Extraction Of Ketapang And Mangrove Natural Dyes As Wisdom For The Development Of Ecological Batik In Pekalongan City

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Abstract

This research explores the use of natural dyes extracted from ketapang leaves (Terminalia catappa) and mangrove wood (Rhizophora mucronata Poir) as environmentally friendly alternatives in the batik dyeing process in Pekalongan City. The experimental method was applied to pieces of cotton cloth dipped in natural dye extraction, with a variety of fixators in the form of alum, chalk and tunjung. The results showed that the type of fixator and pen frequency of dyeing influenced the intensity and character of the color on the fabric. The color produced from ketapang leaves with a tunjung fixator produces a blackish green nuance, while mangrove wood fixed with calcium hydroxide produces a brick red color. This research offers a sustainable solution for the batik industry through natural dyeing, supporting environmental preservation and public health in the Pekalongan batik center area.

Keywords: *Natural dyeing,, batik, ketapang leaves (Terminalia catappa), mangrove wood (Rhizophora mucronata Poir) and Pekalongan City.*

I. INTRODUCTION

Batik is the cultural heritage of our ancestors. Batik is a native Indonesian commodity that has economic and artistic value. The richness of batik culture encouraged UNESCO to include Indonesian Batik as a representative list in 2009. Pekalongan City is one of the batik industry centers [1]. Pekalongan is also a city with the Craft and Folk Arts category which was determined on December 1 2014. [2]. Batik waste is generally characterized by an alkaline pH, chemical dyes containing high TSS (Total Suspended Solid), COD (Chemical Ozygen Demand) and BOD (Biological Oxygen Demand) [3]. Pekalongan City is located on the north coast of Java Island. River water pollution in Pekalongan City is a serious problem that affects the quality of life of the local community. Pekalongan City, which is known as a World Creative City recognized by UNESCO, has big challenges in managing batik industry waste which flows into rivers. Pekalongan City's batik industry is mostly carried out in home industries where waste is channeled directly through house drains to drains where rivers flow.Batik coloring is divided into two categories, including natural dyes and synthetic dyes. Natural dyes are dyes obtained from nature, they can be obtained from animals or plants from parts of flowers, stems, roots, leaves and bark of trees. Synthetic dyes contain heavy metals including Zinc (Zn), Copper (Cu), Lead (Pb), Chromium (Cr), Cadmium (Cd), Arsenic (As) [4] . This results in batik industry wastewater containing COD and TSS which increases quite significantly [5].High COD requires oxygen for the decomposition process. High TSS indicates a large number of solid particles suspended in the water. If both exceed the threshold, it indicates a serious level of pollution.

Fig 1. River water conditions in Pekalongan

There is an alternative to batik coloring that is more environmentally friendly, namely using natural dyes from plant parts. With natural coloring, waste can be easily decomposed and does not cause serious problems for health [5]. Synthetic dyes used by the textile industry produce heavy metals, including: Heavy metals Zinc (Zn), Copper (Cu), Lead (Pb), Chromium (Cr), Cadmium (Cd), Arsenic (As) [6] . Heavy metals contained in dyes. This liquid waste contains dangerous chemicals. Synthetic dyes often contain azo compounds. This dye has carcinogenic properties and has the potential to endanger human health and will damage aquatic ecosystems [3]From the results of the preliminary survey, batik craftsmen do not want to abandon synthetic dyes for the reasons: 1) The work process is shorter, 2) Dyeing only takes place twice after the fabric has been produced 3) Does not require special treatment such as natural dyeing, 4) It is quicker to sell, etc., 4) Not as many colors as synthetic dyes, 5) Colors are less bright. 6) The price of dyes is expensive and the process is complicated. For the reasons mentioned above, they only think about the economic value and do not think about the negative impact on synthetic coloring.The aim of this research is to provide experimental results that natural dyeing can provide more diverse colors with soft colors and with the process and combination of treatments, it will produce various colors from bright colors to deep dark colors. Color extraction was carried out on local wisdom plants of Pekalongan City, namely plants that are abundant around Pekalongan City, namely Ketapang and Mangrove.

