

# The Effect of Composite Flour of Wheat, Durian Seed and Purple Sweet Potato on Muffin's Quality

F. K. Simanjuntak<sup>1</sup>, R. J. Nainggolan<sup>1</sup> and M. Nurminah<sup>1,2,3</sup>

<sup>1</sup>Department of Food Science and Technology Faculty of Agriculture Universitas Sumatera Utara, Medan, Indonesia

<sup>2</sup>Centre for Tubers and Roots Crop Study, Faculty of Agriculture, Universitas Sumatera Utara

Keywords: Composite Flour, Muffin, Durian Seed, Sweet Potato Flour

Abstract: Developing processing flour from Indonesia like durian seed stone and sweet potato can make decrease dependency on import flour like wheat. Composite flour consist wheat flour (WF), durian seed flour (DSF) and purple sweet potato flour (PSPF) that used for muffin's production which composite flours formulation (DSF/PSPF) was used as a factor (40%/10%, 30%:20%, 20%:30%, 10%/40%) and the wheat flour was used as a fixed factor (50%) for each treatment. Physical, chemical and sensory properties of muffin from composite flour were examined. Parameters analyzed in this research were °Hue value, L value, moisture content, ash content, protein content, fat content, crude fiber content, value of texture, aroma, color and taste. Wheat flour (WF) 50 %, durian seed flour (DSF) 10 % and purple sweet potato flour (PSPF) 40 % produced the best and acceptable muffin.

## 1 INTRODUCTION

The growth of population will be increase and depend on consumption wheat flour that cause problem in food security in Indonesia, an example the amount of import of wheat flour will increase every year. The solution for that problem is decrease dependency on the wheat flour with developing processing flour from Indonesian's local food, like durian seed and potato sweet. When developing food security, the most urgent task is to increase the resource efficiency in all local food. Durian seed is the waste that can be changed to be flour and consist high level carbohydrate. Durian seed flour has long shelf life so we can use for bakery (Rofaidah, 2008) and has white yellow colour (Amin, *et. al.*, 2009). One the bakery products traditionally made from wheat is muffin. In Indonesia, the sweet potato is known as the edible tuber. Sweet potatoes hold the first rank (super food) in nutrition among vegetables (Milind and Monika 2015). The characteristic of anthocyanins content in sweet potatoes are high. Anthocyanins are the most basic type of flavonoids from fruits and vegetables that can be used as natural purple dyes (Montilla *et. al.*, 2011) and possess great potential as a source of antioxidants as well as bitter taste (Miguel, 2011), highly capture free radicals,

prevent the occurrence of cancer, aging, and degenerative diseases, such as atherosclerosis than black soy beans, and rice. The relationships also has the ability as a antimutagenic and anticarcinogenic, prevent disruption in the functioning of the liver, antihypertensive and antihyperglycemic (Ginting *et. al.*, 2014).

## 2 MATERIAL AND METHODS

### 2.1 Materials

Durian seed and purple tuber varieties of sweet potato. Other ingredients, such as eggs, margarine, salt, sugar, baking powder, and water.

### 2.2 Composite Flour Preparation

Composite flours formulation consist a factor (Durian Seed Flour/Purple Sweet Potato Flour: 40%:10%, 30%:20%, 20%:30%, 10%:40%) and the wheat flour was used as a fixed factor (50%) for each treatment.

### 2.3 Muffin

Four composition of three flours were used to make muffin (Purnomo et al., 2012). 200 g of flours was added with 2 g baking powder, 2 g vanilli, 150 g margarine, 200 g sugar, 31 g liquid milk, 65 g egg in a kitchen mixer for 15-20 min at low speed (speedsetting: 1). Then baked at 150 °C for 25 minutes in an electrical oven. We analyzed proximat composition of muffin by according (AOAC, 1995) and sensory. Panelists were randomly selected from students of Department of Food Science and Technology University of Sumatera Utara, to perform the evaluation of sensory.

### 2.4 Data Analysis

We analyzed data using SPSS Version 22. Differences were determined using the method of Least Significant Difference (LSD) tests at 95% confidence level ( $P < 0.05$ ) and 99% confident level ( $P < 0.01$ ). The best treatment of the test was then compared with the control treatment using T-test.

Table 1: The effect of composite flour on physical properties of muffin quality

Sample	Parameter	
	°Hue	L
F1	75,54 ± 4,78	37,50 ± 0,94
F2	60,39 ± 1,57	35,97 ± 0,61
F3	48,87 ± 7,79	32,80 ± 4,45
F4	37,57 ± 2,44	28,72 ± 1,57

\*) F1= proportion 50% wheat flour, 40% durian seed flour, 10% purple sweet flour. F2= proportion 50% wheat flour, 30% durian seed flour, 20% purple sweet flour. F3= proportion 50% wheat flour, 20% durian seed flour, 30% purple sweet flour. F4= proportion 50% wheat flour, 10% durian seed flour, 40% purple sweet flour.

