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Assessment of quality parameters and sensory evaluation of soy flour prepared from roasted soybean

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Abstract
The experimental research work was carried out at the department of Agricultural Process Engineering, CAE & T, VNMKV, Parbhani (Maharashtra) to study the quality parameters, anti-nutritional factors and sensory evaluation of soy flour prepared from roasted soybean.
Soybean variety JS -335 was selected for the study on the basis of popularity and yield. Soybean was procured from Soybean Processing Center, VNMKV, Parbhani. Whole unbroken soybean free from infestations was selected for study purpose. The roasted soybeans were milled to obtain soy flour. Evaluation of quality parameters *viz*., moisture content, protein content, bulk density, dispersibility, water absorption capacity and color of soy flour samples was performed as per the standard procedures. Moisture content, bulk density and colour of roasted soy flour decreased with increase in roasting time. The protein content, dispersibility and water absorption capacity increased with increase in roasting time.

Keywords: Soy flour, anti-nutritional factors, roasted soybean

Introduction
Soy flour is most widely used in baked goods 2-15 % is added to breads, crackers, muffins, donuts, cakes, rolls, cookies, tortillas, or chapattis. In baked goods, soy flour increases the storage life and nutritional value, while adding moisture as needed with little or no increase in cost. Also it is also used in pasta products, processed meats, gravies, sauces, soups, cereals, prepared mixes, dairy substitutes, candies, special diet foods and spice bases. In other products, it generally lowers the cost and improves the functional properties by serving as a conditioner, emulsifier, moisture retainer, antioxidant etc. (William *et al*, 2004) [11]. Hence the quality parameters *viz*., moisture content, protein content, bulk density, dispersibility, water absorption capacity and colour were evaluated for soy flour prepared from roasted soybean. Anti-nutritional factors such as tannin oxalate and polyphenol and sensory parameters were also determined.

Materials and Methods
Procurement of Soybean
Soybean variety JS -335 was selected for the study on the basis of popularity and yield. Soybean was procured from Soybean processing center, VNMKV, Parbhani. Whole unbroken soybean free from infestations was selected for study purpose.

Preparation of soy flour from roasted soybean
1 kg clean soybeans which were free from dirt and other foreign material is taken and weighed. Thereafter, soybeans were roasted at 100 ^{o}C temperature for 15 min, 30 min and 45 min respectively in a roaster developed in Department of Agricultural Process Engineering. The roasted soybeans were milled to obtain soy flour. Soy flour obtained was finally packaged in packaging material due to hygroscopic nature of soy flour and then used for analysis.

Soybean
↓
Cleaning
↓
Roasting (100 ^{0}C for 15, 30, 45 min)
↓
Milling
↓
Soy flour

Moisture content
A 5 gm sample was taken in a tare moisture box and was weighed accurately using a single pan digital balance of 0.0001 g sensitivity to get the exact weight of the sample. It was kept in hot air electric oven maintained at temperature of 105 ± 1 ºC for 4 hours. The sample was taken out of oven, cooled in desiccators and weighed to determine the moisture content.

$$\text{Moisture content (\%)} = \frac{\text{Wt. of original sample} - \text{Wt. of dried sample}}{\text{Wt. of original sample}} \times 100$$

Protein content
The protein content was determined by Micro- Kjeldahl's apparatus.

Bulk density
The bulk density of soy flour was determined by the method of (Wang *et al.*, 1976) [10]. 5 g of the sample was weighed into 50 ml graduated measuring cylinder. The samples were packed by gently tapping the cylinder on the bench top 10 times from height of 5cm. The volume of the sample was recorded.

$$\text{Bulk density (g/ml)} = \frac{\text{Weight of the sample}}{\text{Volume of the sample after tapping}}$$

Dispersibility
Dispersibility was determined using the method described by (Kulkarni *et al.*, 1991) [7]. Ten grams of the flour sample was weighed into 100 ml measuring cylinder, water was added to each volume of 100 ml. The set up stirred vigorously and allowed to stand for three hours. The volume of settled particles was recorded and subtracted from 100. The differences reported as percentage dispersibility.

% Dispersibility = 100 - volume of settled particle

Water absorption capacity
In a weighed centrifuge tube 5 gm of sample and 30 ml of distilled water was added and material was suspended in water by mixing with a thin glass rod taking care to see that no sample adhered to the side of centrifuge tube. After holding for a period of 30 min, 10 ml of distill water was used to wash the sample adhering to the stirring rod and centrifuge tube if any. The suspension was then centrifuged at 3000 rpm for 15 min. The supernant liquid was discarded and the tube kept mouth down at an angle of 15-20 in forced draught air oven at 50 ºC. It was placed in desiccators at the room temperature and subsequently weighed. Water absorption capacity was calculated as the amount of water retained by 100 g of sample and expressed in percent. (Bodhankar, 1992) [4].

$$\text{WAC} = \frac{(V1\text{-}V2)\ \text{þ}}{\text{Weight of sample}} \times 100$$

V1 = Initial volume of water used
V2 = Volume of water remaining (not absorbed)
þ = Density of water (1 g/cm3)

Colour
Colour (L, a, b values) of the samples were determined by using colour flex EZ colorimeter, which gave values of: a) Luminosity (L) or sample whiteness which was the total reflection of light in a scale (0 to100), where 0 represents perfect black and 100 perfect white; b) Shade or "a" parameter, known as the predominant wave length, where negative values shows a tendency to red colour, and c) the colour intensity or "b" parameter where negative values show a tendency to blue colour and positive values a tendency to yellow colour. The a*, b* were converted into hue angle (tan-1 b*/ a*) and chroma ((a*2+ b*2)1/2) (Agrahar and Jha, 2010) [3].

