International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(5): 800-804

Received: 06-07-2019
Accepted: 10-08-2019

Ibadahun L Nongrang
Warner College of Dairy Technology, Sam Higginbottom, University of Agriculture, Technology and Science, Prayagraj, Uttar Pradesh, India

SN Thakur
Warner College of Dairy Technology, Sam Higginbottom, University of Agriculture, Technology and Science, Prayagraj, Uttar Pradesh, India

Correspondence
SN Thakur
Warner College of Dairy Technology, Sam Higginbottom, University of Agriculture, Technology and Science, Prayagraj, Uttar Pradesh, India

Studies on the nutritional and chemical quality of bun incorporated with wheat flour and sorghum flour

Ibadahun L Nongrang and SN Thakur

Abstract
The study was conducted to develop bun with the incorporation of different levels of wheat flour and sorghum flour. Quality was evaluated on parameters such as carbohydrates, protein, fat, ash, moisture and total solids. The bun was prepared by adding 100% wheat flour for control (T_0), T_1 was prepared by adding 80% of wheat flour and 20% sorghum flour, T_2 was prepared by adding 70% wheat flour and 30% sorghum flour, T_3 was prepared by adding 60% wheat flour and 40% sorghum flour and T_4 was prepared by adding 50% wheat flour and 50% sorghum flour.

Keywords: sorghum flour, wheat flour, quality

Introduction
Bakery industry in India is considered as one of the major industries in food processing. Baking products are gaining popularity as processed foods because of their availability, ready to eat convenience and reasonably good shelf life. Wheat based baked products like bread, cookies, and cakes are popular among the baked products.

Sorghum is consumed in various forms around the world like baked bread, porridge, tortillas, couscous, gruel, steam-cooked products, alcoholic and non-alcoholic beverages etc. The potential food and industrial applications of sorghum have been reported (Brannan *et al*., 2001; Obizoba, 1988) [4, 19]. It has the potential to be processed into starch, flour, grits and flakes and used to produce a wide range of industrial products. It can also be malted and processed into malted foods, beverages and beer. On account of its nutritional significance, easy adaptability to a wide range of growing conditions, lesser water requirements, sorghum has the potential to be incorporated in the diets of human populations around the world, more specifically to those intolerant to wheat. In India, most of the sorghum produced is consumed in the form of 'roti' which is unleavened, flat bread. It has been estimatedthat nearly 70% of the total sorghum produced in India is consumed in the form of roti (Murty and Subramanian, 1981) [17]. It forms the staple diet and source of nutrition for the farming communities and agricultural labourers in India

At present bread and buns are prepared from white flour which is low in fibre content. For this reason interest in research has arisen in increasing fibre content in diet. Baked products have proved to be acceptable carriers of fibre from various sources (Brockmole and Zabik, 1976).

Bread is one of the most widely consumed food product in the world and bread making technology is probably one of the oldest technology known (Selomulyo and Zhou, 2007). It is an important staple food for many countries. The product is basically made of hard wheat flour, yeast, fat, sugar, salt and water (Badifu *et al*., 2005).

Sorghum, an ancient cereal grain that's a staple crop in India and throughout Africa, has long been considered a safe grain alternative for people with celiac disease and gluten insensitivity. New molecular evidence confirms that sorghum is completely gluten-free, and reports that the grain provides health benefits that make it a worthy addition to any diet.

Gluten is the flexible protein in common grains like wheat, barley and rye that give them a chewy, springy quality when baked into breads or pastas. Gluten triggers inflammatory reactions in people with celiac disease or gluten sensitivity that can cause abdominal pain and digestive issues, and eventually lead to joint pain and intestinal damage. For now, the only way to avoid gluten intolerance is to stick to a strict gluten-free diet.

They also find a variety of other sorghum health benefits, even for people without glute

intolerance. Sorghum has high nutritional value, with high levels of unsaturated fats, protein, fibre, and minerals like phosphorus, potassium, calcium, and iron. It also has more antioxidants than blueberries and pomegranates.

Recent research suggests that certain phytochemicals allow sorghum consumption to reduce the risk of colon and skin cancer more than other grains, and that other properties can promote cardiovascular health and lower cholesterol.

Certain sorghum varieties are more easily digestible than others, and American farmers have started to cultivate varieties that they call "food-grade" sorghum- the grain has historically been grown only for livestock feed in the United States.

