



Enrichment of bread with Bajra flour

B Mounika¹, NNandini², P Prashanth³, P Taslim⁴, Bhaskar V⁵

¹⁻⁵ Department of Food Technology, University College of Technology Osmania University, Hyderabad, Telangana, India

Abstract

Bajra is the second most important millet. It is also called as pearl millet. Pearl millet (*Pennisetum glaucum*) is the most widely grown type of millet. Bajra rich in fiber content, bajra is good for diabetics, keeping the glucose levels normal. (*Triticum* spp.) Whole foods, including whole wheat flour contain some of healthiest fats, carbohydrates and proteins, which are essential in lowering the risk of developing metabolic syndromes. Whole wheat flour has been associated with reversing the weight gain process. Yeast is suspended in water of about 110 degree f with sugar. Mixing of dough is one of the main factor essential to making good yeast-leavened products. The other two are time and fermentation. All three are of prime importance and must be properly co-ordinate. After the dough is mixed, it is set aside for a period of time to allow them to ferment. The area where the dough is put to ferment should be clean and free from odors with a temperature of 80 degree.. In the process of fermentation part of sugar is converted into a form that can be used as a food for yeast. Starches are converted into sugar that produces carbon dioxide gas and alcohol that causes dough to extend. After the dough has fermented it is necessary to divide the dough into pieces and to shape the pieces for panning. The dough is divided into uniform pieces of the desired weight. The seize of the loaves must be uniform. They must be of the same weight if they are to bake off uniformly. Rounding the dough for the intermediate proof by tucking in the raw edges of the piece and forming a round piece of dough. The intermediate proofing period is that period of time that the round piece of dough is allowed to rest between the time the dough is divided and rounded and the time even the piece of dough is formed for panning. This requires from 8 to 15 minutes, depending on the dough. The pieces of the dough are shaped so that they can rise in the pan and form a desirable shaped loaf of bread. The primary purpose of greasing the pan is to prevent the bread from sticking when it is removed. After shaping and panning, loaves should be placed on a properly controlled room or cabinet called the proof box or proof cabinet, for the final or pan proof. Temperature of the cabinet should be maintained at 98 degree f. the final stage in bread production is to place the pans of dough into an oven that is heated to a temperature of 215 degree c.or 425 degree f. The loaf should be cooled so that to it will not dry excessively.

Keywords: Enrichment, Bajra, flour, Pearl, widely

Introduction

The growing nutritional awareness coupled with the consumer's desire for a healthier life style has greatly impacted the evolution of many different products of bajra. Hence bajra bread is made with wheat flour and bajra flour with the proportions.

Production of Bajra

Bajra is the second most important millet. It is used as a regular meal in places like Rajasthan, Gujarat in India. It is also called as pearl millet. Pearl millet (*Pennisetum glaucum*) is the most widely grown type of millet. It has been grown in Africa and the Indian subcontinent since prehistoric times. The center of diversity, and suggested area of domestication, for the crop is in the Sahelzone of West Africa. Recent archaeobotanical research has confirmed the presence of domesticated pearl millet on the Sahel zone of northern Mali between 2500 and 2000 BC. Cultivation subsequently spread and moved overseas to India. The earliest archaeological records in India date to around 2000 BC, and it spread rapidly through India reaching South India by 1500 BC, based on evidence from

the site of Hallur. Cultivation also spread throughout eastern and southern parts of Africa.

Health Binifits of Bajra flour

Bajra has some medicinal properties when bread is heated with honey in the morning.

- It is especially effective for bleeding of piles, epilepsy insomnia, high blood pressure, diabetes and tuberculosis.
- It is highly effective and recommended for service constipation and stomach ulcers.
- This presence of phytic acid and niacin in bajra helps in lowering the cholesterol.
- Bajra rich in fiber content, bajra is good for diabetics, keeping the glucose levels normal.
- This whole grain supports weight loss as the high fiber content leads to feeling of fullness for a long period of time.
- It is helpful in maintaining cardiovascular health and in acidity problems.