II. METHODS

This experimental research method is qualitative in the form of experiments on cotton cloth fragments that are canted and numbered. This research consisted of experiments on two natural colors, namely ketapang leaves (Terminalia catappa) and mangrove wood (Rhizophora mucronata Poir). Fixation is done from 3 different items, namely alum, calcium hydroxide, tunjung. The total number of experiments was 6 tables of results from ketapang leaves (Terminalia catappa) fixation with alum, ketapang leaves (Terminalia catappa) fixation with calcium hydroxide, ketapang leaves (Terminalia catappa) fixation with tunjung, mangrove wood (Rhizophora mucronata Poir) fixation with alum, mangrove wood (Rhizophora mucronata Poir) fixation with calcium hydroxide, mangrove wood (Rhizophora mucronata Poir) fixation with tunjung.The tools used are a batik stove, canting for numbering cloth, apron, spatula, gloves, plastic basin, plastic basket, tongs, scissors, measuring cup, scales. The materials used are cotton cloth, ketapang leaves (Terminalia catappa), mangrove wood (Rhizophora mucronata Poir), alum, calcium hydroxide, tunjung, TRO, LPG gas. The first experimental preparation was to extract ketapang leaves (Terminalia catappa) and mangrove wood (Rhizophora mucronata Poir).

The dried ketapang leaves were cut into small pieces and weighed 1kg and boiled in 5 liters of water for 1 hour, the solution was cooled and stored.The next preparation is mordanting the fabric, preparing the cotton fabric textile material which will be dyed or dyed ketapang leaves (Terminalia catappa) and mangrove wood (Rhizophora mucronata Poir), then soaked with neutral soap or TRO for 2 hours. Make a mixed solution of 8 grams of alum and 2 grams of soda ash (Na2CO3) in every 1 liter of water used, stir until dissolved. Boil the solution until it boils, then add the cotton textile material and boil for 1 hour. Leave the cotton textile material soaked in the solution overnight. Then it is removed and rinsed then dried, and the textile material is ready to be processed for dyeing. The fabric is dyed by covering it with TRO, draining it, and dyeing it with a solution of dye extracted from ketapang leaves (Terminalia catappa) and mangrove wood (Rhizophora mucronata Poir).Fixation or locking with alum, calcium hydroxide, tunjung. Alum solution 70 gr/liter. Alum is dissolved in a large amount of water and left for 24 hours. The clear water in the top layer is used for fixation. Calcium hydroxide solution 50 g/liter. Weigh out the amount of quickcalcium hydroxide according to the water needed. Dissolve the quickcalcium hydroxide and let it sit for 24 hours. Only clear or crystal clear water is located at the top. Tunjung solution 50 gr/liter. Draw a balance according to your needs. Dissolve the Tunjung in water, let it sit for 24 hours. Take the upper water solution for fixation.

III. RESULT AND DISCUSSION

The results of the visual analysis of ringkel exploration with natural dyes on viscose silk fabric are presented in Figure 2.

Fig 2. Fragment with alum fixation ketapang leaf coloring

The results of dyeing natural dyes from the extraction of dry brownish ketapang (Terminalia catappa) leaves with locking or alum fixation produce a brownish yellow color on the Katapang cloth fragments when viewed as a whole color from 1x to 8x dyeing amounts. Dyeing the dye from Ketapang leaves (Terminalia catappa) is left for 15 minutes, drained until dry, then processed for fixation after each amount of dyeing. The fewer the number of dyeings, the lighter the resulting color will be, conversely, if the more the number of dyeings, the resulting color will be darker and darker. The color of ketapang (Terminalia catappa) leaf extraction with alum fixation produces a color that is not much different from the liquid before the fixation process

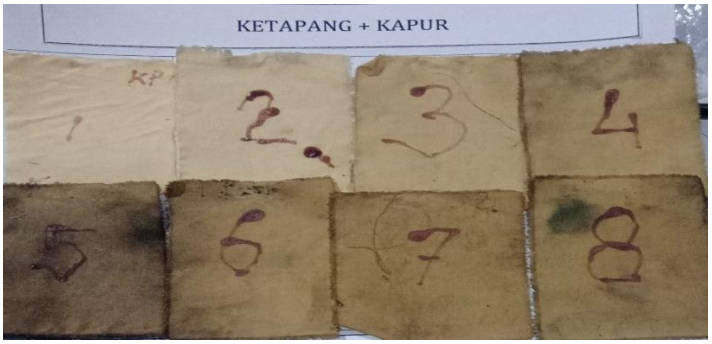

Fig. 3. Fragment with calcium hydroxide fixation ketapang leaf coloring

The results of dyeing natural dyes from the extraction of dry brownish ketapang (Terminalia catappa) leaves with locking or calcium hydroxide fixation produce a brownish yellow color on cotton fabric fragments when viewed as a whole color from 1x to 8x dyeing amounts. Dyeing the dye from Ketapang leaves (Terminalia catappa) is left for 15 minutes, drained until dry, then processed for fixation after each amount of dyeing. The fewer the number of dyeings, the lighter the resulting color will be, conversely, if the more the number of dyeings, the resulting color will be darker and darker. Color of Ketapang (Terminalia catappa) leaf extraction with calcium hydroxide fixation produces a slightly dark color of the liquid before the fixation process.