### 3.2 Effect of Composite Flour on Chemical Properties of Muffin

Table 2 showed a significant difference at the 1% level in protein content, fiber content, and fat content. The low level of moisture in muffin from composite flour was due to lower baking temperature and longer of baking time as compare to traditional proces (Purnomo et al. 2012). Moisture content of muffin from composite flour lower than 100% wheat with ranging than 12.99-15.55% (Barcennas and Rosell, 2006). Moisture content in muffin was influenced by potato sweet flour and durian seed flour (Srivastava, 2012), because decrease and increase of the moisture content took place linearly with the increase and decrease potato sweet and durian sweet. The plasma membrane that protect the inside of cell will damaged if temperature continued to be offered up, it will cause fluid loss in

## 3 RESULTS AND DISCUSSION

### 3.1 Effect of Composite Flour on Physical Properties of Muffin

F1 flour made from proportion 50% wheat flour, 40% durian seed flour, 10% purple sweet flour had a higher °Hue and lower L. F4 flour made from proportion 50% wheat flour, 10% durian seed flour, 40% purple sweet flour had a lower °Hue and lower L. It was influenced by the stability of the pigment anthocyanin (cyanidin and peonidin) which contributed in the formation of blue or purple hue on muffin quality (Truong et al. 2010). Beta-carotene content of sweet potato (Teow et al. 2006) is high, so that it will increase the presence of betakarotene on the final product, but beta carotene is unstable to heat. High intake of betacarotene may help protect against oxidative damage, lowering cancer and cardiovascular disease risk (Genkinger et al. 2014).

the cells, cause shrinkage of the heavy (Estiasih dan Ahmadi, 2009). Crude fiber in durian seed flour (9.44%) higher than potato sweet flour (4.68), it indicated higher crude fiber, higher ability to bind water (Widiatmoko dan Estiasih. 2015).

Table 2. The effect of composite flour on chemical properties of muffin quality

Samples	Parameter				
	Moisture	Ash	Protein	Fat	Crude Fiber
F1	15,25 ± 0,05	1,44 ± 0,17	5,77 ± 0,17	29,76 ± 0,21	1,90 ± 0,008
F2	14,86 ± 0,13	1,43 ± 0,11	5,24 ± 0,16	30,19 ± 0,24	1,89 ± 0,002
F3	13,87 ± 0,17	1,42 ± 0,16	4,60 ± 0,13	31,50 ± 0,69	1,85 ± 0,006
F4	12,99 ± 1,02	1,36 ± 0,11	4,11 ± 0,01	32,48 ± 0,24	1,83 ± 0,003

\*) F1= proportion 50% wheat flour, 40% durian seed flour, 10% purple sweet flour. F2= proportion 50% wheat flour, 30% durian seed flour, 20% purple sweet flour. F3= proportion 50% wheat flour, 20% durian seed flour, 30% purple sweet flour. F4= proportion 50% wheat flour, 10% durian seed flour, 40% purple sweet flour.

Table 3. The effect of composite flour on sensory properties of muffin quality

Samples	Parameter			
	Texture	Aroma	Color	Taste
F1	3,56 ± 0,23	3,60 ± 0,18	3,36 ± 0,04	3,700 ± 0,51
F2	3,56 ± 0,23	3,66 ± 0,18	3,56 ± 0,04	3,76 ± 0,14
F3	3,70 ± 0,33	3,66 ± 0,18	3,73 ± 0,09	3,83 ± 0,04
F4	3,73 ± 0,37	3,66 ± 0,09	4,03 ± 0,14	3,93 ± 0,00

\*) F1= proportion 50% wheat flour, 40% durian seed flour, 10% purple sweet flour. F2= proportion 50% wheat flour, 30% durian seed flour, 20% purple sweet flour. F3= proportion 50% wheat flour, 20% durian seed flour, 30% purple sweet flour. F4= proportion 50% wheat flour, 10% durian seed flour, 40% purple sweet flour.

### 3.3 Effect of Composite Flour on Sensory Properties of Muffin

All sensory indicated higher sweet potato higher value. Muffin had the higher purple sweet potato more preferable. Muffin from F4 higher texture, aroma, color and taste than F1, F2 and F3. Color difference was due to the differences in flour color conditions as raw materials, material formulations, Maillard reactions and caramelizations. Egg yolks had carotenoid pigments that reflect yellow, orange or red colors (Sahara. 2011). Maillard tanning was due to the reaction of carbonyl compounds derived from the break down of carbohydrates or fats with amino compounds in the material. The caramelization occurred because the material was heated at high temperature (Eskin et al., 1971). Antocyanins were positively associated with redness (Han *et al.*, 2017).

