



## Studies on development and standardization of multigrain Bhakarwadi

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### Abstract

The multigrain Bhakarwadi was prepared as a nutritional point of view. The studies on development and standardization of multigrain Bhakarwadi was successfully done and evaluated for proximate analysis and storage study. The Sorghum, Pearl millet and Ragi are a staple food for majority of the population in some parts of India and other developing countries. Sorghum, Pearl millet and Ragi Contain carbohydrate, calcium, Phosphorous and iron. The work has been carried out to preparation of multigrain Bhakarwadi i.e. (T1)10:10:5, (T2)15:5:5, (T3)5:15:5 is Sorghum, Pearl millet and Ragi flour respectively. Multigrain Bhakarwadi formulation T2 was most acceptable than other treatments. The preparations of Bhakarwadi includes mixing of multigrain flour then make a dough than make a chapatti and spread spices stuff (masala) and roll the chapatti, cut into small pieces and fry in oil. Proximate composition of multigrain Bhakarwadi was Carbohydrate (34.6%), Protein (8.7%), Fat (29%), Moisture (21.7%), Ash (2.4%) and Energy (434.2 Kcal) were best among all the levels. Multigrain Bhakarwadi prepared recorded highest score in all the quality attributes and good storage stability. It was concluded that the multigrain Bhakarwadi can be stored for four months in High Density Poly Ethylene (HDPE) pouches at room temperature. So multigrain Bhakarwadi can satisfy the needs of consumer such as quality.

**Keywords:** Multigrain, formulation, Bhakarwadi, proximate analysis, packaging material, storage study

### Introduction

Bhakarwadi is developed as a snack which can be stored for weeks. The flour based round disks are stuffed with roasted poppy seeds, coconut and deep fried to a crispy finish. There are mainly two types of Bhakarwadi, Maharashtra Bhakarwadi of Pune and Gujarati Bhakarwadi of Vadodara. It is popular addition on the Farsan Menu, adding crunch and a warming, sweetness to the menu (Sengupta and Shah, 2016) [12].

Millet having scientific name (*Pennisetum glaucum*) belonging to family (*Poaceae*). It is small seeded and is known as coarse Cereal. Millet is widely grown in the semiarid tropics of Africa and Asia. It constitutes a major source of Carbohydrates (63.8%) and Proteins (12.5%), it has Moisture (12%), Fat (3.5%), crude fiber (5.2%), Minerals (3.1%), and provides energy about 364 kcal. It also contains Calcium (8 mg), Iron (2.9 mg), Thiamin (0.41 mg), Riboflavin (0.28 mg), Niacin (4.5 mg). (Saleh, *et al* 2013). Millets are rich in Phytochemicals, including phytic acid which is believed to lower cholesterol, and phytate, which is associated with reduced cancer risk. (Amadou and Mahamadou (2013) [11]. Millets may also contain toxicants such as- Micotoxins including a) Aflatoxin B1; b) Ochratoxin A; c) FumonisinB1; d) Deoxynivalenol; e) Zearalenon; (Thielecke and Nugent, 2018) [14].

Sorghum having Scientific name (*Sorghum bicolor* L.) and family (*Poaceae*). Sorghum is one of the most important Staple Food grain grown mostly in the semi-arid tropics of Asia, Africa, America and Australia. Drought tolerance makes Sorghum especially important in dry regions. (Kumar *et al*, 2011) [6]. Sorghum acts as a principal source of Energy, Proteins, Vitamins and Minerals. It consists of Moisture (7.3%), Minerals (1.8%), Protein (13.4%), Fat

(3.1%), Fiber (2.1%), and Carbohydrates (72.4%). (Awadelkareem *et al*, 2015). It contains Phytochemicals like Tannins (194.50-995.72 mg/g), Phenolic (16.63-102.82mg/g) and Flavonoids (0.20-0.36) (Abugri *et al*, 2006). In Sorghum, there are Toxicants such as Trypsin Inhibitor, Phytic acid, Tannins, Polyphenols were present (Idris *et al*, 2005) [3].