Still sorghum is the fifth-most produced grain in the world, behind wheat, corn, rice, and barley. In the United States, only wheat and corn are produced in higher quantities. The grain is considered cheap and easy to grow, since it is drought-resistant, grows in dry climates, and requires less water than wheat.

Sorghum's status as an alternative grain for people with gluten intolerance has made it more available as human food in the United States and Pontieri's team suggests that its high nutritional value and other health benefits recommend it as a replacement for rice or corn among the general population as well.

Materials and Methods

The experimental work was carried out in the food laboratory of department of Dairy Technology, Warner college of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj. Wheat flour, butter, sugar, salt, and skim milk powder were procured from a local market of Allahabad whereas, Sorghum flour was procured from a local market of Hyderabad.

Treatments combination of bun

Bun was prepared by blending different levels of wheat flour and sorghum flour in the following levels:

T_0- Bun was prepared by blending of wheat flour

T_1- Bun was prepared by blending 80% of wheat flour with 20% of sorghum flour

T_2- Bun was prepared by blending 70% of wheat flour with 30% of sorghum flour

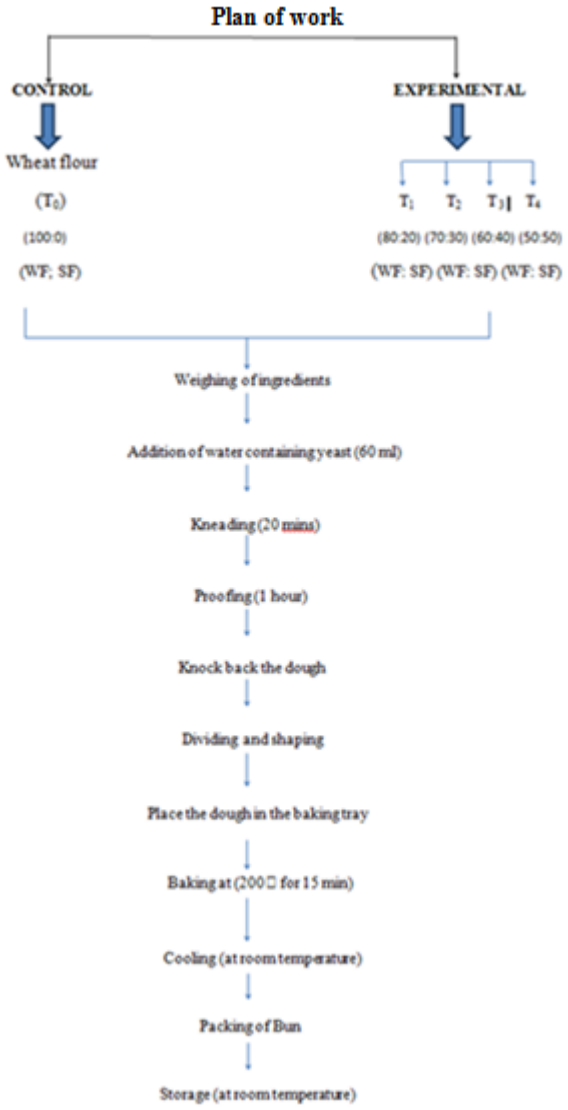
T_3- Bun was prepared by blending 60% of wheat flour with 40% of sorghum flour

T_4- Bun was prepared by blending 50% of wheat flour with 50 % of sorghum flour

In order to prepare bun wheat flour and sorghum flour was taken as per levels and all ingredients were mixed together and dough was prepared. Therefore the dough was kept for proofing for 1 hour and then the dough was kept in baking oven for 200℃ for 15 min and then the prepared bun was cooled and stored at room temperature.

Schematic diagram for preparation of bun

Flow diagram for manufacturing of bun by using wheat flour and sorghum flour



Results and Discussion

The present study ‘Studies on the nutritional and chemical quality of bun incorporated with wheat flour and sorghum flour’. The data collected on different aspects were tabulated and analysed statistically using the methods of variance and critical difference. The significant and non-significant differences observed have been analysed critically within and between the treatment combinations The results obtained from the analysis are presented in this chapter under the following headings.

