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Exploring the Quality of Eco-Prints from Floral Waste Across Fabric Variations

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ABSTRACT - Textile dyes are commonly used in the production of fashion products. However, to reduce reliance on synthetic textile dyes, the use of natural dyes has become an important alternative. One sustainable method for applying natural dyes is the eco-print technique. This study aimed to examine: (1) the quality of color fastness to soap washing in eco-print results on cotton, linen, and silk fabrics; and (2) the quality of color aging in eco-prints using *kenikir* flowers on cotton, linen, and silk fabrics. The research employed an experimental method by producing eco-prints on cotton, linen, and silk fabrics. The materials used for eco-printing included *kenikir*, insulin, grass, and frangipani flowers, applied through a steaming technique. Sample testing was conducted at the UII Textile Laboratory to assess color fastness to soap washing and color aging. Data were analyzed descriptively, based on three repetitions of each test. The findings revealed that the average score for color fastness to soap washing was 4–5, which falls under the good criteria. Meanwhile, the results of the color aging test showed values of 97.66 for cotton, 101.61 for silk, and 114.99 for linen. Among these, silk fabric demonstrated higher results, indicating that the eco-printed motif appeared older or darker in color compared to cotton and linen.

Keywords: Eco-print quality, flowers, primissima cotton fabric, silk fabric, linen fabric.

INTRODUCTION

In Indonesia, ecoprint is increasingly recognized and applied within the fashion industry, as it offers an alternative to synthetic textile dyes commonly used in producing fashion products. Over time, the textile industry has become more committed to applying eco-fashion principles by utilizing environmentally friendly materials (Hatef Jalil & Shaharuddin, 2020). According to Nurcahyanti & Septiana (2018), the concept of ecoprint within eco-fashion represents a sustainable and strategic approach in supporting the development of fashion products in Indonesia.

Ecoprint is a textile dyeing technique that employs natural pigments extracted from plants to produce motifs and colors directly on fabric surfaces (Irianingsih, 2008). Motifs generated through manual techniques are unique, distinctive, and durable, making them susceptible to piracy or plagiarism (Nurcahyanti & Septiana, 2018). Ecoprint involves transferring patterns from foliage or flowers onto fabrics that have undergone processing to remove waxy layers and fine impurities, ensuring that dyes and motifs absorb properly. This process not only enhances the absorption of colors but also results in distinctive visual beauty. Furthermore, ecoprint contributes to sustainability by utilizing renewable natural resources while minimizing the use of synthetic dyes in production, thereby elevating its artistic value (Naini & Hasmah, 2021).

Floral waste, often discarded, has the potential to serve as a source of natural pigments for ecoprinting. To achieve high-quality motifs, the ecoprint process must be carried out with precision. Plant parts that can be used include flowers, leaves, stems, and roots (Larasati, 2019). The stages of ecoprinting typically consist of pre-mordanting, post-mordanting, eco-printing, and fixation. Successful outcomes depend heavily on the choice of fabrics and natural materials. Fabrics made from natural fibers are most suitable, while the plant materials used—such as flowers—must contain pigments capable of producing stable motifs and colors. A critical component of this process is mordanting, as it determines whether the colors and motifs will be absorbed and fixed effectively.

Mordanting involves boiling fabrics before applying flowers, using chemical substances that form bonds with natural dyes to enhance absorption and color resistance (Pancapalaga, 2021; Bhute & Aniket, 2015). The process includes both pre-mordant and post-mordant stages, with dosage adjusted according to fabric type and material. Since not all fabrics are suitable, only those made of natural fibers—such as linen, cotton, rayon, and silk—are recommended, as natural dyes adhere more effectively to natural fiber textiles (Yesica & Rodia, 2020). Similarly, not all flowers are appropriate, as only those containing tannins or high concentrations of natural pigments can produce quality results.

Previous studies have further confirmed these findings. Aliffianti & Kusumastuti (2020) demonstrated that *pulutan* can be used as a natural dye for viscose rayon, with color variations depending on the mordant applied. Mongkholrattanasit et al. (2022) also highlighted that the type of mordant significantly influences the range of colors produced. Likewise, Salsabila & Mochammad (2018) found that ecoprints on linen fabrics using rose and *hebras* flowers absorbed well, and that the steaming method influenced the final motif. Supporting this, Nada & Widowati (2020) revealed that the use of arbor, alum, and quicklime mordants in the steaming process produced motifs with very high-quality results. Collectively, these studies indicate that the steaming technique significantly affects the clarity and durability of ecoprint motifs.

