Optimization of the Utilization of 3B Bukersiracang as an Alternative Natural Purifier of Batik Color Waste

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Abstract

Tuban is a small town in the East Java which is famous for its batik gedog industrial. The production center of batik gedog is located in Kerek Subdistrict. From the batik-making process, it produces liquid waste from coloring process. Batik coloring waste that's disposed of directly without being processed can cause pollution. One of the solution is making natural purifier. The purpose of this research is to treat batik waste in Kerek, so it doesn't endanger the environment in its disposal. Based on this problem, the authors made purifier from siwalan fibers (*Borrassus flabellifer*), corncobs (*Zea mays*), peanut shells (*Arachis hypogae*), moringa seeds (*Moringa oleifera*), and other materials. This research was conducted by interviewing one of the batik employees in Kerek who used to dispose of batik dyeing waste on the ground. The method used is experimental and documentation. Based on the results of the study, it is known that siwalan fibers, corncob, peanut shells, moringa seeds, gravel, charcoal, and stones can be used as the alternative to natural purifier batik dye waste. This is because these materials have the property of absorbing. The result is the waste from the batik dyeing that is clearer and safer for further disposal.

Keywords: Type your keywords here, separated by semicolons ;

1. Introduction

Tuban is a small town that has a lot of potential in the field of agriculture and batik industry. In agriculture, Tuban is a producer of borassus fruit. Borassus production in Tuban Regency in 2007 amounted to 5,477 tons (Amir, 2017). In addition, Tuban also produces many agricultural products, such as peanuts. Peanut production in Tuban District reached approximately 27,945 tons (Amir, 2017). Tuban is also the producer of corn crops. The area of corn commodity crops in Tuban District reaches 90,019 Ha with an average production of 43.75 kw (Amir, 2017). Corn production in Tuban Regency in 2018 reached 21,762 tons through a garden area of 4,037 Ha. Moringa plants are found in the yard of Tuban people's houses.

The potential in Tuban is still not utilized optimally by the public in general. This one of them can be seen in the fruit of borassus that is only used by young fruit seeds for sale, but the borassus fibers are just thrown away. In addition, there are corn weevil and peanut skin that are generally only used as a substitute for firewood. Another potential is moringa plants that are only utilized by the leaves, which unwittingly that moringa seeds can also clear batik waste. Some research suggests that moringa seed

extract (*Moringa oleifera*) may improve coagulation ability and eradicate bacteria or small microbes (Aslamiah et al., 2013).

The potential in Tuban regency in addition to this is also seen in the field of industry. Tuban is an area that has a variety of industries such as batik. Tuban batik handicraft center or known as batik gedog has reached 1,612 units spread across several sub-districts (Sagita & Ciptandi, 2020). However, this potential also has an impact on the community and the surrounding environment. With the number of batik handicraft centers in Tuban, the waste of batik coloring is also increasing every day. Most batik entrepreneurs throw the batik coloring results directly into the environment or river without any management. Batik industry waste also contains synthetic materials that are difficult to dissolve or difficult to decompose. After the coloring process is complete, a murky and concentrated liquid waste will be produced. This colorful waste water is causing problems to the environment. Waste colors produced from the batik industry are generally non-biodegradable inorganic compounds that can cause environmental pollution, especially aquatic environments. One example of dyes that are widely used in batik industry is red ASBO R, naptol, and indigosol. In coloring, this compound is only used about 5% while the remaining 95% will be disposed of as waste. This compound is stable enough that it is very difficult to degrade or decompose in nature. In addition, the compound is also dangerous, especially if it is in a very high concentration. This of course can damage the balance of environmental ecosystems characterized by the death of aquatic organisms around the waste disposal site (Ninggar & Santoso, 2014). The negative effect of chemical color in the coloring process by batik craftsmen is the risk of skin cancer because they do not use gloves and is continuously exposed to chemicals in batik waste that are carcinogens, which are cancer cell-causing materials. Moreover, polluted river water seeps into wells and pollutes the water used for daily living purposes. If this continues, it will damage the ecosystem.

