



Received 3rd September 2020

Accepted 01st July 2021

Published 23rd July 2021

Open Access

DOI: 10.35472/jsat.v5i2.316

Classification of Color Pigments of Robusta Coffee Plants with Mordanting Method Applied to Cloth Masks

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Abstract: Part of the coffee plant as a whole from the roots until the fruit can produce dye pigment, the coffee plant that is made sample is Robusta coffee plant (Coffee Robusta). The absence of natural color calcification uses one whole plant. So it is made from coffee plants typical of Lampung as a local identity. The mordanting process of the extract results in the parts of the coffee plant on the French cotton fabric, producing pigments that can be used as dyes for textiles. This method is easy to classify the pigment from the parts of the coffee plant. Classifications of colors obtained from warm, soft, and cold color ranges (casual, beautiful, Natural, beautiful, romantic, elegant, classic, clear and cool casual). This research was conducted to classify various colors of Robusta coffee plants, roots, wood, bark, ranting, wet leaves, dried leaves, wet skin, wet bark, dry hard skin, wet seeds, dried seeds, and grain powders with The mordanting process is transferred on the cloth. From the results of the experiment, excellent color absorption resulted from wet fruit skin with a tendency towards warm colors and applied to the mask as an example of the product by means of a brush so that not much wasted color content. way in brushes and applications on this mask is an effort to respond to environmental issues and new normal.

Keywords: *classification, coffee robusta, color, mordanting*

Introduction

As one of the countries that have a wealth of natural resources that are quite abundant, Indonesia's liquid country is very potential in the provision of raw materials sourced from nature. But in reality, the natural resources that have not been done with the maximum despite the traditional management is carried out by the former ancestors.

Natural dyes extracted from the extract are the types of flora, fauna, and even minerals and metals. Geographically also affects the extract results of natural ingredients. Indonesia's natural resources have the potential to enrich natural color collection. The natural color of the plateau teak leaves is not always the same as the lowland. Natural color mapping of each natural resource is an effective step to enrich the natural color collection of Indonesia. This color map is not only used for textile, but also food, and branding colors.

Lampung is one of Robusta coffee producers that is quite famous for its quality. Coffee in general as a drink, then developed as a face mask, body scrub, aroma

therapy and there are also textile motifs of the visual form of the coffee plant. Textiles are not far from fibers and colors and also there is also no full color mapping of one whole plant. Likewise from the visual realm because the exotic color of coffee has not been mapped as the typical color of Robusta coffee in Lampung with the character that has as a natural dye and non food.

Coffee is one of the lush Flora of Lampung. Robusta Coffee (*Coffea Canephora*) has various parts of the root of the waste resulting from the process of coffee. One of the coffee bean processing waste is coffee shell. The coffee fruit has two of the skins, the skin of the fruit and shells [1] If viewed from the morphology of coffee plants that have roots, stems, leaves, flowers, fruit [2].

Natural colors are used and are commonly known only small portions. Many papers circulate but only discuss one or two of a particular plant. Such as the dye of the jackfruit wood extract by [3], the root of Mengkudu by [4], the Betel nut seed extract by [5], extraction of flower petal Rosella by [6], Natural colors of Ketapang



leaves, mahogany leaves, floral Combrang by [7], and the extraction of the crab shell pigment by [8]. So far no one is seeking to grouping color maps on one "digitally intact plants. The natural color of the extract result on the fabric and water will be digitized so it is easy to find the color impression of the coffee plant using a color scale image by [9].

The dyeing process requires the role of mordants, Morand here Help the vegetable color stick to the dipped fibers [10]. The process of extracting coffee plants is done by boiling the raw material and then transferred its color to cotton fabric. This process is the most ideal in transferring pigments on the fabric. After all the samples were successfully done, then saw the color tied to the cloth to know the impression of the color contained in the coffee plant through the extraction process by the fixation of alum and non fixation Con Color Index by [11] and Image Color scaled by [9].

Method

Materials and tools

Natural color research material in the form of Robusta coffee plants (*Coffea Canephora*), alum, and air. The equipment used are, fabrics, knives, scissors, strainers, stirrers, scales, air-rebuses, PYREX measuring cups, Adobe Illustator CS6, color indices by [11] and color of the image scaled by [9].