Based on the literature, this research addresses the following problem formulation: Can the use of flowers on three different types of fabrics produce unique and high-quality ecoprint motifs? Accordingly, the objective of this study is to determine the quality of ecoprints using kenikir, insulin, grass, and frangipani flowers on linen, cotton, and silk fabrics, assessed through color fastness testing against soap washing and color aging testing.

METHOD

This study employed an experimental method through laboratory testing to evaluate the final color quality of floral motifs produced using kenikir, insulin, grass, and frangipani flowers on primissima cotton, linen, and silk fabrics. Experimental research is designed to identify the effects intentionally produced by the researcher under controlled conditions.

The eco-printing process was carried out at LaRomiz Boutique from June 23, 2025, to June 24, 2025. The research subject focused on the use of flowers as the primary material for eco-printing, applied across three different fabric types. The research procedure consisted of three main stages: (1) preparation for eco-printing, (2) data collection through laboratory test results, and (3) descriptive analysis to interpret the outcomes.

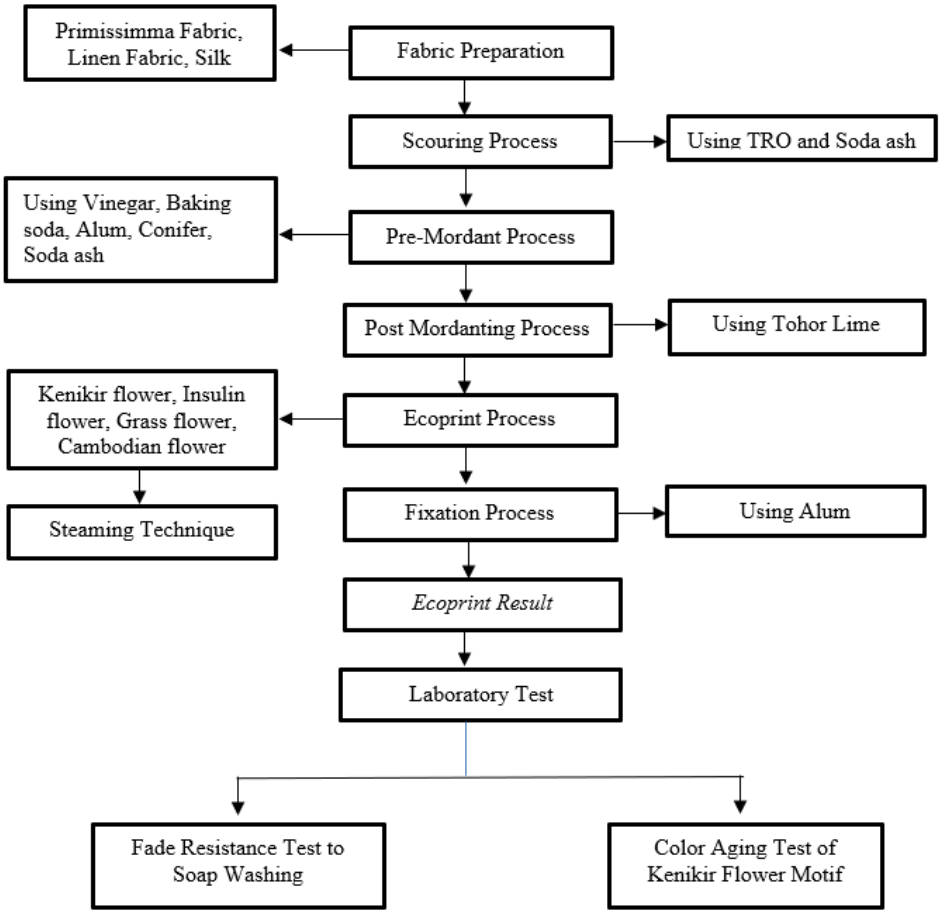

FIGURE 1. Research flow.

RESULT AND DISCUSSION

This study examines the quality of eco-prints using flowers on several types of fabrics. To obtain relevant and valid data, laboratory tests were conducted at the Textile Manufacturing and Testing Laboratory, Faculty of Industrial Technology, Universitas Islam Indonesia (UII). These tests aimed to evaluate (1) the color fastness to soap washing and (2) the color aging of eco-prints on three types of fabrics. The results of each test and their descriptive analysis are presented below.

Descriptive Test of Color Fastness to Soap Washing

The descriptive analysis aimed to systematically present the data obtained from three laboratory tests, using the gray scale standard with values ranging from 1 (poor) to 5 (very good).

TABLE 1. Results of TLW test value of eco-print fabric against soap washing.