Nutritional value for Bajra

Table 1

Pearl Millet	
Nutritional value per 100 g (3.5 oz.)	
Energy	1,470 kJ (351 kcal)
Carbohydrates	75 g
Dietary fiber	6.0 g
Fat	3.3 g
Protein	10.6 g
Minerals	2.3 g
Iron	16.9 mg
Calcium	35 mg

Production of Wheat flour

(Triticum spp.) Is a cereal grain, originally from the Lavent region of the Near East but now cultivated worldwide. In 2013, world production of wheat was 713 million tons, making it the third most produced cereal after maize (1,016 million tons) and rice (745 million tons). Wheat was the second most produced cereal in 2009; World production in the year was 682 million tons, after maize (817 million tons), and with rice as a close third (679 million tons).

Health benefits of refined wheat flour

- Whole foods, including whole wheat flour contain some of the healthiest fats, carbohydrates and proteins, which are essential in lowering the risk of developing metabolic syndromes.
- Whole wheat flour has been associated with reversing the weight gain process. The consumption of higher fiber foods helps in boosting the metabolic rate and thus, contributes to keeping the body weight under control.
- Consuming whole wheat flour in foods has been proven to protect the body against the risk of insulin resistance, which can otherwise lead to visceral obesity, low levels of protective HDL cholesterol, high triglycerides and high blood pressure. These are sufficient protections against cardiovascular problems.
- Enriched with magnesium, whole wheat flour is linked to lowering the risk of type 2 diabetes. Daily consumption of these foods has shown a decline in the increasing blood sugar, by about 19%.
- People who consume a diet with high amounts of betaine and choline are likely to have lesser chances of acquiring chronic inflammation by almost 20%. This in turn lowers medical conditions such as heart disease, osteoporosis, cognitive decline and Alzheimer's disease.
- Whole wheat flour is an excellent source of insoluble fiber which is vital for preventing the formation of gallstones, especially in women, by speeding up the intestinal transit time and reducing the secretion of bile acids. Excessive amounts of bile acids can lead to gallstone formation.

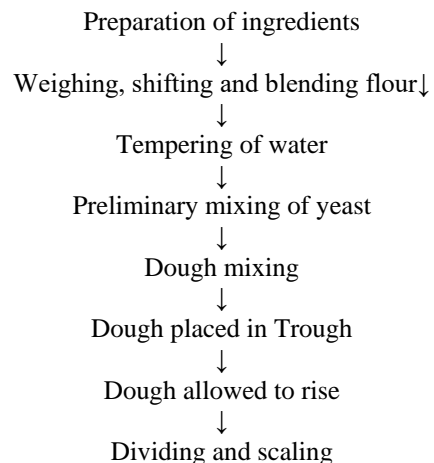
Materials and Methods

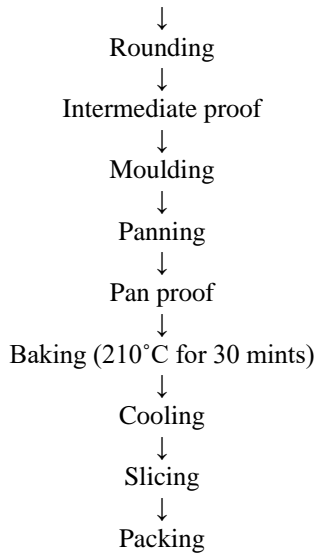
Raw Materials

1. Bajra flour: Bajra grains are milled into flour and take the proportion with wheat flour it contains the nutrition values. The nutrition values are calculated by using different methods.

