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The Effect Of Nixtamalization Of Sorgum Rice On Proximate

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Abstract—Nixtamalization is one of the processing techniques identified to reduce mycotoxin contamination in food. Tortilla chips are a lighter snack product so it is necessary to add a variety of food ingredients that also have high fiber content, one of which is sorghum flour. The advantage of sorghum flour is that it has The fiber and mineral content is higher than wheat flour. Sorghum flour has relatively the same nutritional value as rice, wheat and corn, namely the protein, fat and carbohydrate content is completely sufficient. This research aims to determine the effect of adding sorghum flour on the characteristics of Tortilla chips. The research was carried out using a completely randomized factorial design (CRD), the first factor was concentration (%) of Ca(OH)2 with 5 treatment levels (0.1%, 0.4%, 0.7%, 1% and 1.3 %) with treatment parameters water content (%), ash content (%), protein content (%), fat content (%), carbohydrate content (%) and analysis of crude fiber content (%). The first and second factors were obtained by a combination of 15 treatments with 2 repetitions. The results of the research with the addition of Ca(OH)2 and long fermentation time showed the best results for a protein content of 9.77% in the K1L1 treatment in accordance with the minimum sorghum flour quality requirements of 8.5% and with the hedonic analysis values of aroma and color not significantly different.

Keywords—Corn Flour, Sorghum Flour, Tortilla Chips.

I. INTRODUCTION

This snack is usually made from flour or starch with the addition of other food ingredients, with or without frying, and has a sweet or salty taste, is usually high in calories, carbohydrates and fat, while other ingredients such as protein, vitamins, fiber and other nutrients are usually found in low numbers (Oktavia, 2007 in Syarifah and Amrih, 2021). Therefore, food diversification is needed to complement increasing needs by considering health and practicality aspects. One of these practical snack products is tortilla chips (Meliza et al, 2019).

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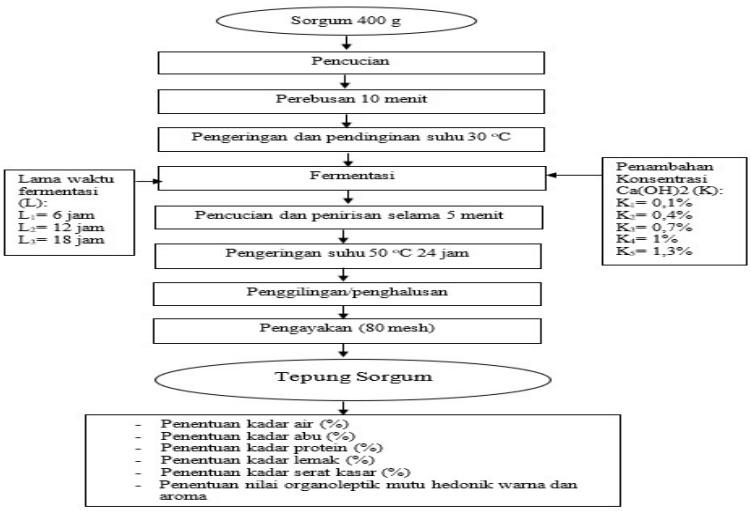
Tortilla chips are a snack product in the form of crisps or chips made from corn in triangular or square shapes with different thicknesses (Meliza et al, 2019). This product has a savory taste and crunchy texture so it is often consumed as a snack. The nutritional value contained in 100 g of tortilla chips is 73 g of carbohydrates, 9 g of protein, 15 g of fat, and 6 g of fiber (Suri, 2020). Sorghum has the ability to replace wheat flour by 20% - 25% in making bread or cakes, 40% - 50% in making cakes, 70% - 80% in making pastry. Sorghum can also be used as a substitute in making wet noodles with a sorghum content of up to 20%. Sorghum's ability to produce combined flour saves the use and import of wheat flour. Seeing sorghum's ability to replace wheat flour, sorghum can be used to make tortilla chips. Based on this background, researchers are interested in conducting research on the manufacture of sorghum flour and its use as a substitute for wheat flour in making tortilla chips. Therefore, the tortilla chips produced are not only an ordinary snack, but are also expected to contain high nutritional value.

