

# Implementation of Batik Dyeing Using *Jengkol* Peels Extract at Rang Minang Batik House in Padang Panjang City

Indah Wulandari<sup>1)</sup>, Agusti Efi<sup>2)\*</sup>

<sup>1)2)</sup> Department of Family Welfare, Faculty of Tourism and Hospitality, Universitas Negeri Padang, Indonesia

\*Corresponding Author

Email : [gustti@yahoo.co.id](mailto:gustti@yahoo.co.id)

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## ABSTRACT

The use of synthetic dyes in the batik industry, considered practical and efficient, has had negative impacts on health and the environment. This study aims to explore the production and application of natural dye extracts from *jengkol* (*Archidendron pauciflorum*) peels as an alternative dye in the batik dyeing process at Rumah Batik Rang Minang. A descriptive qualitative approach was used, with data collection methods including documentation, interviews, and observation. The study results show that the *jengkol* peel extract is produced through a boiling process and applied to batik fabric using the dipping technique. The dyeing process involves soaking the fabric in *jengkol* peel extract and repeating the dipping to ensure color durability. The use of this extract produces a distinctive and long-lasting color, offering an eco-friendly solution for the batik industry.

## KEYWORDS

Natural Dyeing  
*Jengkol* Peels  
Extract Production  
Dyeing Technique

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## INTRODUCTION

Batik, as one of Indonesia's cultural heritages recognized globally, has undergone various changes in its dyeing techniques and materials. Today, the use of synthetic dyes is more practical than natural dyes. The process of using synthetic dyes is easier than natural dyeing, and synthetic dyes are readily available. As a result, the use of natural dyes has declined over time. According to Diba and Wahyuningsih (2021:127), the use of synthetic dyes in textile dyeing is an innovation aimed at making it easier for textile artisans to process materials. However, excessive use of synthetic dyes has negative impacts. Zumarni, et al (2022: 134) state that, while synthetic dyes are practical and easily accessible, they also pose environmental issues and are harmful to human health. Purnaningtyas, et al. (2014: 2) note that the chemical content of synthetic dyes, along with the use of wax that is insoluble in water, contributes to environmental problems. Given the harmful effects of synthetic dyes on both the environment and human health, there is increasing awareness, particularly among the batik industry and MSME actors, to return to using environmentally friendly dyes.

Eskak & Salma, (2020) state that traditional batik dyeing once relied on natural dyes sourced from the environment around the craftsmen. However, with technological advancements and the demand for efficiency, many craftsmen have shifted to synthetic dyes. Synthetic dyeing is considered more practical because it is easy to obtain, faster in the dyeing process, and offers a wider range of colors with greater color stability (Pujilestari, 2016). Despite these advantages, the use of synthetic dyes has negative impacts on both health and the environment. This shift reflects a transition from traditional, sustainable practices to modern methods that have the potential to harm the environment.

Therefore, efforts are needed to revive the use of natural dyes in textile dyeing. However, the adoption of natural dyes is hindered by the public's lack of knowledge about the available natural ingredients and how to process them. To promote natural dyeing again, as it is safer, more sustainable, and environmentally friendly, various small industries have begun returning to the use of eco-friendly, natural raw materials, with government encouragement.

The batik industry in West Sumatra Province has seen significant growth, expanding to various cities and districts, including Padang Panjang. Rang Minang Batik is one of the outcomes of an incubation program initiated by the Padang Panjang government in collaboration with the Cooperation Office, Padang Panjang City Coperindag, and the Padang City Industrial Center. This program aims to foster the development of the creative industry in the region, particularly in batik art. As part of this effort, Batik House Rang Minang has incorporated the use of natural dyes in its batik production process. The use of natural dyes, such as jengkol peels extract, is a step towards reducing the negative environmental and health impacts associated with synthetic dyes. Additionally, using these natural materials enhances the aesthetic value and uniqueness of the batik products produced.

