

## ACCEPTABILITY PURPLE SWEET POTATO BUTTER CAKE AND CARBOHYDRATE ANALYSIS FOR DIABETICS SNACK

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### ABSTRACT

Purple sweet potato is a functional food, containing high anthocyanins, fiber, amylose and low glycemic index. Sweet potato is one of carbohydrates source that potentially as local resources for an effort of staple food diversification. Cake is popular bakery products that have sweet taste and soft texture. Butter cake gives distinctive aroma of butter and savory favored. In Indonesia, patients with diabetes mellitus have increasing from 1.1% (2007) to 1.5% (2013). Snack for diabetics must have appropriate nutritional value and can control blood glucose to prevent the risk of complications in patients with diabetes mellitus. Diabetics need snacks that have appropriate nutritional value that does not cause hypo/hyperglycemia.

This study is based on experimental research design using a randomized block design (RAK) with 3 formula substitution of wheat flour and purple sweet potato and 1 control, organoleptic (sensory) test and analysis of carbohydrates. Organoleptic (sensory) data were analyzed using One Way ANOVA, and carbohydrate test data were analyzed using Luff Schrool methods. Our result in the research on the acceptability purple sweet potato butter cake showed significant real difference of the sensory score included flavour, aroma, colour and texture by used 75% concentration of purple sweet potato and also increases the sensory scores of the product, resistant starch content and acceptability of cake. The carbohydrates analysis of purple sweet potato butter cake showed that the starch in butter cake with 75% concentrate of purple sweet potato is 27.77%.

*Keywords* : butter cake, sweet potato, carbohydrate, diabetics

### Introduction

Diversification of daily food is still not in accordance with the pattern of the ideal food contained in the food pattern of hope (PPH). Based on the National Socioeconomic Survey (2009-2013) found that the rate of sweet potato consumption had decreased 18.20% from 2011 to 2013. The consumption level of rice exceeds the recommended limits, conversely the rate of sweet potato consumption is smaller than the recommended, that is < 36kg / capita / year (Ariani, 2010).

Sweet potato is alternative food ingredient in Indonesia (Andrianto, 2004). Purple sweet potato is functional foods (Winarno, 2004). Sweet potato is one source of carbohydrates that potentially as local resources in an effort to diversification of staple food. Therefore, due to the high productivity potential and easily obtained on the local market, regional and international. Sweet potato price levels are low and affordable by all segments of society can be

one important factor to encourage diversification (Anjak, 2010).

Purple sweet potato contains the pigment anthocyanins higher than other types of sweet potato (Aripnur, 2010). Anthocyanins have the potential to reduce blood sugar levels (anti hyperglycemia) (Richana, 2012) and can be a natural colorant for food (Suprpta, 2003). Purple sweet potatoes have high levels of dietary fiber that is 4.72% per 100 grams (Nintami, 2012). Cake is popular bakery products that have sweet taste and soft texture. Butter cake give distinctive aroma of butter and savory favored (Ardiarini, 2012).

In Indonesia, patients with diabetes mellitus have increasing from 1.1% (2007) to 1.5% (2013) (Badan Litbangkes, 2013). Diabetics need snacks that have appropriate nutritional value that does not cause hypo/hyperglycemia (Aviaty, 2013).

Our objective was attempt a novel approach that effort increasing variations food processing with purple sweet potato as the main ingredient and study the effect of purple sweet potato in butter cake as snack for diabetics. The aim of this study was to

investigate the best product and carbohydrate value of purple sweet potato butter cake.

## Methods

This study is based on experimental research design using a randomized block design (RAK) with 3 formula substitution of wheat flour and purple sweet potato and 1 control, hedonic test and analysis of carbohydrates.

Organoleptic (sensory) evaluation of the product to determine the texture, flavour, aroma and colour of the product. The test score were analyzed using One Way ANOVA to find the best product. The best product was further analyzed with Luff Schrool methods.

