

## **BAB V**

### **KESIMPULAN DAN SARAN**

#### **5.1. Kesimpulan**

Berdasarkan penelitian yang telah dilakukan, diperoleh beberapa kesimpulan sebagai berikut :

1. Penambahan mordan akan mempengaruhi *color strength*, *color fastness* dan *color coordination*.
2. Penggunaan garam umumnya meningkatkan ketahanan zat warna namun menurunkan ketahanan ketika digunakan dengan mordan simplokos.
3. Peningkatan konsentrasi mordan dari 10 hingga 12 g/L tidak selalu memberikan *color strength* dan *color fastness* yang baik
4. Peningkatan konsentrasi warna akan meningkatkan *color strength*.

#### **5.2. Saran**

Berdasarkan penelitian yang telah dilakukan, saran yang dapat diberikan adalah :

1. Menganalisa lebih jauh interaksi garam dengan brazilin.
2. Kain katun perlu dibersihkan secara seluruh dari kotoran sebelum dilakukan pewarnaan seperti *bleaching*.
3. Penambahan zat aditif selain garam untuk meningkatkan ketahanan pewarna saat pencucian dengan air dan deterjen.

## DAFTAR PUSTAKA

- Afifah, F. R. I., & Umam, K. (2019). DYEING OF SECANG WOOD ( *Caesalpinia sappan* L.) POWDER DYES FROM SPAY DRYER ON COTTON FABRICS. *Balai Riset Dan Standardisasi Industri Samarinda Post-Mordan*, 22–31.
- Anderson, J. M., & Voskerician, G. (2010). The challenge of biocompatibility evaluation of biocomposites. *Biomedical Composites*, 325–353. <https://doi.org/10.1533/9781845697372.3.325>
- Astina, I. G. A. A. (2010). *OPTIMASI PEMBUATAN EKSTRAK ETANOLIK KAYU SECANG (Caesalpinia sappan L.) SECARA DIGESTI: APLIKASI DESAIN FAKTORIAL* [Universitas Sanata Dharma]. [https://repository.usd.ac.id/17357/2/068114168\\_Full.pdf](https://repository.usd.ac.id/17357/2/068114168_Full.pdf)
- Astuti, I. (2003). *Symplocos Jacq.* In *Plant Resources of South East Asia*, 12(3).
- Baer, D. R., & Thevuthasan, S. (2010). Characterization of Thin Films and Coatings. *Handbook of Deposition Technologies for Films and Coatings*, 749–864. <https://doi.org/10.1016/B978-0-8155-2031-3.00016-8>
- Baker, J. R. (1958). Principles of biological microtechnique; a study of fixation and dyeing. In *Principles of biological microtechnique; a study of fixation and dyeing*. Methuen; <https://doi.org/10.5962/bhl.title.5905>
- Baldim Zanin, J. L., De Carvalho, B. A., Martineli, P. S., Dos Santos, M. H., Lago, J. H. G., Sartorelli, P., Viegas, C., & Soares, M. G. (2012). The Genus *Caesalpinia* L. (Caesalpinaceae): Phytochemical and Pharmacological Characteristics. *Molecules*, 17(7), 7887. <https://doi.org/10.3390/MOLECULES17077887>
- Becerir, B. (2017). Color concept in textiles: a review. *Journal of Textile Engineering & Fashion Technology*, 1(6), 240–244. <https://doi.org/10.15406/jteft.2017.01.00039>
- Benkhaya, S., M' rabet, S., & El Harfi, A. (2020). A review on classifications, recent synthesis and applications of textile dyes. *Inorganic Chemistry Communications*, 115(January), 107891. <https://doi.org/10.1016/j.inoche.2020.107891>
- Berradi, M., Hsissou, R., Khudhair, M., Assouag, M., Cherkaoui, O., El Bachiri, A., & El Harfi, A. (2019). Textile finishing dyes and their impact on aquatic environs. *Heliyon*, 5(11). <https://doi.org/10.1016/j.heliyon.2019.e02711>
- Briggs, D. (2005). X-ray photoelectron spectroscopy (XPS). *Handbook of Adhesion: Second Edition*, 621–622. <https://doi.org/10.1002/0470014229.ch22>