- 2. Wheat flour:** Wheat flour is added in the form of refined wheat flour i.e., maida and its taken as same as the proportions with bajra flour (ex: proportions like bajra flour 50%, wheat flour 50%, bajra flour 60%, wheat flour 40%, bajra flour 40%, wheat flour 60%). wheat flour contains gluten it helps in the formation bread.
- 3. Water:** Water like any other common ingredient of bakery products must be uniform in order to obtain uniform results in the products. The water supply contains hardness and pH. Water has several functions in bread making and it makes possible the formation of gluten.
- 4. Dried yeast:** The function of yeast in bread making is to lighten the dough and impart to it a characteristic aroma and flavour. This has been the function of yeast for centuries and remains so even through its activities have been improved over a period of time through scientific modifications in its manufacture and a broader understanding of bread making methods. Yeast undergoes fermentation.
- 5. Sugar:** Sugar is used as the flavour enhancer and it is also act as a preservative. It is added in crystal form.
- 6. Salt:** Salt is used as the flavour enhancer. And is also acts as a preservative. In bread making salt is mainly added for taste. It brings out the taste of other ingredients, and improves the flavour and characteristic of bread without salt the dough are wetty. It therefore improves, gain and texture of loaf by strengthening of dough, thus indirectly helping colour, gain colour and texture.

Flowchart for preparation of bread





1: Flow chart for production of Bread from bajra flour

Procedure

Combining the ingredients

The special points in mixing bread dough are:

1. Yeast is suspended in water of about 110 degree f with sugar:
2. The shortening should be held back for couple of minutes until the flour becomes wet.

Mixing of dough is one of the main factors essential to making good yeast-leavened products. The other two are time and fermentation. All three are of prime importance and must be properly co-ordinate.

Fermentation Period

After the dough is mixed, it is set aside for a period of time to allow them to ferment. The area where the dough is put to ferment, should be clean and free from odors with a temperature of 80 degree f

Several changes takes place during within the dough during fermentation period which cause the dough to produce good bread if the dough is handled properly for the rest of the process. In the process of fermentation part of sugar is converted into a form that can be used as a food for yeast. Starches are converted into sugar that produces carbon dioxide gas and alcohol that causes dough to extend. The enzyme protease causes the gluten to soft and capable for stretching. As dough ferments, acidity will develops in dough it also helps to stretch out.



Fig 1

Rounding The Dough: Rounding the dough for the intermediate proof by tucking in the raw edges of the piece and forming a round piece of dough.

Intermediate Proof: The intermediate proofing period is that period of time that the round piece of dough is allowed to rest between the time the dough is divided and rounded

and the time even the piece of dough is formed for panning. This requires from 8 to 15 minutes, depending on the dough.

Molding and Panning: the pieces of the dough are shaped so that they can rise in the pan and form a desirable shaped loaf of bread. Bread pans should be greased sufficiently to prevent the loaf from sticking but should not be excessively greasy. The loaf should be in the center of the pan.

Pan Greasing: the primary purpose of greasing the pan is to prevent the bread from sticking when it is removed.

Pan Proofing the Loaves: after shaping and panning, loaves should be placed on a properly controlled room or cabinet called the proof box or proof cabinet, for the final or pan proof. Temperature of the cabinet should be maintained at 98 degree f. and the relative humidity at 88 percent. During pan proofing the action of the yeast is speeded up by higher temperature and the gluten becomes more mellow and more extensible. To determine whether the loaf is properly proofed, touch the loaf lightly with one finger-tip and press in slightly. if the impression made by the tip of the finger remains, the loaf is proofed ; if the imprint does not remain and fills out when the fingertip is removed the loaf is still too tight and compact and should be proofed more. Usually 60 or 65 minutes time is sufficient.

Baking: The final stage in bread production is to place the pans of dough into an oven that is heated to a temperature of 215 degree c.or 425 degree f. The oven temperature also vaporizes moisture on the surface of the bread and ultimately causes caramelization of the sugars, starches, and other ingredients that make up the exposed dough surfaces. And the time required for baking is 40 minutes.

