Proceeding International Conference on Green Agro-Industry
Volume 4, 2020 | Pages : 170-175

The Use Indigofera Plants As Natural Dyes For Batik

Darban Haryanto [1*] and Ellen Rosyelina Sasmita [2]

[1] Lecturer in the Department of Agriculture's Agriculture Faculty UPN "Veteran" Yogyakarta

*Corresponding author: darbanharyanto@ymail.com

Abstract.

Yogyakarta,as the center of batik, most of the batik industry uses chemical dyes for its coloring material. However, since there is a prohibitation using chemical dyes, especially from azzo species in the Netherland, Japan, and Germany, it opens the opportunity to replace chemical dyes to natural dyes this research was aimed to inform the advantage of using the Indigofera plant (*Indogofera tinctoria*) as natural coloring agents for coloring batik cloth which has a prospective future supporting the eco–fashions. By extracing the leaves will produce blue color paste that can be used for batik coloring. Observation was cunducted at Triharjo village in August 2019 by following the process from collecting the Indigo leaves, making paste until applying it to coloring the batik cloth It is proven the batik at Indigofera plants as natural dyes has an advantage over the chemical dyes, that the waste does not pollute the enviroment.

Keywords: batik, indigofera, natural dyes

1. Introduction

Indigofera plant is one type of plant where the leaves can be used as natural coloring agents for coloring batik cloth which has a prospective future. Yogyakarta as the center of batik most of the batik industry for its coloring material uses chemical dyes. The advantage of this chemical textile dye is that it is inexpensive and has a high stability compared to natural dyes, in addition to the diversity of colors available and the continuity of the guaranteed material so that it is preferred by consumers. However since there is a prohibition on using chemical dyes, especially from azo species in the Netherlands, Japan and Germany, it provides an opportunity to find a substitute for chemical batik colors using natural batik dyes.

Dyestuff-producing plants grow in Indonesia, more than 150 types of plants that produce dyes that can be extracted from roots, stems, flowers, bark and others. Among these types of plants producing color is Indigofera. The leaves of this plant can be extracted which can give a blue color.

Indigofera plants are relatively easy in their cultivation and do not require fertile land requirements, so that the marginal land of these plants can be cultivated. Indigofera plants are resistant to pruning, so at the age of 4 months the leaves can be utilized to be processed into indigo paste that produces blue color (tom). In its life cycle that can reach 2 years, plants can be taken as many as 6 times pruning. Indigo leaf processing can be done by extracting this plant with the following steps: the

leaves are immersed in a soaking tub and then the immersion water is oxidized, the result is a settling paste. This paste is then drained to reduce the water content. Indigo paste produced can be used for natural batik dyes.

Indigofera plant is one type of plant where the leaves can be used as natural dyes for coloring batik cloth which has a prospective future since there is a prohibition on using chemical dyes, especially from azo species in the Netherlands, Japan and Germany, according to Septia and Dian Widiawati, (2013) indigofera leaves can also be used as a craft coloring craft. The advantage of this chemical textile dye is that it is inexpensive and has a high stability compared to natural dyes, in addition to the diversity of colors available and the continuity of the guaranteed material so that consumers . However, since there isa prohibitation on usprefer it.

Dyestuff-producing plants grow in Indonesia, more than 150 types of plants that produce dyes that can be extracted from roots, stems, flowers, bark and others. The resulting colors include combination colors such as green, orange, brown, indigo and the basic colors of red, yellow and blue (Heyne 1987 in Kasmudjo et al). Among these types of plants producing color is Indigofera. The leaves of this plant can be extracted which can give a blue color.

In the Special Region of Yogyakarta, especially in the area of batik centers, namely in Wukirsari Imogiri Bantul, Lendah kulon progo in the last decade the development of the batik industry experienced significant development, interestingly the use of synthetic dyes slowly began to be replaced with natural dyes. This was suspected because batik with natural dyes had a higher price besides the waste does not pollute the environment, but the problem that arises is that these batik craftsmen get a supply of natural dyes from outside the Yogyakarta area. One of the natural dyes that produce blue (tom) is derived from the leaf extract of the indigo fera plant. Some areas of Bantul, especially in the Triharjo Pandak area, have cultivated these plants as raw material for making indigo paste. These indigofera plants are relatively easy in their cultivation and do not require fertile land requirements, so that marginal land in these plants can be cultivated. Indigofera plants are resistant to pruning, so at the age of 4 months the leaves can be utilized to be processed into indigo paste which produces blue color (tom). In its life cycle that can reach 2 years, plants can be taken as many as 6 times pruning. Indigo leaf processing can be done by extracting this plant with the following steps: the leaves are immersed in a soaking tub then this immersion water is oxidized, the result is a settling paste. This paste is then drained to reduce the water content. Indigo paste produced can be used for natural batik dyes.

2. Material and Methods

The research method used to obtain data by observation and question and answer at the place of business making natural blue extract with the raw material of Indigo plant leaves, in the village of Triharjo Pandand subdistrict of Bantul Regency.

Materials used include: indigo leaves, lime, water while the tools used are: soaking tubs, aeration tubs , water pumps, pasta filters.