Hanifati and Novrita (2023:1371) stated that natural dyes are sourced from the environment by utilizing surrounding natural resources. Rhofur (2019:31) adds that traditional dyes are made from natural ingredients extracted from plant parts such as peels, branches, leaves, roots, seeds, or sap. Putri and Novrita (2024) also mention that natural dyes for textiles typically come from the extracts of various plant parts, including roots, wood, leaves, seeds, or flowers. Fitrihana (2018:3) explains that the extraction process is conducted by boiling the materials with a solvent, usually water. The process of extracting natural dyes through boiling and fermentation is further supported by Putri and Novrita (2024). Ramadan (2024:99) adds that boiling is the primary method for producing textile dyes from natural materials. Rumah Batik Rang Minang uses this boiling technique to extract natural dyes from *jengkol* peels, which are then applied to batik.

The dyeing process on batik generally uses the soaking technique. Yuliana and Adriani (2022: 183) describe soaking as the uniform staining of textile material across its surface. Fitrihana (2018) explains that soaking involves evenly applying color to the material. Ramadani (2024:99) also states that the dyeing process using natural dyes is typically carried out through soaking. From these perspectives, it can be understood that soaking is the process of thoroughly and evenly coloring fabric fibers using natural dyes with the assistance of water, steam, or heat, ensuring the material's resistance to fading. In light of the issues associated with synthetic dyes, this study will explore the production of natural dyes extracted from *jengkol* peel and their application in batik dyeing at Rumah Batik Rang Minang, Padang Panjang City, as an effort to reduce environmental pollution caused by synthetic dyes.

## METHOD

This study employs a qualitative descriptive method, utilizing both primary and secondary data. The research was conducted at Rang Minang Batik House, located in Bukit Surungan Village, West Padang Panjang, Padang Panjang City, West Sumatra Province, from June 3 to July 3, 2024. Data collection methods included documentation, interviews, and observations, with the research informants consisting of the head/owner of the batik house and nine batik craftsmen at Rang Minang Batik House. The researcher serves as the primary instrument, analyzing the data through reduction, presentation, and conclusion drawing. The validity of the data was ensured through extended observation, increased diligence, triangulation, case analysis, the use of reference materials, and audits.

## RESULT AND DISCUSSION

### 1. Production of *Jengkol* Peels Extract

Batik House Rang Minang for natural coloring of batik, using *jengkol* peels as a natural material in making the extract. In the process of making extracts by means of redemption. The recipe for making *jengkol* peel extract is to clean using 1:2 Volt for *jengkol* peels. The boiling of *jengkol* peels is carried out until the boiling water reduces to half of its original volume. The steps to make the extract can be explained as follows: The first thing is to prepare the necessary ingredients, including water and *jengkol* peels. Gather the equipment needed for boiling. Wash the *jengkol* peels thoroughly and then break it to release the dye. Place the cleaned, broken peels into a 5 kg capacity pan. Add water in a 1:2 ratio—if using 5 kg of peels, add 10 liters of water. Boil the mixture until the water volume is reduced to half, approximately 5 liters. After boiling, let the solution cool and refrigerate it overnight. The next day, strain the cooled solution to separate the peels from the liquid. The filtered extract is now ready to be used for dyeing batik.



Figure 1. *Jengkol* Peels as a Natural Ingredient (Source: Wulandari, 2024)



Figure 2. *Jengkol* Peels Boiling (Source: Wulandari, 2024)



Figure 3. Stews That Have Been Inhabited All Night (Source: Wulandari, 2024)

### 2. The Process of Dyeing Batik at the Rang Minang Batik House with *Jengkol* Peels

Batik House Rang Minang employs natural dyeing techniques using soaking methods. The equipment required for dyeing includes pots, stoves, mixers, gloves, scales, spoons, measuring cups, tubs, and jars. The materials needed are water, TRO, and mordants (mountain limestone and gravel). In this process, a fabric measuring 2.5 meters by 1.15 meters is dyed using 5 liters of natural material

extract. The fabric is not weighed individually because it is typically a piece that has already been used or damaged. As a result, the mass of the fabric can vary due to the amount of wax used in clamping or stamping. For comparison, a piece of cloth measuring 2.5 meters by 1.15 meters, which has been painted, is soaked in 2 liters of a limestone solution as part of the fixation process.