Based on the background above, the author took the initiative to make use of borassus fibers, corn weevil, peanut skin, and other materials, such as sand, charcoal, and gravel to purify batik waste physically. As for lowering the pH, the authors use moringa seeds because it has coagulant properties. Therefore, the author creates a paper entitled “Optimization of the Utilization of 3B Bukersiracang as an Alternative Natural Purifier of Batik Color Waste”.

2. Research Method

This type of research is an experiment that discusses the utilization of borassus fibers, corn weevil, peanut skin, and moringa seeds as an alternative to natural purifiers of batik color waste.

2.1. Research Design

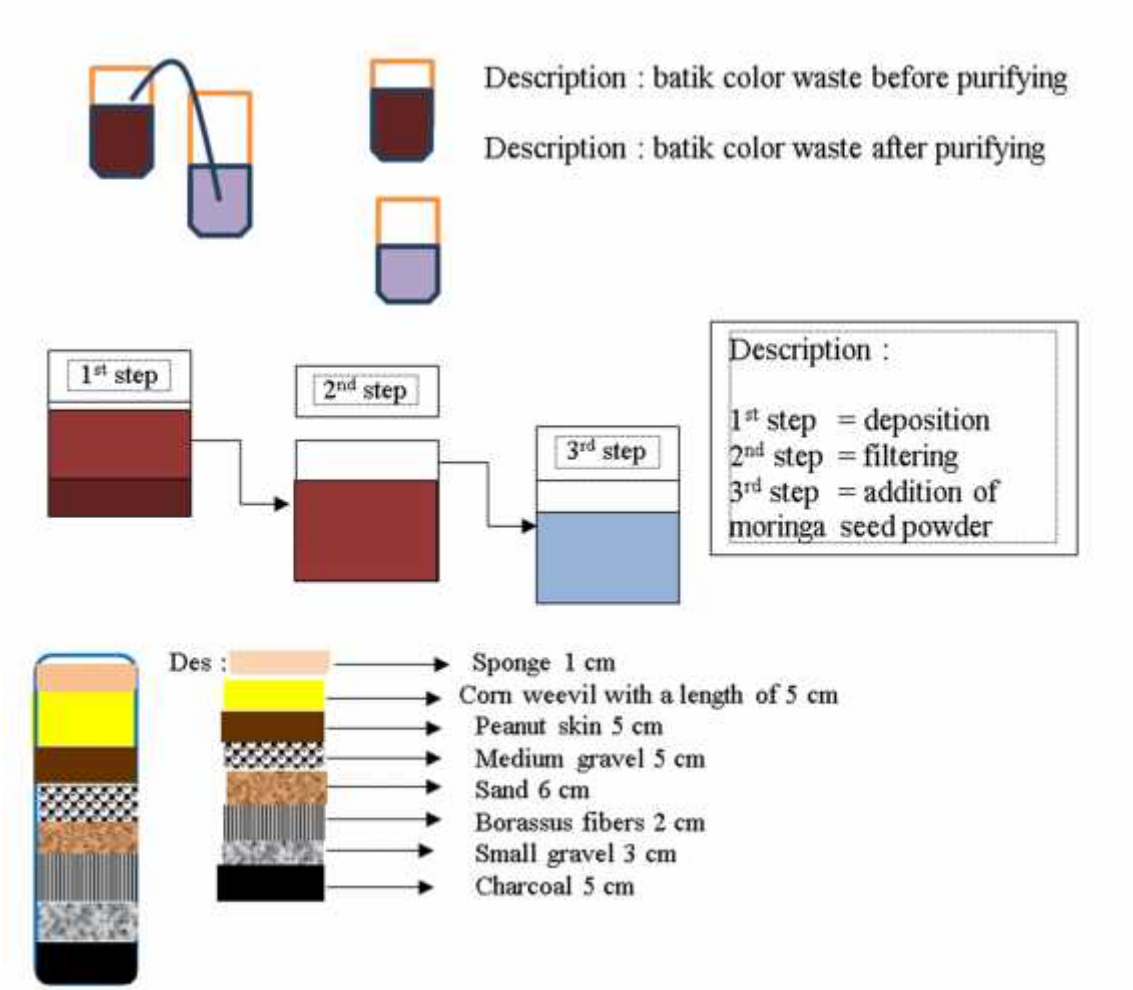

Fig 1. Resarch Design

In this paper, the author uses experimental methods. The first process is to collect materials, such as borassus fibers that can be obtained around Tasikmadu Tuban. Furthermore, the fibers are washed thoroughly. Once clean then dried under the hot sun until dry. Corn weevil, peanut peel as well as other ingredients can be found around the house. The order of making this purifying tool from the bottom up is to put the sponge at the very bottom, thick sponge about 1 cm, then assault the borassus on it with a thickness of 5 cm, small pebbles with a thickness of 3-4 cm, sand with a thickness of 6 cm, large pebbles as thick as 2.5 cm, peanut skin 5 cm, charcoal and the top is corn weevil with a thick 6 cm. And before pouring the waste into the purifier, first precipitate the waste for 1-3 hours. After visible sedimentation, batik waste water can be put in a

purifier. After obtained the results of physical purification then the next stage is purification of the second stage using natural ingredients in the form of moringa seeds (*Moringa oleifera*) by smoothing the moringa seeds first then mixing the results of previous purification with moringa seed powder (*Moringa oleifera*) and after mixing let stand for 1 hour then filter the waste water that is separated from the dirt in the waste. In this case, the addition of moringa seeds is done to lower the pH of the batik waste water.

2.3 Research Place and Time

