

## Effect of Temperature and Extraction Time on the Yield, Water Content and Methoxyl of Coconut Fiber Pectin

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### Abstract

This research aims to see the effect of temperature and extraction time on water content, yield and methoxyl content of coconut fiber pectin. This research was carried out experimentally factoril in Design Random Complete, which consists two treatment that is temperature extraction and extraction time with three repetitions. The results of this research show that treatment temperature extraction very influence yield pectin, rate water and methoxyl pectin while the extraction time affects the water content of the pectin. At a temperature of 70 O C and long extraction 60 minutes obtained the highest average yield of pectin, namely 4.31%, while the average the lowest pectin yield was obtained from treatment with an extraction temperature of 90 ° C and an extraction time of 90 minute. Average rate methoxyl highest obtained from treatment temperature 70 O C and long extraction 30 minute, whereas average percent rate methoxyl Lowest obtained from treatment with an extraction temperature of 90 O C and an extraction time of 90 minutes, namely 8.03% and 7.61% respectively. From the results obtained, it was concluded that the pectin obtained was classified as deep pectin group with high methoxyl content, namely >7%. Average percent of pectin content The lowest was 90 O C and the extraction time was 90 minutes, namely 10.19%, while the highest obtained from treatment with an extraction temperature of 70 O C and an extraction time of 30 minutes. From the results of the analysis this water content means that the water content of the coconut fiber pectin obtained is deep study this has fulfil condition for water content dry pectin that is 10-14%.

**Keywords**— Coconut Fiber; Extraction; Methoxin Pectin Temperature; Yield, Water Content

### Introduction

Coconut (*Cocos Nucifera* LINN) is oneone of the current agricultural industrial crops This was developed by the government in linewith efforts to increase foreign exchange through commodity export non-oil and gas Which have role important in economy in Indonesia. Benefit Coconut plants are not only located on the flesh of the fruit can be processed intocopa, coconut cream and oil coconut, butall over part from plant coconut have benefit Which big for life man. Thereby big there are so many benefits to this coconut plant which named it as "treelife" or the tree of life [1]. Fiber coconut is Wrong one part of coconut which until now in Indonesia the majorityis waste in utilization fruit coconut.

As part fruit coconut, many fiber Coconut follow many production coconut. According to [1] in producing one ton of copra join in generated 1.8 tons fiber coconut.Production copra



average per year is around 1,519,440 tons. This means every year we produce 2,734,992 tons fiber coconut. Until now this level utilization fiber coconut still very less and is generally used as material burn or thrown away so just as rubbish. Only part small which used in industry fiber and a number of goods craft in a way limited.

Beside fiber, in fiber coconut contained various substance which level quite high, some of which are various substance which level enough tall among them is pectin. Pectin is something compound which have ability for form gel and based on characteristic the pectin is mainly used in making jelly, jam and marmalade [2]. Generally commercial pectin is made from waste from the fruit processing industry, for example skin fruit orange, dregs fruit Apple, skin fruit wine and so on.

[3] The pectin content of coconut varies between 4.8 – 12 % depends from age fruit. Whereas according to [4] in a way natural content pectin in various results plant different from one another. But it all depends on how process which done for extraction of pectin from plant tissue. Process taking pectin from network plant | normal aid it with extracting plant tissue but. Matter This Also depends Let treatment given to plant tissue which extracted. Condition giving treatment which best here it is which will expressed through study this.

Fruit was used as the research object coconut variety Galam with cultivars Mapanget 99 with age harvest 12 month. With giving treatment temperature and long process extraction on network material.

## Literature Review

Referring to the results of research conducted by [3] regarding the Study of the Physical, Chemical, and Structural Properties of Low- and High-Methoxyl Pectin-Based Film Matrices Including Sunflower Waxes, it was concluded that regarding chemical characteristics, most of the raw materials' chemical groups were found in the resulting films, and the presence of C-H bending due to pectin gelation was observed. Finally, the compatibility and contribution of pectin and sunflower waxes to the production of the films were demonstrated, as well as the possibility of using materials from industrial waste in food packaging applications.

The results of further research refer to research [4] regarding Evaluation of Composites Reinforced by Processed and Unprocessed Coconut Husk Powder, the results of the research show that it was observed that the processing of coconut husk powder was beneficial, allowing not only positive improvements to the properties of the composite, but also a better workability and wettability of the particulates, which was attributed to the change in the average size and shape of the particulates. That means that the composites with processed coconut husk powders have improved impact strength (46 up to 51%) and compressive strength (88 up to 334%), in comparison with unprocessed particles.