### *Cake formulation and preparation*

The ingredients for this cake were used corn sugar and milk flour for diabetics. The cake ingredients were weighed using an analytical balance. First, eggs were manually broken and yolk was separated from albumen. Butter and sugar were mixed at high speed until uniform, the yolk was added at a steady rate (about 3 min) and after that the purple sweet potato was added, mixed well. The flour and milk flour were added, the cake batter was further mixed at a steady rate (about 5 min). The albumen was mixed at high speed in other bowl (about 3 min). After all the albumen was added into cake batter and stir well. Filled cake batter (30 g) into cupcake cup and baked.

Four butter cake purple sweet potato have different containing variable purple sweet potato and wheat flour concentrations : 0%, 25%, 50%, 75% and were baked at 120°C temperatures for 40 min. The cake were cooled on a wire racks at 27 °C for 35 minutes before organoleptic (sensory) and chemical evaluation.

### *Organoleptic (sensory) evaluation*

Twenty five member panelists comprising of students from Politeknik Kesehatan Kementrian Kesehatan Riau evaluated the samples using the 5 points hedonic scale method. Scores were given to the scales: (5) Like very much, (4) Like slightly, (3) Like moderately, (2) Dislike moderately, (1) Dislike very much. The coded samples were presented to panelist to evaluate

for the attributes : flavour, colour, aroma and texture.

Evaluation of the cake was conducted 1 hour after baking. Sensory testing was done on all 4 types of cake. Each panelist was presented with 4 coded randomized samples. Each sample was coded with three random digit numbers and the positions of the samples were randomized. Panelists were seated in individual sensory booths. The score were analyzed by ANOVA.

### *Statistical analysis*

Data were analyzed with SPSS version 16.0 using one – way Analyzed of Variance (ANOVA). Significant differences were tested using the Duncan Multiple Range Test. Two replications were used for chemical evaluation.

### *Chemical Analysis*

Carbohydrate was determined based on Luff Schrool Method.

## Results

### *Sensory evaluation*

Result of these studies with ANOVA indicated that there is significant difference ( $p < 0.01$ ) between each samples in terms of flavour, colour, aroma and texture.

Table 1. Results of sensory evaluation of four types of cake

	Control	Purple Sweet Potato		
		25%	50%	75%
Flavour	3.60 ±	3.40 ±	3.76 ±	4.72 ±
	0.913	0.816	0.663	0.542
Colour	4.16 ±	2.92 ±	3.28 ±	4.80 ±
	0.554	0.862	0.792	0.408
Aroma	4.16 ±	3.88 ±	4.00 ±	4.48 ±
	0.554	0.600	0.707	0.586
Texture	3.76 ±	3.24 ±	3.92 ±	4.72 ±
	0.879	0.831	0.702	0.458

**\*Mean values in the same row which are not followed by the same letter are significantly different ( $p < 0.01$ ). Mean ± standard deviation (n = 25)**

Results for the flavour were around 84 – 100% showed in Fig 1. This indicated the high scored of flavour is product with 75% purple sweet potato concentrate.

Figure 1. Result of flavour of four types cake

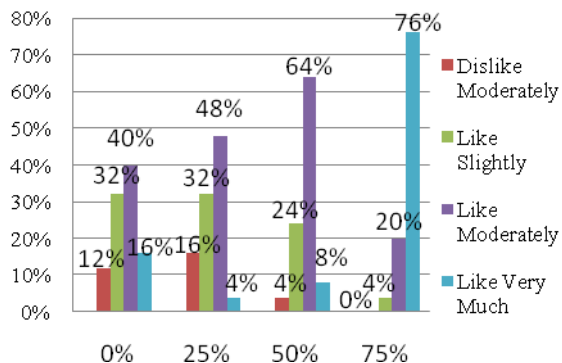


Figure 1. Flavour result of sensory test. Note n = 25; 5 hedonic scale

Results for the colour were around 64 – 100% showed in Figure 2. This indicated the high scored of colour is product with 0% and 75% purple sweet potato concentrate.

