

Soft Bran of Sorghum Potential for High Fiber Supplement Food

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Abstract

Soft bran of sorghum produced from the second polishing of rice sorghum, which is the outermost part of the grain portion encased by husks. This research is aimed to examine the potential of soft bran sorghum as a food supplement, and research used was Randomized Block Design (RBD): 1-factor RBD experiments with 3 replications. Factor Types of Sorghum Rice Bran (B) were B₁ : soft bran of red sorghum (*Sorghum bicolor*) and B₂ : soft bran of white sorghum (KD 4). Observations: organoleptic test with parameters of taste, color, flavor, and appearances, and chemical analysis of moisture content, carbohydrate, protein, fat, and fiber. Data analysis: organoleptic test used Friedman test, while chemical analysis used variance analysis continued by Duncan test 5%. Conclusions: 1) Rendement of sorghum grain was 6 tons/ha, sorghum rice was 4,2 tons/ha, sorghum flour was 4,2 tons/ha, soft bran of sorghum was 0,6 tons/ha, bran of the sorghum grain was 1,2 tons/ha; 2) The best treatment for soft bran of sorghum (B₂/ soft bran of white sorghum (KD 4)): water content was 11%, carbohydrates was 71%, protein was 11.5%, fat was 2.1%, and fiber was 11.2%; 3) Soft bran of sorghum could be used as food supplements: bakery, cookies, soup mix, pureed, and supplement drinks.

Keywords: sorghum, soft bran, supplement, fiber

Introduction

Many kinds of alternative food sources could potentially be developed to support the diversification program and food security of the Indonesian, one of them is sorghum (*Sorghum Sp*). Sorghum as a world's food source is ranked 5th after wheat, rice, corn and barley. When soil moisture is not a limiting factor, average sorghum yields can reach 5-6 ton/ ha. In Indonesia sorghum has long been known by farmers, especially in Java, NTB and NTT, specifically in East Java, the largest areas of sorghum production are in Lamongan, Bojonegoro, Blitar, Bangkalan, Sampang, and Lumajang.

Soft bran of sorghum is the outermost part of the grain portion encased by husks. Grains are fruits and seeds of a variety of the true cereal crops, such as rice, wheat, and sorghum. The term soft bran is mainly associated with rice, because this cereal is known as the cultural heritage. However, rice bran can be obtained also from corn, wheat, and sorghum.

The anatomy of soft bran consists of aleurone and pericarp layer. Aleurone is the outermost layer of the endosperm, while pericarp is the deepest part of the husk. The separation process of soft bran from the other part of rice is known as milling (polishing) to increase their shelf life, as well as to bleach them. The majority of the community equalizes between rice bran and bran although, soft bran and bran is different. Bran is rice milling waste/pulverization of the first rice. Meanwhile, rice bran is a residual of

pulverized soft bran / rice milling of the second (rice husk). Soft bran of sorghum is produced from the second polishing of rice sorghum which is the outermost part of the grain portion encased by husks.

During this time soft bran of sorghum has not been fully utilized, therefore further research is needed. The aims of this research are to analyze the potential of soft bran of sorghum as a food supplement.

Materials and Method

Research used Randomized Block Design (RBD): 1-factor RBD experiments with 3 replications. Factor Types of soft bran sorghum (B) were B1: soft bran of red sorghum (*Sorghum bicolor*) and B2: soft bran of white sorghum (*KD 4*). Observations: organoleptic test with parameters of taste, color, flavor, and appearances, and chemical analysis of moisture content, carbohydrate, protein, fat, and fiber. Data analysis were organoleptic test used Friedman test, while chemical analysis used variance analysis continued by Duncan test 5%.

Results and Discussion

Soft bran of sorghum yield

Sorghum yields are presented on Table 1. It can be seen that the production of Soft bran sorghum 10% of the total grain sorghum, it indicates that the Soft bran of sorghum potential to be developed further, and Soft bran of sorghum yield demonstrates the potential to be used as a food supplement.

Table 1. Sorghum yields

Sorghum Production	Yield
Sorghum grain	6 ton/ha
Sorghum rice	4,2 ton/ha
Sorghum flour	4,2 ton/ha
Sorghum soft bran	0,6 ton/ha
Sorghum bran	1,2 ton/ha

Physical Test of Sorghum Rice Bran

The result of physical observations for Soft bran of sorghum is presented on Table 2. In Table 2, difference on the color of Soft bran of sorghum is recorded. It will become the advantages of Soft bran of sorghum which can produce product with different variety of color.

