Effect of Composite Flour (Wheat and Pumpkin Flour) and Type of Stabilizers on the Quality of Dry Noodles

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Keywords: Dry noodles, stabilizer, wheat flour, pumpkin flour

Abstract: Every year we import wheat flour from other countries to supply domestic needs in making noodles. There were many plants from local resources that can be used as flour to substitute wheat flour, like pumpkin. This research deal about making flour from pumpkin fruit, effect of composite flour (wheat and pumpkin flour) and the type of stabilizers on the quality of dry noodles. The pumpkin flour can subtitute wheat flour about 20% to make dry noodles.

1 INTRODUCTION

Local food diversification is an important development effort in achieving food security, especially in relation to diverse food availability, overcoming nutrition problems and empowering people's economy. One of the development of food diversification is to look for the potential of local plants to reduce the rate of use of imported flour (Marsigit, 2010). In 2017-2018, Indonesian wheat imports are predicted to reach 9.7 million tons, up 0.7 percent from 2016-2017 which reached 9 million tons (Food and Agriculture Organization, 2017). The high number of wheat imports shows a large demand for food products based on wheat and derivatives such as wheat flour. The development of flour through the use of local carbohydrate sources can contribute to the decrease in consumption of wheat flour (Mojiono et al; 2016).

Pumpkin is one of the agricultural commodities that contain a lot of beta-carotene or provitamin A which is very beneficial for health. Pumpkin also contains nutrients such as protein, carbohydrates, some minerals such as calcium, phosphorus, iron, and some vitamins B and C. Pumpkin (Cucurbita moschata) is a type of creeper from the Cucurbitaceae family which is classified as a type of annual plant. This plant has been widely cultivated in African, American, Indian and Chinese countries. This plant can grow in the lowlands and highlands. The ideal height for pumpkin plants is between 0-1500m above sea level (Hendrasty, 2003). Pumpkin has an average weight of 3-5 kg. The thickness of the fruit flesh is about 3 cm and it tastes rather sweet. For large squash, there is a weight that reaches 20 kg per fruit. Pumpkin round flat, oval, or long with many grooves (15-30 grooves) (Krisnawati, 2009). Nutritional composition of pumpkin flour in 100 grams of material is carbohydrate 77.65%, protein 5.04%, fat 0.08%, water 11.14% and ash 5.89% (Widowati et al., 2001).

Hydrocolloids can function to substitute gluten in products or foods that do not contain gluten. Hydrocolloids are classified in water-soluble fibers. Hydrocolloids can fuse with water and form tissue with flour particles so that it becomes a cohesive network. Xanthan gum and CMC can produce better structures and have a higher number of cells (Gomez and Sciarini, 2015). Gum arabic is an emulsifier so arab gum will be easily dissolved in water or oil (Hakim dan Chamidah, 2013). In this research, we studied the effec of composite flour (wheat and pumpkin flour) and the type of stabilizers on the quality of dry noodles.

Nurminah, M. and Nainggolan, R.
Effect of Composite Flour (Wheat and Pumpkin Flour) and Type of Stabilizers on the Quality of Dry Noodles.
DOI: 10.5220/0008548001520155
In *Proceedings of the International Conference on Natural Resources and Technology (ICONART 2019)*, pages 152-155
ISBN: 978-989-758-404-6

2 MATERIAL AND METHOD

This research was conducted at Analisa Kimia Bahan Pangan Laboratory, University of North Sumatera. Pumpkins were purchased from farmer at Kecamatan Saribudolok, kabupaten Simalungun, Indonesia. The making of pumpkin flour: tthe pumpkin was peeled with 0.2 cm thick sliced knife, placed in a baking sheet and dried in an oven with temperature 50^{o}C about 24 hours, then milled and sifted with 80 mesh sieve. The making of noodles: Mixed pumpkin and sweat flour with formulation 10%:90%; 20%:80%; 30%:70%, 40:60% and 50%:50% with total treatment about 100 gr. Mixed 5 treatment with 4 stabilizer (non stabilizer, arab gum, CMC, and Tween 20). Added salt (0,2 %), egg (14%), and Na_2CO_3. Kneaded about 15 minutes, made sheet shape and made noodles using ampia machine, steamed at temperature 100^{o}C about 12 minutes and dried in the oven at 50^{o}C about 24 hours. Analysis consist of moisture content analyis by using oven method (AOAC, 1995), ash content using dry ashing method (Sudarmadji et al., 1997), sensory test (Soekarto, 1982).