Physio-chemical characteristics

From the table 1 it can observed that the highest value of carbohydrate was found to be in T_4 (67.22) containing 50%wheat flour and 50% sorghum flour lowest value of carbohydrate was found to be in T_0 (61.10) containing 100% wheat flour. It was also observed that protein percentage in T_0 (13.25) was highest containing 100% wheat flour and lowest protein was found to be in T_4 (12.20). Highest fat percentage was found in T_4 (6.45) containing 50% of wheat flour and 50% sorghum flour this increase in fat is due to addition of butter, highest percentage of ash was observed in T_4 (1.33) and lowest percentage of ash was observed in T_0 (1.00), highest percentage of moisture was observed in T_0 (19.05) containing 100% of wheat flour and lowest percentage was observed in T_4 (12.81) containing 50% of wheat flour and 50% of sorghum flour. The highest percentage of total solids

was observed in T_4 (87.19) containing 50% of wheat flour and 50% of sorghum flour whereas, the lowest percentage of total solids was recorded in T_0 (80.95) containing 100% of wheat flour.

Table 1: Physiochemical parameters of bun

Parameter	Treatment (Mean Value)				
	T0	T1	T2	T3	T4
1. Physiochemical Analysis					
Carbohydrate %	61.10	63.46	64.72	65.96	67.22
Fat %	5.60	5.94	6.11	6.28	6.45
Protein%	13.25	12.84	12.62	12.41	12.20
Ash %	1.00	1.03	1.14	1.23	1..33
Moisture%	19.05	16.75	15.42	14.12	12.81
Total Solids%	80.95	83.25	84.58	85.88	87.19

Carbohydrate percent of bun

Carbohydrate percentage in bun samples of different treatment and control, the highest mean carbohydrate percentage was recorded in the sample T_4 (67.22) followed by T_3 (65.96), T_2 (64.72), T_1 (63.46), T_0 (61.10).

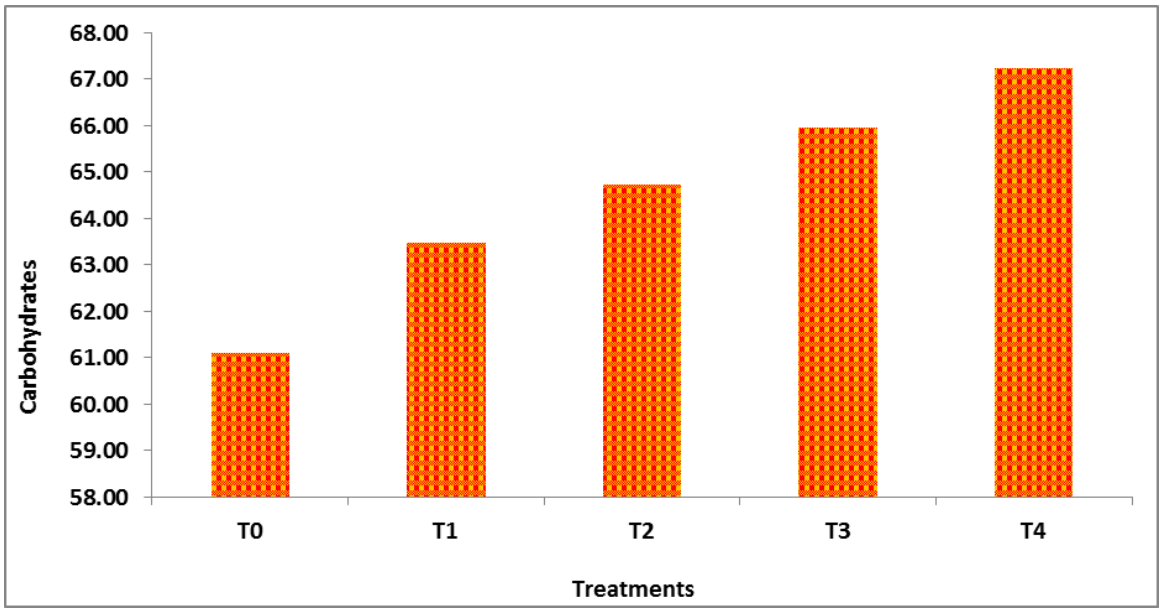


Fig 1: Carbohydrate content of bun

Protein percent of bun

Protein percentage in bun samples of different treatment and control, the highest mean protein percentage was recorded in the sample of T_0 (13.25) followed by T_1 (12.84), T_2 (12.62), T_3 (12.41), T_4 (12.20).