Table 2. Color Test of Sorghum Soft bran

Treatment	Color
B1	Reddish white
B2	Yellowish white

Organoleptic Test of Sorghum Rice Bran

The result of organoleptic test is presented on Figure 1 and Table 3.

The result of percentage calculation of organoleptic test with parameters of color, flavor and appearance used treatment for factors types of sorghum soft bran (B) were B1: Soft bran of red sorghum (*Sorghum bicolor*) and B2: Soft bran of white sorghum (*KD 4*), the meaning of scores were 1: dislike, 2: somewhat like, 3: neutral, 4: like, dan 5: really like.

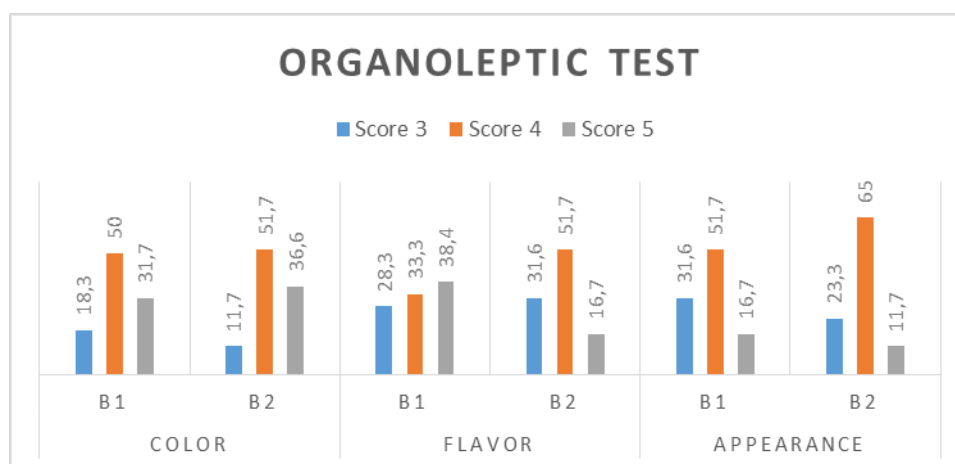


Figure 1. The Result of Organoleptic Test of Sorghum Soft Bran

Table 3. The Result of Friedman Test of Sorghum Rice Bran

Test Statistics ^a			
Parameter	Warna	Aroma	Kenampakan
N	60	60	60
Chi-Square	1.190	0.167	0.00
df	1	1	1
Asymp. Sig.	.275	.683	1.00
a. Friedman Test			

It was showed that the highest score for color parameter was on B2 treatment (B2 was white soft bran / KD4 with percentage 36.6% score 5 (really like), flavor parameter was on B1 treatment (red soft bran / *Sorghum bicolor*) with percentage 38.4% score 5 (really like); and the highest score for appearance parameter was on B1 treatment (red soft bran / *Sorghum bicolor*) with percentage 31.6% score 5 (really like). As shown on Table 2, it seemed that physically soft bran color was different, it was an advantage of sorghum soft bran, and on Table 3, it seemed that the result of friedman test for sorghum soft bran product demonstrated that color parameter (Sig 0,275 > 0,05), flavor parameter (Sig 0,683 > 0,05), and appearance (Sig 1,000 > 0,05), which was meant that the parameters of color, flavor, and appearance were not significantly different, for those parameters resulted from factor types of sorghum soft bran, showed that all could be accepted by the panelists, although there was difference for the color of the sorghum soft bran i.e. red soft bran which was resulted from red sorghum / *Sorghum bicolor* and white soft bran which was resulted from white sorghum / KD4, it was an advantage of both types of sorghum soft bran resulted.

Chemical Test of Sorghum Soft Bran

The result of chemical test is presented in Figure 2. The moisture content was (10,9-13,60%), carbohydrate was (69,56-71,53%), protein was (10-11,52%), fat was (1,57-2,8%), and fiber was (11,21-12,01%). The result of variance analysis shows that the moisture content was (Sig 0,847 > 0,05), carbohydrate was (Sig 0,424 > 0,05), protein was (Sig 0,653 > 0,05), fat was (Sig 0,626 > 0,05), crude

fiber was ($\text{Sig } 0,082 > 0,05$), it can be concluded that moisture content, carbohydrate, fat, and crude fiber were not significantly different. Moisture content of sorghum soft bran was $< 14\%$. This condition is as a requirement for safety moisture content, so it is to prevent the growth of microbes, and the high content of carbohydrate, protein, fat become an advantage of sorghum soft bran, as well as high fiber content. Dietary fiber is one of the non nutrition nutritional substances that can not be digested by human digestive enzymes. The dietary fiber does not produce energy and nutrition. Dietary fiber contained in many plants, spread from the roots, stems, leaves, flowers, fruits until the seeds. The presence of fiber in the diet is highly recommended in the diet, although it has no nutritional value, because of dietary fiber in charge of maintaining the health of the digestion and can prevent various diseases. Nutrient content for soft bran of rice, corn, and sorghum is presented in Table 4.