## Research Method

Place and Time Study this held in Laboratory Technology Agriculture and Laboratory Chemistry Food Science Faculty Agriculture, during 1 month.

### Material and Tools

Material main which used in study this is: coconut (*Cocos nucifera* LINN). Ingredients chemistry which used: Aluminum Chloride 1 M, Sour Chloride 0.02 N, Ammonium Hydroxide 48, phenolphthalein indicator, Sodium Hydroxide 0.1 N, Acid Alcohol 85 8, Neutral Alcohol 95 and Aquadas as well as chemicals for analysis: Ethanol 96, Sodium Hydroxide 0.25 N and





Hydrochloric Acid 0.25 N.

Tools which used is : scales, knife, scissors, glass cup, glassmeasuring, dropper pipette, stirrer, heater, pipette measuring, pumpkin measuring, oven, pH meters, receptacle bottle, thermometer, mortar, cloth filters and tools for analysis, namely: burette, static, Cup porcelain, exicator, glass watch, mufflefurnace, magnetic stirrerAnd Erlenmeyer.

### ***Design Test***

Study this held with use method test factorial in Design Random Complete which consists of two factors and three times test.

Factor A is three temperature treatments level:

- Temperature 70° C next called A<sub>1</sub>
- Temperature 80° C called A<sub>2</sub>
- Temperature 90° c called A<sub>3</sub>

Factor B that is treatment long extractionwith three level:

- 30 minute hereinafter mentioned B<sub>1</sub>
- 60 minutes are called B<sub>2</sub>
- 90 minute called B<sub>3</sub>

### ***Procedure***

Procedure Work done with method extraction [5].

Dried coconut fiber that has been separated from shell- gnya, cut pieces with long not enough more 2 cm. The pieces of coconut fiber were weighed the weight and then the piece of coir coconut the grinded. Extraction done with road heat materialin solution HC1 02 N (made with dilute concentrated HC1 to 1.66 ml to1 liter solution).

Extraction done on temperature 70° C, 80° C and 90° C with forever extraction 30 minute, 60 minute And 90 minute. Comparison of ingredients and HC1 solution 0.02 N is 1: 10. Once the extraction is complete, furthermore solution the filtered with use cloth strain. The extraction obtained is added to Aluminum Chloride 1 m as much 6 ml/100ml extract And Ammonium Hydroxide 48 for precipitate the pectin. The settling pH is set between 3.8 4.0 with add AmmoniumHydroxide 4 (made with methoddilute 4 ml of Ammonia to 100 ml of solution). The precipitate that occurs is filtered with use cloth strain. Next, the precipitate was washed with solutionAcid Alcohol 85 and continued with Neutral Alcohol 95%. Then precipitate the dried in oven on temperature370 - 40° C for 8 O'clock.

### ***Things Which Observed:***

Pectin dry Which obtained weighed its weight for know amount pectinWhich can extracted Then amountpectin Which can extracted Thendone analysis Rendement Pectin, Rate Methoxyl Pectin, Pectin Moisture Content, DegEsterification, Galacturonate Content and Weight.Equivalent.

### ***Rendement Pectin***





Rendement Pectin calculated based on comparison heavy. Pectin dry and heavy initial material. Calculation of pectin yield is:

**Heavy Pectin Dry**

$$\% = \frac{\text{Pectin Dry}}{\text{Heavy Initial}} \times 100$$

*e a a h a n a w a l*

Material which has smoothed weighed in Cup porcelain as much 1-2 gram. entered in oven and heated at 100-105°C for 5 hours. Cooled in evaporator and weighed heavy. Treatment this repeated until heavy constant.

*e a u l a - u l a - e a a k h*

$$\% = \frac{\text{Pectin Dry}}{\text{Heavy Initial}} \times 100$$

*e a u l a - u l a*

Rate Methoxyl [6] Dissolve 0.5 gr pectin in 100 ml CO<sub>2</sub>-free distilled water is then added 1 gr NaCL And 6 drops indicator phenolphthaleinred. Furthermore solution then neutralized. With 0.1 N NaOH until indicator changed the color (pH neutral). Solution neutral the added 25 ml NaOH 0.25 N, stirred And silenced for 30 minutes at room temperature circumstances closed. Furthermore into the solution the added 25 ml HCl0.25 N and titrated with 0.1 N NaOH until the color changes red and endure during 30 second. The number of levels methoxyl calculated with equality as following:

$$\% = \frac{31}{100} \times 100$$

**Results and Discussion**

**Rendement Pectin**

Average yield of coir pectin Coconut extracted based on temperature and different extraction times are presented in the table 1.

