduces risk of bone damage as good in calcium content. It is Good source of sulphur containing amino acids like tryptophan, cystine and methionine. Naturally iron is present in finger millet helps to cure anaemia. Finger millet helps to increase the haemoglobin level in blood. Fox millet (*Setaria italica*) is one of the oldest cultivated millets in the world. Foxtail millet is also known as Italian millet. It is cultivated mainly in Asian, African and American countries. Fox millet is the most cultivated millet after pearl millet and is grown in hot arid and semi-arid regions. Karnataka, Telangana, Andhra Pradesh, Maharashtra, Tamil Nadu, Rajasthan and Uttar Pradesh are the major producers of finger millet in India.Nutritional profile of foxtail millet per 100g shows carbohydrates (60.9g), protein (12.3g), fat (4.3g), crude fiber (8.0g), minerals (3.3g) and energy (351kcal) (Sharma and Keshavan, 2017). It is also a good source of minerals such as magnesium, manganese and phosphorus. Fox millet is the richest source of fiber among millets (Hariprasanna, 2016). Fox millet is a good food or the heart because it contains a lot of magnesium. Foxtail millet seeds increase kidney function, contribute to the development of body tissues and energy exchange. Beetroot is Beta vulgaris subsp. vulgaris (conditiva) and describes some types of edible fennel cultivated throughout the Americas, Europe and Asia. Unlike its subspecies *Beta vulgaris* sub sp. vulgaris (altissima), known as sugar beet, the sugar content in beet subspecies conditiva is about 2 times lower (US Department of Agriculture, 2013). The intense red color of beets is due to the high concentration of betalains. secondary plant metabolites. The food industry uses beta waves as natural dyes, but more and more attention has been paid to their potential health benefits for humans, especially their antioxidant and anti-inflammatory effects (Georgiev *et al.,* 2010; Zielinska Przyjemska *et al.*, 2009).

METHODOLOGY

The present research was carried out in the department of quality lab at Milestones industry pvt ltd., Paithan, Aurangabad, Maharashtra.

Materials:

Period of experiment:

The experiment reported was conducted during the period from September 2023 to January 2024.

Raw materials and ingredients :

Beetroot powder was prepared in the laboratory, where as the foxtail millet, sorghum, finger millet, red chilli powder, salt, ajwain and cumin powder was procured in the local grocery market.

Methods:

Beetroot powder preparation (Fig. 1) :

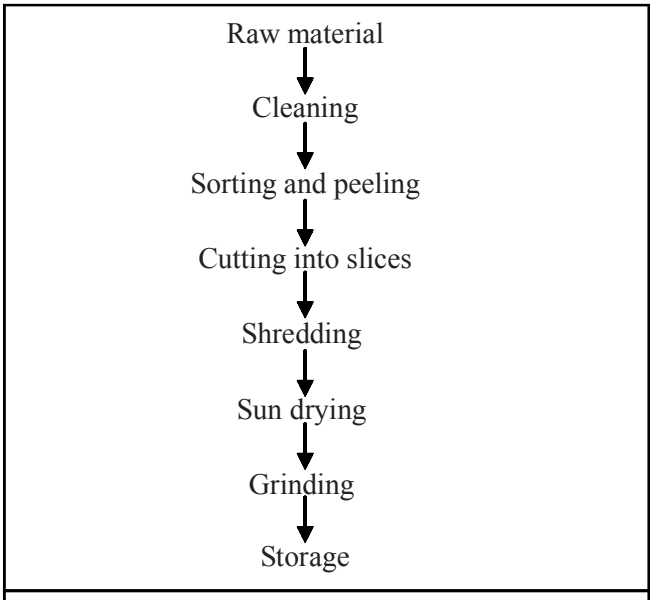

Fig. 1 : Flow diagram of preparation of Beetroot powder

Development of paratha incorporated with multigrain and beetroot powder:

Two different types of paratha premix are made coded as T_1 and T_2 prepared according to composition given in Table 1.

