UTILIZATION OF YOUNG COCONUT FIBERS AS TEXTILE DYES

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ABSTRACT

Young coconut fiber is used as a natural dye, in addition to producing colors that have their characteristics; it is also not harmful to the environment. Young coconut coir is easily obtained and minimal cost, so it is more economical to be used as an alternative textile dye. This study aims to reveal, describe and analyze the processing of young coconut coir extract and see the colors produced from young coconut coir extract on Primisima cotton material with differences in fixation with Tawas, Limestone Tohor and Tunjung. This study used a qualitative method through experiments. The results revealed the name of the color produced from young coconut coir extract without fixation was Dark Salmon Pink with color code # C3937F, with an R element of 76.47%, G 57.65%, and B 49.80%. Whereas dyeing using alum fixation agent produces color Clamshell Pink with color code #BBA491, R element equal to 73.33%, G 64.31% and element B 56.86% and lime fixation agent produces Muddy Waters Brown color with color code # B7875C with elements R 71.76%, G 52.94% and B 36.08%. There is a striking color difference when dyeing using a fixation agent tunjung with the resulting color is Soft Brown with color code # 6B5F46 and RGB elements lower than other fixation substances namely R 41.96%, G 37.25%, and B 27.45%.

***Keyword**: young coconut coir, natural dyes, textile dyes*

Introduction

Indonesia is a tropical country. The tropics produce very fertile soils. Soil fertility makes Indonesia rich in plants. Some plants can be used in various industries such as the food industry, beauty, textile coloring, and others.

Textile staining that used to use natural coloring was switched to using synthetic dyes due to its advantages such as ease in getting solid colors, more comfortable to obtain, having a variety of colors, availability of colors more secure and practical in its use. However, the use of dyes synthetics can harm the environment and the human body. At present, environmental pollution due to industrial waste is quite alarming. One of the wastes that seriously disturb environmental sustainability is wastewater that contains synthetic dyes produced by the large-scale textile industry as well as Small and Medium Industries. Some negative impacts arising from the presence of dyes

that exceed the threshold, namely the occurrence of eye irritation, skin, respiratory disorders, can even cause death[1].

The use of dyes synthetic that is not environmentally friendly makes textile artisans return to natural coloring which is also a wealth of the archipelago that needs to be preserved. Plants that can be utilized as one of the natural dyes are coconut. Coconut as a plant that all parts can be used as stems leaves, fruit and even parts of the coconut fiber. However, the portion of coconut fiber is still not utilized to the fullest, as evidenced every year from all the coconut fiber waste; only about 15% is reprocessed by the community[2]. Moreover, parts of young coconut coir are left to accumulate and dry up so that it becomes waste and burned.

Young coconut coir contains tannin compounds, which are substances that can color protein or cellulose fibers. The tannin content in young coconut coir is 5.62%[3]. This compound can be used for coloring textile materials, besides it is easy to obtain, it also has no cost, so it is more efficient to be used as an alternative textile dye.

Textile materials that are dyed with natural dyes are materials derived from natural fibers such as silk, wool, and cotton (cotton). Materials from synthetic fibers such as polyester, nylon and others do not have an affinity or attractiveness towards natural dyes so these materials are difficult to be colored with natural dyes. Material from silk, in general, has the best affinity for natural dyes compared to material from cotton. Cotton materials such as primisima are very often used as textile crafts.

Coconut palm plant types include Dwarf, Kelapa Gading, Kelapa Yellow (C.*Eburen),* Red Coconut *(C.Rubescens),* Coconut Green *(C.Viridis)* and others. Young coconut fruit has green skin when cutting or opened in the fiber can be white, and there is also a red/pink. The type of young green coconut which is red/pink on the fiber is commonly called Wulung coconut which has the advantage of being used as an antidote to poison, but the obstacle faced in cultivating is that pests and diseases quickly attack this coconut. So that this coconut supply is still very little on the market so the price is also relatively high. Unlike the white green coconut which is an ordinary young coconut is easily cultivated and widely spread on the market. Green coconut that is quickly and easily found can be used as natural dyes for textile materials by utilizing young coconut coir into extracts for dyeing textile materials (primisima cotton) with color binders alum, lime Thor and tunjung.

Method

This research was qualitative research through experiments. Choosing a research design that is suitable for the experimental research of dyeing from ordinary green coconut coir extract categorized as young coconut. In this experimental study research the author as a data instrument using written data sources and objects that were

[1] Ni Wayan Yuninggrat et al (2018). Appropriate Technology for Processing Textile Waste for the Eastern Star Weaving Industry. Widya Laksana Journal, 7 (1), 93-99.

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observed to see the color produced by the dye obtained from extracts of young coconut fiber on primissima cotton cloth using mordant alum, lime and Tunjung.

The implementation phase of the data analysis begins with the preparation stages of the tools used as a support in this experimental study. Research on natural dyes from young coconut fibers requires tools including pans, stoves, plastic spoons, ropes raffia, tongs, measuring cups, digital scales, blender, scissors, plastic gloves, filter, and basin.

