



PROCEEDING

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(ICND)

On Future Leader, Nature and Local Culture
for Sustainable Development

Surakarta, May 29, 2013



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Potential of mango leaf (*magnifera indica l*) as cotton and silk textile dyes

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ABSTRACT

Now a days a lot of pollution caused by the textile mills that use synthetic textile dyes that harm the environment. To reduce the use of synthetic dyes, natural dyes potential for use. One of the natural resources that have the potential for natural textile dyes are plant mango (*Magnifera indica L*). Part of the mango crop that can be used as dyes are leaves. On mango leaves are pigment-containing mangiferine kromofos carbonyl group. This pigment is easy release of these substances on the fabric because it is a kind of gum mangiferine that can be used as a coloring agent. Abundant mango crop in Indonesia, and the price is cheap. This experiment aimed to obtain the dye from the leaves of mango and its utilization in textiles. Natural dyes extracted tested on cotton and silk fabric. Natural dyes obtained by boiling the leaves of mango extraction with distilled water in 1:4 ratio. Fabric to be colored must dimordanting then soaking the natural dyes with time variation 10, 20, and 30 minutes later fixation. Fixer solution used is $Al_2(SO_4)_3$, $FeSO_4$, and $CaCO_3$. Fabrics that have been fixed then washed and analyzed with the washing water. Wavelength of the data obtained colour fadeing values based long time of fabric dyeing and fixer solution. In the results, the textile silk tie by both the dyeing time 30 minutes and fixer solution $Al_2(SO_4)_3$ for 4999. For cotton textiles showed the most excellent colour fadeing dye at 30 minutes at fixer solution $Al_2(SO_4)_3$ and $CaCO_3$ at 4265.67

Keywords: *Mango leaves, Extraction, Mordanting, colour fadeing*

INTRODUCTION

The development of the textile industry has made progress. The assortment of textile products that exist today use more synthetic materials. Synthetic dyes are very harmful to the environment, because it contains carcinogenic properties which allegedly can cause skin allergies and skin cancer will be. One way to overcome this problem is to use natural dyes which are substances that are environmentally friendly, can be produced in the country, is not harmful to the skin, and obtained more diverse colors and natural pigments quality not inferior to synthetic dyes, thus giving look more luxurious, attractive and natural^[1].

Mango (*Mangifera indica L*), classified in the plant family Anacardiaceae, is cultivated in many tropical and subtropical regions for commercial fruit production and as a garden tree. There are over a thousand mango varieties around the world^[2]. One natural resource that can be used or potentially for natural dyes is by extraction plant mango. Part of the mango crop that can be used as dyes are the leaves because it contains pigments that contain mangiferine kromofos the carbonyl group, hydroxyl group is aromatic auxochrome, so that the pigment is easy to release these substances on the fabric as a type rather than xanthan mangiferine that can be used as a coloring agent^[1]. The purpose of this experiment was to determine the potential of a substance on the leaves

of the plant warrants mango (*Magnifera indica* L) and ability absorption of natural dyes on silk and cotton.

METHOD

Extraction of natural dyes

Natural dyes are plant leaves of mango (*Magnifera indica* L) diced boiled with solvent (water) by comparison 500gram: 2 Liter, mixture is then boiled water boiling water changed color and stayed third. Cooking water separated from the leaves (residue) with filter cloth. Water extract of the stew called is used as a natural dye.

Mordanting

Mordant is a substance that serves as a solvent or plant color, as well as affect the final color of the staining^[3]. Fabric samples (silk and cotton) each cut with a certain pattern as much as 3 sheets of each pattern. Each sample was then washed with neutral soap and dried. Dry cotton cloth that has been boiled in a solution containing $\text{Al}_2 (\text{SO}_4)_3$ and Na_2CO_3 in 1 L of water with a mass ratio of 4:1. Cotton cloth and then left to soak in the solution for 1 night. After soaking cotton fabric rinse and then dried (without squeezed). Cotton fabric which is subsequently dried and ironed ready for the dyeing process. Mordanting process similar to silk cloth cotton cloth, which distinguishes it is the solution used for dyeing (8 g $\text{Al}_2 (\text{SO}_4)_3$ in 1 L of water, warming temperatures (60°C) was kept constant up to 1 hour.