Table 1 : Composition of Standardize Method of Paratha premix

Sr. No.	Ingredients	Sample	
		T_1	T_2
1.	Sorghum Powder	30	35
2.	Finger millet	25	20
3.	Foxtail millet	20	25
4.	Beetroot Powder	10	15
5.	Red Chilli Powder	4	4
6.	Ajwain Power	1	1
7.	Salt	4	4
8.	Cumin powder	1	1

Preparation of gluten free multigrain and beetroot paratha premix:

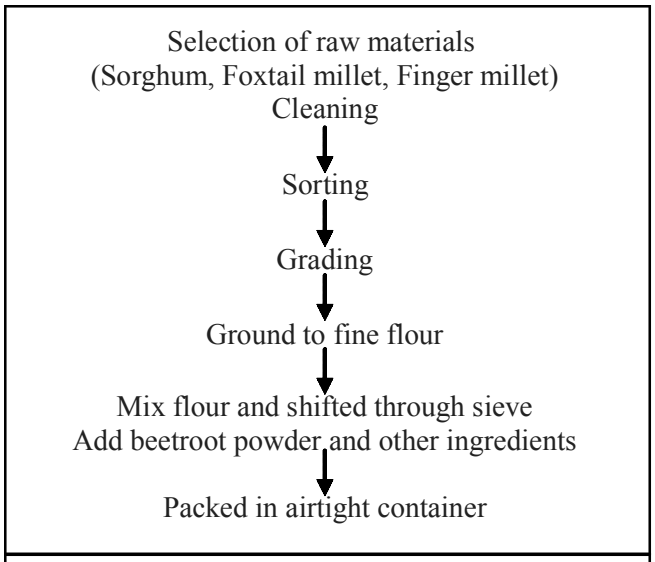

Fig. 2 : Process flow sheet of paratha premix

Preparation of paratha premix:

Beginning with the selection of raw materials (sorghum, foxtail millet, finger millet), the process involves thorough cleaning and sorting to remove any impurities. The raw materials are then graded according to quality standards. Next, they are ground into fine flour, ensuring a consistent texture. The flour is meticulously mixed and sifted through a sieve to achieve a smooth blend. Additional ingredients, such as beetroot powder, are incorporated to enhance flavor and nutrition. Finally, the finished product is carefully packed into airtight containers, ready to be distributed and enjoyed by consumers.

Proximate Analysis of Paratha premix:

Moisture content, protein content, fat content, ash content, total carbohydrate content, total energy was determined using procedures. The moisture content was determine using hot air oven method, Protein content was determine using the kjeldhal method, Fat is estimated by AOAC 950.54, and Ash content is determined by muffle furnace while Carbohydrate was by the difference method. Iron and calcium content was determined using standard method mentioned in Ranganna (2009).

Determination of Moisture content:

A small amount of the paratha premix sample was kept in a pre-weighed glass petri-dish and dried in hot air oven at 130ºC for 4 hours. Then the loss in weight was calculated as the percentage of moisture content (MC) of a sample.

$$MC\ (\%) = \frac{W_2 - W_1}{2W} \times 100$$

where, W= weight of the sample, a W_1= weight of sample along with dish after heating and W_2= weight of sample along with dish before heating.

Determination of Ash content:

The samples were weighed before and after burning at 600º for 4-6 hours and the loss in weight were calculated as a percentage of the ash content of sample.

$$Ash\ (\%) = x = \frac{\text{Weight of ash}}{\text{Weight of sample}} \times 100$$

Determination of protein content:

Protein estimation was done in kjeldhal digestion flask, with the kjeldhal method given by AOAC (1980).

Determination of fiber content:

Digest the fat-free sample in the H_2SO_4 and NaOH by 30 minutes washing each and allow the residue to dry at 105ºC overnight and final residue was burnt at 600ºC for 4 hours, The amount of fiber can be calculated as

$$\text{Crude fiber} = \frac{(W_2 - W_1) - (W_3 - W_1)}{W} \times 100$$

where, W= weight of the sample, the W_1= weight of empty crucible, W_2= weight of sample + weight of empty crucible and W_3= weight of the sample after ignition+ weight of empty crucible.

Determination of Fat content:

Dissolve sample in an organic solvent (petroleum ether) and make the double extraction so that maximum amount of fat can be extracted by removal of organic solvent at 60ºC in the oven. The final calculation of fat was done by the help of a formula as:

$$FAT\ (\%) = \frac{\text{Weight of extracted fat}}{\text{Weight of sample}} \times 100$$

Determination of Carbohydrate content:

The FDA requires that food manufacturers calculate total carbohydrates in their food with the following formula:

Total Carbohydrates =

Total Weight of Food Serving - (Weight of Crude Protein + Weight of Total Fat + Weight of Moisture + Weight of Ash).

Analysis of Iron content:

Sample was weighed and turned into ash. 2.0M HCL, 0.1M KSCN that is potassium thiocyanate was added and sample ash was washed and mixed well. Absorbance was taken at 458nm.

Analysis of Calcium:

Preparation of the standard solution (EDTA, sodium hydroxide, dilute HCL solution and dilute NaOH solution) and reagents (buffer solution, standard calcium solution) were prepared in the fixed proportions.