- Broadbent, A. D. (2001). *Basic principles of textile coloration*. Society of Dyers and Colorists.
- Cardon, D. (2007). *Natural Dyes: Sources, Tradition, Technology and Science*. Archetype.
- Chandraprabha, P., Ravi, P. ., & Sarma, U. . (2014). Dyeing of coir using caesalpinia sappan. *CCRI, Coir Board, Govt. of India*, 1–8. <http://coirboard.gov.in/wp-content/uploads/2014/07/DyeingofCoirwithCsappan.pdf>
- Dapson, R. W., & Bain, C. L. (2015). Brazilwood, sappanwood, brazilin and the red dye brazilin: From textile dyeing and folk medicine to biological staining and musical instruments. *Biotechnic and Histochemistry*, 90(6), 401–423. <https://doi.org/10.3109/10520295.2015.1021381>
- Darda, M. A. (2020). Investigation Impact of Salt, M:L, Soda Ash on Cotton, and Cotton Viscose Blended Fabrics Dyeing Using Direct Dyes. *Journal of Textile Science & Fashion Technology*, 6(3), 4–8. <https://doi.org/10.33552/jtsft.2020.06.000638>
- Ding, Yi, & Freeman, H. S. (2017). Mordant dye application on cotton: optimisation and combination with natural dyes. *Coloration Technology*, 133(5), 369–375. <https://doi.org/10.1111/COTE.12288>
- Ding, Yin. (2013). *A Comparism of Mordant and Natural Dyes in Dyeing Cotton Fabrics*. 139.
- Dochia, M., & Sirghie, C. (1985). Cotton fibres. In *Handbook of natural fibres*. Woodhead Publishing Limited. <https://doi.org/10.1533/9780857095503.1.9>
- Drumond Chequer, F. M., de Oliveira, G. A. R., Anastacio Ferraz, E. R., Carvalho, J., Boldrin Zanoni, M. V., & de Oliveir, D. P. (2013). Textile Dyes: Dyeing Process and Environmental Impact. *Eco-Friendly Textile Dyeing and Finishing*. <https://doi.org/10.5772/53659>
- Failisnur, F., Sofyan, S., & Kumar, R. (2017). Efek Pemordanan terhadap Pewarnaan Menggunakan Kombinasi Limbah Cair Gambir dan Ekstrak Kayu Secang pada Kain Rayon dan Katun. *Jurnal Litbang Industri*, 7(2), 93–100. <https://doi.org/10.24960/JLI.V7I2.3541.93-100>
- Failisnur, F., Sofyan, S., & Silfia, S. (2019). Ekstraksi kayu secang (*Caesalpinia sappan* Linn) dan aplikasinya pada pewarnaan kain katun dan sutera. *Jurnal Litbang Industri*, 9(1), 33. <https://doi.org/10.24960/JLI.V9I1.5272.33-40>
- Fardhyanti, D. S., & Riski, R. D. (2015). PEMUNGUTAN BRAZILIN DARI KAYU SECANG (*Caesalpinia sappan* L) DENGAN METODE MASERASI DAN