Method

The extraction process used in this study was the Experimental method with 3 treatments for 12 raw materials. The treatment used is non-mordant, pre-mordant and simultaneous. Fixation used is alum, then coloring each done for 30 minutes. The following 12 raw materials of coffee coloring are:

1. **Root** is a part of a plant that is in the ground or buried in the soil.
2. **Wood** taken from the trunk of the inner tree, then in thin and small slices.
3. **Bark** is taken by a small slice.
4. **Twigs** cut to a small size.
5. **Fresh leaves** are leaves that are still green or have a high water content that is cut into small pieces.

6. **Dried leaves** are leaves that are already brown or have a low water content that is cut into small pieces.
7. **Fruit Peel** is the skin of the fruit or coffee beans outside that is still green or red and has a high water content. this skin is taken by peeling.
8. **Fresh Camplung skin** or horn skin is the deepest layer of coffee skin close to direct coffee beans.
9. **Dry Camplung skin** or horn skin is the deepest layer of coffee skin close to direct coffee beans.
10. **Fresh beans** that no longer have outer skin or inner skin.
11. **Dried beans** that no longer have outer skin or inner skin.
12. **Coffee powder** is the result of grinding of coffee beans that have been roasted.

However, flowers are not included in the raw materials of this coloring, because at the time of the study was not the flower season.

Application of colors

Using painting techniques such as watercolors with brushes and color extracts as ink. Coffee color is applicationd on the mask, this responds to the issue of the outbreak, namely the coronavirus that can not be separated from one of them is the use of masks as new normal.

Results And Discussion

1. Color Classification of Robusta coffee tree Extract results

One coffee plant managed to get 72 colors with 2 types of analysis namely on water and cloth which each use 3 variations of the mordanting Alum (simultaneous, pre-mordant, Free-mordant). Mordanting for natural coloring is more than 3 in number, each mordant has a characteristic that will react according to the treatment and certainly will many possible colors to be produced. In accordance with Fox's statement that why many possibilities for the application of color from the results of this experiment, that the beauty of many techniques used will produce a variety of colors that can not be resided by the results [10].

Table 1. Colors of Robusta Coffee Tree Extract results

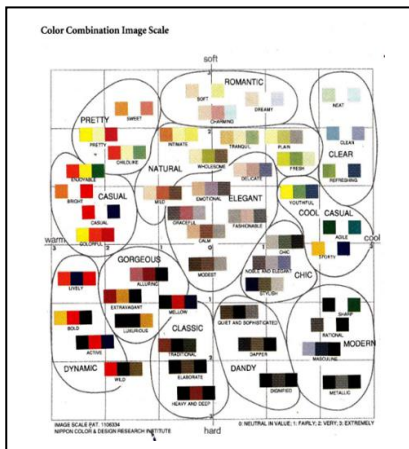
No	Natural Dyes	Water			Fabric		
		Simultane	Pre-Mordant	Free-Mordant	Simultane	Pre-Mordant	Free-Mordant
1	Root						
2	Wood						
3	Bark						
4	Twigs						
5	Fresh Leaves						
6	Dried Leaves						
7	Fruit Peel						
8	Fresh Camplung Skin						
9	Dry Camplung Skin						
10	Fresh Beans						
11	Dried Beans						
12	Coffee Powder						

The research is done by extracting the coffee plant mordant alum. The composition of the variable used is; Non-mordant, pre-mordant, and Aerotest Simultane respectively 30 minutes of boiling. The extracted data can be seen in table 1.

2. Classification of Robusta Coffee tree color Effect extract Result

That every color has a diverse emotion display. [9] in his book made a strategy to break/translate something abstract (color) in an objective way. That every picture, objects, and colors in each individual have different tastes so they are transmissible into words for easy understanding. As in soft colors, charming, dreamy including in romantic colors and on the colors of sharp, rational, masculine, metallic are included in modern color.

Classify the color impression on the research results that have been summarized in the table. 1 we can see through the Color Combination Image Scale below.



Pictures 1. Color Combination Image Scale by Kobayashi S. 1990.