The natural dyeing process using **jengkol** peels involves the following steps. First, soak a cloth measuring 2.5 meters by 1.15 meters in a bowl filled with water and Turkish Red Oil (TRO) mixed with 2 grams of soda ash per liter. Leave it for 15 minutes, then rinse and let it dry. Once the fabric is dry, it is ready to be decorated with motifs using printing and embroidery techniques. After applying the motifs, the fabric is dyed using the rubbing technique, then left to dry in the sun. Next, the fabric is rubbed to remove excess wax (if used), washed, and dried again in the sun. After drying, the batik cloth is soaked in a bucket containing prepared natural dye extracts. The soaking process continues until the color is evenly distributed across the fabric. The fabric is then removed and allowed to air dry. This process is repeated three to five times. The more times the process is repeated, the more intense the color becomes.

After soaking, the batik cloth is immersed in a pre-prepared color-fixing solution. The color-fixing agent used is hill limestone, mixed at a ratio of 1:10, and the solution should be prepared the day before use to allow the agent to settle overnight. The steps for soaking in the color-fixing solution are as follows: (a) Take the batik cloth that has dried after soaking in natural dyes. (b) Apply the color-fixing solution by either pinning the limestone to the fabric or soaking the fabric in the limestone solution. The method used can affect the final color outcome. After the fabric has been soaked in both the dye and the color-fixing solution, rub the fabric to remove excess moisture and then let it dry.



**Figure 4.** Soak The Cloth in TRO (Turkish Red Oil)  
(Source: Wulandari, 2024)



**Figure 5.** Printing Process at Rang Minang Batik House  
(Source: Wulandari, 2024)



**Figure 6.** Fabric Melting After Soaking  
(Source: Wulandari, 2024)

### 3. Extract Manufacturing

The process of making natural dyes involves extracting or preparing a natural dyeing solution from plant materials. Kamala and Adriani (2019:306) state that natural dyes can be obtained through the extraction process by boiling the plant parts to be used. This process aims to extract color pigments from the plant. Fitrihana (2010: 92) explains that extraction is the process of separating one or more substances from solids or liquids using solvents. This process involves two main components: the solvent and the substance to be extracted. In this case, water is used as the solvent because it effectively extracts tannins from natural dyes. The optimal conditions for extraction are 100°C with a solvent-to-material ratio of 1:10, achieving an extraction efficiency of 0.43% over 60 minutes (Kwartaningsih., et al.: 2013). For cleaning the peels, a 1:3 v/v ratio of water is used, and the mixture is boiled until the water volume is reduced by one-third of the original amount. Alamsyah (2018: 140) notes that the extraction process involves heating by boiling natural dyes mixed with water.

The extraction process is carried out by boiling natural dyes with water, as described by Fitrihana water (2007), First, cut the desired parts of the plant, such as leaves, stems, peels, or fruits, into smaller pieces. Take 500 grams of these plant parts and place them in a pan. Add water in a 1:10 ratio (5 liters of water for 500 grams of plant material). Boil the mixture until the volume of water is reduced by half (to 2.5 liters). If a thicker solution is desired, you can reduce the volume of the remaining liquid further. An indication that the color pigment has been sufficiently extracted is a noticeable change in the color of the water. After boiling, strain the solution to separate the liquid from the residue. The filtered liquid is the natural dye solution and is ready for use once it has cooled.

It appears that in practice, Batik Rang Minang uses a different ratio than the theoretical 1:10. In practice, the ratio found is 1:2. For extracting natural color from *jengkol* peels, 5 kg of peels are boiled in 10 liters of water, resulting in a 1:2 ratio. The extraction process involves the following steps: First, prepare the necessary tools and materials, including weighing 5 kg of *jengkol* peels and preparing 10 liters of water. Place the peels in a sack and crush them until they break. Put the crushed peels in a pan and add water in a 1:2 ratio. Boil the mixture, stirring occasionally, until the water volume is reduced by half. Remove the mixture from heat and let it infuse overnight to ensure that the color pigments are fully extracted from the peels. After infusion, strain the mixture to separate the extract from the peels. The filtered extract is now ready for use in the fabric dyeing process. The entire dye manufacturing process takes one day and one night.

