

PAPER • OPEN ACCESS

The effect of the additional of Moringa leaves flour (*Moringa oleifera*) on the physicochemical properties of cup cake from composite flour

To cite this article: Mimi Nurminah *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **305** 012031

View the [article online](#) for updates and enhancements.

The effect of the additional of Moringa leaves flour (*Moringa oleifera*) on the physicochemical properties of cup cake from composite flour

Mimi Nurminah^{1,2*}, Hotnida Sinaga¹, and Nelly Sahrina Gultom¹

¹Department of Food Science and Technology, Faculty of Agriculture, Universitas Sumatera Utara, Medan, Indonesia

²Centre for Tubers and Roots Crop Study, Faculty of Agriculture, Universitas Sumatera Utara, Medan, Indonesia

*Email : miminurminah@usu.ac.id or mimisinaga@yahoo.co.id

Abstract. Moringa leaf (Daun kelor) is a local plant that can be used for food and medicine in Indonesia, like vegetable and drug for bone. This study was to find nutritional of cup cake made from mocaf and wheat flour with the additional of Moringa leaves flour and to find the formulation of making cup cake. This research was performed using completely randomises design. Addition moringa leaves flour had effect on phisicochemical properties of cup cake. The best cup cake was made from 100% of wheat flour and 0% mocaf flour and the additional of 2% Moringa leaves flour.

Keywords: Mocaf, Wheat Flour, Moringa Leaves Flour, Cup Cake.

1. Introduction

Microbes used in fermentation were lactic acid bacteria which hydrolize starch into sugar and convert it to organic acid. This process made modification of characteristic on mocaf like viscosity, rehydration power and ability to dissolve [1]. Moringa leaf (local name “Daun kelor”) or *Moringa oleifera* is a local plant that can be used for food and medicine in Indonesia, like vegetable and drug for bone. Moringa oleifera is a part of the moringaceae [2]. Moringa oleifera multipurpose of Moringa oleifera were medicine, food for human consumption such as yogurt, cake, bread, biscuits and soup [3]. Many researches have been on using moringa leaves such as supplementation of wheat flour with moringa oleifera [4]. The purpose of this research was to find the nutritional content of cup cake made from mocaf and wheat flour with the additional of moringa leaves flour and to find the best formulation of making cup cake.

2. Material and Methods

The research was conducted at Analisa Kimia Bahan Pangan Laboratory, University of North Sumatera, from March to July 2018. Moringa oleifera was collected from Calang, Aceh Jaya, the wheat flour was collected from PT. Indofood Bogasari flour and Mocaf (*Modified cassava flour*) was collected from Yogyakarta.



The formulation and process of cup cake making refer to [5] with a slight modification: wheat flour (100 gr), margarine (75 gr), sugar (75 gr), eggs (150 gr), baking powder (20 gr), mocaf flour (0%, 25%, 50%, 75%, 100%), and moringa leaves flour (0%, 0.5%, 1%, 1.5%, 2%). Margarine, eggs, and sugar mixed until it forms a smooth cream, add wheat flour, mocaf flour, moringa leaves flour, and margarine, stir manually using a wooden spoon until all were completely blended. Then cup cake were placed on cup or baking sheet and baked using an oven toaster at approximate temperature of 160°C for 30 minutes. The done cup cake were taken out, cooled, and packaged in polyethylene plastic packaging. Analysis consist of moisture content analysis using oven evaporation [6], dry ashing [7], using kedhal method [8], and dietary fiber content using autoclave method [9].

3. Result and Discussion

3.1. Moisture content

Table 1 showed the more Mocaf flour that used, the lower water content. Protein content in flour has effect. Protein in mocaf flour is lower protein than wheat flour. Water content higher because had hydroxyl and carboxyl group that can absorb water, functional group (NH₂, NH, OH, and CO) in protein can make protein absorb water molecule through hydrogen bond [10].