Preparation of fixer (color lock)

There are three types of Iasa used fixer solution which is FeSO_4 , $\text{Al}_2 (\text{SO}_4)_3$, or CaCO_3 . The third process of the fixer solution is as follows: FeSO_4 fixer solution: dissolve 50 g FeSO_4 in 1 L of water. Let it settle and take the clear solution. Fixer solution of $\text{Al}_2 (\text{SO}_4)_3$: dissolve 50 g of $\text{Al}_2 (\text{SO}_4)_3$ in 1 L of water. Let it settle and take the clear solution. CaCO_3 fixer solution: dissolve 50 g of CaCO_3 in 1 L of water. Let it settle and take the clear solution.

Dyeing and fixation

The fabric are already in moordanting then dipped with dyeing time variation of 10, 20, and 30 minutes to extract natural dyed. Cloth that has been dyed in fixation premises hereinafter soaking into the fixer solution that has been made for 10 minutes. Furthermore cloth rinsed with distilled water Analysis. Quality of staining on the fabric sample can be determined by measuring the rinse water absorbency fixation devices using spectrophotometer.

RESULTS AND DISCUSSION

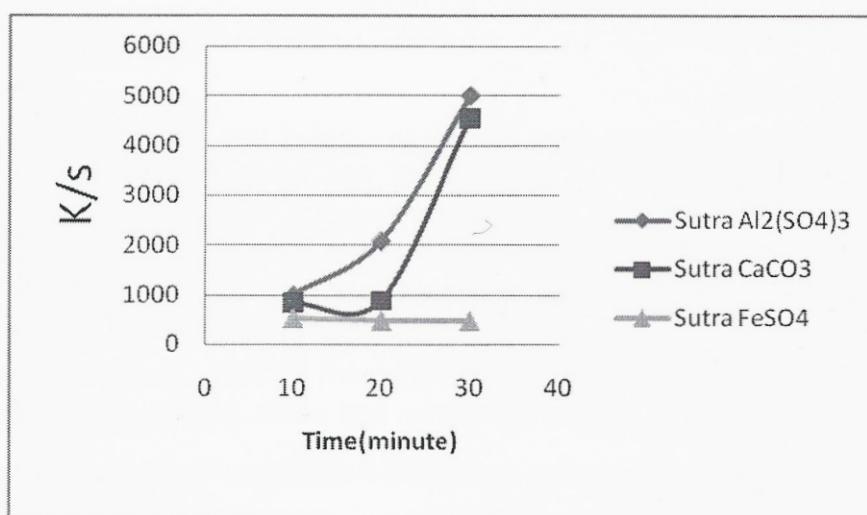
Result

Table 1. Data K / S Calculation at Mango Leaf Natural Dyes

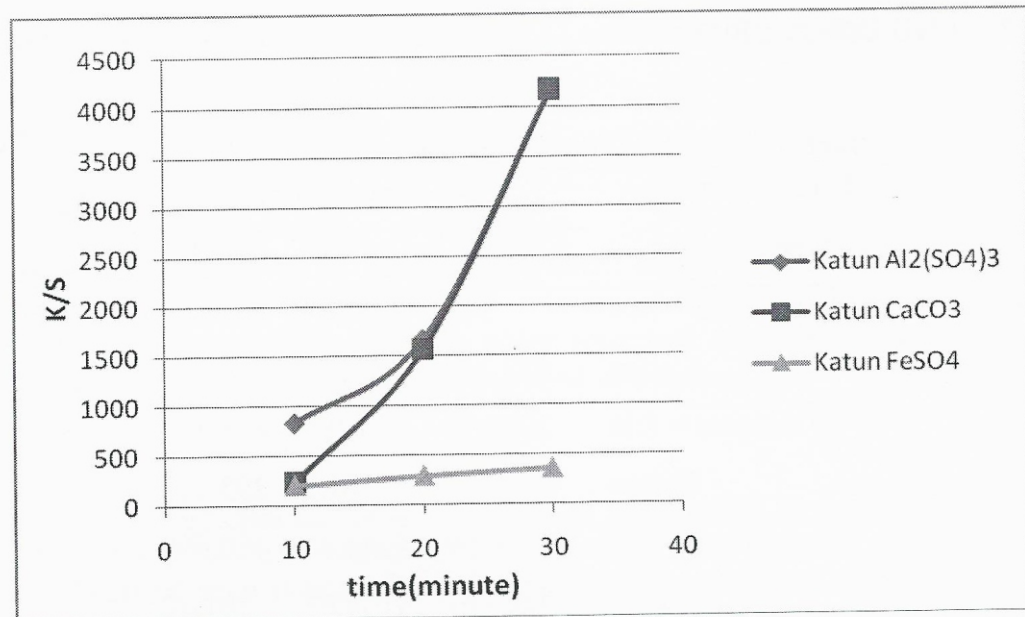
Time of soaking - type of fabric	K / S calculation		
	Al ₂ (SO ₄) ₃	CaCO ₃	FeSO ₄
10 minutes = Silk	999	832.334	525.316
Cotton	832.334	238.235	201.43
20 minutes = Silk	2082.33	876.193	475.191
Cotton	1665.67	1561.5	293.118
30 minutes = Silk	4999	4544.45	470.699
Cotton	4165.67	4165.67	361.32

Discussion

Natural dyes can be obtained from plants. Of the plant can be taken roots, stems, bark, leaves and fruit. This study used the leaves of mango to produce natural dyes extracted manner. Dye produced by mango leaves are brownish green. This study was conducted to determine the color fading of the dyeing results dyes from mango leaves. Time used for dyeing is 10, 20, 30 minutes, and fixer solutions used include