Experiments on the manufacture of natural purifiers from borassus fibers (*Borrassus flabellifer*), corn weevil (*Zea mays*), peanut skin (*Arachis hypogaea*) and moringa seeds (*Moringa oleifera*) on batik color waste were conducted at the Biology Laboratory of PGRI Ronggolawe University located at Jalan Manunggal No. 61, Semanding District, Tuban Regency on Monday, January 4, 2021 at 13.00 WIB.

2.4 Research Subjects

In this paper, the subjects are borassus fibers (*Borrassus flabellifer*), corn weevil (*Zea mays*), peanut skin (*Arachis hypogaea*), moringa seeds (*Moringa oleifera*) and naptol type batik color waste, namely red asbo.

2.5 Tools and Materian

The equipment used in this study include: pestle, place to pound (mortal), sunlight, cutter, scissors, basin, large bottle, spectrometer test equipment, conductivitymeter, beaker, pH meter, measuring glass, laptop, and mobile phone camera.

Materials used in this study include: Corn weevil (*Zea mays*), peanut skin (*Arachis hypogaea*), charcoal, borassus fiber (*Borrassus flabellifer*), gravel, silica sand, sponge, moringa seeds (*Moringa oleifera*), batik coloring waste type red asbo.

2.6 Data Collection Techniques

Preparation Stage

The first preparation done by the author is doing observations about borassus fibers found in Manunggal Tuban Village, then hypothesize about the manufacture of alternative tools of natural saturation of borassus fibers using other ingredients, such as peanut skin, corn weevil, moringa seeds, and other ingredients. It is done so that the manufacture of water purifiers is more maximal. By conducting experiments on borassus fibers and other materials by researching directly.

Research Stage

At this stage, the author conducted experiments on the manufacture of natural purifiers from borassus fibers, corn weevil, peanut skin, and moringa seeds. The first process is to prepare all the tools and materials. The second process is to wash the fibers and dry them. The third process is arranging all the necessary materials in a large used plastic bottle that has been cut off the top. The fourth process, let batik waste for

approximately 3-4 hours to be separated from other impurities. The fifth process is to insert the waste water into the purifier slowly and wait until the water drops to the bottom of the purifier and then open the bottle cap. Sixth add moringa seed powder as much as 12 grams for every 300 mL of water produced by the first sieve and wait until there is a sediment then filter the water that has been cleared.