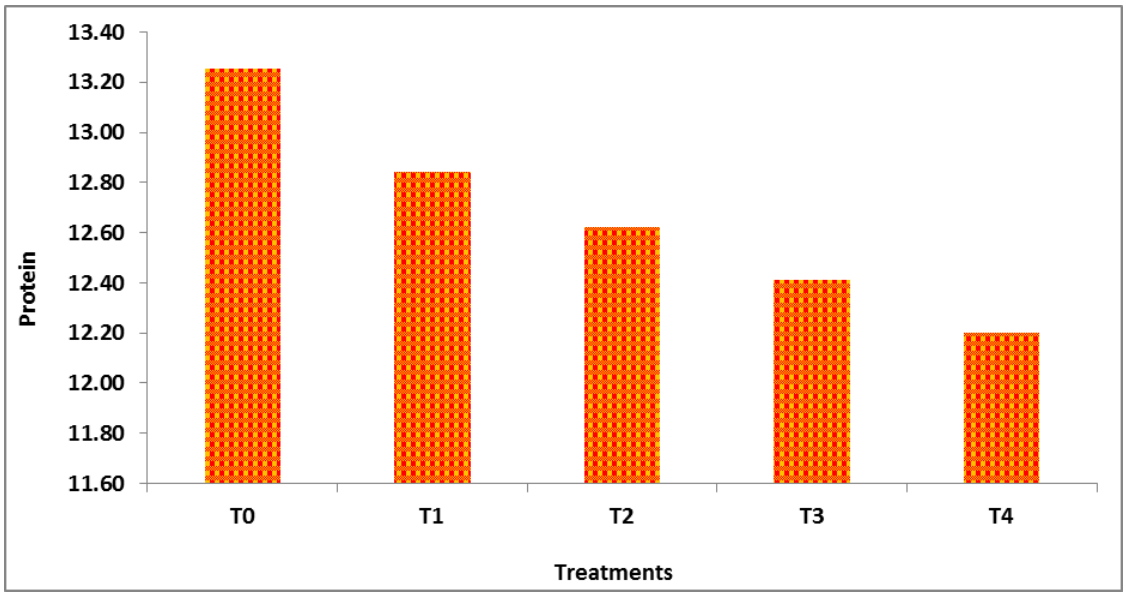


Fig 2: Protein content of bun

Fat percent of bun: Fat percentage in bun samples of different treatment and control, the highest mean moisture percentage was recorded in the sample ofT_4 (6.45) followed by T_3 (6.28), T_2 (6.11), $T_0$1 (5.94), T_0 (5.60).

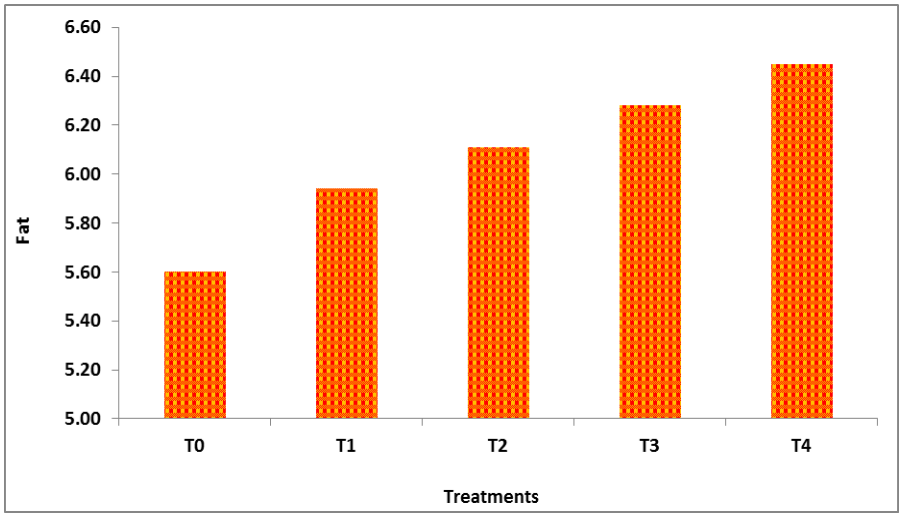


Fig 3: Fat content of bun

Ash percent of bun

Ash percentage in bun samples of different treatment and control, the highest mean ash percentage was recorded in the sample of T_4 (1.33) followed by T_3 (1.23), T_2 (1.14), T_1 (1.03), T_0 (1.00).