The data analysis using randomized design were analyzed using SPSS version 22 for windows. The results reported in all tables are average of triplicate observation subjected to one way analysis of variance (ANNOVA). Different among the ranges of the properties were determinate using the method of Least Significant Differences (LSD) tests at 95% confidence level (P<0.01). The best treatment was then compared with the control treatment T-test De Garmo was used in determining the best treatment method.

3 EFFECT COMPOSITE FLOUR AND THE TYPE OF STABILIZERS ON MOISTURE CONTENT

Tabel 1: Effect of composite flour on moisture content

Pumpkin Flour:Wheat Flour	Moisture Content
T1 = 10%:90%	3.134
T2 = 20%:80%	3.140
T3 = 30%:70%	3.294
T4 = 40%:60%	3.447
T5 = 50%:50%	3.749

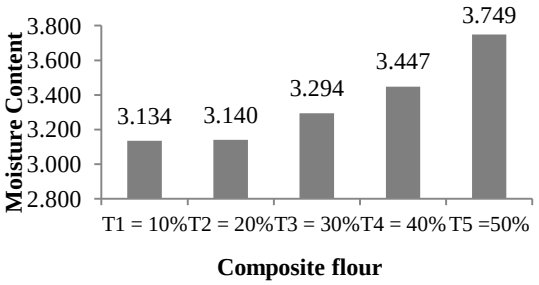

Figure 1: Effect of composite flour on moisture Content

Table 1 and figure 1 showed that we produced the dry noodles that contain moisture content about 3.134 until 3.749. When we checked in SNI (Standar Nasional Indonesia with code SNI 01-3551-2000 for instant noodles) and SNI 01-2974-1999 for dry noodles, we found that our product (dry noodles) lower than SNI, it mean that our products meet the requirements determined by SNI in Indonesia. When the moisture content of product is lower, we can hope that the product can be stored longer because microbes can be prevented from growing and multiplying. Noodles are one of the food products that has a large number of interested people in Indonesia. One of the famous noodle products on the market is dried noodles. Dry noodles have advantages such as ready to cook, practical, low prices, and a long shelf life (Jayasena et al.,2010).

Tabel 2: Effect of the type of stabilizers on moisture content

The type of Stabilizers	Moisture Content
Non Stabilizer (P0)	3.254
Arab Gum (P1)	3.300
CMC (P2)	3.405
Tween 20 (P3)	3.452

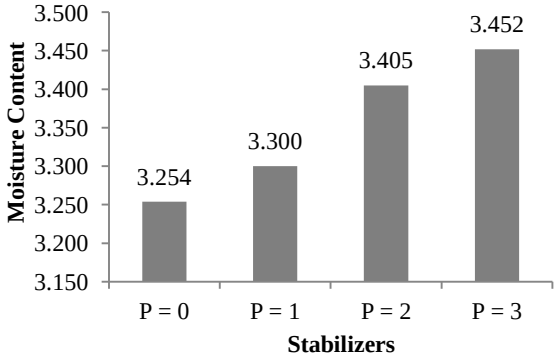

Figure 2: Effect of the type of stabilizers on moisture content

Table 2 and figure 2 showed that the effect of the type of stabilizers on moisture content. Moisture content of the product consists of 3.254 until 3.452. The type of stabilizers showed no significant difference on moisture content.

