

Effect of Comparative Flour of Purple Sweet Potato (*Ipomea batatas*) and Wheat Flour of Nutrition Value on Brownies

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Abstract: Determination of protein, fat and carbohydrates of brownies with variations of purple sweet potato flour comparison with wheat flour. Brownies flour made with variation ratio of purple sweet potato flour with wheat flour that was (80:20), (60; 40), (40:60) and (20:80) with a total weight of 100 grams of flour. The protein content was determined by the Kjeldahl method, fFat content was determined by continuous extraction, carbohydrate content was determined by counting aliquots weight reduction as the results of moisture, ash, protein and fat. The result showed the highest protein content in variation (40:60) which is 7.09% and the lowest (80:20), which is 3.23%. The more purple sweet potato flour added the protein in brownies was increase. The highest fat content in variation (20:80) is 18.60% and the lowest (80:20) and (60: 40), which is 0.63%. The more the flour was added the fat content of the brownies was increase. The highest levels of carbohydrates obtained from the reduction of protein, fat, water and ash. Furthermore, the antioxidant test on purple sweet potato flour which has antioxidants that are very good for consumption which have IC50: 173.14 mg / L.

1 INTRODUCTION

Purple sweet potato is one type of sweet potato is widely grown in Indonesia. Purple sweet potato contains of nutrients are rich in vitamins (B1, B2, C and E), minerals (Ca, Mg, K and Zn), dietary fiber and carbohydrates. Also, purple sweet potato has a fairly dense purple color for their anthocyanin pigmen that has spread from skin to the meat section of the yam. The protein content cultivars are mostly between 1.5% and 2.5%, including low to moderate when compared to other vegetables. Although the quality of protein is rather balanced, there are very few sulfur-containing amino acids. The sweet potato is a good source of vitamin C and vitamin B. (Rubatzky, 1998).

Besides having a great production, which is about 15-20 tonnes / ha (Joseph et al., 2003) The stability and a higher anthocyanin content in purple sweet potato from another source, make it as an alternative to natural dyes (Kano et al. 2005). Purple sweet potato convert into flour is one way to save and preserve the purple sweet potato. Sweet potato starch is broken down from yams which eliminated most of water content about 7% (Sarwono, 2005). Brownies is one type of pound cake. Brownies has

two type which is brownies and baked brownies. Cake brownies has a constant structure as when the brownies was cut its looks uniform from pore crumbs and eaten soft also moist texture.

2 MATERIALS AND METHODS

Brownies production was divided into several steps. The first step, butter was heated. The second step, 3 eggs were whipped with 100 ml sugar. Then, second step was mixed and was added with ½ tsp Baking powder, ¼ tsp butter then mixed until homogeny for 20 minutes. Next step added 100 g of flour with variation of purple sweet potato flour with wheat flour (20: 80; 40: 60; 80:20; 60:40). All component was added mixed and stirred until distributed. Then added 3 tsp cocoa powder, chocolate bars, and melted butter. Then stirred until evenly distributed over 5 minutes and put into baking pan or for 35-40 minutes.

2.1 Determination of Protein

Brownies product was added into Kjeldahl about 0.1 g, then added 0.3 g of selenium and 15 ml of H₂SO₄. The result was destructed with Kjeldahl method at 450°C until the solution becomes clear. Distillation water then inserted into the system. accommodated the result in a flask which contained of 25 ml of H₃BO₃ 3% and mixed with 3 drops of Tashiro indicator. Then titrated with 0.1 N HCl to determined % N.

2.2 Determination of Fat Content

Wrapped brownies which has dried with oven at 105°C with paper into soxhlet tool. Then extracted with N-hexane for 6 hours at 80°C. Then N-hexane solution was distilled from the extracted fat at 100-105°C. Then put in the desiccator, determined the constant weigh of sample. Fat content is then calculated.

2.3 Determination of Water Content

Brownies about 2 g added into cup then inserted in oven at 105°C for 30 minutes. Weigh it the dried sample then, repeated until constant weight. Water content is then calculated.

2.4 Determination of Ash Content

Brownies was added into porcelain cup of known weight. Then inserted into a furnace at 400°C for 5 hours until a white ash ago, weighed and calculated the ash content.

2.5 Determination of Carbohydrate

Calculated the percentage of moisture, ash, fat, and protein. Then carbohydrate levels was calculated by calculating the difference between 100% to the sum of these percentages. Carbohydrate content (%) = (100 - (protein + fat + water + ash)) (Fadilah, 2002).