Sensory evaluation
Organoleptic evaluation is the way of knowing acceptability of product using the senses, *viz*., sight, smell, touch, test and hearing. It is also a way of simulating the consumer response by a few experienced judges, a panel of ten judges comprising of faculty and students of the institutes was formed. Sensory evaluation was carried out by the standard method. (ISI, 1971a, 1971b). All indexes were measured using a scale from 0 to 9, where a score of 9 presents excellent quality and a score of 0 represents the lowest quality level. Soy flour samples were evaluated in different sensory attributes by a panel of minimum 10 judges of College of Agricultural Engineering and Technology, VNMKV, Parbhani. Sensory attributes like color and appearance, texture, flavour, and overall acceptability were assessed using nine point hedonic scales for all samples.

Results and Discussion
The results of quality parameters *viz*., moisture content, protein content, bulk density, dispersibility, water absorption capacity and color of soy flour prepared from roasted soybean are presented in table 1

Moisture content
Moisture provides a measure of the water content in the flour. The data regarding moisture content of soy flour prepared from roasted soybean is given in table 1. The moisture content of soy flour sample prepared from 15 to 45 min roasted soybean at 100 ºC ranged between 4.77 % to 3.53 %. There was a slight reduction in the moisture content of the roasted soy flour samples but significant difference existed among them, which could be as a result of the high temperature and time. Also it was significantly differed from the moisture content of the raw soy flour. Similar results are presented in Fig. 4.1(a) A through bar diagram. Similar pattern was observed by Yusuf *et al*., (2008) for raw and roasted benniseed and bambara groundnut flour.

Protein content
From table 1, it reveals that the protein content was found to be lowest for raw (control) soy flour i.e. 38.82 %. The protein content of soy flour samples varied from 39.33 to 41.19 % for soy flour prepared from 15 min roasted soybean to 45 min roasted soybean. The result shows that in roasting protein content increased significantly. The results of the present study regarding protein content are in line with the results of the previous study done by Kavitha *et al*., (2014) [6] for cereal and legume flours and Olanipekun *et al*., (2015) [9] for kidney beans seed flour.

Table 1: Quality parameters of soy flour prepared from roasted soybean

Treatment/Parameter	Moisture content (%)	Protein content (%)	Bulk density (g/cm^3)	Dispersibility (%)	Water absorption Capacity (%)	Color				
						L*	a*	b*	Hue angle	Chroma
T(control)	5.04	38.82	0.50	63.54	234.28	85.06	0.58	27.92	88.80	27.92
R1	4.77	39.33	0.45	66.13	260.14	83.17	2.80	24.39	83.45	24.55
R2	4.05	40.58	0.41	68.95	264.32	80.40	3.94	23.12	80.32	23.45
R3	3.53	41.19	0.38	70.52	267.58	78.61	4.51	22.34	78.58	22.79
SE ±	0.285	0.195	0.022	0.799	4.485	0.413	0.402	0.398	0.144	0.272
CD	0.963	0.676	0.078	2.820	10.823	1.486	1.390	1.283	0.477	0.815

***** Significant at 5 % level
Where,
T = Control (Unprocessed)
R1 = Soy flour prepared from 15 min roasted soybean
R2 = Soy flour prepared from 30 min roasted soybean
R3 = Soy flour prepared from 45 min roasted soybean

Bulk density
The bulk density is generally affected by the particle size of the flour and it is very important in determining the packaging requirement, material handling and application in processing in the food industry. From table 1, it reveals that the bulk density of soy flour samples ranged 0.45 g/cm3 for soy flour prepared from 15 min roasted soybeans to 0.38 g/cm3 for soy flour prepared from 45 min roasted soybeans. The result shows that bulk density decreased significantly.

Dispersibility
From table 1, the dispersibility of soy flour sample ranged from 66.13 % for soy flour prepared from 15 min roasted soybean to 70.52 % for soy flour prepared from 45 min roasted soybeans. The dispersibility of roasted soy flour increased significantly. From the data it was observed that dispersibility increased significantly in case of soy flour prepared from 15 min soybean to 45 min roasted soybean.

Water absorption capacity
From table 1, water absorption capacity of soy flour samples increased with increasing roasting time. Water absorption capacity of soy flour prepared from roasted soybeans ranged 260.14 % for soy flour prepared from 15 min roasted soybeans to 267.58 % for soy flour prepared from 45 min roasted soybeans. These observations were in agreement with those reported by Yusuf *et al.*, (2008) for raw and roasted benniseed and bambara groundnut flour.