Eco-print Sample	Test No.	Average Result	Criteria
Cotton Fabric	1	4	Good
	2	4	Good

Eco-print Sample	Test No.	Average Result	Criteria
	3	4	Good
Silk Fabric	1	4–5	Good
	2	4–5	Good
	3	4–5	Good
Linen Fabric	1	4–5	Good
	2	4–5	Good
	3	4–5	Good

The table shows that the color fastness test against soap washing on cotton, silk, and linen fabrics consistently resulted in values between 4 and 5, which fall under the "good" category. Specifically, cotton fabric achieved an average score of 4 across three tests, while silk and linen fabrics obtained an average of 4–5. Thus, the eco-printed fabrics demonstrated good resistance to soap washing.

Descriptive Color Aging Test

The color aging test was conducted to determine the stability of eco-printed colors on the fabrics. Laboratory testing was performed three times using the UV-PC Model ISR-2200 program to measure Reflectance values (R%).

TABLE 2. Results of fabric color aging test value (R%).

Sample Code	Test No.	Eco-print Fabric Color Aging Test Value (R%)
STD-Cotton	–	97.66
Cotton	1	6.31
	2	6.75
	3	7.63
STD-Silk	–	101.61
Silk	1	3.24
	2	3.26
	3	3.22
STD-Linen	–	114.99
Linen	1	5.88
	2	5.92
	3	6.53

The descriptive analysis of the test results shows the following:

a. Cotton fabric recorded values of 6.31, 6.75, and 7.63 across three tests, with a standard value (STD-Cotton) of 97.66.
b. Silk fabric showed results of 3.24, 3.26, and 3.22, with a standard value (STD-Silk) of 101.61.
c. Linen fabric achieved values of 5.88, 5.92, and 6.53, with a standard value (STD-Linen) of 114.99.

Based on these findings, linen fabric demonstrated the highest color aging value (114.99) compared to cotton and silk. This indicates that the motifs printed on linen fabric appeared darker, reflecting stronger color aging properties.

Discussion

This study discusses the analysis of the quality of ecoprints produced from flowers applied to three types of fabrics, namely primissima cotton, linen, and silk. The discussion is based on laboratory test results that were analyzed descriptively to reinforce theoretical perspectives and relevant findings from previous studies.

The laboratory test results on the color fastness to soap washing indicated that the three types of fabrics achieved an average score of 4–5, which falls into the good category. Meanwhile, the color aging test revealed that linen fabric

obtained the highest average value (114.99) compared to the other fabrics, suggesting that the motifs produced on linen tended to appear darker or older in tone.

These findings align with research conducted by Astuti & Widihastuti (2021), which examined the quality of color aging through laboratory testing on primissima cotton. Their study found that darker colors were produced depending on the frequency of dyeing processes (1, 3, and 5 times). This indicates that color aging outcomes can be influenced by the number of dyeing applications performed.

Similarly, Maghfiroh & Widowati (2020) investigated the quality of dyeing results on primissima mori fabric. Their laboratory tests demonstrated that the darkest color aging was achieved using arbor mordant, while the color fastness to soap washing yielded a score of 4, which was higher than those obtained using alum and quicklime mordants.

In addition, Subekti et al. (2020) studied the effect of dyeing frequency on color aging, color space, and color fastness. Their results showed that after six repetitions of dyeing, the color fastness test consistently reached a score of 4–5, which is categorized as good.

Other relevant studies also support these findings. Septian (2020) examined the effect of polyester fabric yarn *tetal* on hapa zome ecoprints with kenikir flowers. The results demonstrated that polyester yarn *tetal* influenced the outcomes of kenikir flower eco-prints, where fabrics with a warp density of 70 hl/in and a weft density of 115 hl/in were classified within the good category. Likewise, Maharani (2018) investigated "ecoprint natural dye" techniques using plant leaves as motif printing materials and found that different plants produced varying print colors depending on the type of fixation and additional materials applied.

Collectively, these findings suggest that the quality of ecoprint motifs is influenced not only by fabric type but also by the frequency of dyeing, choice of mordant, and characteristics of the plant materials used. This highlights the importance of selecting appropriate fabric and processing techniques to achieve optimal results in sustainable textile production.

CONCLUSION

Based on the analysis and discussion, it can be concluded that the color fastness test to soap washing on the three types of fabrics—primissima cotton, linen, and silk—yielded an average score of 4–5, which is categorized as good. In the color aging test, linen fabric achieved the highest average value (114.99), indicating that the resulting motifs appeared older or darker compared to cotton and silk. These findings are consistent with previous research and supported by the theoretical framework of the ecoprinting process, which serves as the primary basis of this study.

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