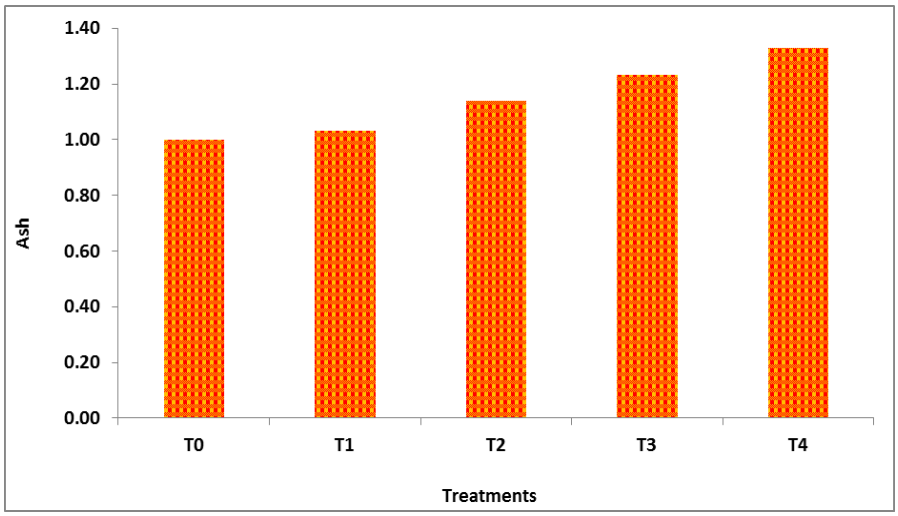


Fig 4: Ash content of bun

Moisture percent of bun

Moisture percentage of bun samples of different treatment and control, the highest mean moisture percentage was recorded in the sample of T_0 (19.05) followed by T_1 (16.75), T_2 (15.42), T_3 (14.12), T_0 (12.81).

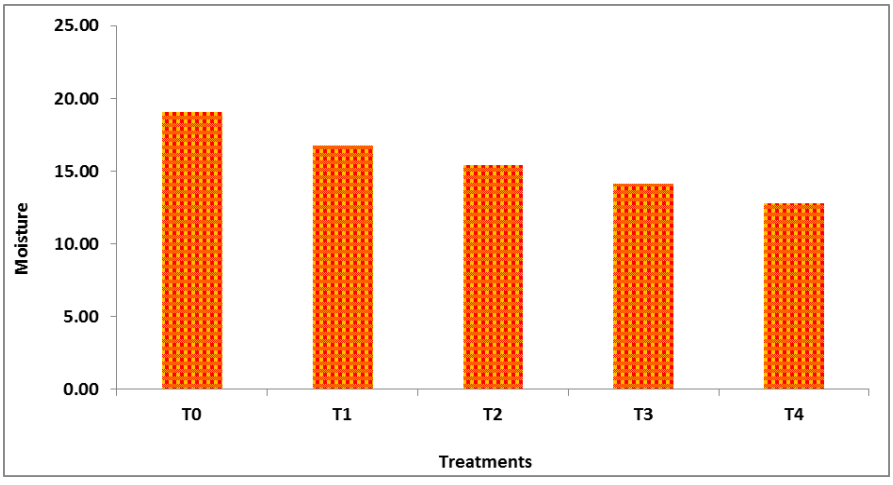


Fig 5: Moisture content of bun

Total solids percent of bun

Total solids percentage of bun samples of different treatment and control, the highest mean moisture percentage was recorded in the sample of T_4 (87.19) followed by T_3 (85.88), T_2 (84.58), T_1 (83.25), T_0 (80.95).