Sample titration: Sample was taken in the diluted form and add a buffer to maintain pH (approx 10). A pinch of erichrome black T (till red color appeared) and titrated with EDTA (till blue color appeared).

Sensory Evaluation:

The sensory evaluation of different organoleptic properties viz, colour, flavour, texture, and taste were carried out by a panel of 10 judges on the basis of Nine Point Hedonic Scale. The average score was calculated for individual organoleptic property. The overall acceptability of the product was taken as the average score of all these organoleptic properties (Davis Rotimi Jam, 2012).

RESULTS AND DISCUSSION

Proximate Analysis of Paratha Premix:

Proximate analysis of selected T_1 sample showed the following result as per the Table 2. The moisture content of Paratha was 4.23 %, the protein content was 11.0%, the carbohydrate content was found 68.98%, total fibre content was 6.51%, total fat content was 6.50%, and total ash content was 9.29%. total energy found was 378.42 kcal/100 g. among the minerals iron and calcium content was 5.5 and 74 mg per 100 gram of product, respectively.

Table 2 : Proximate analysis of paratha premix

Sr. No.	Parameter	Results
1.	Protein	11
2.	Carbohydrate	68.98
3.	Fats	6.50
4.	Moisture	4.23
5.	Fiber	6.51
6.	Ash	9.29
7.	Calcium (mg)	74
8.	Iron (mg)	5.5

Sensory Evaluation:

Sensory evaluation of prepared Paratha was done by 9 point hedonic scale, 10 semi trained panel members were employed for this sensory evaluation. The product was evaluated on the basis of colour, taste, texture, flavour, appearance and overall acceptability. Overall result were oberseved as sample T_1 has maximum score in each sensory attribute, so it selected for further study.

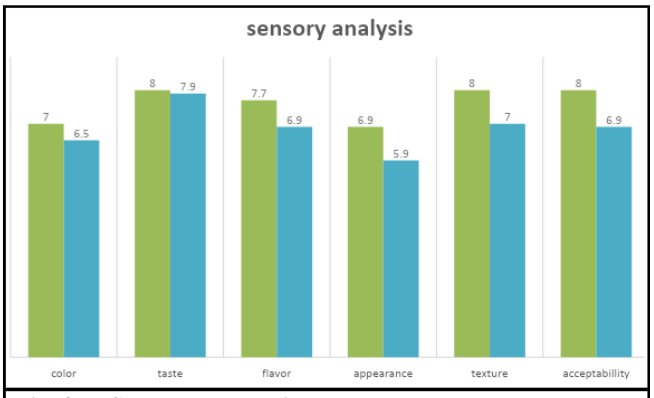

Fig. 3 : Sensory evaluation

Sample (T_1) **Sample (T_2)**

Table 3 : Sensory evaluation of Paratha premix

Sample	Color	Taste	Flavor	Appearance	Texture	Overall acceptability
T_1	7	8	7.7	6.9	8	8
T_2	6.5	7.9	6.9	5.9	7	6.9

Conclusion:

Obtaining raw materials for manufacture is the first step in the process. Sorting and cleaning guarantee quality and get rid of contaminants. Next, peel and either slice or shred, depending on your desired consistency. To maintain flavour and texture, the sliced or shred pieces are subsequently sun-dried. To get the right consistency, the materials are ground after they have dried Results obtained were satisfactory and the premix showed good quality characteristics on Moisture, Ash, Fat, Protein, carbohydrate, fiber and energy. The overall acceptability was found with T_1. "Development of gluten free multigrain and beetroot paratha premix" for proximate, sensory, physiochemical and microbial analysis. In which it shows high protein in sample T_1 (11), high fat content (6.85) in sample T_2, high carbohydrate (68.95) and fiber content (6.51) in T_1 sample as well. Furthermore, high energy found in sample T_1 (378.42), high ash content (9.35) in T_2, high moisture content (4.5) in T_2. From the present investigation it can be concluded that the bright red hue of beetroots is caused by high concentrations of betalains, a type of phenolic secondary plant metabolites. Beyond their usage as natural colouring agents, betalains are becoming more and more well-liked due to their possible health benefits, especially their anti-inflammatory and antioxidant characteristics. The addition of foxtail millet aids in the growth of bodily tissue, aids in energy metabolism, and improves kidney function.These gluten free multigrain beetroot paratha premix can be stored at room temperature up to 12weeks of manufacturing due to absence of bacteria, mould, yeast till the 12th week. and it is recommended as healthy food for all age persons

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