The first step is to prepare the necessary tools and materials, including weighing 5 kg of *jengkol* peels and preparing 10 liters of water. Next, place the peels in a sack and crush them until they break apart. Then, put the crushed peels in a pan and add water in a 1:2 ratio. Boil the mixture, stirring occasionally, until the water volume is reduced by half. After boiling, remove the mixture from heat and let it infuse overnight to ensure that the color pigments are fully extracted from the peels. Once the infusion is complete, strain the mixture to separate the extract from the peels. The filtered extract is now ready for use in the fabric dyeing process. The entire dye manufacturing process takes one day and one night.

#### 4. Batik Dyeing Process

Batik House Rang Minang employs an immersion technique for the batik dyeing process using natural dyes. According to (Prasetyo 2020: 25), natural dyes are derived from natural materials such as plants and animals, including plant parts like peels and fruits. Nugraheni, et al (2020: 136) describe dyeing as a process that applies color to batik through uniform soaking. Additionally, Fitrio & Efi (2023) in Sunarto (2008:3), explain that the dyeing process involves evenly applying dye to textile materials, including fibers, yarns, and fabrics. This technique uses appropriate dyeing agents for the type of material being dyed, resulting in colors with good colorfastness.

Yuliana and Adriani (2022), describe soaking as the process of applying color to fibers, threads, or fabrics thoroughly using dyes. This process involves immersing the material in water, steam, or subjecting it to dry heating to achieve a color that is resistant to fading. Dewy and Novrita (2019:249) explain that the color yield in the absorption process is influenced by three main factors: 1) Migration, where the dye dissolves and moves to adhere to the material; 2) Adsorption, which causes the dye to stick to the surface; and 3) Diffusion, where the dye is absorbed from the surface into the material, followed by fixation. According to Amalia and Akhtamimi (2016: 85) fixation is achieved through infiltration, which aims to lock the dye into the fibers to prevent the resulting color from bleeding or fading.

Based on the expert opinions presented above, it can be concluded that natural dyes are derived from ingredients of natural origin, such as plants and animals, including peels and fruits. Dyeing should be performed with suitable dyes to ensure colorfastness for textile materials like fibers, yarns, and fabrics. The dyeing process involves thoroughly applying color using water, steam, or dry heating to ensure resistance to fading. Delmasari et al.( 2024:27), describe the color fixation in the dyeing process, known as fixation. At Rumah Batik Rang Minang, the fixation and mordanting process occurs after the fabric has been dyed with natural dyes or at the end of the soaking process. In line with the opinion Cahya and Novrita (2023:567) emphasize that the mordanting stage is crucial for binding the dye and preventing it from fading. Common mordants include tunjung, alum, betel lime, and others. At Rang Minang Batik House, two types of mordants are used: tunjung and bukit tui lime (lime from Bukit Tui, Padang Panjang City).

The research conducted at Rang Minang Batik House reveals that the soaking technique is used for applying natural dyes. The process of batik dyeing using *jengkol* peel extract at Rang Minang Batik House follows these steps: a) Prepare the filtered *jengkol* peel extract; (b) Soak the cloth in a mordant, then apply motifs using printing or canting techniques; (c) Apply synthetic motifs to the fabric as needed; (d) Dry the cloth in the sun, followed by candle waxing; (e) After sun-drying, soak the cloth in the natural dye extract for 1 hour; (f) Weigh the fabric after it dries and repeat the soaking process 3-5 times; (g) Finally, weigh the dried batik cloth using a hill crane and funnel.

#### CONCLUSIONS

Based on the results and discussion above, it can be concluded that the natural material used at Rang Minang Batik House is *jengkol* peels. The technique for making natural dye extracts at Rumah Batik Rang Minang involves a redemption process: the peels are boiled in a 1:2 ratio (5 kg of peels with 10 liters of water) until the volume is reduced by half. This process takes about two hours, followed by cooling the extract overnight. The natural dyeing technique used at Rumah Batik Rang Minang is an immersion method. The process begins with soaking the fabric in a solution of 2 grams/liter of TRO (Turkish Red Oil) for 15 minutes, then drying it. The fabric is then given a motif using canting or stamping. After applying the motif, the fabric is dyed by first immersing it to ensure the color penetrates the design, then drying it. The fabric is subsequently soaked in the natural dye extract 3-5 times for deeper color. Finally, fixation is achieved using mordants from tui and tunjung limestone.

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