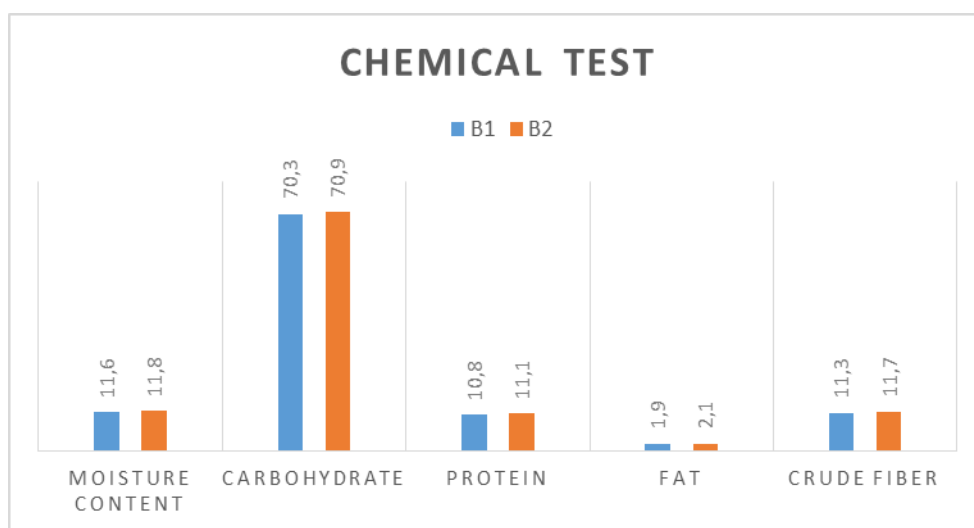


Figure 3. The Result of Chemical Test of Sorghum Soft Bran

The carbohydrate and protein of sorghum soft bran and soft bran of rice and corn can be seen in Table 4. The sorghum soft bran protein and carbohydrate content are similar. While the fat content are lower for sorghum soft bran.

Table 4. The comparison between nutritional value of Soft bran of rice, corn, and sorghum

Component	Soft bran of rice	Soft bran of corn	Soft bran of red sorghum	Soft bran of white sorghum
Carbohydrate	54,6 g	64,5 g	70,3 g	71 g
Protein	12,6 g	9 g	10,8 g	11,1 g
Fat	14,8 g	8,5 g	1,9 g	2,1 g

Source: Depkes (1996) dan Noerhartati (2015-2016)

Probability Test

The result of probability test calculations of sorghum soft bran is presented in Figure 4. Probability analysis performed to determine the odds of each ground state. Ground state to include the quality of color, flavor, appearance, moisture content, carbohydrate, protein, fat, and fiber content. Probability value showed the importance of a ground state, the greater the probability of the value of the ground state, the more important the ground state. On behalf of sorghum soft brand products, the parameter of appearance was (21%) and it was considered as the most important parameter compared to the other parameters, i.e.

color was (17%), protein was (14%), carbohydrate was (13%), flavor was (12%), moisture content was (9%), fat was (7%), and fiber content was (7%).

