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Utilization of Bromelin Enzyme Extracts in Leather and Pineapple Tube (*Ananas comosus* L. Merr) As A Latex

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ABSTRACT

Clotting is a phase change event of a sol to a gel phase with the help of a coagulant commonly called coagulant. The purpose of this research is to produce coagulant that accelerate latex cogulation using natural ingredients skin and pineapple cobs and produce latex with good quality. This study was done by weighing 750 grams of pineapple skin and pineapple, cut into small pieces, washed with aquades, added 0.1 M sodium acetate, mashed and then filtered. Then the extract obtained in the vortex and then centrifuged for 25 minutes at a speed of 3,500 rpm and stored at a temperature of 4 ˚C. Furthermore, the latex coagulation process, latex that has been clot dry and weight of rubber weighed. The largest weight of rubber is the addition of 25 ml of coagulant which produces 27,41 gram of dry rubber and at variable of contact time of heavy weight of rubber is found at 6 hours contact time with rubber weight equal to 25,94 gram. The largest weight of rubber is the addition of 25 ml of coagulant which produces 27,41 gram of dry rubber and at variable of contact time of heavy weight of rubber is highest at contact time 6 hours with rubber weight equal to 25,94 gram. The result of rubber quality testing on coagulant volume variation obtained the best rubber obtained at the time of addition of 25 ml of latex coagulant. The results of the analysis on nitrogen content, dirt content and ash content in the addition of 25 ml coagulant is close to the requirements of SIR 20. As for the results of rubber quality testing on the variation of the best rubber contact time is obtained at the time of contact time 18 hours. The results of the analysis on nitrogen content, dirt level and ash content at 25 ml of this coagulant maturation close to the requirement of SIR 20.

KEY WORDS: *Bromelin, Coagulant, Enzyme, Latex, Pineapple.*

1.0 INTRODUCTION

Based on the Directorate General of Plantation (2013) report, natural rubber in Indonesia is one of important plantation commodities besides palm, cocoa and tea. This is demonstrated by the number of farmers involved in natural rubber business reaching 190,133 households, so that many people depend on this plant the development of rubber plantations in Indonesia is widespread throughout the region. The largest rubber plantation is located in South Sumatera Province of 675,437 ha, while Riau Province is in fourth with plantation area of 399,445 ha.

Clotting is a phase change event of a sol to a gel phase with the help of a coagulant commonly called coagulant. The latex will coagulate if the electrical charge is lowered (dehydratated), the latex pH is lowered (addition of H + acid) and the addition of electrolyte. (Abednego, 1981). Decrease in latex pH may occur either naturally or intentionally or in the presence of preferential treatment of latex such as the addition of lumps. Clotting naturally occurs due to the activity of the many decomposing bacteria in the air.

The aim of this research is to produce coagulant which accelerate latex coagulation using natural leather and pineapple cobs and produce good latex latex and observe the effect of extract volume addition and contact time of crude extract of skin and pineapple granules to the level of impurities, Nitrogen content and ash content accordingly SIR provisions.

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2.0 METHOD

2.1 Materials and tools

The materials used in this paper are pineapple skin and cobs obtained from the early morning market of panam, liquid latex obtained from perforated rubber garden, ammonium sulfate, sodium acetate, filter paper, universal indicator pH and aquadest. Equipment used in this paper is a vacuum filter, 100 ml measuring flask for dilution of solution, 250 ml glass, 500 ml glass of chemical, stirrer, incubator, centrifugation, reactor, 100 ml measuring cup for measurement of solution, dropper, spatula, knife cutters, plastic containers and analytic scales.

2.2 Procedure

2.2.1 Working procedure Bromelin Enzyme Extraction from Bonggol and Pineapple Skin

Initially the skin and pineapple pinee is cleaned and washed with aquades then cut into small pieces to simplify the process of homogenization (blender). Weigh the skin and the pineapple cobs according to the variables to be studied ie 750 grams of skin mixture and pineapple cobs will then be dihomogeniasi by adding 0.1 M sodium acetate solution that serves to maintain the pH fixed on acid conditions. After finely filtered the material using a vacuum filter to retrieve the filtrate that will be in the vortex using stirrer for 45 minutes and added ammonium sulphate solution that serves for precipitation. The enzyme was then incubated for approximately 17 hours and centrifugation was done for 25 minutes at 3500 rpm.