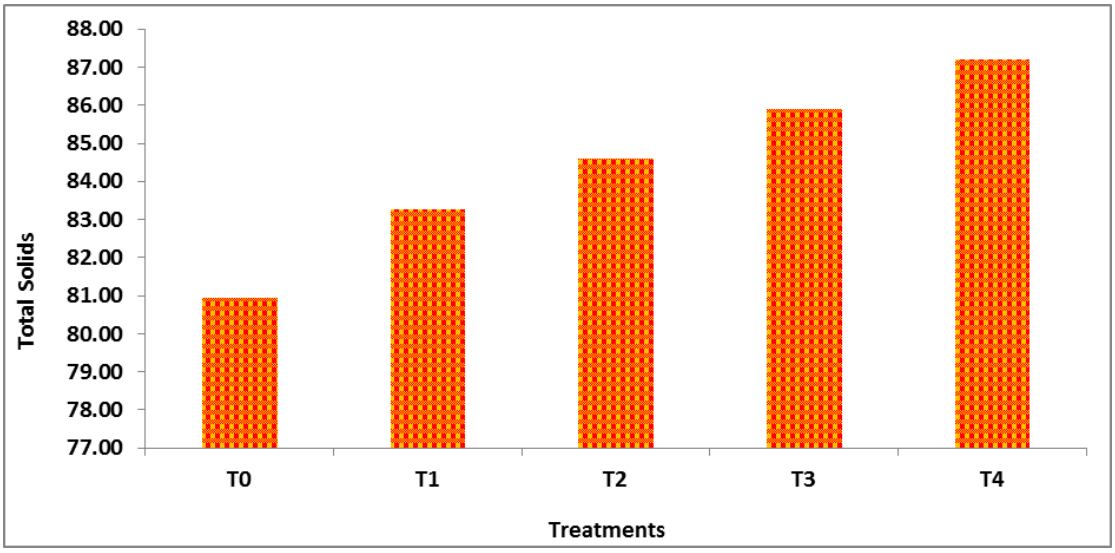


Fig 6: Total Solids content of bun

Conclusion

On the basis of the results obtained during the study it is concluded that wheat flour and sorghum flour can be successfully employed for the preparation of bun. Sorghum flour a cereal grain has long been considered a safe grain alternative for people with celiac disease and gluten insensitivity. Sorghum has high nutritional value, with high levels of unsaturated fats, protein, fibre, and minerals like phosphorus, potassium, calcium, and iron. The data obtained on various parameters were statistically analysed. Chemical evaluation showed that bun prepared by using wheat flour and sorghum flour T3 (treatment 3) (60:40) was found to be more acceptable because of higher nutritional profile as well as it scored maximum for all sensory appeal.

Acknowledgement

The author wish to express her heartfelt thanks to the Dean of Warner College of Dairy Technology, SHUATS, Prayagraj, for his constant support and guidance and also to my advisor Dr. S.N Thakur for his valuable suggestions, support and encouragement, and deep involvement in my research work.

References

1. Abdelghafor *et al*. Quality of Bread from Composite Flour of Sorghum and Hard White Winter Wheat, Advance Journal of Food Science and Technology, 2011.
2. Angioloni A, Collar C. Effects of pressure treatment of hydrated oat, finger millet and sorghum flours on the quality and nutritional properties of composite wheat breads. Journal of Cereal Science. 2012; 30:1-7.
3. Abdallah AMA. Characterization of Sorghum and Millet Wet-milling Proteins in Bread System. M.Sc. Thesis. University of Khartoum, 2002.
4. Christine E, Christopher E, Godwin I. Nutritional and Organoleptic Properties of Wheat (*Triticum aestivum*) and Beniseed (*Sesame indicum*) composite flour baked foods. Journal of Food Research. 2012; 1(3):84-92.
5. Elkhalifa AE, Schiffler B, Bernhardt R. Effect of fermentation on the functional properties of sorghum flour. Food Chemistry. 2005; 92:1-5.
6. Perten H. Sorghum processing project in Sudan. Proceedings. Symposium: Sorghum and Millets for Human Food. International Association for Cereal Chemistry, Vienna, Tropical Products Institute, London, 1977.
7. Pranoto Y, Anggrahini S, Efendi Z. Effect of natural and Lactobacillus plantarum fermentation on in-vitro protein and starch digestibilities of sorghum flour. Food Bioscience. 2013; 2:46-52.
8. Serna-Saldivar S, Rooney LW. Structure and chemistry of sorghum and millets. In: D.A.V. Dendy, editor. Structure and Chem. of Sorghum and Millets. St Paul: American Association of Cereal Chemists, Inc., 1995, 69-124p.
9. Suhendro EL, McDonough CM, Rooney LW, Wanishka RD, Yetneberk S. Effects of processing conditions and sorghum cultivar on alkaline processed snacks. Cereal Chemistry. 1998; 75:187-193.