- APLIKASINYA UNTUK PEWARNAAN KAIN. *Jurnal Bahan Alam Terbarukan*, 4(1), 6–13. <https://doi.org/10.15294/jbat.v4i1.3768>
- Fitriah, S. N., & Utami, B. (2013). Penggunaan Buah Duwet (*Eugenia Cumini*) pada Batik Sutera Madura. *E-Journal*, 02(03), 14–23.
- Friedman, M., & Jürgens, H. S. (2000). Effect of pH on the Stability of Plant Phenolic Compounds. *Journal of Agricultural and Food Chemistry*, 48(6), 2101–2110. <https://doi.org/10.1021/JF990489J>
- Ganesan, P., & Karthik, T. (2017). Analysis of colour strength, colour fastness and antimicrobial properties of silk fabric dyed with natural dye from red prickly pear fruit. *Journal of the Textile Institute*, 108(7), 1173–1179. <https://doi.org/10.1080/00405000.2016.1222862>
- Guleria, B. S., Manav, A. K., & Indrayan, A. K. (1997). Isolation and Extraction of Medically Useful Dye from the Heartwood of *Caesalpinia sappan* Linn. using Different Solvents. *Asian Journal of Chemistry*, 9(4), 816–818.
- Gupta, V. K. (2020). Fundamentals of Natural Dyes and Its Application on Textile Substrates. *Chemistry and Technology of Natural and Synthetic Dyes and Pigments*, 1–32. <https://doi.org/10.5772/intechopen.89964>
- Hadi, D. S., & Siswadi. (2011). ALUMINUM LEVELS ON LEAVES, BARK, AND ROOT OF TWO LOBA SPECIES: LOBA WAWI (*Symplocos fasciculata* Zoll.) AND LOBA MANU (*Symplocos cochinchinensis*). *Strangthening Forest Science and Technology for Better Forestry Development*. [https://www.researchgate.net/publication/348251704\\_ALUMINUM\\_LEVELS\\_ON\\_LEAVES\\_BARK\\_AND\\_ROOT\\_OF\\_TWO\\_LOBA\\_SPECIES\\_LOBA\\_WAWI\\_Symplocos\\_fasciculata\\_Zoll\\_AND\\_LOBA\\_MANU\\_Symplocos\\_cochinchinensis](https://www.researchgate.net/publication/348251704_ALUMINUM_LEVELS_ON_LEAVES_BARK_AND_ROOT_OF_TWO_LOBA_SPECIES_LOBA_WAWI_Symplocos_fasciculata_Zoll_AND_LOBA_MANU_Symplocos_cochinchinensis)
- Hanum, S. F., Darma, I. D. P., & Sumerta, I. M. d. (2012). *PEMANFAATAN POHON LOBA ( Symplocos fasciculata Zoll .) SEBAGAI PEMBANGKIT WARNA ALAM PADA KERAJINAN TENUN DI DESA PEJENG , TAMPAK SIRING , GIANYAR , BALI*. 11(3), 367–372.
- Holinesti, R. (2007). *Studi pengamatan pigmen brazilein kayu secang (Caesalpinia sappan L.) sebagai pewarna alami serta stabilitasnya pada model pangan* [IPB (Bogor Agricultural University)]. <http://repository.ipb.ac.id/handle/123456789/50776>
- Hunger, K. (2013). Industrial Dyes. In K. Hunger (Ed.), *WILEY-VCH*. WILEY-VCH.
- Ibrahim, N. A. (2011). Dyeing of Textile Fibre Blends. In M. Clark (Ed.), *Handbook of*

- Textile and Industrial Dyeing* (pp. 147–172). Woodhead Publishing Limited.
- Iqbal, M. (2008). *Textile Dyes*. Rehbar Publishers Karachi.
- Kabir, S. M. M., Koh, J., & Momotaz, F. (2014). ANALYZING THE SUITABLE ELECTROLYTE FOR REACTIVE DYEING PROCESS IN COTTON GOODS. *Journal of Engineering Science*, 05(1), 75–80.
- Kanazawa, H. (1991). Interaction between Metallic Ions and Dyes. 1. Effects of Various Metallic Salts on Dyeing of Silk and Cotton Fabrics with Dye Extracted from *Caesalpinia Sappan L.* *Rika Hokoku*, 42, 19–34.
- Kechi, A., Chavan, R., & Moeckel, R. (2013). *Ethiopian Dye plants As a Source of Natural Dyes for Cotton Dyeing*.
- Koswara, S. (2009). Pewarna Alami: Produksi dan Pengolahannya. *EBookPangan*, 1–36. <http://tekpan.unimus.ac.id/wp-content/uploads/2013/07/PEWARNAALAMI.pdf>
- Kumar, A., & Konar, A. (2011). Dyeing of Textiles with Natural Dyes. *Natural Dyes*, November 2011. <https://doi.org/10.5772/21341>
- Laksono, A. I., & Subiyati. (2021). PENGARUH METODE MORDAN ALAM DAUN SIMPLOKOS PADA PENCAPAN KAIN KAPAS DENGAN ZAT WARNA ALAM DAUN MARENGGO (*Chromolaena odorata L.*). *Prosiding Seminar Nasional Industri Kerajinan Dan Batik*, 1–14. <https://proceeding.batik.go.id/index.php/SNBK/article/view/117/74>
- Lee, S. C., Shin, E. C., Kim, W. J., & Park, S. M. (2012). *Dyeing Process for Improving Properties of Black Color using Natural Dyes and Mordant*. 107, 33–39.
- Lestari, D. W., Isnaini, Salma, I. R., & Satria, Y. (2018). BENTONIT SEBAGAI ZAT MORDAN DALAM PEWARNAAN ALAMI PADA BATIK MENGGUNAKAN KAYU SECANG (*Caesalpinia Sappan Linn.*). 95–102.
- Ly, B. C. K., Dyer, E. B., Feig, J. L., Chien, A. L., & Del Bino, S. (2020). Research Techniques Made Simple: Cutaneous Colorimetry: A Reliable Technique for Objective Skin Color Measurement. *Journal of Investigative Dermatology*, 140(1), 3-12.e1. <https://doi.org/10.1016/J.JID.2019.11.003>
- Mansour, R. (2018). Natural dyes and pigments: Extraction and applications. *Handbook of Renewable Materials for Coloration and Finishing*, 75–102. <https://doi.org/10.1002/9781119407850.ch5>
- Moiz, A., Aleem Ahmed, M., Kausar, N., Ahmed, K., & Sohail, M. (2010). Study the effect of metal ion on wool fabric dyeing with tea as natural dye. *Journal of Saudi Chemical*