2.2.2 Latex Coagulation Process

600 liters of liquid liquid prepared, then prepared 6 pieces of plastic containers and each filled with 100 ml of liquid latex and added with a bromelin enzime extract with a respective volume of 5 ml each; 15 ml; and 25 ml and for a contact time of 6 hours; 18 hours and 24 hours each added 25 ml of crude extract of bromeline enzyme, then mixed to make the mixture homogeneous so that coagulation process will be faster and evenly. Then the sample was kept silent for the clotting process and the latex was milled, milled to crepe and weighed.

3.0 RESULTS AND DISCUSSION

The results of this research are rough extract of bromelin enzime and dry weight of rubber. Below is the data of the weight of the rubber shown in table 1:

Table 1: Weight of Rubber Produced in Addition of Coagulant Variation (Rough Extract of Bromelin Enzyme)

Coagulant Volume	Coagulant Time	Latex Volume	Latex Weight
5 ml	64 menit	100 ml	25,83 gram
15 ml	45 menit	100 ml	26,97 gram
25 ml	34 menit	100 ml	27,41gram

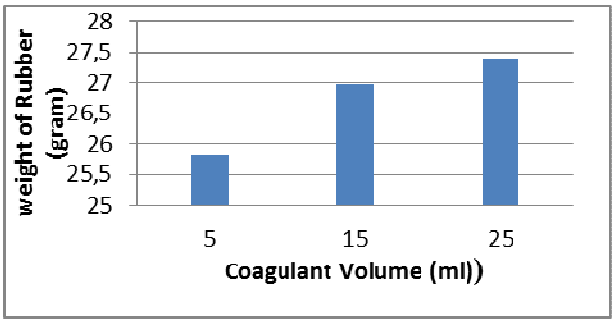

Figure.1: Effect of Adding Coagulant Variation to Rubber Weight

In Table 1, it shows that the more coagulant volume added to the latex the faster the coagulation time and the greater the weight of the resulting dry rubber. The largest weight of rubber is the addition of 25 ml of coagulant which produces 27,41 gram of dry rubber. Acid content in crude extracts of skin and pineapple cobs can decrease latex pH, lower latex pH causes damage to latex stability resulting in clumping or coagulation. In addition to acid content, enzyme bromelin in the skin and pineapple cobs can also accelerate the coagulation process.

Table 2: Rubber Weight Generated on Variations of Contact Time Between Coagulant and Latex

Contact Time	Coagulant Volume	Latex Volume	Latex Weight
6 Jam	25 ml	100 ml	25,94gram
18 Jam	25 ml	100 ml	24,21 gram
24 Jam	25 ml	100 ml	23,35 gram

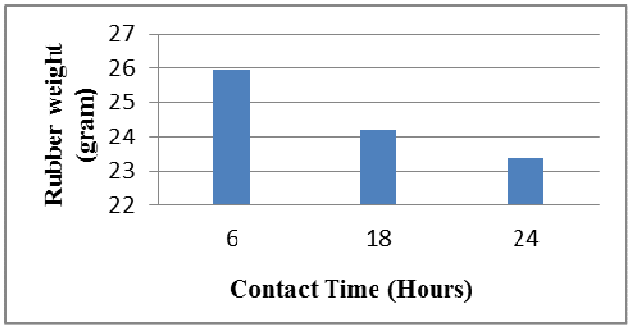

Figure.2: Influence of Con tact Time Variation Between Coagulant and Rubber Weight Latex

In Table 2, it shows that the weight of the resulting rubber decreases with the length of coagulation contact time, the greatest rubber weight is at 6 hours contact time with a rubber weight of 25.94 grams. The addition of coagulant to the latex emulsion will result in unstable colloid particle particles which will result in

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impaired protein structure. When protein structure is disrupted the function of protein structure as a latex protector will decrease until the breaking of the protective layer occurs. The breakage of the protective layer will result in the formation of rubber clumps and the separation of water from rubber clumps. So the longer the coagulation contact time will be more and more water will be separated and ultimately the weight of the resulting rubber will decrease.

