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The Effect of Lime Solution's Concentration ($\text{Ca}(\text{OH})_2$) on Physicochemical and Sensory Properties of Durian Seed's Flour (*Durio zibethinus*)

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Abstract. Lime solution was used to decrease mucus in durian seed, so durian seed can be used for food like flour. The introduction of durian seed for flour is aimed to looking for new resource of flour, decrease our dependence on wheat flour, and support food diversification program. The study was conducted to investigate the effect of lime solution's concentration in durian seed's flour using completely randomized design by single factor. Durian seed's flours production which lime solution's concentration (K) was used as factors (0,1%, 0,5%, 0,9%, 1,3%). Parameters analyzed were ash, moisture, fat, protein, crude fiber, aroma and color. Based on the analysis parameters results, the best durian seed's flour will be applied in muffin's production. The results showed that lime solution soaking treatment ($\text{Ca}(\text{OH})_2$) 0,1% produced the best durian seed's flour.

1. Introduction

One way that decrease our dependency on wheat import was developing of processing flour from Indonesian's local plant. Researchers had interested to explore wastes from agriculture [1], like durian seed gum [2,3]. Durian seed contain high level of carbohydrate that can be used for food. Durian seed can be processed into flour. Processing durian seed into flour need special handling, like removal mucus with addition salt 6 % and stired under running water [4]. Soaking in $\text{Ca}(\text{OH})_2$ solution (lokal name "kapur sirih solution") on processing of durian seed can removal mucus, extend shelf life and prevent browning, give a hard textures, and reduce bitter taste [5]. Durian seed had high starch about 42.1 % [6], has long shelf life [7] and white yellow colour [8]. Paper investigate the effect of lime solution's concentration ($\text{Ca}(\text{OH})_2$ solution) in durian seed's flour using completely randomized design by single factor. Durian seed's flours are produced in which lime solution's concentration (K) was used as factors (0.1% , 0.5%, 0.9%, 1.3%).

2. Material and Methods

The research was conducted at *Teknologi Pangan* Laboratory, University of North Sumatera. Durian seed are sorted and cleaned. Durian seed were discarded the skin, after that durian seed sliced into 2-3 mm thickness. There were four samples that prepared. All of sample were soaking in lime solution's concentration ($\text{Ca}(\text{OH})_2$), the first 0.1% concentration, second 0.5% concentration, third sample



soaked in 0.9% concentration and the fourth soaked in 1.3% concentration. The time of soaked were 4 hours. The durian seed were washed and drying in oven about 20 hours and the drying temperature was 20°C. The flour from durian seed were obtained by crushing the dried slices using steamroller and sifted using a 80 mesh sieve. Analysis consist water content analysis using oven evaporation method [9], ash content analysis using dry ashing method [10], fat content using soxhlet method and protein content using kjedhal method [11], and crude fiber content using autoclave method [12].

3. Results

3.1. ASSESSMENT I: The effect of lime solution's concentration on physicochemical properties of durian seed flour

3.1.1. Water Content

Table 1 showed that the higher lime solution's concentration the lower water content on the durian seed flour. $\text{Ca}(\text{OH})_2$ can reduce mucus content on durian seed, the mucus of durian seed contain glycoprotein that can binding calcium so the water in mucus can be released easily when drying process that caused there is no barrier [13].

3.1.2. Ash Content

The effect of lime solution's concentration showed a significant difference at the 1% level in the ash content. Table 1 showed that the higher lime solution's concentration the higher ash content on the durian seed flour. Suprpto reported that soaking in lime solution's ($\text{Ca}(\text{OH})_2$) can make the higher mineral content in material such as Calcium, Ferrum, Sodium, Potassium and Phosphorus [14].

3.1.3. Protein Content

The effect of lime solution's concentration showed a significant difference at the 1% level in the protein content. Table 1 showed that the higher lime solution's concentration the lower protein content. When the durians seed was soaked, there were many proteins are bond and form deposits and are lost during washing process.

3.1.4. Fat Content

The effect of lime solution's concentration showed a significant difference at the 1% level in the fat content. Table 1 showed that the higher lime solution's concentration the lower fat content. While the higher lime solution's concentration, there were many fatty hydrolysis processes occurred. Fat in alkaline condition can be hydrolyzed easily, so fat content can be decrease [15].

3.1.5. Crude Fiber Content

The effect of lime solution's concentration showed there was no significant difference in the crude fiber content. Table 1 showed that the higher lime solution's concentration the lower crude fiber content.

3.2. ASSESSMENT I: The effect of lime solution's concentration on sensory properties of durian seed

3.2.1. Hedonic color value

The effect of lime solution's concentration showed a significant difference at the 1% level in hedonic color value. Table 2 showed that the higher lime solution's concentration the lower hedonic color value. There were effects of lime solution's on pigment in durian seed, the higher lime solution's, the color of durian seed flour showed more brownish yellow-brown that panelist didn't like. Pigments were very sensitive to chemical, physical and mechanical influences [15].

3.2.2. Hedonic aroma value

The effect of lime solution's concentration showed a significant difference at the 1% level in hedonic aroma value. Table 2 showed that the higher lime solution's concentration the higher hedonic aroma content. The soaking of durian seed in lime solution's can reduce unpleasant aroma that effect on panelists's assessment. Jarod reported that soaking in lime solution's can removal mucus, extend shelf life and prevent browning, give a hard textures, and reduce bitter taste [5].

Table 1. The effect of the lime solution's concentration on physicochemical properties of durian seed flour

Parameter	Lime solution's concentration			
	K1 (%) (0.1)	K2 (%) (0.5)	K3 (%) (0.9)	K4 (%) (1.3)
Water content (%)	6.769	6.644	6.497	6.332
Ash content (%)	2.470	2.680	3.036	3.312
Protein content (%)	6.670	6.515	6.390	6.157
Fat content (%)	0.477	0.440	0.411	0.388
Crude Fiber content (%)	9.446	9.345	9.129	8.929

Table 2. The effect of the lime solution's concentration on sensory properties of durian seed flour

Parameter	K1 (%)	K2 (%)	K3 (%)	K4 (%)
Hedonic color value	4.441	3.867	3.360	3.187
Hedonic aroma value	2.933	3.307	3.773	4.360

Conclusion

The results showed that lime solution soaking treatment ($\text{Ca}(\text{OH})_2$) 0,1% produced the best durian seed's flour.

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