The fabric used in this study is primisima cotton fabric. Primisima cotton cloth has suitable dye absorbing properties. The nature of this primisima cotton is expected to show colors that are more varied and sharper. This young coconut fiber was taken from the waste of young coconut stalls around the black stump dadok. The selected young coconut coir is a kind of ordinary green coconut which is white when it is cleaved on the coir. This coconut husk will turn brown if it opens for too long.

Furthermore, there are several stages, namely the fabric processing stage (mordanting process), the processing stage of natural dye extraction, the dyeing stage, and the color locking/binding stage (fixation process) and the finishing stage (oxidation process).

Stages of Fabric Processing (Mordanting)

Primissima cotton cloth that will be colored is first through the process *mordanting* using alum and soda ash in order to facilitate the absorption of natural dyes produced by Young Coconut Fiber Extract. The steps to implement the processing of the cloth *(mordanting)* is as follows:

a) cotton cloth primisima measured using centimeters in size between 25x25cm and cut as many as four pieces for one Extracts Fiber Coconut

Figure 1 measurements cotton primisima

b) Cotton cloth primisima that have been cut then weighed and produced massive 22.5 gr per piece.

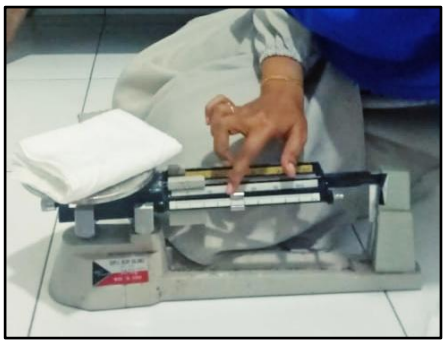

Figure 2 The process of weighing the primisima cotton fabric

c) Prepare Substance *Mordan* namely alum and soda ash to facilitate the process of absorption of color. This process requires alum weighing 8 grams/ liter and 2

gram/liter soda ash. A comparison of textile materials with solutions *mordan* commonly used is 1: 30. Primisima cotton fabric needed for each dye extract is 4 (four) pieces with a size of 25x25 cm and a weight of 22.5 gr.

d) Alum and soda ash dissolved in clean water, stir until dissolved. Solution is *Mordan* boiled until boiling, then put in primisima cotton and boiled for 1 hour. After that, turn off the heat and let the cloth soaked in the solution overnight. After being soaked overnight in the solution, the cloth is removed and rinsed (without squeezed) and then aired to dry and ironed. This primisima cotton fabric is ready to be dyed.

Figure 3 Process of Boiling Primisima Cotton Fabric with Mordan Material

Figure 4 Process of Drying Cotton Primisia Fabric

Stages of Processing Young Coconut Fiber Extraction

Primisima cotton fabric material that has been through the process is *mordanting* ready dipped in the extract of Young Coconut Fiber. In the process of extracting/making solution Young Coconut Fiber needs to be adjusted to the weight of the material to be processed so that the amount of solution Young Coconut Fiber produced can be sufficient to dye primisima cotton. Comparison of extracts solution Young Coconut Coir with Primissima Cotton Fabric commonly used is vlot 1: 30. The Steps of the extraction processing are as follows:

a) Weight of the primisima cotton fabric is adjusted to the Young Coconut Coir solution which will be extracted 1:30 because the weight of fabric that is processed 90 grams, the need for natural dyes solution is 2.7 liters.
b) Water is prepared in a ratio of 1: 10, for example, if the weight of the extracted material is 500gr, the water is 5 liters. Boil the ingredients until the water volume becomes half 2.5 liters. Because it requires a 2.7-liter dye solution for that in this

study requires 5.4 liters of water and requires 540 grams of Young Coconut Fiber, then boiled so that the volume becomes half 2.7 liters.

c) After knowing the number of comparisons for extract processing, weigh Young Coconut Fiber as needed. The weight of the fabric is 90 grams, which means that it needs 540 grams of Young Coconut Fiber and 5.4 liters of clean water.

Figure 5 Pieces of Young Coconut Fiber Young Coconut

d) Fiber which has been cut into small sizes as much as 540 grams is put in a pan containing clean water as much as 5.4 liters
e) of Young Coconut Fiber Material boiled in a pot until it boils to half of 5.4 liters to 2.7 liters

Figure 6 Young Coconut Coir Boiling Process

f) Filter the solution resulting from the boiling of the Young Coconut Coir to separate from the rest of the material that has been extracted (residue).
g) This filtered extract solution is called a natural dye solution. After chilling, the solution is ready to use for dyeing fabric.

Stages of Young Coconut Fiber Extract Dyeing

Primisima cotton fabric that has been through the process of *mordanting* has been ready to be dipped in a solution of Young Coconut Fiber extract in proportion to vlot 1: 30. Textile materials can produce colors if dipped for 15-30 minutes and repeat dyeing at least three times. Furthermore, the temperature used when dyeing using room temperature, this takes into account the use of this processing can be used in the entire textile industry, such as batik industry so as not to damage the motifs that have been canting for dyeing using cold water or around a temperature of 24-26 degrees[4]. The steps for the dipping process include:

a) Young Coconut Coir Extract Solution as a result of the extraction process is prepared in the dyeing place.