Figure 2. Result of color of four types cake

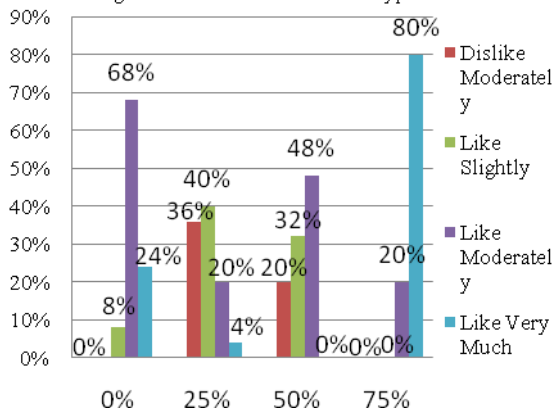


Figure 2. Colour result of sensory test. Note n = 25; 5 hedonic scale

Results for the aroma were 100% showed in Fig 3. This indicated that all types of product have high scored.

Figure 3. Result of aroma of four types cake

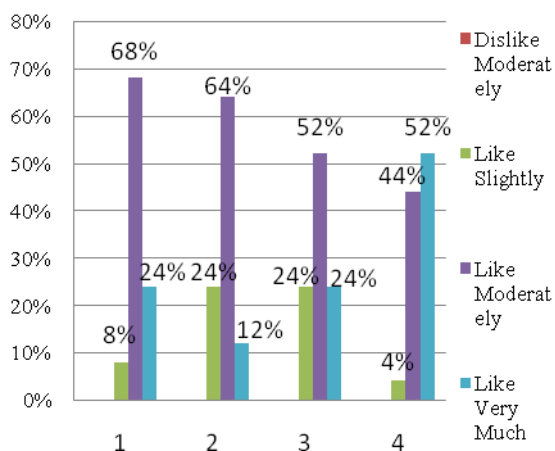


Figure 3. Aroma result of sensory test. Note n = 25; 5 hedonic scale

The sensory result for the texture showed in Table 4. Results for the texture were 80-100%. This indicated that all the types of product were the favorite product.

Figure 4. Result of texture of four types cake

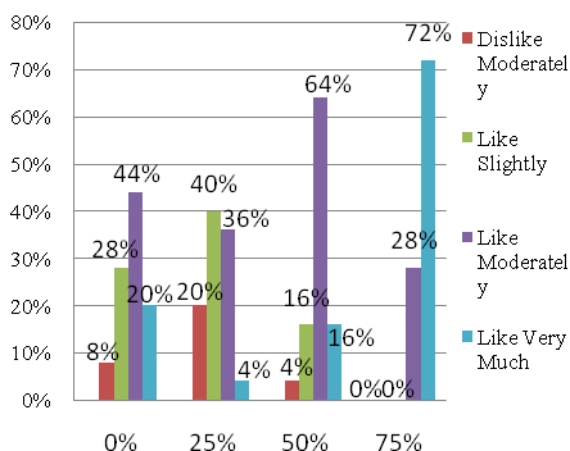


Figure 4. Texture result of sensory test. Note n = 25; 5 hedonic scale

The sensory score of the cookies was presented in Table 1. Cake prepared from purple sweet potato with 75% concentrate were rated high in flavour, colour, aroma, and texture with significant difference ( $p < 0.01$ ) as compared to control, and the cake were scored high by the panelist. The aroma of purple sweet potato butter cake gives distinctive aroma of butter and savory favored. The colour of purple sweet potato butter cake with 75% concentration are shown in purple colour that really give eye-catching. The texture of purple sweet potato butter cake have soft texture and sweet taste from corn sugar and milk flour for diabetics.

Purple sweet potatoes attracted interest as a healthy food additive and a potential source of natural food colorants due to their high level of anthocyanins (Winterhalter, 2011) and also the sweet potato anthocyanins have antioxidant activity (Hardoko, 2010). Purple sweet potatoes have high levels of dietary fiber that is 4.72% per 100 grams (Nintami, 2012).