Completion Stage

In the final stage, the authors collected data that has been obtained from the implementation stage in the form of purifiers, photographs of the process of purifying experiments from borassus fibers, corn weevil, peanut skin, moringa seeds and other ingredients. After obtaining the data, the author draws conclusions about what the author has researched in the paper entitled "Optimization of the Utilization of 3B Bukersiracang as an Alternative Natural Purifier of Batik Color Waste".

3 Research Results and Discussion

Table 1. Purification Results Include Odor and Color

Num	Sample Test	Odor		Color	
		Before	After	Before	After
1.	Batik color waste	Very stinging	Less stinging	Murky and red	Clear and bright yellow

Table 2. Purification Results Include pH dan Electric Delivery Power

Num	Sample Test	Sample Volume		Purification result			
		Before purification	After purification	Before purification		After purification	
				pH	DHL	pH	DHL
1.	Batik color waste	600 mL	300 mL	10,70	25,3 *mS*	9,47	3,64 *mS*

3.1 Data Analysis

From the results of the study, it can be known that the results of purifying include odor, color, pH, and DHL. Based on Table 2, the results of purification using borassus fibers, corn weevil, peanut skin, moringa seeds and other materials can be known that the test of batik color waste samples as much as 600 mL occurs discoloration, namely before the clearing of the color of the solid red sample and after clearing the color of the sample to be clear and bright yellow. In terms of sample odor, before purification is more pungent than the sample after purification (Table 1). From the clearing data to compare pH, and DHL. It is known that the pH of the sample before purification is 10.70 and after purification is 9.47. The Electrical Delivery Power in the sample before clearing is 25.3 and the ElectricIty In the sample after clearing is 3.64 (table 8.2).

3.2 Discussion

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The purpose of this purifying process is to reduce the density of batik color waste and lower the pH level in batik waste that tends to be alkaline (pH>7) so that it is not harmful to the environment at the time of disposal of the latest batik color washing waste. From the results of the purification, borassus fibers, corn weevil, peanut skin, and other additives that can reduce the density of the color that was originally a solid black batik color waste becomes clearer with 1-2 times filtering process.

The next test is to measure the pH, which is to measure the degree of acidity in batik color waste. pH for clean water is a neutral pH of 6.5-8.5. Based on the results of clearing it is known that the pH after is 9 which previously had a pH of 10, and to lower the pH of the waste to be close to neutral then the author added moringa seed powder that has coagulant properties. According to Putranto & Alexander (2017), the impact of a high pH can lead to the death of living things in the water and can cause discoloration of water.

Electric Delivery Power (DHL) is the ability of water to conduct electric current and the ability to be reflected from the total solids in water and temperature at the time of measurement. After the pH test, then test DHL (Arif, 2008). DHL test function is to test the metal content dissolved in batik color waste. According to Pratiwi et al. (2019) the requirement for clean water is 1µS/cm [23]. From the filtering data can be known that DHL contained in batik color waste is 3.64 mS/cm (Table 2).

From the analysis of the influence of borassus fiber, corn weevil, peanut skin, moringa seeds and other materials on batik color waste can be known that borassus fibers, corn weevil, peanut skin and other materials can clear the waste of washing batik dyes naturally, with the results of laboratory tests at the Tuban District Environment Agency namely, pH= 8 and Electric Delivery Power= 3.64.

Based on the data shows that borassus fibers (Borrassus flabellifer), corn weevil (Zea mays), peanut skin (Arachis hypogaea), moringa seeds (Moringa oleifera) and other materials such as silica sand, gravel, charcoal, and sponge can be used as an alternative natural purifier in batik color waste. This purifying is done to minimize the

impact of negarif from the disposal of batik color waste that can cause skin itching and can cause skin cancer.