3.2. Ash Content

Table 1 showed that the higher mocaf flour the higher ash content. Mocaf flour had higher ash content (1, 7953%), ash content was a non-volatile component, stay after burning. Cassava contain high mineral, like calcium 84 mg, phosphor 125 mg and 1 mg ferrum [11]. Table 2 showed that higher moringa leaf, higher ash content. Moringa leaf has high ash content, 9.38%. Moringa leaves are plants that contain higher ferrum than other vegetables, about 17.2 mg/100 gr [12].

3.3. Protein Content

Table 1 showed that higher mocaf, lower protein content. The main ingredient of wheat flour was wheat that had protein, meanwhile mocaf was cassava that had high carbohydrate. Soaking cassava in water can make lower protein, because protein in cassava were dissolve in water [13]. Mocaf flour had lower protein content than wheat flour, mocaf had no gluten [14]. Table 2 showed that higher moringa leaves flour higher protein. Moringa leaves flour had high protein content about 17.52% [15]. Moringa leaves flour had 8 essential amino acid and 10 non-essential amino acids [16].

3.4. Fat Content

Table 1 showed that lower mocaf flour lower fat content. Table 2 showed that the higher moringa leaves flour higher fat content. Moringa leaves flour had higher fat about 73% oleat acid (omega-9), linoleic acid (omega-3), and alphas-linolenic acid (omega-6) [16].

3.5. Dietary Fiber Content

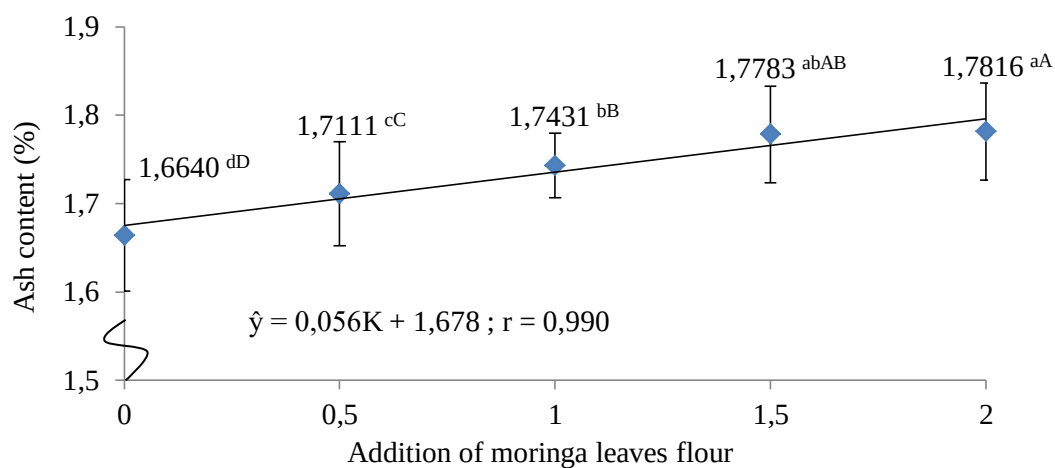
Table 1 showed that higher mocaf flour higher dietary fiber content. Mocaf flour were made from cassava that had high dietary fiber. Raw Cassava consist dietary fiber about 0.9 gr [17]. Table 2 showed that higher moringa leaves flour higher dietary fiber. Moringa leaves flour had higher dietary fiber about 10.52%. Moringa leaves had five times higher dietary fiber than the others vegetables [16].