Rubber Quality Test Result Analysis

Rubber quality test was conducted to find out how the effect of the addition of crude extract of bromelin enzyme on skin and pineapple cobs to coagulum quality which was produced based on SIR standard with test parameters that were done were test of Nitrogen content, dirt level and ash content. Test results for addition of latex coagulant with variation of volume 5 ml; 15 ml and 25 ml can be seen in Table 3.

Table 3: Rubber Quality Test Result with Coagulant Volume Variation

No	Parameter	Testing Results		
		Vol 5 ml	Vol 15 ml	Vol 25 ml
1.	Nitrogen	0,21%	0,21%	0,18%
2.	The dirt content	0,23%	0,13%	0,08%
3.	The ash content	0,43%	1,40%	0,34%

In Table 3, it can be seen that according to SIR quality requirements based on SNI 06-1903-2000, the value of Nitrogen content of rubber coagulum produced is 0.21%, 0.21% and 0.18% is below the maximum limit value has been established, so that the nitrogen content of the coagulant produced is acceptable. Where the maximum permitted nitrogen content is 0.6%. In the analysis of dirt content, it can be seen that the highest dirt content of 0.23% is in the variation of coagulant volume of 5 ml and the lowest 0.08% in the variation of 25 ml coagulant volume increase. Based on SNI 06-1903-2000 the level of impurities obtained is still acceptable because the maximum permissible level is 0.2%. In the ash content analysis, the maximum value of ash content in rubber is 1.00% and the data can be seen that the ash content obtained in addition to the coagulant variation is still acceptable. The best ash content was at 0.34% on the addition of 25 ml of coagulant. Then it can be concluded that the best rubber results obtained at the time of addition of 25 ml of latex coagulant. The results of the analysis on nitrogen content, dirt content and ash content in the addition of 25 ml of coagulant is close to the requirements of SIR 20.

Table 4: Rubber Quality Test Result with Variation of Contact Time

No	Parameter	Testing Results		
		6 jam	18 jam	24 jam
1.	Nitrogen	0,12%	0,14%	0,14%
2.	The dirt content	0,27%	0,12%	0,12%
3.	The ash content	1,01%	0,45%	1,27%

In Table 4, it can be seen that according to SIR quality requirements based on SNI 06-1903-2000, the value of Nitrogen content of rubber coagulum produced is 0.12%, 0.14% and 0.14% is below the maximum limit value so that the nitrogen content of the coagulant produced is acceptable. Where the maximum permitted nitrogen content is 0.6%. In the analysis of dirt content, it can be seen that the largest impurity content of 0.27% is in the variation of contact time 6 hours, above the maximum limit allowed. The lowest dirt level is 0.12% on the contact time variation of 18 hours and 24 hours. Based on SNI 06-1903-2000 the level of impurities obtained is still acceptable because the maximum permissible level is 0.2%. In the ash content analysis, the maximum value of ash content in rubber is 1.00% and the data can be seen that the ash content obtained in addition to the coagulant variation is still acceptable. The best ash content is at 0.45% at 18 hours contact time variation. So it can be concluded that the best rubber results obtained at the time of contact time 18 hours. The results of the analysis on nitrogen content, dirt level and ash content at 25 ml of this coagulant maturation close to the requirement of SIR 20.

4.0 CONCLUSION

The result of rubber quality testing on coagulant volume variation obtained the best rubber obtained at the time of addition of 25 ml of latex coagulant. The results of the analysis on nitrogen content, dirt content and ash content in the addition of 25 ml coagulant is close to the requirements of SIR 20. As for the results of rubber quality testing on the variation of the best rubber contact time is obtained at the time of contact time 18 hours. The results of the analysis on nitrogen content, dirt level and ash content at 25 ml of this coagulant maturation close to the requirement of SIR 20.

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REFERENCE

1. Effendi A, Winarni and Sumarni, W. 2012. Optimizing the Use of Bromelin Enzyme from Pineapple Sauce In Coconut Oil Maker. Indonesia Journal of Chemical Science. Vol.1: 1-1
2. Sianipar, J. 2006. Evaluation of Three Types of Agricultural Waste as Feed Goat Cut. National seminar on animal husbandry and veterinary technology.
3. National Standardization Agency 2000. SNI.06-1903-2000: Standard Indonesian Rubber (SIR).