Al₂(SO₄)₃, FeSO₄ and CaCO₃. Cloth then rinse, rinse water then analyzed by spectrophotometer to determine the fastness of the fabric shown by the wavelength of the reading on the spectrophotometer. Wavelength of the data obtained is then converted to the Kubelka-Munk equation is plotted in the following graph.



Graph 1. Dyeing time relation with K / S on Silk Fabrics



Graph 2. Dyeing time relation with K / S on Cotton Fabrics

Effect of Time Color Fabric Dyeing Resilience

Value of K / S declare resistance colors of fabric dyeing results, the greater the value of K / S color the better the resistance. In chart 1 shows that the value of K / S highest at 30 minutes dyeing time with fixer solution of $Al_2(SO_4)_3$ with the value of K / S 4999 but in this study there were errors in the conduct of research and the mistakes of the less scrupulous researchers in conducting research and observations, and results in the calculation of the value of K / S at the time of 30 minutes and used fixer solution is $FeSO_4$ impaire K / S. Dyeing in graph 2 also induced an increase in the value of K / S. in graph 2 also showed resistance to cotton color is best with a 30-minute dyeing time fixer solution $Al_2(SO_4)_3$ and $CaCO_3$ with a value of K / S 4165.67.

CONCLUSION

From the research that has been done can be concluded that the leaves of mango plants (*Mangifera indica* L) has potential as a natural dye for textiles with a brownish-green color. The longer the process of dyeing the resistance value of the color will be even greater. From this research that the value of resistance best color for silk fabric dyeing time is at 30 minutes with a fixer solution $Al_2(SO_4)_3$ with the value of K / S for 4999. As for the resistance value of cotton cloth is best color dyeing time 30 minutes with a fixer solution $Al_2(SO_4)_3$ and $CaCO_3$ with the value of K / S 4165.67

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