Cooling: The loaf should be cooled so that to it will not dry excessively. Conditions which cause this excessive drying are that the air is too dry warm in The cooling room or their

Table 2: Fomulation of refined wheat flour and bajraflour

Ingridients (%)	Control	Sample A	Sample B	Sample C
Refined wheat flour	100	90	85	80
BAJRA flour	0	5	7.5	10
Water	65	65	65	65
Yeast	2	2	2	2
Salt	2	2	2	2
Sugar	6	6	6	6

Organoleptic Evaluation Of Bajra Bread

Sensory evaluation offers the opportunity to obtain a complete analysis of the various properties of food as perceived by human sense. Sensory evaluation is an important and best method for evaluating new products developed which provide quality measure and production control.

Sensory Evaluation

Sensory evaluation – A scientific discipline used to evoke, measure, anlyse and interpret reactions to those characteristics of foods an materials as they are perceived by the sense of sight, smell, taste, touch and hearing. Sensory evaluation was one of the earliest methods of quality control and it its sill widely used in industry. However, the level of application depends on the situation. Sensory judgment is expressed by the components like stickiness, firmness and bulkiness. Here, the acceptability of the treatments was evaluated by a panel of 20 members. They assigned scores for appearance, taste, flavor, texture, colour, mouth feel, after taste. The overall quality score was taken as the

combined score of the above attributes.

Sensory evaluation standards are instrumental in the assessment of consumer products by the use of the human senses (sight, smell, taste, touch and hearing). The discipline of sensory analysis requires the use of a panel of human evaluators, where in test results are recorded based on their responses to the products under test. Statistical analysis is then employed to generate inferences and insights regarding the product. These sensory evaluation standards help consumer goods developers and manufactures in the evaluation of their goods to ensure product quality, consumer satisfaction and marketing success.

Hedonic rating test

The samples prepared were sensory evaluated to determine the color, flavor, texture, taste, after taste and overall acceptability of the product. The samples were analyzed by panelists 20 in number for the all the parameters stated above. Sensory evaluation is mainly useful to know if the product reached al the properties of control sample in sensory angle. And it useful to know up to what extent the product satisfied the consumer and what are the benefits and what are the draw backs and to know the comments of the panelists. The samples are evaluated on a 9 point scale using hedonic rating method. Each product is evaluated and given a score by the panelists on the 9 point scale for each parameter for each sample. The scores of all the samples of all the 20 members are taken a mean score and tabulated below. By analyzing this table we can find out which sample is good both in nutritional and sensory angle. According to the above table and the scale we can assess which sample is most accepted by the consumers

the people use bread as breakfast food. Bajra contain lot of nutrients. Bajra bread is easily digested. It is most useful for women’s especially for pregnant ladies.

Results and Discussions

Table 3: The results of the proximate analysis of Bajra bread

Parameters	Control	Sample A	Sample B	Sample C
Moisture (%)				
Crust	22.4	24.6	26.6	27.4
Crumb	26.2	28.7	30.58	33.2
Protein (%)	11	11.03	11.045	11.06
Fat (%)	1.92	1.05	1.207	1.31
Ash (%)	0.19	0.24	0.43	0.37
Acid Insoluble ash (%)	1.09	1.52	2.98	3
Iron (mg)	2.7	2.965	3.097	3.231
Calcium (mg)	23	23.95	24.425	24.902
Phosphorus (mg)	0.305	0.432	0.447	0.450
Crude fiber	0.3	0.345	0.367	0.390

Table 4

Sample	Appearance	Color	Texture	Flavour	Taste	Mouth feel	After taste
Control	0.85	1.5 2	1.6	1.8	1.8	1.8	2
Sample A	2.5	2.4 2.3	2.3	2.7	2.4	2.5	2.4
Sample B	1.8	1.9 2	1.8	2.2	2.2	2	2.1
Sample C	2.3	2.8 3	3	2.8	2.7	3	2.8

Sample c is superior than the other samples.

Conclusion

The bajra bread contain high amount of iron and dietary fiber. Iron is essential nutrient for human consumption. A lack of iron content may results in development of anemia. Fiber is good for diabetics. Bread is a staple food most of