- Society*, 14(1), 69–76. <https://doi.org/10.1016/j.jscs.2009.12.011>
- Mussak, R. A. M., & Bechtold, T. (2009). Natural Colorants in Textile Dyeing. *Handbook of Natural Colorants*, 315–337. <https://doi.org/10.1002/9780470744970.ch18>
- Neswati, N., & Ismanto, S. D. (2018). EKSTRAKSI KOMPONEN BIOAKTIF SERBUK KAYU SECANG (*Caesalpinia sappan*, L) DENGAN METODE ULTRASONIKASI. *Jurnal Teknologi Pertanian Andalas*, 22(2), 187. <https://doi.org/10.25077/jtpa.22.2.187-194.2018>
- Ngamwonglumlert, L., Devahastin, S., Chiewchan, N., & Raghavan, G. S. V. (2020). Color and molecular structure alterations of brazilein extracted from *Caesalpinia sappan* L. under different pH and heating conditions. *Scientific Reports*, 10(1), 1–10. <https://doi.org/10.1038/s41598-020-69189-3>
- Nutchawanit, M., Satirapipathkul, C., & Mongkholrattanasit, R. (2019). The Effects of Cationization on Dyeing Properties of Cotton Fabric Dyed with Marigold and Rose. *International Journal of Chemical Engineering and Applications*, 10(2), 60–63. <https://doi.org/10.18178/ijcea.2019.10.2.741>
- Ohama, P., & Tumpat, N. (2014). Textile dyeing with natural dye from sappan tree (*Caesalpinia sappan* Linn.) Extract. *International Journal of Fashion and Textile Engineering*, 8(5), 432–434.
- Patel, B. H. (2011). Natural Dyes. In M. Clark (Ed.), *Handbook of Textile and Industrial Dyeing* (pp. 395–424). Woodhead Publishing Limited.
- Puspa, M. (2021). *PENGARUH MORDAN TERHADAP HASIL PEWARNAAN KAIN KATUN MENGGUNAKAN PEWARNA ALAMI DARI EKSTRAK KAYU SECANG (CAESALPINIA SAPPAN)*. Universitas Katolik Parahyangan.
- Putri, L. A., Adriani, & Novrite, S. Z. (2015). *PERBEDAAN MORDANTING TERHADAP HASIL PENCELUPAN ZAT WARNA ALAM AIR LIMBAH PENIRISAN GETAH GAMBIR PADA SUTERA MENGGUNAKAN MORDAN TUNJUNG (FESO4)*. Universitas Negeri Padang.
- Repon, M. R., Islam, M. T., & Mamun, M. A. Al. (2017). Ecological risk assessment and health safety speculation during color fastness properties enhancement of natural dyed cotton through metallic mordants. *Fashion and Textiles*, 4(1). <https://doi.org/10.1186/s40691-017-0109-x>
- Samanta, A. K. (2018). Fundamentals of Natural Dyeing of Textiles: Pros and Cons. *Current Trends in Fashion Technology & Textile Engineering*, 2(4).