#### Resistant starch

Result indicated that resistant starch of purple sweet potato butter cake with 75% concentrate is 27.776% with two replication. The main content of purple sweet potato is a starch. Sweet potato starch content consists of 30 – 40% of amylose and 60 - 70% of amylopectin (Nintami, 2012).

At the metabolic level, the effect of resistant starch on glucose delivery is likely to have a positive impact on insulin responses and that gives effect for the utilization of fat which stored, that may influence appetite signals (Tapsell, 2004).

#### Conclusions

Incorporation of purple sweet potato on baking cake process did not change the functional properties but increases the sensory scores of the product, resistant starch content and acceptability of cake, especially for butter cake.

#### References

- Andrianto, T.T., & N. Indarto 2004. Ubi Jalar dan Kentang. Absolut. Yogyakarta.
- Anjak, 2010. Prospek Pengembangan Ubi Jalar Mendukung Diversifikasi Pangan dan Ketahanan Pangan. Diakses di [http://pse.litbang.deptan.go.id/ind/pdffiles/anjak\\_2010\\_10.pdf](http://pse.litbang.deptan.go.id/ind/pdffiles/anjak_2010_10.pdf)
- Ardiarini, M.D., 2012. Pembuatan Cake dari Tepung Ketan Hitam. Universitas Negeri Yogyakarta. Skripsi. Program Studi Teknik Boga Fakultas Teknik.
- Ariani, M., 2010. Diversifikasi Konsumsi Pangan Pokok Mendukung Swasembada Beras. Prosiding Pekan Sereal Nasional. Balai Pengkajian

- Teknologi Pertanian Banten. ISBN : 978-979-8940-29-3
- Aripnur, 2010. Ubi Jalar Ungu. <http://www.banjar-jabar.go.id>. Diakses tanggal 25 Juni 2010
- Avianty, S., 2013. Kandungan Zat Gizi & Tingkat Kesukaan Snack Bar Ubi Jalar, Kedelai Hitam Sebagai Alternatif Makanan Selingan Penderita Diabetes Melitus Tipe 2. Artikel Penelitian Universitas Diponegoro. Semarang.
- Badan Litbangkes, 2013. Laporan Riskesdas 2013. Diakses di [www.litbang.depkes.go.id/sites/.../rkd2013/Laporan\\_Riskesdas2013.PDF](http://www.litbang.depkes.go.id/sites/.../rkd2013/Laporan_Riskesdas2013.PDF)
- Hardoko, L.H., & T.M. Siregar, 2010. Pemanfaatan Ubi Jalar Ungu (*Ipomoea batatas* L. Poir) Sebagai Pengganti Sebagian Tepung Terigu dan Sumber Antosianin pada Roti Tawar. *Jurnal Teknologi dan Industri Pangan*, 21 (1).
- Nintami, A.L. & N. Rustanti, 2012. Kadar Serat, Aktivitas Antioksidan, Amilosa dan Uji Kesukaan Mi Basah Dengan Substitusi Tepung Ubi Jalar (*Ipomoea batatas* var *Ayamurasaki*) Bagi Penderita Diabetes Melitus Tipe 2. *Jurnal of Nutrition College*, 1(1).
- Richana, N., 2012. Ubi Kayu dan Ubi Jalar. Nuansa Cendekia. Bandung.
- Suprpta, 2003. Pengaruh Lama Blanching Terhadap Kualitas Stik Ubi Jalar (*Ipomoea batatas* L.) dari Tiga varietas. *Prosiding Temu Teknis Nasional, Tenaga Fungsional Pertanian*.
- Tapsell, Linda C., 2004. Diet and metabolic syndrome : where does resistant starch fit in?. *Journal of AOAC Internasional*, 87 (756-60).
- Winarno, F.G., 2004. *Kimia Pangan dan Gizi*. Penerbit Gramedia. Jakarta
- Winterhalter, Peter, et al., 2011. *Anthocyanins in Purple Sweet Potato (*Ipomoea batatas* L.) Varieties*. Global Science Books.