Colour
The data regarding color parameters *viz*., lightness, redness, yellowness, hue and chroma of raw and soy flour samples prepared from roasted soybeans are shown in table 1. From table 1, it reveals that there was significant difference in colour values of soy flour samples prepared from roasted soybeans. Raw soy flour has higher L* value i.e. 85.06 which was decreased further with increasing roasting time. The lightness of soy flour varied from 83.17 to 78.61 for soy flour prepared from15 min roasted soybeans to soy flour prepared from 45 min roasted soybeans. Raw soy flour has lower a* value i.e. 0.58 which was increased further in soy flour prepared from 15 to 45 min roasted soybean. The redness of soy flour varied from 2.80 to 4.51 for soy flour prepared from15 min roasted soybeans to soy flour prepared from 45 min roasted soybeans. Raw soy flour has higher b* value i.e. 27.92. The yellowness of soy flour ranged 24.39 to 22.34 for soy flour prepared from 15 to 45 min roasted soybean. From the data it was observed that yellowness of soy flour samples decreased as roasting time increased. Hue angle was largest in soy flour prepared from raw soybean i.e. 88.80. Hue angles were observed to be decreased in soy flour samples prepared from 15 to 45 min roasted soybean i.e. 83.45 to 78.58. Similarly chroma values were found to be decreased from 24.55 to 22.79 in soy flour samples prepared from 15 to 45 min roasted soybean. These observations were in agreement with those reported by Jideani *et al.*, (2009) [5] for morama bean flour.

Sensory evaluation of soy flour prepared from roasted soybean
Quality assessment of soy flour prepared from raw, 15 min, 30 min and 45 min roasted soybean was performed for various quality attributes *viz*., colour and appearance, texture, flavour and overall acceptability. The data regarding sensory evaluation of soy flour samples prepared from raw, 15 min, 30 min, and 45 min roasted soybean is given in table 2.

Table 2: Sensory evaluation of soy flour prepared from roasted soybean

Treatment	Colour and appearance	Texture	Flavour	Overall acceptability
T (Control)	8.0	8.0	7.8	7.6
R1	8.0	8.2	8.0	8.4
R2	7.9	8.3	8.3	8.3
R3	7.8	8.4	8.5	8.2
SE±	0.052	0.122	0.152	0.255
CD	NS	NS	NS	NS

NS Non significant

Table 2 shows that there was non significant difference in sensory parameters *viz*., colour and appearance, texture, flavour and overall acceptability of soy flour samples prepared from 15 min to 45 min roasted soybean.

Conclusion
Moisture content, bulk density and colour of roasted soy flour decreased with increase in roasting time. The protein content, dispersibility and water absorption capacity increased with

increase in roasting time. There was non significant difference in sensory parameters *viz*., colour and appearance, texture, flavour and overall acceptability of soy flour samples prepared from 15 min to 45 min roasted soybean.

References

1. Adegunwa MO, Adebowale AA, Solano EO. Effect of thermal processing on the biochemical composition, anti-nutritional factors and functional properties of beniseed (*sesamum indicum*) flour. American Journal of Biochemistry and Molecular Biology 2012;2(3):175-182.
2. AOAC. Official Methods of Analysis 15th Edn. Association of Official Analytical Chemists, Washington D.C 1990.
3. Agrahar-Murugkar Dipika, Jha Krishna. Effect of drying on nutritional and functional quality and electrophoretic pattern of soyflour from sprouted soybean. Journal of Food Science and Technology 2010;47(5):482- 487.
4. Bodhankar SS. Preparation and qualities of weaning food. M. Tech. Thesis Marathwada Aricultural university Parbhani (Maharashtra). 1992.
5. Jideani VA, Van Wyk J, Cruywagen MH. Physical properties of *Tylosemia esculentum* and the effect of roasting on the functional properties of its flour. African Journal of Agricultural Research 2009;4(11):1208-1219.
6. Kavitha S, Parimalavalli R. Effect of processing methods proximate composition of cereal (wheat and maize) and legume (mungbean and groundnut) flours. Journal of Human Nutrition and Food Science 2014;2(4):1051.
7. Kulkarni KO, Kulkarni DN, Ingle UM. Sorghum malt based weaning food formulation preparation, functional properties and nutritive value. Food and Nutrition Bulletin 1991;13(14):322-327.
8. Maidala A, Doma UD, Egbo LM. Effects of different processing methods on the chemical composition and antinutritional factors of soybean. Pakistan Journal of Nutrition 2013;12(12):1057-1060.
9. Olanipekun OT, Omenna EC, Olapade OA, Suleiman P, Omodara OG. Effect of boiling and roasting on the nutrient composition of kidney beans seed flour. Sky Journal of Food Science 2015;4(2):24-29.
10. Wang N, Lewis MJ, Brennan JG, Westby A. Effect of processing methods on nutrients and anti-nutritional factors in cowpea. Food Chemistry 1997;58:59-68.
11. William Shurtleff, Akiko Aoyagi. History of Soy Flour, Grits, Flakes, and Cereal- soy blends 2004, Part I.