Table 2. Number of Robusta Coffee Tree Extract results

N	Water			Fabric		
	Simultane	Pre-mordant	Free-mordant	Simultane	Pre-mordant	Free-mordant
1	RGB 227-201-175 CMYK 10-20-30-0	RGB 225-143-75 CMYK 10-50-80-0	RGB 208-164-115 CMYK 0-25-50-20	RGB 226-202-192 CMYK 10-20-20-0	RGB 227-242-231 CMYK 10-0-10-0	RGB 227-242-231 CMYK 10-0-10-0
2	RGB 188-170-153 CMYK 0-10-20-30	RGB 207-147-81 CMYK 0-35-70-20	RGB 208-164-115 CMYK 0-10-100-40	RGB 226-202-192 CMYK 10-20-20-0	RGB 226-202-192 CMYK 10-20-20-0	RGB 227-242-231 CMYK 10-0-10-0
3	RGB 189-165-118 CMYK 10-20-50-20	RGB 129-80-23 CMYK 25-60-100-40	RGB 146-56-17 CMYK 10-80-100-40	RGB 226-202-192 CMYK 10-20-20-0	RGB 226-202-192 CMYK 10-20-20-0	RGB 212-218-238 CMYK 15-10-0-0
4	RGB 208-164-115 CMYK 0-25-50-20	RGB 159-93-65 CMYK 15-60-70-30	RGB 228-169-90 CMYK 0-30-70-10	RGB 227-242-231 CMYK 10-0-10-0	RGB 212-218-238 CMYK 15-10-0-0	RGB 212-218-238 CMYK 15-10-0-0
5	RGB 146-109-77 CMYK 0-30-50-50	RGB 146-56-17 CMYK 10-80-100-40	RGB 146-56-17 CMYK 10-80-100-40	RGB 226-183-186 CMYK 0-25-10-10	RGB 226-183-186 CMYK 0-25-10-10	RGB 226-202-192 CMYK 10-20-20-0
6	RGB 168-151-112 CMYK 0-10-40-40	RGB 175-75-20 CMYK 0-75-100-30	RGB 146-56-17 CMYK 10-80-100-40	RGB 229-200-181 CMYK 0-15-20-10	RGB 226-202-192 CMYK 10-20-20-0	RGB 227-242-231 CMYK 10-0-10-0
7	RGB 127-95-76 CMYK 0-30-40-60	RGB 165-45-63 CMYK 10-90-60-30	RGB 167-9-37 CMYK 0-100-80-35	RGB 251-212-218 CMYK 0-20-5-0	RGB 252-223-235 CMYK 0-15-0-0	RGB 212-218-238 CMYK 15-10-0-0
8	RGB 208-165-129 CMYK 0-25-40-20	RGB 197-53-27 CMYK 0-90-100-20	RGB 220-111-90 CMYK 0-65-60-10	RGB 252-223-235 CMYK 0-15-0-0	RGB 252-223-235 CMYK 0-15-0-0	RGB 212-218-238 CMYK 15-10-0-0
9	RGB 227-201-175 CMYK 10-20-30-0	RGB 159-93-65 CMYK 15-60-70-30	RGB 126-104-49 CMYK 30-70-100-0	RGB 226-202-192 CMYK 10-20-20-0	RGB 227-242-231 CMYK 10-0-10-0	RGB 227-242-231 CMYK 10-0-10-0
10	RGB 106-115-104 CMYK 40-25-40-40	RGB 129-80-46 CMYK 25-60-80-40	RGB 146-109-77 CMYK 0-30-50-50	RGB 227-242-231 CMYK 10-0-10-0	RGB 227-242-231 CMYK 10-0-10-0	RGB 212-218-238 CMYK 15-10-0-0
11	RGB 109-99-89 CMYK 0-10-20-70	RGB 108-81-71 CMYK 0-30-30-70	RGB 109-95-87 CMYK 0-15-20-70	RGB 227-242-231 CMYK 10-0-10-0	RGB 227-242-231 CMYK 10-0-10-0	RGB 212-218-238 CMYK 15-10-0-0
12	RGB 110-98-70 CMYK 0-10-40-70	RGB 97-96-106 CMYK 10-10-0-70	RGB 107-100-106 CMYK 40-40-30-40	RGB 229-200-181 CMYK 0-15-20-10	RGB 226-202-192 CMYK 10-20-20-0	RGB 229-200-181 CMYK 0-15-20-10

The classification of the results of the experiments of natural color extracts robusta coffee trees that have been summarized in table 1 can be known by looking at the image scale above. So it is obtained from a range of warm, soft, and cool colors (casual, pretty, natural, gorgeous, romantic, elegant, classic, clear, and cool casual).