Fig 4. Fragmen dengan pewarnaan daun ketapang penguncian tunjung

The results of dyeing natural dyes from the extraction of dry brownish ketapang (Terminalia catappa) leaves with locking or fixation of tunjung produce a blackish green color on cotton fabric fragments when viewed as a whole color from 1x to 8x dyeing amounts. Dyeing the dye from Ketapang leaves (Terminalia catappa) is left for 15 minutes, drained until dry, then processed for fixation after each amount of dyeing. The fewer the number of dyeings, the lighter the resulting color will be, conversely, if the more the number of dyeings, the resulting color will be darker and darker. Color of Ketapang leaf extraction (Terminalia catappa) with tunjung fixation produces a dark color from the liquid before the fixation process and changes the original color of the ketapang leaf (Terminalia catappa).

Fig 5. Fragment with alum fixation mangrove wood staining

The results of dyeing natural dyes from the extraction of mangrove wood (Rhizophora mucronata Poir) with locking or alum fixation produce a reddish pink color on cotton fabric fragments when viewed as a whole color from 1x to 8x dyeing amounts. Dyeing mangrove wood (Rhizophora mucronata Poir) dye is left for 15 minutes, drained until dry, then processed for fixation for each amount of dyeing. The fewer the number of dyeings, the lighter the resulting color will be, conversely, if the more the number of dyeings, the resulting color will be darker and darker. The color of mangrove wood (Rhizophora mucronata Poir) with alum fixation produces almost the same color as the liquid before the fixation process and does not change the original color of mangrove wood (Rhizophora mucronata Poir) but locking with alum produces a thin or inconspicuous color.

Fig 6. Fragment with staining of tunjung fixation mangrove wood

The results of dyeing natural dyes from the extraction of mangrove wood (Rhizophora mucronata Poir) with locking or tunjung fixation produce a brownish red color on the cotton fabric fragments when viewed as a whole color from 1x to 8x dyeing amounts. Dyeing mangrove wood (Rhizophora mucronata Poir) dye is left for 15 minutes, drained until dry, then processed for fixation after each amount of dyeing. The fewer the number of dyeings, the lighter the resulting color will be, conversely, if the more the number of dyeings, the resulting color will be darker and darker. The color of mangrove wood (Rhizophora mucronata Poir) with tunjung fixation produces a different color from the liquid before the fixation process. The color of mangrove wood (Rhizophora mucronata Poir) fixation with tunjung is more intense than fixation with alum.

Fig 7. Fragment with calcium hydroxide fixation mangrove wood staining

The results of dyeing natural dyes from the extraction of mangrove wood (Rhizophora mucronata Poir) with locking or tunjung fixation produce a brick red color on cotton fabric fragments when viewed as a whole color from 1x to 8x dyeing amounts. Dyeing mangrove wood (Rhizophora mucronata Poir) dye is left for 15 minutes, drained until dry, then processed for fixation after each amount of dyeing. The fewer the number of dyeings, the lighter the resulting color will be, conversely, if the more the number of dyeings, the resulting color will be darker and darker. The color of mangrove wood (Rhizophora mucronata Poir) with tunjung fixation produces a different color from the liquid before the fixation process. The color of mangrove wood (Rhizophora mucronata Poir) fixation with calcium hydroxide is the most concentrated color of the two previous fixations, namely alum and tunjung.

IV. CONCLUSION

The results of dyeing batik fragments from the extraction of ketapang leaves (Terminalia catappa) and mangrove wood (Rhizophora mucronata Poir) vary depending on the amount of dyeing and the type of fixator which gives different colors. The coloring of ketapang (Terminalia catappa) leaves is very different if tunjung fixation is used. Staining of mangrove wood (Rhizophora mucronata Poir) is best using calcium hydroxide fixation. This research is for experiments on natural dyes from leaves and wood that have potential in Pekalongan City.

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