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Physicochemical properties of egg roll from composite flour of wheat and purple flesh sweet potato

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Abstract. Intensification of use of local food like purple flesh sweet potato is useful for food diversification program and food endurance in Indonesia. Physicochemical properties of egg roll from addition purple flesh sweet potato flour and concentration of carboxymethyl cellulose (CMC) have been learned, with ratio of wheat flour with purple flesh sweet potato flour (T): (80%:20%; 60:40%; 40%:60%; and 20%:80%) and concentration of CMC (C): (0%; 0,5%; 1,0%; and 1,5%). Using wheat flour with purple flesh sweet potato flour of (60%:40%) and concentration of CMC (0,5%) gave the best quality of egg roll.

1. Introduction

Indonesia has dependence on consumption wheat flour for food. Every year, there is increasing on import of wheat flour. Meanwhile there are many plants in Indonesia can made flour like cassava and sweet potato. Developing flour from sweet potato can make import wheat flour will decrease. Sweet potatoes hold the first rank (super food) in nutrition among vegetables [1]. Sweet potatoes varieties with white or pale yellow flesh taste sweet compared to red meat, pink, pink and orange [2]. There was research report that potato sweet had many superiority like highly capture free radicals, prevent the occurrence of cancer, aging, and degenerative diseases, such as atherosclerosis than black soy beans, rice, black and Aubergine purple. Potato sweet had a antimutagenic and antikarsinogenic, prevent disruption in the functioning of the liver, antihyperthensi and antihyperglycemic [3]. Potato sweet had high anthocyanins, that reported as antioxidant and/or anti-inflammatory activities [4].

2. Material and Methods

The research was conducted at *Analisa Kimia Bahan Pangan and Teknologi Pangan* Laboratory, University of North Sumatera. The purple flesh sweet potato were purchased from farmer Berastagi, Sumatera Utara, Indonesia. Wheat flour (Kunci Biru) were purchased PT. Bogasari Flour. The formulation and process of egg roll making refer to Cahyaningtyas [5] and Munawaroh [6] with a slight modification. Wheat flour, purple flesh sweet potato flour, eggs (70%), ovalet (5%), sugar (40%), milk powder (10%), vanilla (2%), tapioca flour (15%) and margarine (50%). Mixed wheat and purple flesh sweet potato flour in accordance with treatment. Mixed eggs, ovalet and sugar for 10 minutes, and add flour, milk powder, vanilla, and tapioca flour, mixed again. Add margarine which has melted, mixed again and add CMC accordance with treatment until all were completely blended.



Then heated mold egg roll with temperature 80°C, and is poured dough above a mold egg roll. Heated dough egg roll for 1 minutes 30 seconds an up look ripe, then rolled up using chopsticks. Cooled ago was done packaging costs so that egg roll not easily crushed, crunchy and extend power save egg roll.

Analysis consist of moisture content analysis using oven method and protein content, ash content, carbohydrate content, and dietary fiber content. De Garmo was used in determining the best treatment method.

3. Results and Discussions

3.1. Moisture Content

Figure 1 showed that there was increase in maiture content while the higher purple flesh sweet potato flour that used on egg roll production. Dietary fiber content in purple flesh sweet potato flour about 3,78% meanwhile in wheat flour 2-2,5%. Dietary fiber had effect on moisture content. There were many free hydroxyl group that had ability to binding water [7]. Figure 1 showed that the higher concentration of CMC the higher moisture content. CMC had OH that binding with water, when CMC is put into food material, CMC which is hydrophilic can absorb water [8]. Sari [9] reported that the higher dietary fiber content the higher moisture content. There was a report that the higher CMC can make matrix of dough more and complex, that can inhibit evaporation of water [10].