II. RESEARCH METHODOLOGY

This research was carried out from February 2023 to May 2023 at the LAPTIAB Science and Technology Research Center, Serpong – South Tangerang. The materials used for analysis were sorghum and tortilla chips. The reagents used are H2SO4 solution, mercury oxide, K2SO4 solution, sodium hydroxide (NaOH) solution, sodium thiosulfate, saturated boric acid solution, 0.02 N hydrochloric acid solution, and petroleum ether. This research is divided into 2 stages. Stage 1 of the research was making sorghum flour using a Non-Factorial Completely Randomized Design (RALF) with two treatment factors. Stage 2 is making tortilla chips

Making Sorghum Flour

Whole sorghum weighs up to 400 g. The sorghum is washed thoroughly under running water to remove any remaining dirt (soil or dust left on the sorghum seeds). The sorghum is then boiled in water for 10 minutes to soften the sorghum grains to optimize the fermentation process. Sorghum is dried and cooled to 30 °C. Ca(OH)2 (0.1%, 0.4%, 0.7%, 1%, 1.3% w/w) was then added and soaked in 400 ml of distilled water. After that, the sorghum is fermented according to the treatment, namely 6 hours, 12 hours and 18 hours. Based on preliminary research, a long fermentation time of more than 18 hours will cause a rancid odor in sorghum. The sorghum is then washed and drained for 5 minutes. The sorghum was then dried in a cabinet dryer at 50 °C for 24 hours. The sorghum was then ground with a blender at speed 1 for 3 minutes and sieved with an 80 mesh sieve. The flow diagram for making sorghum flour can be seen in Figure 1.



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III. RESULTS AND DISCUSSION

Research Analysis

Tabel 1. Effect of concentration (%) of Ca(OH)2 on the observed parameters

Parameter	Konsentrasi (%) Ca(OH)2 (K)				
	K_1(0,1%)	K_2 (0,4%)	K_3 (0,7%)	K_4 (1%)	K_5 (1,3%)
Water content (%)	13,90 ± 1,64	14,73 ± 0,22	13,45 ± 0,21	12,65 ± 0,36	11,57 ± 0,43
Ash content (%)	1,30 ± 0,16	1,34 ± 0,17	1,38 ± 0,20	1,40 ± 0,10	1,44 ± 0,21
Protein content (%)	10,23 ± 0,07	9,92 ± 0,14	9,69 ± 0,11	9,30 ± 0,17	8,91 ± 0,17
Fat content (%)	4,02 ± 0,28	4,04 ± 0,24	4,00 ± 0,16	3,57 ± 0,42	3,26 ± 0,85
Carbohydrate Content (%)	70,56 ± 1,81	69,97 ± 0,55	71,47 ± 0,46	73,07 ± 0,85	74,81 ± 1,29
Crude fiber content (%)	1,15 ± 0,13	1,06 ±0,08	0,95 ± 0,09	0,85 ± 0,08	0,84 ± 0,05
Oganoleptic (hedonic) value		3,57 ± 0,10	3,58 ± 0,14	3,73 ± 0,20	3,69 ± 0,08
- Color	3,56 ± 0,10	3,46 ± 0,08	3,54 ± 0,21	3,61 ± 0,12	3,71 ± 0,21
	3,27 ± 0,24				

Based on research that has been carried out, the results obtained are that the concentration (%) of Ca(OH)2 has an influence on water content (%), ash content (%), protein content (%), fat content (%), carbohydrate content (%) , crude fiber content (%), and organoleptic value (color and aroma).

Effect of Fermentation Time on Observed Parameters

Based on research that has been carried out, the results obtained are that the length of fermentation time has an influence on water content (%), ash content (%), protein content (%), fat content (%), carbohydrate content (%), crude fiber content (%)), and organoleptic values (color and aroma) are presented in Table 2.

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Tabel 2. Effect of fermentation time on the observed parameters

Parameter	Lama Waktu Fermentasi (L)		
	L_1 (6 jam)	L_2 (12 jam)	L_3 (18 jam)
Kadar air (%)	13,39 ± 1,22	13,48 ± 1,49	12,92 ± 1,30
Kadar abu (%)	1,29 ± 0,16	1,38 ± 0,17	1,46 ± 0,14
Kadar protein (%)	9,77 ± 0,45	9,58 ± 0,50	9,49 ± 0,52
Kadar lemak (%)	4,07 ± 0,17	3,90 ± 0,30	3,35 ± 0,69
Kadar Karbohidrat (%)	71,49 ± 1,65	71,66 ± 2,16	72,78 ± 2,31
Kadar serat kasar (%)	1,06 ± 0,16	0,96 ± 0,14	0,90 ± 0,11
Nilai oganoleptik (hedonik)			
- Warna	3,65 ± 0,06	3,65 ± 0,21	3,57 ± 0,12
- Aroma	3,43 ± 0,28	3,56 ± 0,16	3,57 ± 0,23

IV. CONCLUSION

Based on the research results, it can be concluded that sorghum flour increases the nutritional quality of tortilla chips, especially the protein content, which is 14.104. This product also gave a positive response to the organoleptic value in terms of overall acceptance, namely the panelists really liked the tortilla chips product with the addition of sorghum flour. It can be said that the addition of sorghum flour as a substitute for wheat flour can have a positive influence on the quality characteristics of tortilla chips, in fact the overall nutritional quality component of tortilla chips with the addition of sorghum flour is better than the nutritional quality of tortilla chips with the addition of wheat flour.

parties who need it.

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