Table 1. The effect of the comparison of composite flour (wheat flour with mocaf flour) on the physicochemical properties

Quality parameters	Ratio of flour : Mocaf (P)				
	P1 (%) (0:100)	P2 (%) (25:75)	P3 (%) (50:50)	P4 (%) (75:25)	P5 (%) (100:0)
Water content (%)	21.1888	22.0098	22.4545	22.8961	23.8012
Ash content (%)	1.7953	1.7462	1.7245	1.7075	1.7074
Protein content (%)	3.7834	3.7966	4.1845	4.2718	4.4023
Fat content (%)	16.0416	15.9725	15.8655	15.8507	15.8482
Fiber content (%)	2.5093	2.5074	2.3992	2.3137	2.2416

Table 2. The effect of addition of Moringa leaves flour on the physicochemical properties

Quality parameters	Addition of moringa leaves flour (K)				
	M1 (0%)	M2 (0.5%)	M3 (1%)	M4 (1.5%)	M5 (2%)
Water content (%)	22.0542	22.4132	22.3096	22.9487	22.6246
Ash content (%)	1.6640	1.7111	1.7431	1.7783	1.7816
Protein content (%)	3.8504	4.0160	4.0209	4.2157	4.3357
Fat content (%)	15.7911	15.8596	15.9188	15.9908	16.0181
Fiber content (%)	2.1679	2.2507	2.4119	2.4690	2.6716

Figure 1. The relationship between addition of Moringa leaves flour with ash content of *cup cake*

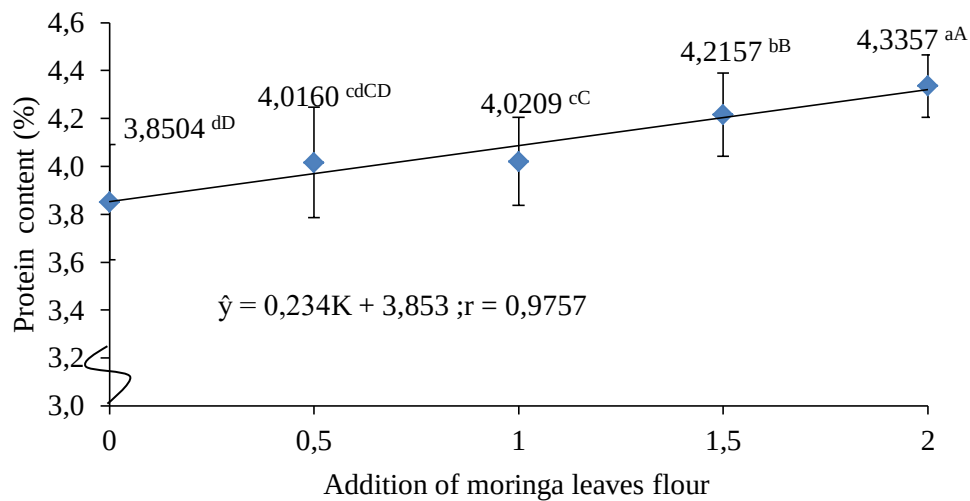


Figure 2. The relationship between addition of Moringa leaves flour with protein content of *cup cake*.

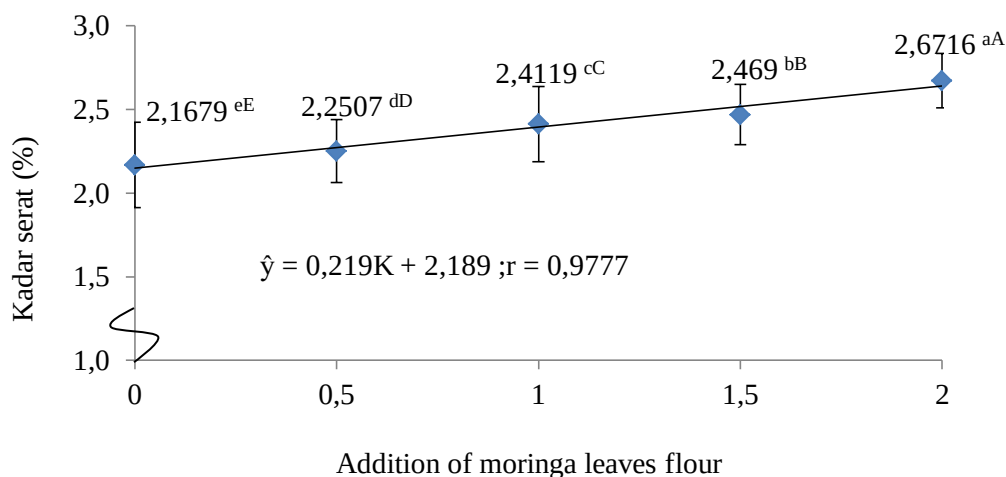


Figure 3. The relationship between addition of Moringa leaves flour with fiber content of *cup cake*.