Table 1. LSR Test on Moisture Content

Distance	LSR		Ratio of flour (%)	Mean (%)	Notation	
	0,05	0,01			0,05	0,01
-	-	-	T ₁ = 80% : 20%	3.645	d	D
2	0.090	0.124	T ₂ = 60% : 40%	3.968	c	C
3	0.095	0.130	T ₃ = 40% : 60%	4.268	b	B
4	0.097	0.133	T ₄ = 20% : 80%	4.636	a	A

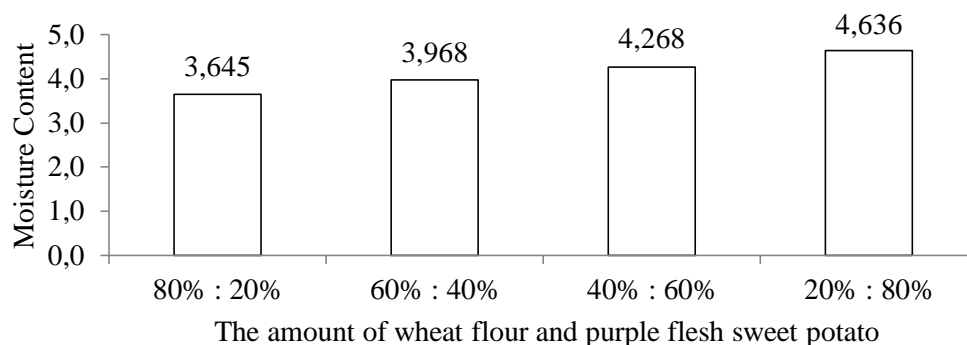


Figure 1. Effect the amount of wheat flour and purple flesh sweet potato on moisture content

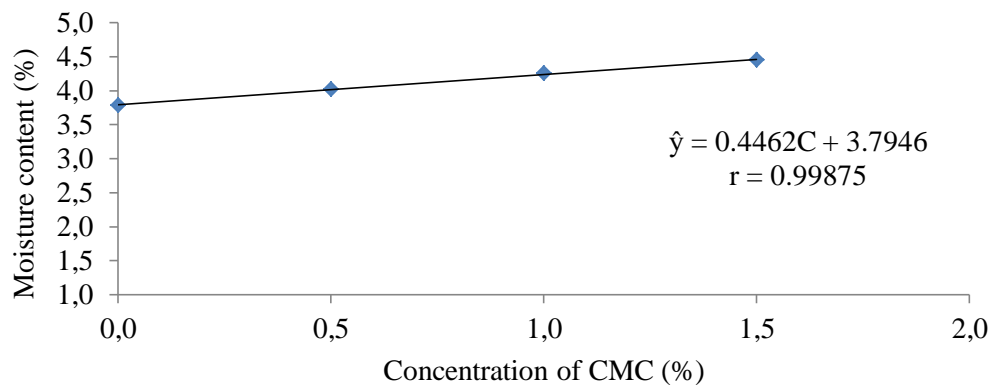


Figure 2. The effect of concentration of CMC on moisture content

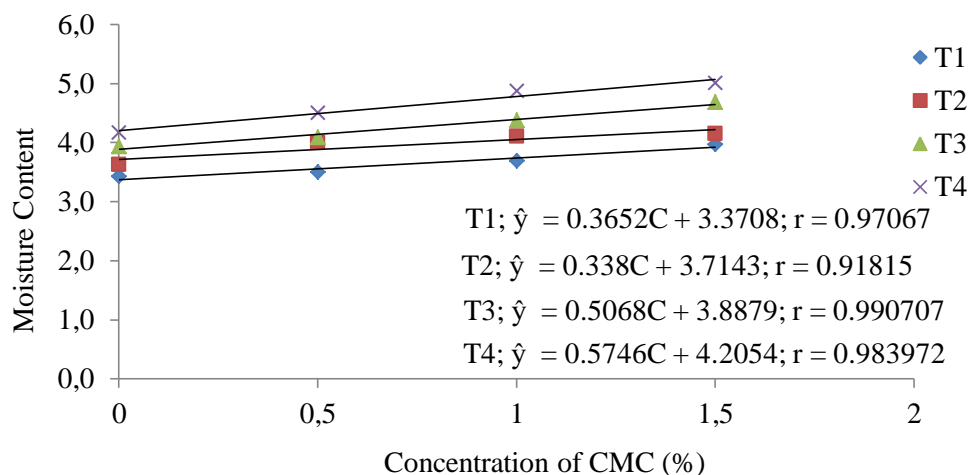


Figure 3. Interaction between the amount of wheat flour and purple flesh sweet potato and concentration of CMC on moisture content

3.2. Ash Content

Table 2 showed that the higher purple flesh sweet potato flour the higher ash content. Ash content showed mineral content in it. Mineral consists of two type, organic salts and non-organic salts. Antarlina and Utomo reported that the purple flesh sweet potato flour contain about 2% ash content [11]. Our ash content analysis was about 3.19%. Meanwhile in National Standarization of Indonesia ash content of wheat flour about 0.7%. It showed that the higher purple flesh sweet potato flour the higher ash content of egg roll [12].