Ragi is common name of finger Millet (*Eleusine coracana* L.) in India. It is cultivated broadly in major parts of India and Africa. Finger Millet is a subtropical and tropical grain which can withstand in drought and high temperature environment. Finger Millet is used as poor man's crop due to its elongated sustainable strength as it could be kept securely for a number of years devoid of any insect and pest infestation. (Rathore *et al*. 2019) [9]. It is belongs to *Poaceae* family. Ragi or Finger Millet has a polygonal rhombic shape. It is small in size varying diameter from 1-2 mm. Finger Millet have a deep brown to shades ranging from red to almost black. (Shobana *et al*. 2013) [13]. Finger Millet is one of the rich sources of nutrient compared to other cereal crop. It contain moisture content about (12%), Dietary fiber (18%), Protein (9.8%), Carbohydrate (81.5%), Starch (65-75%), Fat (1-1.7%), Minerals (2.7%), and Crude fiber (4.3%) that equivalent to other millets and cereals. It is also rich source of Calcium (344 mg), Phosphorous (2283 mg), Iron (3.9 g) Vitamin B and Vitamin E and other Micronutrient. It contains Anti-nutritional factor such as Tannins (0.04-3.47%), Phytate (0.48%), Oxalate (0.36%) and Polyphenols (Rathore *et al*. 2019) [9].

Bhakarwadi is the snacks product. Generally it is prepared by whole wheat flour and Bengal gram flour. We prepare Bhakarwadi by mixing the multigrain flour as they provide the significant amount of Carbohydrates. They also provide

Minerals like Calcium and Iron. This mixture of multigrain will provide the higher Energy value with more nutrients to the consumers.

**Material & Methods**

**Procurement of Raw Material**

Raw materials required during present investigation were procured from local market such as Sorghum, Pearl millet, Ragi, Bengal gram flour, salt, sugar, Ajwain, Coriander seeds, Fennel seeds, Cumin seeds, Sesame seeds, Poppy seeds, dry shredded coconut, tamarind pulp Jaggery, Garam masala, red chilli powder and edible oil etc. Most of the chemicals and equipments used in this investigation were of analytical grade which are obtained from College of Food Technology Saralgaon, Thane.

**Physical Properties of multigrain Bhakarwadi**

The colour of multigrain Bhakarwadi was determined by visual observations, the length, breadth and width of multigrain Bhakarwadi was measured by vernier calliper. The weight of multigrain Bhakarwadi was measured on analytical weighing balance.

**Chemical Properties of multigrain Bhakarwadi**

Proximate composition such as moisture, ash, crude fat, crude protein and crude fibre of all the Ingredients and multigrain Bhakarwadi was determined according to the procedures given in AOAC (2000). For moisture determination samples were dried in oven at 130°C for 60 minutes. For ash determination samples were placed in muffled furnace at 550°C to burn out all carbon compounds leaving in organic part (ash). Fat was determined by fat extraction unit by using n. Hexane. For fibre determination, samples were treated with 1.25% Sulphuric acid and Sodium Hydroxide solution. After filtration of digested material it was washed with hot water and then ignited. By calculating loss of weight after ignition, crude fibre contents were determined. Protein contents were determined by using Kjeldahl’s unit.

**Sensory Evaluation of multigrain Bhakarwadi**

Prepared product were evaluated for sensory characteristics in terms of appearance, color, flavor, aftertaste, texture and overall acceptability by 10 semi-trained panel members comprised of academic staff members using 9- point Hedonic scale. Judgments were made through rating the product on a 9 point Hedonic scale with corresponding descriptive terms ranging from 9 ‘like extremely’ to 1 ‘dislike extremely’. The obtained results were recorded in sensory score card.

**Statistical Analysis**

The analysis of variance of the data obtained was done by using completely randomized design (CRD) for different treatments as per the method given by Panse and Sukhatme (1967). The analysis of variance revealed at significance of p<0.005 level S.E and C.D. at 5 percent level is mentioned wherever required.

**Preparation of multigrain flour for preparation of Bhakarwadi**

Sorghum, Pearl millet and Ragi were cleaned properly then Sorghum, Pearl millet and Ragi was grinded in household flour mill. The flours were sieved through of BS 100mm-

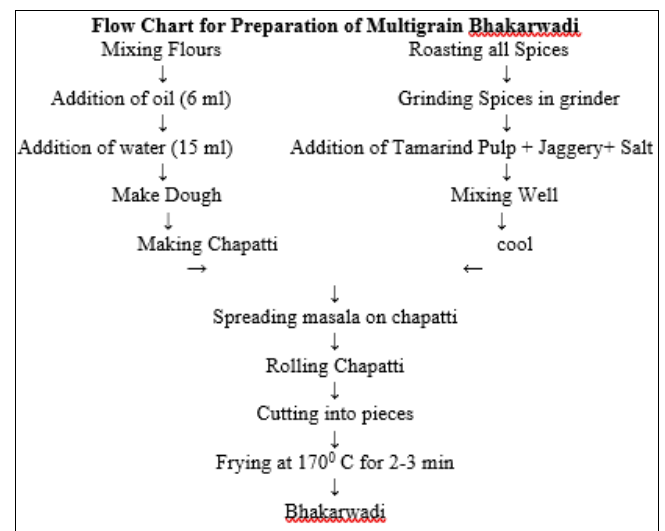
Mesh size. All the flours were stored in air tight containers for further use.