2.6 The Antioxidant with DPPH Test Method

DPPH solution about 5 ml was added into 2.5 ml of 100 ppm purple sweet potato flour, homogenized and left for 30 minutes in a dark room. After that, the measured absorbance at the maximum wavelength of 516 nm. Do the same way to the sweet potato Flour 200 ppm, 300 ppm and 400 ppm.

3 RESULTS AND DISCUSSION

3.1 Effect of Wheat Flour on A Purple Sweet Potato Brownies to Protein Content

The result of Protein content was showed in Figure 1 that increased of the protein value in comparison brownies with purple sweet potato flour with wheat flour 80:20, 60:40 and 40:60. This is because the protein content of purple sweet potato is higher than wheat flour. The more purple sweet potato flour was added the highest levels of protein produced. According to Susilawati & Medikasari (2008) levels of protein in the purple ubi flour is 2.79 per 100 grams of purple ubi. According to Saragih (2011) the quality standard is at 5.03. In other hand, brownies at 20:80 variation was decreased this was due to the comparison of sweet potato flour with wheat flour used is not suitable. As the result, it was decreased the levels of a protein slightly and already meet the protein content which has been specified.

Table 1: Data nutritional value in comparison brownies purple sweet potato flour with wheat flour.

Variation	Parameter (%)				
	Protein	Fat	Water	Ash	CHO
80:20	3.23	0.63	5.07	0.02	88.39
60:40	3.85	0.63	16.16	0.02	76.69
40:60	7.09	14.07	34.36	0.02	41.81
20:80	6.47	18.60	26.34	0.02	45.92



Figure 1: Diffractogram of limestone powder from the Sidikalang mountains, Dairi, North Sumatra.

3.2 Effect of Wheat Flour on A Purple Sweet Potato Brownies to Fat Content

The result of fat content of comparative flour brownies was showed in Figure 2 that fat content of brownies was increase with a ratio of purple sweet potato flour and wheat flour. This is because the fat content of the flour is higher than the purple sweet potato flour, the more of flour was added the fat

content of the brownies will increase. According to Sudarmadji (1989), the fat content of wheat flour was 11.3 g per 100 grams of flour while the fat content in purple sweet potato flour was 0.81 g per 100 grams of purple sweet potato flour (Susilawati and Medikasari 2011). Fat content of purple sweet potato flour also will decrease with warming and drying in the processing of flour so that more purple sweet potato flour was added to the production of the fat content of brownies will also be on the wane.

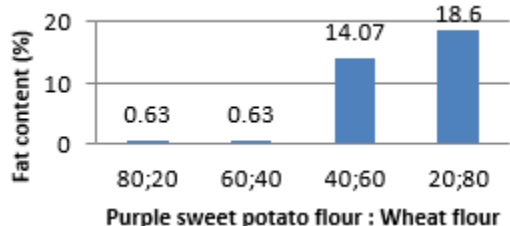


Figure 2: Effect of variation of purple sweet potato flour with wheat flour on the fat content of brownies.

3.3 Effect of Variation of Purple Sweet potato Flour with Wheat Flour on the Water Content of Brownies

The result in Figure 3 was showed the increasing of the water content of brownies with a ratio of purple sweet potato flour with wheat flour in the ratio of 80:20, 60:40 and 40:60 and comparison purple sweet potato flour with wheat flour was decreased 20:80. This is because the water content in the purple sweet potato flour over then in wheat flour which is removes most of the moisture content of about 7%, and still contained large enough water quantities. So, the greater the number of purple sweet potato flour is added in making brownies the water content contained in these brownies will increase.

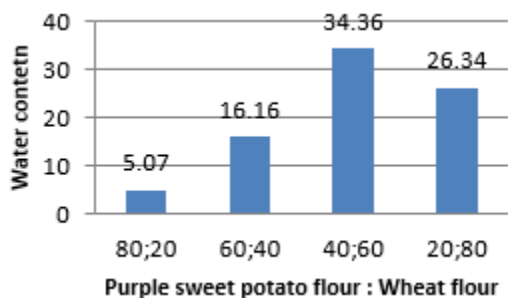


Figure 3: Effect of variation of purple sweet potato flour with wheat flour on the water content of brownies.

3.4 Effect of Variation of Purple Sweet potato Flour with Wheat Flour on the Ash Content of Brownies

The result in Figure 4 shows that there was no changes of ash content of brownies. This because the same of the physical and chemical properties on the food material. There was also no change in the brownies batter.