- <https://doi.org/10.19080/ctfjte.2018.02.555593>
- Saraswati, I. (2016). Pengaruh nilai pH terhadap warna dari kayu secang (*Caesalpinia Sappan L.*) sebagai indikator alami baru. *Media Medika Muda*, 1(3), 151–156. <https://ejournal2.undip.ac.id/index.php/mmm/article/view/2607>
- Sari, R., & Suhartati. (2016). Secang (*Caesalpinia sappan L.*): Tumbuhan Herbal Kaya Antioksidan. *Info Teknis EBONI*, 13(1), 57–67.
- Shamey, R., & Zhao, X. (2014). Introduction to dyeing and dyehouse automation. *Modelling, Simulation and Control of the Dyeing Process*, 1–30. <https://doi.org/10.1533/9780857097583.1>
- Shimo, S. S. (2015). CIELAB Color Spaces of Reactive Dyed Cotton Fabric Predisposed by Correlated Color Temperature of Illuminant and Depth of Shade. *International Journal of Current Engineering and Technology*, 55(22), 2277–4106. <http://inpressco.com/category/ijcet>
- Sinsawasdi, V. K. (2012). SAPPANWOOD WATER EXTRACT: EVALUATION OF COLOR PROPERTIES, FUNCTIONAL PROPERTIES, AND TOXICITY. In *UNIVERSITY OF FLORIDA*. <https://dspace.ups.edu.ec/bitstream/123456789/5224/1/UPS-QT03885.pdf>
- Soeprijono, P. (1973). *Serat-serat tekstil*. Institut Teknologi Tekstil. [https://books.google.co.id/books/about/Serat\\_serat\\_tekstil.html?id=5797nQAACAAJ&redir\\_esc=y](https://books.google.co.id/books/about/Serat_serat_tekstil.html?id=5797nQAACAAJ&redir_esc=y)
- Sugiyanto, R. N., Putri, S. R., Damanik, F. S., & Sasmita, G. M. A. (2013). Aplikasi Kayu Secang (*Caesalpinia Sappan L.*) dalam Upaya Prevensi Kerusakan Dna Akibat Paparan Zat Potensial Karsinogenik melalui Mnpce Assay. *Pekan Ilmiah Mahasiswa Nasional Program Kreativitas Mahasiswa - Penelitian 2013*. <https://doi.org/10.0/CSS/ALL.CSS>
- Sunarya, I. K. (2012). ZAT WARNA ALAM ALTERNATIF WARNA BATIK YANG MENARIK. *Jurnal INOTEK*, 16, 1–21.
- Talukder, E. M., Kamruzzaman, M., Majumder, M., Shakhawat Hossain Rony, M., Hossain, M., & Das, S. (2017). Effects of Salt Concentration on the Dyeing of Various Cotton Fabrics with Reactive Dyes. *International Journal of Textile Science*, 6(1), 7–14. <https://doi.org/10.5923/j.textile.20170601.02>
- Tarbuk, A., Grancaric, A. M., & Leskovac, M. (2014). Novel cotton cellulose by cationisation during the mercerisation process-part 1: Chemical and morphological changes. *Cellulose*, 21(3), 2167–2179. <https://doi.org/10.1007/s10570-014-0245-z>

- Wanyama, P. A. G., Kiremire, B. T., Ogwok, P., & Murumu, J. S. (2010). *The effect of different mordants on strength and stability of colour produced from selected dye-yielding plants in Uganda*. 81–92.
- Wolela, A. (2021). Effect and Role of Salt in Cellulosic Fabric Dyeing. *Advance Research in Textile Engineering*, 6(1), 2–6. <https://doi.org/10.26420/advrestexteng.2021.1061>
- Wongsooksin, K., Rattanaphani, S., Tangsathit-Kulchai, M., Rattanaphani, V., & Bremner, J. B. (2007). Study of an Al(III) Complex With the Plant Dye Brazilein From Ceasalpinia Sappan Linn Al(III) Complex With Brazilein From Ceasalpinia Sappan Linn. *Suranaree J. Sci. Technol*, 15(2), 159–165.
- Yusuf, M., Shabbir, M., & Mohammad, F. (2017). Natural Colorants: Historical, Processing and Sustainable Prospects. *Natural Products and Bioprospecting*, 7(1), 123–145. <https://doi.org/10.1007/s13659-017-0119-9>
- Ziarani, G. M., Moradi, R., Lashgari, N., & Kruger, H. G. (2018). Cyanine Dyes. *Metal-Free Synthetic Organic Dyes*, 127–152. <https://doi.org/10.1016/b978-0-12-815647-6.00008-x>