**Formulation of Multigrain Bhakarwadi**

Multigrain Bhakarwadi prepared with incorporation varying levels of Sorghum flour, Pearl Millet flour and Ragi flour were investigated. The formulation was made by varying levels of Sorghum flour, Pearl Millet flour and Ragi flour viz., 00:00:00, 10:10:5, 15:5:5 and 5:15:5 percent respectively and data were illustrated. T2 was selected on the basis of sensory evaluations which show high score for Colour, Taste and Appearance.

**Table 1:** Formulation for preparation of Multi Grain Bhakarwadi

Ingredients	Treatments (in gm)			
	T0	T1	T2	T3
Refined Wheat Flour	25	00	00	00
Sorghum	00	10	15	5
Millet	00	10	5	15
Ragi	00	5	5	5
Bengal gram flour	15	10	10	10
Edible Oil	5	6	6	6
Salt	2	2	2	2
Ajwain	2	2	2	2
Coriander Seeds	4	4	4	4
Fennel Seeds	3	3	3	3
Cumin Seeds	3	3	3	3
Sesame Seeds	5	4	4	4
Poppy Seeds	8	8	8	8
Dry Shredded Coconut	18	23	23	23
Red Chilli Powder	2	2	2	2
Garam Masala	1	1	1	1
Sugar	5	5	5	5
Tamarind Jaggery Chutney	2	2	2	2



**Result and Discussion**

**Physical properties and Chemical properties of Multigrain Bhakarwadi**

**Table 2:** Physical properties of Multigrain Bhakarwadi

Parameter	Observation
Colour	Brown
Shape	Oval
Weight	8 gm
Dimension	3cm×2cm×1cm

Physical properties of multigrain Bhakarwadi done. Colour and shape done by Visual observation brown colour observed and oval shape detected. Weight of multigrain Bhakarwadi was 3gm done by digital weighting balance. The dimension of multigrain Bhakarwadi was 3cm×2cm×1cm analysed by Vernier calliper. The product was very crunchy as looking very tempting and taste was super, it was accepted by many consumers.

**Table 3:** Chemical properties of Multigrain Bhakarwadi

Chemical Parameter	Selected Sample
Ash	2.4%
Moisture	21.7%
Fat	29%
Protein	8.7%
Carbohydrate	34.6%
Energy	434.2 kcal

Chemical properties of Multigrain Bhakarwadi tabulated in above. Carbohydrates 34.6%, moisture 21.7%, fat content 29 %, protein content 8.7%, Ash 2.4% and Energy values was found to be 434.2 kcal respectively.

### Sensory Evaluation Result

**Table 4:** Sensory Evaluation of Multi Grain Bhakarwadi

	T0	T1	T2	T3
Colour	8	7.5	8.5	8
Flavour	7.5	8	8	7.5
Taste	8	7.5	8.5	7.5
Texture	7.5	7.5	8	7
Appearance	8	7.5	8.5	7
Overall Acceptability	7	7.5	9	7

The color of T2 sample as per table is 8.5 point while sample T0 (8), T1 (7.5), T3 (8). The flavour of sample T2 was acceptable with 8 point while samples T0 (7.5), T1 (8), T3 (7.5). The taste of sample T2 was selected by 8.5 points while other samples points are T0 (8), T1 (7.5), T3 (7.5). The texture of sample T2 was selected by 8 points while other samples points are T0 (7.5), T1 (7.5), T3 (7). The appearance of sample T2 was selected by 8.5 points while other samples T0 (8), T1 (7.5), T3 (7). The overall acceptability of sample T2 was selected by 9 points while other samples points are T0 (7), T1 (7.5), T3 (7). According to above table sample T2 more acceptable than other sample and more acceptable to consumer satisfaction.

### Conclusion

In the present study finally it is concluded that Multi Grain Bhakarwadi prepared from different Variations of multigrain Sorghum, Pearl millet and Ragi has high Nutrition quality and also its is rich in Protein, carbohydrates and some vital minerals such as calcium and iron in proper amount and has great health benefits. The present investigation carried out for information of multi grain Bhakarwadi in which T2 sample found more superior than sample T1 and T3 so, T2 sample is more acceptable on its sensory attributes.

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