[4] Nita Sahara et al (2018). Riau Malay Pelaminan Ornamental Design Variation as Inspiration for Batik Craft innovation. 7 (2) p-ISSN: 2301-5942 e-ISSN: 2580-2380

b) Primisima cotton material is *mordanting* put into a solution of Young Coconut Coir Extract with a long dyeing process for 30 minutes by continuing to stir or soak without any air space between the fabric and the solution so that the color is resulting evenly distributed.
c) Cloth that has been dipped in Young Coconut Coir Extract Solution in the air is aired to
d) Do the dyeing process such as point 2 (two) and 3 (three) three times.

Color Locking Stages (Fixation)

Primisima cotton cloth that has gone through the dyeing process of natural dyes extract will produce a color cotton fabric, but the resulting color does not have good fastness without going through the process of fixation (locking color). This study uses alum lime Thor and tunjung as the material *fixer*. The steps of this fixation process include:

a) Making a solution of *fixer* Alum, Tohor Lime, and Tunjung with a ratio of 50 grams of alum, Tohor Lime, and Tunjung in each liter of water used. Let it settle and take a clear solution.

Table 1 Material Fixation /*Fixer*

No	Name *Fixer*	Material *Fixer*	clear solution *fixer*
1.	Tawas		
2.	Lime Tohor		
3.	Alas		

b) Fabric that has colored primisima dipped into a definite solution fixer for 10 minutes then remove and winds.
c) Dipping the fabric into the fixer solution is done up to 3 (three) repetitions so that the results are more variable than others.

Finishing Stages The oxidation

Process is the final stage before the fabric is ready to use. There are several steps in the process of oxidation, including:

a) fabric which has been completed is fixed is then washed with clean running water then aerated
b) fabric was dried ironed and finished

Result and Discussion

The results of the study will explain the results of experiments regarding the processing of Young Coconut Fiber extract in primisima cotton cloth using vlot 1:30 and three times the dyeing process. The results of the color from dying young coconut coir extract then carried out the fixation process to bind the color using the type of alum, lime Thor and tunjung.

The color produced in the dyeing process is seen using the application *Color Blind Assistant* on a computer that can read color names, color codes and RGB values (Red*, Green, and Blue*)

Table 2 Color Results of Young Coconut Coir

Color	Fixation Substance	Color Name Color	Code	RGB	Percentage of RGB Value
	Without Fixation	*Muddy Waters Brown*	# 9D725C	R 157 G 114 B 092	R 61.57% G 44.70% B 30.08%
	Alum	*Dark Salmon Pink*	# AE997F	R 174 G 153 B 127	R 68.23% G 60.00% B 49.80%
	Chalk Tohor	*Muddy Waters Brown*	# AB7B4E	R 171 G 123 B 078	R 67.06% G 48.23% B 30.59%
	Visit	*Dark Gray (26% White)*	# 45423E	R 069 G 066 B 062	R 27.06% G 25.88% B 24.31%

Based on the table above it can be concluded that the color produced from young coconut coir extract without the use of fixation substances is *Dark Salmon Pink* with a color code # C3937F, while the element R being the dominant element in this color is equal to 76.47% followed by elements G 57.65% and element B 49.80%.

The results of immersion of young coconut extract using alum fixation produced a color *Clamshell Pink* with color code #BBA491 with an R element of 73.33%, G 64.31%, and element B 56.86%. The pair of lime fixation substances produces color *Muddy Waters Brown* with color code # B7875C with an element content of R 71.76%, G 52.94% and B 36.08%. There is a striking color difference when dyeing using a fixation fixture with the resulting color is *Soft Brown* with a color code # 6B5F46 and an RGB content that is lower than other fixation substances namely R 41.96%, G 37.25%, B 27 45%.

Conclusion

Based on the findings of *research* that have been proposed, it can be concluded that there are four colors produced from young coconut coir extract. The color result of dyeing young coconut coir extract without the use of fixation substances is *Dark Salmon Pink*. While the results of dyeing young coconut coir extract using alum fixation agent produce color *Clamshell Pink*, and the results of the dyeing color using lime fixation agent produce *Muddy Waters Brown,* color and the color dyeing result using tunjung fixation agent with the resulting color is *Soft Brown.*

There are differences in the color of the four-color results, can be described color results from dyeing young coconut coir extract without the use of fixation substances, producing an R element which is the dominant element in this color that is equal to 76.47% followed by G element 57.65% and element B 49.80% with color code # C3937F. While the results of dyeing young coconut coir extract using alum fixation substances produced an R element of 73.33%, G 64.31% and element B 56.86% with color code #BBA491. Furthermore, the results of color dyeing using lime fixation substances produce an element content of R 71.76%, G 52.94% and B 36.08% with a color code # B7875C*,* and there are striking differences from the results of color dyeing using the use of fixation substances tunjung produce an elemental content of R 41.96%, G 37.25%, B 27.45% with a color code # 6B5F46*.*

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