4 EFFECT COMPOSITE FLOUR AND THE TYPE OF STABILIZERS ON ASH CONTENT

Tabel 3: Effect of composite flour on ash content

Pumpkin Flour:Wheat Flour	Ash Content
T1 = 10%:90%	3.034
T2 = 20%:80%	3.121
T3 = 30%:70%	3.324
T4 = 40%:60%	3.618
T5 =50%:50%	3.950

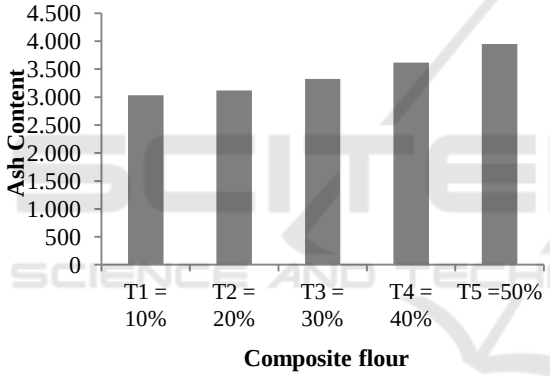

Figure 3: Effect of composite flour on ash content

Table 3 and figure 3 showed that the amount of ash were about 3.034 until 3.950. When we added more pumpkin flour, amount of ash content will increase. Ash content indicates the content of minerals or organic substances in foodstuffs that are not flammable and evaporate during spawning (Ratnasari dan Yunianta, 2015). It means pumpkin flour contain high mineral. Pumpkin contains calcium 45 mg, fosfor 64 mg, ferrum 1.4 mg, vitamin A 180 SI, vitamin B1 0.008 mg and vitamin C 52 mg (Departemen Kesehatan RI, 1996). Meanwhile wheat flour contains calcium 106 mg, fosfor 64 mg, ferrum 1.2 mg and vitamin B1 0.12 mg (Departemen Kesehatan RI, 1996).

5 EFFECT COMPOSITE FLOUR AND THE TYPE OF STABILIZERS ON SENSORY TEST

Tabel 4: Effect of composite flour on hedonic taste

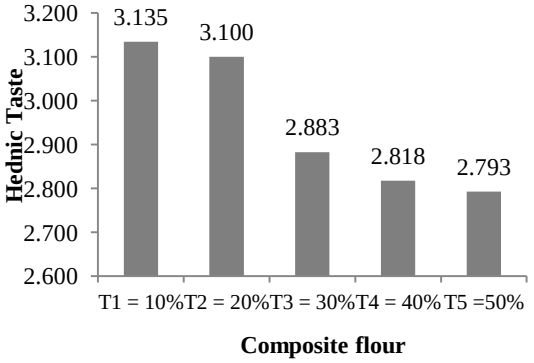

Figure 4: Effect of composite flour on hedonic taste

Table 4 and figure 4 showed that hedonic test were about 2.793 until 3.135. The acceptable hedonic test which is worth above 3 is the amount of pumpkin flour about 10 to 20%. the amount of pumpkin flour above 20 percent shows the taste that is less preferred.

Tabel 5: Effect of composite flour on hedonic colour

Pumpkin Flour:Wheat Flour	Hedonic Colour
T1 = 10%:90%	3.265
T2 = 20%:80%	3.200
T3 = 30%:70%	3.186
T4 = 40%:60%	3.037
T5 =50%:50%	2.935

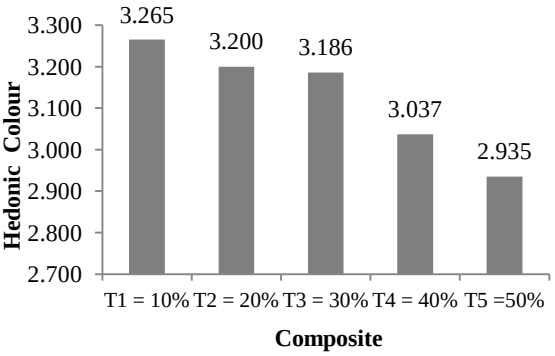

Figure 5: Effect of composite flour on hedonic colour

Table 5 and figure 5 showed that hedonic colour were about 2.935 until 3.265. We can see that when

the added more pumpkin flour, the hedonic colour will decrease. High gelatinization will cause a Maillard reaction, which is a reaction between carbohydrates which specifically reducing sugars with primary amine acid groups found in food which causes brownish color (Winarno, 1992). Non-enzymatic browning that often occurs when drying pumpkin is a Maillard reaction. The browning reaction can be prevented by doing initial treatment such as adding anti-browning and soaking in hot water or a combination of both (Sappers and Miller, 1992).

6 CONCLUSION

The pumpkin flour can subtitute wheat flour about 20% to make dry noodles.

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