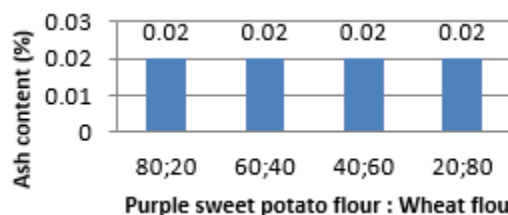


Figure 4: Effect of variation of purple sweet potato flour with wheat flour on the Ash content of brownies.

3.5 Effect of Variation of Purple Sweet potato Flour with Wheat Flour on the Carbohydrate Content of Brownies

The result in Figure 5 where the carbohydrate content was determined by calculating the difference between 100% with the number of levels of protein, fat, water and ash. Therefore, when the number of carbohydrates levels obtained decreasing it will be increased and if the levels are increasing the levels of carbohydrates produced will decrease.

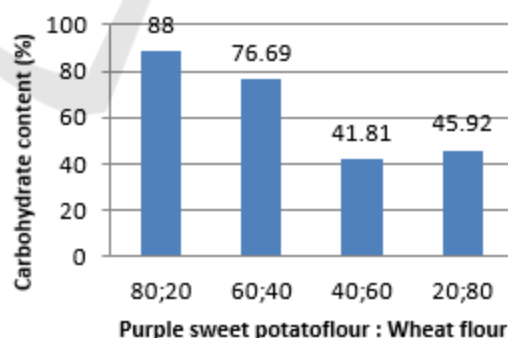


Figure 5: Effect of variation of purple sweet potato flour with wheat flour on the carbohydrate content of brownies.

3.6 The Antioxidant Activity Test in The Purple Sweet Potato Flour with Wheat Flour

The result in Table 2 shows that the purple Sweet potato flour is not much different from other sweet potato flour. Based on the IC50 the potential of purple sweet potato as a functional food ingredient or food mainly for its antioxidant health. In this case, the higher value of purple sweet potato the lower the IC50 of antioxidant and otherwise. IC50 purple sweet potato flour is 173.14 mg / L.

Table 2: Absorbance measurement result for purple sweet potato flour.

Sample	Absorbance	%inhibition
Blank	0.801	0
100 ppm	0.321	59.92
200 ppm	0.272	66.04
300 ppm	0.225	71.91
400 ppm	0.212	73.53

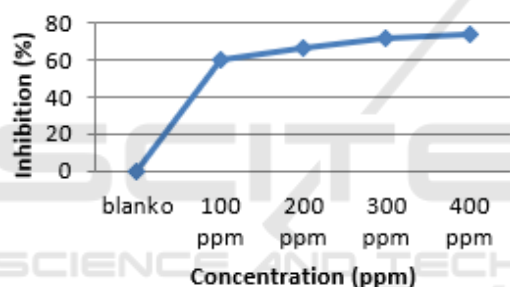


Figure 6: Inhibition vs concentration of purple sweet potato.

3.7 The Antioxidant Activity Test in the Purple Sweet Potato Flour with Wheat Flour

IC50 of wheat flour are: 299.49 mg / L.

Table 3: Absorbance measurement flour.

Sample	Absorbance	%inhibition
Blank	0.763	0
100 ppm	0.485	36.43
200 ppm	0.377	50.58
300 ppm	0.364	52.29
400 ppm	0.369	51.63

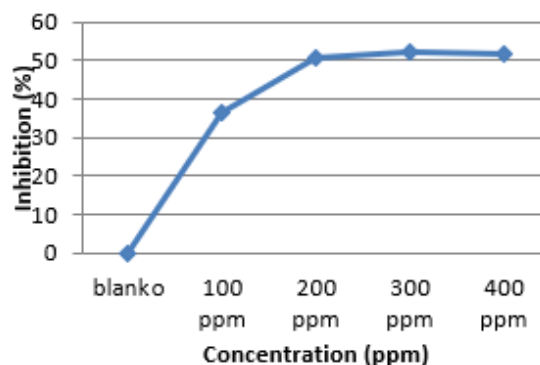


Figure 6: Inhibition vs concentration of purple sweet potato.

4 CONCLUSIONS

The more purple sweet potato flour was added, the higher protein levels produced in the brownies, the more flour was added, the higher the fat content to be generated at brownies. While on the carbohydrate content results in a reduction of levels of protein, fat, water and ash. However, variations of purple sweet potato flour in the ratio (40:60) about 7.09% and (20:80) about 6.47% still have a good protein content and good yield brownies. Based on the quality standards of brownies per 100 grams is 5.03%. Antioxidant generated by the purple sweet potato flour is IC50 173.14 mg/L, while the wheat flour has IC50 299.49 mg/L.

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