3. Discussion

Indigo leaf extraction becomes coloring through several main processes namely fermentation, aeration and reduction. Following is an explanation of each stage and the method of making it.

3. 1. Collection of Indigo Leaves

Indigo plants that are more or less 4 months old can be harvested leaves. Picking leaves usually by including a little twig. The time of indigo leaf harvesting is very influential on the quality of the extracted color quality. The best time to harvest indigo leaves is before sunrise (based on the experience of farmers in the Wonosobo area).

Figure 1. Leaves of Indigo plants ready for harvest

3. 2. Fermentation

Indigofera plants contain indicative glucosides. This indication needs to be fermented enzymatically hydrolyzed so that it turns into indoxyl and glucose. Fermentation is generally done by soaking the leaves in water. When fermentation will arise froth foam on the surface of immersion water. Fermentation can be stopped if a lot of foam has formed. This process takes approximately 1-2 days.

• Leaf weight ratio: water volume = 1:10 (kg: liters)

• Because the leaves are very light so the leaves can be submerged, weights are needed that are placed on the leaves (all leaves must be submerged)

• Immersion results are blue liquid must be separated from the leaves.

• Separation of leaves is done by filtering with a filter cloth. The result of filtering is a yellowish blue liquid. Furthermore, this liquid is dissolved (aeration).

Before being ground or aerated, the lime solution is added with lime water which is made by dissolving active lime in water. Active lime marks can be checked by dissolving them in water. If there are bubbles, they are still active.

Figure 2. Indigo leaf fermentation process

The weight range of lime used is 2-3% of the weight of leaves soaked, then dissolved in 1-3 liters of water. This lime solution is left to sit for at least 1 day before pouring it in an indigo marinade solution. Adding lime will make the solution alkaline where the dyes are more soluble in this atmosphere. Adding less lime will result in the dye not being taken completely, and if there is too much lime, then the paste will contain lime which can affect the coloration (fading).

After adding lime, the color of the solution will turn yellowish green. A solution that is too brown indicates too much lime is used

3. 3. Aeration (Blurring)

Indoxyl produced from the fermentation process needs to be oxidized to become indigotin (blue dye). The oxidation process is done by blurring (it can also be called aeration or contact with oxygen in the air) During the blurring process white foam or foam will form. Blurring continues until the foam disappears. The time range depends on the liquid in contact with air. If done manually with a dipper spray, 1 medium size bucket (20 liters) can last for 0.5 - 1 hour. In larger scales, bubble-producing spargers (such as those used in fish ponds or shrimp ponds) can be used.

Figure 3. Aeration process (aeration)

After the froth in the solution is gone, the paste will begin to settle to the bottom. The deposition process can be waited for 3-4 hours. The surface of the water will become clear greenish and below will appear blue deposits. The strip can be removed and the precipitate filtered with cloth. Filtering paste can be done by hanging in a filter cloth.

Pasta that is formed is not too durable or easily rot if exposed to air. Therefore, the paste must be stored in a tightly closed container. With good storage, it can last up to 1 year. In order to prolong the storage process, the paste can be dried by being dried in the sun to dry and become powder. In powder form it can last several years.

3. 4. Reduction

Indigo paste containing indigotin can already be used for dyeing batik cloth. However, this compound is not soluble in water so it cannot be attached to the fabric just like that. Reduction process is needed so that the blue color can be attached to the fabric. Indigotin needs to be reduced to indigo leuco in order to dissolve and adhere to the fabric. There are several types of reducing agents that can be used, both chemical and natural. The chemical commonly used is sodium hydrosulfite (commonly called hydro) while natural ingredients such as reducing sugar. Reducing sugar is sugar that can reduce, for example, fructose. Generally found in palm sugar but not in granulated sugar. So that even though they are the same sweet and called sugar, not all can be used as reducing sugar.

Figure 4. Indigo Paste

3. 5. Dyeing

Cloth that has been dyed with indigo needs to be air-dried to contact air. Oxygen in the air will change the greenish brown color of the fabric to bright blue. This indicates that the Leuco indigo compound that attaches to the fabric slowly becomes indigotin again. The dyeing process can be carried out several times until the desired color is achieved. Usually ranges from 3 to 5 times.

4. Conclussions

From the results of observations made it can be concluded how to make indigo paste through several stages, namely:

1. Preparation stages of indigofera plant leaf material, soaking, fermentation, aeration and reduction.
2. The paste obtained can be used as a natural coloring agent in blue.

References

Anonim. 2008. *Zat warna alam*. [Online]. https://batikyogya.wordpress.com/category/zat-warna-alam/page/2/

Departemen Pertanian. 2009. *TanamanNila*. [Online]. http://ditjenbun.deptan.go.id/budtansim/index.php?option=com_content&view=article&id=13:tanaman-nila indigoferal&catid=6:iptek&Itemid=7 [11 Februari 2011]

Kasmudjo, Panji Probo S, Titis Budi Widowati. (1995), *Pemanfaatan Limbah serbuk Kayu Mahoni Sebagai Pewarna Batik Alami*