Treatments	Repetition				Average (%)
	Time (B)	1	2	3	
70°C	30'	3,80	3,87	3,73	3,80
	60'	3,97	3,95	3,86	3,92
	90'	3,90	3,90	3,84	3,88
80°C	30'	4,27	4,27	4,29	4,27
	60'	4,30	4,37	4,27	4,31
	90'	4,27	4,28	4,19	4,24
90°C	30'	3,57	3,62	3,67	3,62
	60'	3,63	3,65	3,69	3,65
	90'	3,59	3,59	3,59	3,59

Table 1 show that average dry pectin yield from coconut fiber supreme that is 4.31 % obtained from p e r l a k u a n temperature \_ 80°C And \_ \_ long \_ \_ e k s t r a k s i 6 0 min , whereas flat -flat yield The lowest coconut fiber dry pecting is as big as 3.59 % obtained from treatment temperature 90°C and a long time e x t r a c t i o n 9 0 m e m i n .





Results of analysis of variations in pectin yield dry coconut fiber (attachment 1) show that treatment temperature Extraction has no effect real, while the temperature treatment interaction And long extraction no give influence Which real to yield pectin dry coconut fiber.

**Rate Methoxyl**

Results average rate methoxyl pectin dry coconut fiber from temperature and long treatment extraction yeng different served on table following: (table 2)

Table 2 showing that that average methoxyl content of dry coconut fiber pectin highest obtained from treatment temperature extraction 70° C And long extraction 30', while the average methoxyl pectin content The lowest dry coconut fiber is obtained from treatment temperature 90° c And long extraction 90minutes. From table on obtained also that the value of dry methoxyl pectin content fiber coconut Which obtained in study. This including in group pectin with high methoxyl content, namely more greater than 7 results of body print analysis methoxyl content of dry pectin. coconut fiber show that treatment temperature extraction give influence Which very real whereas treatment extraction long extraction And interaction between treatment temperature.

**Rate Water Pectin**

Results average analysis rate water pectin dry fiber coconut which generated based on treatment temperature and long extraction which different served on table 3

Treatments	Repetition			Average (%)	
	Time (B)	1	2		3
70°C	30'	13,80	13,67	13,62	13,69
	60'	12,67	12,56	12,53	12,58
	90'	12,59	12,48	12,45	12,50
80°C	30'	11,85	11,92	11,89	11,88
	60'	11,73	11,75	11,69	11,72
	90'	11,65	11,68	11,62	11,65
90°C	30'	11,40	11,45	11,46	11,43
	60'	10,36	10,32	10,39	10,35
	90'	10,18	10,21	10,19	10,19

Table 3 show that average percent rate water Obtained pectin dry fiber coconut

The highest was 13.69 from temperature treatment extraction 70°C And long extraction 30 minute, whereas average percentage rate water Lowest that is 10.19 obtained from temperature treatment extraction 90°C And long extraction 90 minutes.

This is because at a temperature of 70°C, amount water Which evaporate from extract Still small the amount compared to with amount water Which evaporate on treatment temperature 80°C and 90°C.

**Conclusion**

Temperature extraction influence yield, water content and methoxyl content pectin. Long extraction influence pectin, Pectin dry fiber coconut Which obtained in this research are classified as on methoxylated pectin tall, Rate water pectin dry fiber coconut Which obtained in study This fulfil condition For rate water pectin dry i.e. 7 - 14 8, Rendement pectin highest obtained on





treatment temperature extraction 80<sup>0</sup> C Andlong extraction 60 minute (A2B<sub>2</sub>)whereas Which Lowest obtained on treatment temperature extraction 90°C Andlong extraction 90 minute (A3B<sub>3</sub>)

Treatmen ts	Repetition				Average (%)
	Time (B)	1	2	3	
70°C	30'	7,9938	7,9973	8,1075	8,0328
	60'	7,9075	7,9835	7,9981	7,9521
	90'	7,9604	7,9671	7,9806	7,9693
80°C	30'	7,7852	7,7841	7,7841	7,7844
	60'	7,7603	7,7745	7,7432	7,7593
	90'	7,7431	7,7632	7,7316	7,7459
90°C	30'	7,6540	7,7617	7,6678	7,6411
	60'	7,6321	7,6371	7,6458	7,6381
	90'	7,6175	7,5975	7,7273	7,6143

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