3.3. Protein Content

Table 2 showed that higher purple flesh sweet potato flour the lower protein content. This influenced by the protein content of flour. Wheat flour had high gluten. Gluten is a type of protein that is naturally contained in cerealia which is insoluble in water. Purple flesh sweet potato flour had lower protein content than wheat flour [13].

3.4. Carbohydrate Content

Table 2 showed that higher purple flesh sweet-potato flour the lower carbohydrate content. Carbohydrate levels are influenced by other nutritional components. The lower other nutritional components the higher carbohydrate will be. The lower water content in foodstuffs, the higher the other component like carbohydrate and mineral will be [14].

3.5. Dietary Fiber Content

Table 3 showed that higher purple flesh sweet potato flour the higher dietary fiber content of egg roll. Basic on raw material analysis, dietary fiber on purple flesh sweet potato flour higher than sweet wheat flour, about 3,78%, meanwhile dietary fiber on wheat flour about 2-2,5% [12]. Wisti reported that the higher purple flesh sweet potato flour the higher dietary fiber content in cookies [15]. Figure 4 showed CMC contain dietary fiber that soluble in water.

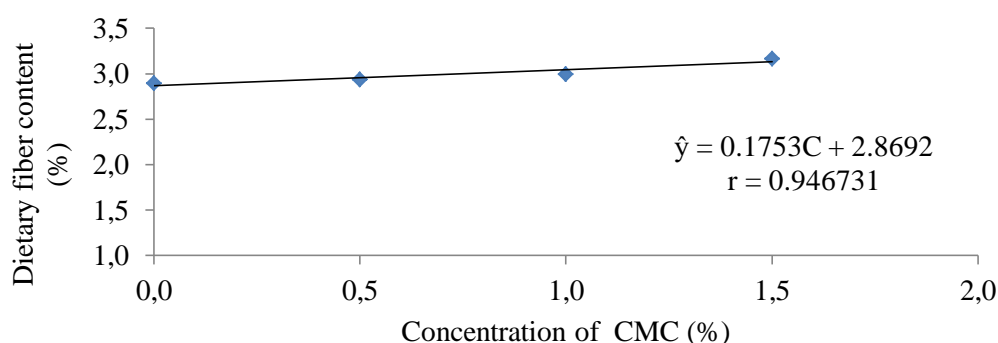


Figure 4. The effect of concentration of CMC on dietary fiber content

Table 2. The effect of amount of wheat flour with purple flesh sweet potato flour on physicochemical properties of egg roll

Parameters	Wheat flour : <i>purple flesh sweet potato flour</i>			
	T ₁ 80% : 20%	T ₂ 60% : 40%	T ₃ 40% : 60%	T ₄ 20% : 80%
Water content (%)	3.6447	3.9678	4.2680	4.6364
Ash content (%)	1.1758	1.4687	1.9791	2.0534
Protein content (%)	7.2560	7.1788	6.7614	6.3497
Carbohydrate content (%)	67.7266	65.9561	65.5430	65.5038
Fiber content (%)	2.7517	2.8633	3.0486	3.3389

Table 3. The effect of concentration of carboxymethyl cellulose (CMC) on physicochemical properties of egg roll

Parameters	<i>Carboxymethyl cellulose (CMC)</i>			
	CMC ₁ 0	CMC ₂ 0.5	CMC ₃ 1.0	CMC ₄ 1.5
Water content (%)	3.7870	4.0194	4.2602	4.4503
Ash content (%)	1.6190	1.6738	1.6871	1.6971
Protein content (%)	7.0352	6.9485	6.8576	6.7047
Carbohydrate content (%)	66.9703	66.3244	65.9164	65.5183
Fiber content (%)	2.8960	2.9394	2.9986	3.1684

Conclusion

The amount of wheat flour about 60 % and purple flesh sweet potato flour of about 40% and concentration of CMC (0,5%) gave the best quality of egg roll.

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