3. RGB and CMYK classification of Robusta coffee tree Extract results

This research helps facilitate the users of digital color in the works, namely by creating an RGB and CMYK table according to the color results in table 1. Use the color

equation on the book Color Index by []. RGB and CMYK color numeric data can be seen in table 2.

4. Application of colors

From many colors resulting from the extraction process, it is taken 4-5 colors to use. the method used is painting with brushes and ink taken from the extract. the product used as an example is a mask. this is to respond to the world issue that is the trend of masks in the new normal era of the effects of the coronavirus outbreak.



Pictures 2. coloring equipment.



Pictures 3. coffee color application on mask painting technique.

Conclusions

The color on the fabric and the color on the extracted water have different colors. The classification of the results of robusta coffee tree natural color extract experiments that have been summarized in table 1 can be known by looking at the picture above. that obtained several colors such as: warm, soft, and cool (casual, beautiful, natural, romantic, elegant, classic, clear, and casual cool). Color application on the fabric by means of a brush more get the result of the ditel and not wasted. coloring experiments using brushes that

are on cloth masks can be seen in **Pictures 2 and 3**, this responds to the current issues in the world. This application experiment is just an example, can be applied to the same media but different products.

The results of this study explain that these findings have the potential to be done as an easy method to map the natural colors of one whole plant. Because color mapping on one whole plant is an innovation or a new thing to do. this is done for the need for knowledge of the local color of flora of the archipelago that needs to be published as a natural wealth and the world of science. Potential research to be developed for future research such as: visual branding, color palette ideas as well as color knowledge contained in every plant around us.

Acknowledgements

Thank you for ITERA has been given to me chance get Hibah ITERA Smart in 2019.

References

- [1] Redha. F, Ed. "Penyerapan Emisi CO dan NOx pada Gas Buang Kendaraan Menggunakan Karbon Aktif dari Kulit Cangkang Biji Kopi" USM, Banda Aceh, 2018.
- [2] Juliansyah. D, "Budidaya Tanaman KOPI", M.S. thesis, UNS, Serang, 2015.
- [3] Rosyida A, dan Zulfiya A. "Pewarnaan Bahan Tekstil dengan Menggunakan Ekstrak Kayu Nangka dan Teknik Pewarnaannya untuk Mendapatkan Hasil yang Optimal" Jurnal Rekayasa Proses. Vol. 7, 2013.
- [4] Farida F, Atika F.V, Haerudin A. "Pengaruh Variasi Bahan Pra Mordan pada Pewarnaan Batik Menggunakan Akar Mengkudu (Morinda Citrifolia)" Ejournal kemenperin. Vol.32, 2015.
- [5] Prabawa I.D.G.P. "Ekstrak Biji Buah Pinang sebagai Pewarna Alami pada Kain Sasirangan" Jurnal Riset Industri Hasil Hutan. Vol. 7, pp. 31-38, 2015.
- [6] Mahfud. T. "Ekstrak Pewarna Alami Kelopak Bunga Rosella (Hibiscus Sabdariffa) pada Pembuatan Minuman Serbuk Instan Rosella" Jurnal Sains Terapan. Vol. 1, pp. 27-33, 2015.
- [7] Kumalasari V. "6 Potensi Daun Ketapang, Daun Mahoni, dan Bunga Kecombrang sebagai Alternatif Pewarnaan Kain Batik yang Ramah Lingkungan" Jurnal Teknik Lingkungan. Vol. 2, 2016.
- [8] Narsiani. "Ekstraksi Pigmen Karotenoid pada Cangkang Kepiting sebagai Pewarna Alami yang Sehat" Jurnal Ilmia UMG. Vol. 7, pp. 27-33, 2018.
- [9] Kobayashi S, Color Image Scale. Japanese: Kodansha, 2013.
- [10] Fox. A, Natural Processes In Textile Art. UK: Batsford, 2015.
- [11] Krause. J, Color Index. Ohio: How Books, 2007.