## 4 CONCLUSIONS

Based on the results of research on the use composite flour to make muffin, it can be drawn conclusion that using durian seed flour and potato sweet flour can make acceptable muffins. The study indicate that composite flour showed effect on the quality of muffins. The final results showed that F4 (50% Wheat Flour, 10% Durian Seed Flour and 40%

Potato Sweet Flour) produced the best and acceptable muffins.

## REFERENCES

- Amin M., Amiza, R. Arshad. 2009. Proximate composition and pasting properties of durian (*Durio z.*) seed flour. *Int. J. Of Postharvest Tech. Innovation*.
- AOAC. 1995. *Official Methods of Analysis of the Official Analytical Chemist Association of Analytical Chemist Inc Arlington VA.*
- Barcennas M.E., Rosell C.M. 2006. Effect of frozen storage time in the bread crumb and aging of parbaked bread. *Food Chem* 95:438-445.
- Eskin, N. A. M., Henderson, H. M., dan Townsend, J. 1971. *Biochemistry of Food Academic Press, London.*
- Estiasih, T dan Ahmadi. 2009. *Teknologi Pengolahan Pangan. Bumi Aksara. Jakarta.*
- Genkinger JM, Platz EA, Hoffman S.C., Comstock G.W., Helzlsouer K.J. 2004. Fruit, vegetable antioxidant intake and all cause, cancer and cardiovascular disease mortality in a community dwelling population in Washington County, Maryland. *Am J Epidemiol.*
- Ginting E, Yulifanti R., dan Jusuf M. 2014. Ubi jalar sebagai bahan diversifikasi pangan lokal. *Balai Penelitian Tanaman Aneka Kacang dan Umbi, Malang.*
- Han, F., Ju, Y., Ruan, X., Zhao, X., Yue, X., Zhuang, X., Qin, M., dan Fang, Y. 2017. Color, anthocyanin, and antioxidants characteristic of young wines produced from spine grapes (*Vitis davidii* foex) in China. *Food & Nutrition Research* 61. 1-11.

- Milind P dan Monika. 2015. Sweet potato as a super food International Journal of Research Ayuverda pharmacology 6(4) 557-562.
- Montilla E C, hillebrand S, dan Winter halter P. 2011. Anthocyanins in purple sweet potato (*Ipomea batatas* L) varietis Global Science Book 5(2)19-24.
- Miguel MG. 2011. Anthocyanins: Antioxidant and/or anti-inflammatory activities. Journal of Applied Pharmaceutical Science 01(06) 7-15.
- Purnomo, E. H., A. B. Sitanggang, D. S. Agustin, P. Hariyadi, dan S. Hartono. 2012. Formulation and process optimization of muffin produced from composite flour of corn, wheat and seed potato. J. Teknologi dan industri pangan. 23(2):165-172.
- Rofaida, L.L. 2008. Komperasi Uji Karbohidrat pada Produk Olahan Makanan dan Tepung terigu dan Tepung biji durian (*Durio zibethinus* Murr). Skripsi. Pendidikan Biologi Fakultas Keguruan dan Ilmu Pendidikan. Universitas Muhamaddiyah. Surakarta.
- Sahara, 2011. Penggunaan Kepala Udang sebagai Sumber Pigmen dan Kitin dalam Pakan Ternak. Jurnal Agribisnis dan Industri Peternakan 1(1):31-35.
- Srivastava S, Genitha T R, Yadav V. 2012. Preparation and quality evaluation of flour and biscuit from sweet potato. Journal of Food Processing & Technology 3(12) 1-5.
- Teow CC, Truong V, Mcfeeters RF, Thompson RL, Pecota KV, Yencho GC. 2007. Antioxidant activities, phenolic and betacarotene content of sweet potato genotypes with varying flesh colours. Food Chem 103:829-838.
- Truong V D, Deighton N, Thompson R T, Mcfeeters R F, Dean L O, Pecota KV and Yencho GC. 2010. Characterization of anthocyanins and anthocyanidins in purple fleshed sweet potatoes by HPLC-DAD/ESI-MS/MS. Journal Agriculture Food Chemistry 58 404-410.
- Widiatmoko, RB. Dan T. Estiasih. 2015 Karakteristik Fisiko Kimia dan organoleptik Mie kering berbasis tepung Ubi Jalar Ungu pada berbagai Tingkat Penambahan Gluten. Jurnal Pangan dan Agroindustri. 3 (4):1386-1392.