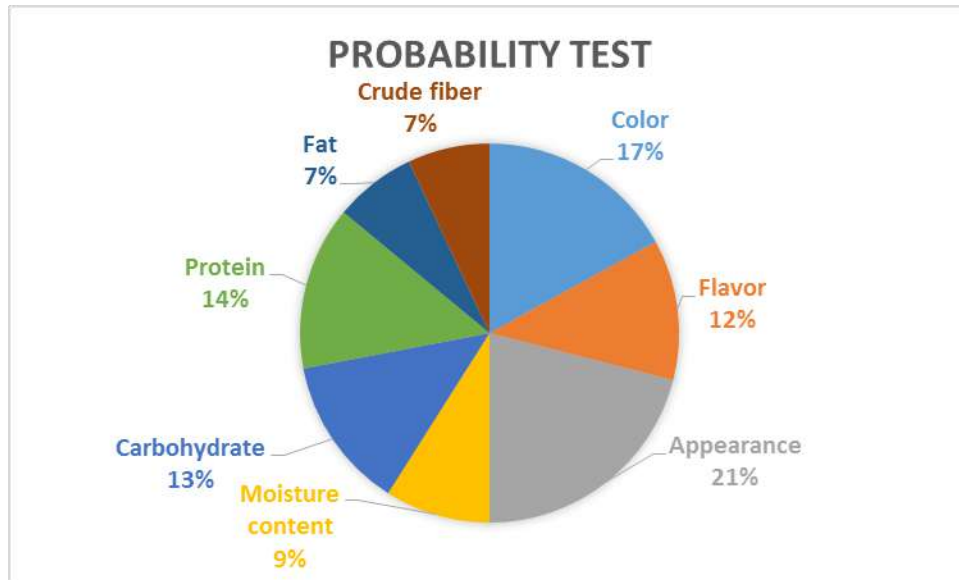


Figure 4. Probability test chart of sorghum soft bran

Alternative Selection

The result of alternative selection calculation is presented on Figure 5. Alternative processes are nothing compared to determine the optimal process. Based on the result of alternative selection for selected treatment was treatment B2 (B2 was soft bran of white sorghum / KD4), with the value of calculation result was 25.79, with the value of moisture content was 11%, carbohydrate was 71%, protein was 11.5%, fat was 2.1%, and fiber was 11.2%.



Figure 5. Graph of alternative selection of sorghum soft bran

Soft bran of sorghum as a food supplement

Soft bran of sorghum can be used as a food supplement: bakery, cookies, soup mix, pureed, and supplement drinks. The flow diagram of sorghum soft bran preparations as a food supplement is presented on Figure 6. The use of sorghum soft bran as a food supplement, in the following manner: Sorghum soft bran resulted is previously mashed, then done the sifting, in order that rice bran produced has a uniform size. It is continued to the process of roasted. Soft bran of sorghum is later ready to be used as a food supplement.

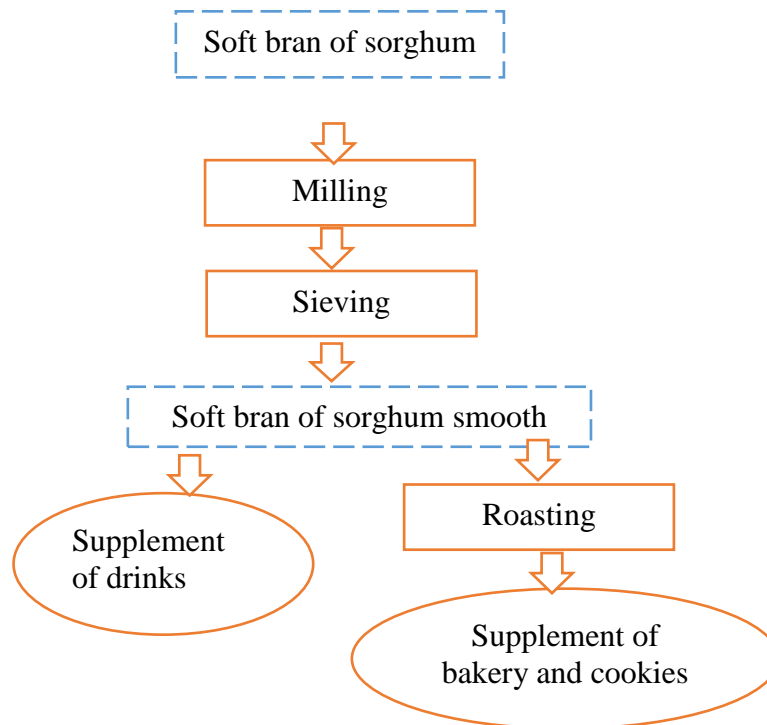


Figure 6. Flow diagram of sorghum soft bran preparations as a food supplement

Conclusion

- 1) Rendement of sorghum grain was 6 ton/ha, sorghum rice was 4,2 ton/ha, sorghum flour was 4,2 ton/ha, sorghum soft bran was 0,6 ton/ha, sorghum bran was 1,2 ton/ha;
- 2) The best soft bran of sorghum was (B2/soft bran of white sorghum/*KD4*), with moisture content was 11%, carbohydrate was 71%, protein was 11,5%, fat was 2,1%, and crude fiber was 11,2%;
- 3) Soft bran of sorghum could be used as a food supplement: bakery, cookies, soup mix, pureed, and supplement drinks.

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