Conclusion

The best cup cake was made from 100% of wheat flour and 0% mocaf flour and the additional of 2% moringa leaves flour.

References

- [1] Subagio, A, dkk. (2008). Produksi Operasi Standar (POS): Produksi Mocaf Berbasis Klaster. UNEJ-Press, Jember.
- [2] Arora DS, Onsare JG, Kaur H. Bioprospecting of Moringa Moringaceae: Microbiological perspective. J pharmacog and phytochem. 2013; 1(6):193-215.
- [3] Daba M. Miracle Tree: A Review on Multi-purpose of Moringa oleifera and its Implication for Climate Change Mitigation. J Earth Science & Climate Change. Doi:10.4172/2157-7617.1000366,2016; 7(8).
- [4] Abou-Zaid AA, Nadir AS. Quality Evaluation of Nutritious Chocolate and Halawa Tahinia Produced with Moringa oleifera Leaves Powder. Middle East J. Applied Science. 2014;

- 4(4):1007-1015.
- [5] Ismayeni, Y. (2007). Variasi Brownies Kukus dan Panggang. Kawan Pustaka.
 - [6] SNI. 1992. Cara Uji Makanan dan Minuman. 01-2891-1992. Badan Standarisasi Nasional. Jakarta.
 - [7] SNI. 1994. Tapioka. 01-3451-1994. Badan Standarisasi Nasional. Jakarta.
 - [8] Sudarmadji, S. B. Haryono dan Suhardi. (1989). Prosedur Analisa Untuk Makanan dan Pertanian. Liberty, Yogyakarta.
 - [9] Apriyanton, A., D. Fardiaz, N. Puspitasari dan S. Budiyo. (1989). Petunjuk Laboratorium Analisa Pangan. IPB-Press, Bogor.
 - [10] Lehninger, A. H. (1995). Dasar-Dasar Biokimia. Erlangga, Jakarta.
 - [11] Wahjuningsih, S. B. (1990). Pengaruh Lama Fermentasi dan Cara Pengeringan Terhadap Mutu Gari yang Dihasilkan. Skripsi Fakultas Teknologi Pertanian IPB, Bogor.
 - [12] Yamaego, W. C., Bengaly, D. M., Traore, S. A. (2011). Determination of Chemical Composition and Nutritional Values of Moringa oleifera Leaves. Pakistan Journal of Nutrition. 10 (3): 264-268.
 - [13] Hidayat, B. (2009). Karakteristik Tepung Ubi Kayu Modifikasi. Bandar Lampung.
 - [14] Salim, E. (2011). Mengolah Singkong Menjadi Tepung Mocaf Bisnis Produk Alternatif Pengganti Terigu. Andi Offset, Yogyakarta.
 - [15] Zakaria., A. Tamrin., Sirajuddin, dan R. Hartono. (2012). Penambahan tepung daun kelor pada menu makanan sehari-hari dalam upaya penanggulangan gizi kurang pada anak balita. Jurnal Media Gizi Pangan. 13 (1): 41-47.
 - [16] Krisnadi. (2005). Kelor Super Nutrisi. Pusat Informasi dan Pengembangan Tanaman Kelor Indonesia, Blora.
 - [17] Alfriansyah, N. (2009). Rahasia Sehat dengan Makanan Berkhasiat. ITB-Press, Bandung.