Based on the results of this study showed that borassus fibers (Borrassus flabellifer), corn weevil (Zea mays), peanut skin (Arachis hypogaea), moringa seeds (Moringa oleifera) and other materials can be used as a natural batik color waste purifier.

How to Optimize the Utilization of 3B Bukersiracang as an Alternative Natural Purifier Batik Color Waste

From the results of the experiment it can be known that borassus fibers (*Borrassus flabellifer*), corn weevil (*Zea mays*), peanut skin (*Arachis hypogaea*), and moringa seeds (*Moringa oleifera*) can be used as an alternative natural purifier on batik color waste. The benefits possessed by borassus fibers (*Borrassus flabellifer*), corn weevil (*Zea mays*), peanut skin (*Arachis hypogaea*), and moringa seeds moringa seeds (*Moringa oleifera*) and other additional ingredients such as borassus fibers have benefits as filter small particles in wastewater batik dyes. The corn weevil has a role as an absorbent dye in batik color waste. Peanut skin has the benefit or role as a filter of larger particles in batik color waste and sand has a role as absorbent chemical substances that exist in batik color waste. Moringa seeds here have a role as a lowering of the price of water pH to approach the normal water pH of 7. The beans can be used as a natural purifier after being pounded.

How to process borassus fiber, corn weevil, peanut skin, and moringa seeds and other additives as an alternative natural purifier on batik dye washing waste that is, batik color waste samples as much as 600 mL silenced approximately 3 hours until visible deposits at the bottom of the glass, then pour the batik color waste into a bottle that has been filled with borassus fibers, corn weevil, peanut skin , moringa seeds and other additives namely sand, gravel, and charcoal. Once the waste water reaches the bottom of the bottle, open the bottle cap and then prepare the glass to accommodate the filtering results. Mix the moringa seed powder into the previous purification water and leave for 2 hours then separate between the clean water with the rest of the moringa powder that settles under the container.

At this stage the author conducted experiments on the manufacture of natural purifiers from borassus fibers, corn weevil, peanut skin, and moringa seeds. The first process is to prepare all the tools and materials. The second process is to wash the fibers and dry them. The third process is to arrange all the necessary materials in a large used plastic bottle that has been cut off the top. The fourth process let batik waste for approximately 3-4 hours to be separated from other impurities. The fifth process is to insert the waste water into the purifier slowly and wait until the water drops to the bottom of the purifier then open the bottle cap.keenam add moringa seed powder as much as 12 grams for every 300 mL of water produced by the first sarong and wait until there is a precipitate filter water that has been cleared.

Based on the results of the study it is known that borassus fiber, corn weevil, peanut skin, moringa seeds, and other additives can be used as an alternative natural purifier on natural and synthetic dye waste because corn weevil has porous materials that can absorb dyes in batik waste. And peanut skin that can bind dirt to wastewater batik dyes and borassus fibers that can filter out small particles that exist in batik color waste. And moringa seeds are coagulants that can lower the pH in wastewater. The

parameters measured in the cleansing of batik color waste are color, pH, and DHL.

4 Conclusion

How to optimize the utilization of 3B Bukersiracang until it can be used as an alternative natural purifier of batik color waste is to go through several stages. The first stage is to deposit large particles in the waste, the second stage of filtration using the tools that have been made, the third stage of adding moringa seed powder to the filtered waste, the last stage is to filter the water after being silenced for 1-2 hours. From this study, it can be known that natural purifiers from optimizing the utilization of 3B Bukersiracang can lower the pH of batik color waste which was originally 10.70 to 9.47; DHL decreased from 25.3 to 3.64 and the color of the batik color waste liquid changed which was originally murky concentrated to be clear and not concentrated. From the data of the study, 3B Bukersiracang can be an alternative natural purifier for batik color waste.

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