Analyzing the Different Coloration Techniques on Bamboo Woven Fabrics

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Abstract:
This paper presents a study on Analyzing the different colouration techniques on (100%) bamboo woven fabric which are generally used on apparel production. Analyzing the dye ability of woven bamboo fabric at different processing stages with two different dyes. A two different dyes used for the analyzing the coloration bamboo fabric, namely-Direct dye and Reactive dye. Ten certain samples of bamboo fabric were cut. Sample-1,2colored with two dyes, sample-3,4 de-sized and dyed, sample-5,6de-sized, scoured and dyed. sample-7,8de-sized, scoured, bleached and dyed. Sample-9,10 de-sized, bleached and dyed. Two samples were used on every processing and carried out with two different dyes. These processed and dyed samples at each stage is undergone with light fastness, rubbing fastness, wash fastness test and compared with the test results.

Keywords: Bamboo, Processing, Reactive & Direct Dye, Light Fastness.

1. INTRODUCTION
The fast growing grass has made its mark as an eco-crop in textile world. Bamboo fabric is a natural textile that has been growing in popularity in recent years. Breath ability, highly absorbent material, quick drying, natural UV protectant, bio-degradable, hypoallergenic, odour absorption properties and its environmental friendliness. In market Bamboo Fabric is better known for decorative purpose, in which the characteristics of colorfulness taken place a main role in decorative purpose. Many companies who produce bamboo fabric employ an extensive bleaching process, but there are companies who leave the bamboo fiber unbleached. Many methods are followed as per the need, here we have tried some difference flow process of dyeing. This report shows the dyeability performance of bamboo fabric with difference process flow of dyeing. Light fastness of the fabric is analyzed after the dyeing of the fabric using various process flow of dyeing.

This study will be helpful for
i. Better Understand of dyeability of bamboo fabric
ii. Find the better way for dyeing the bamboo fabric at different processing stages.
iii. To predict the variation in dyeability in the bamboo fabric from the different process of fabric processing and dyeing.

Bamboo products are further characterized by its good hydrophilic nature, excellent permeability, soft feel, excellent dyeing behaviour and its antimicrobial property[1]. According to modern concept of consumption, bamboo fiber comes from natural, reproducible resource, and the exhausted is biodegradable which meets the requirements of environmental protection, so bamboo fiber is a weaving material with a bright prospect[1].Cellulose, hemi-cellulose and lignin are the 8main chemical composition of bamboo timber, and some other substances with small quantities such as ash and so on[2].Since bamboo contains cellulose it has similar dyeing property as cotton.

2. MATERIALS AND METHODOLOGY
In this project we used bamboo by bamboo woven fabric purchased from VSM weaves India limited, Erode. Fabric were cut into 10 samples namely ,RD sample-1,RD sample-2, RD sample-3,RD sample- 4, RD sample-5,D sample-1,D sample-2,D sample-3,D sample-4,D sample-5, where RD-Reactive dye and D-Direct dye. RD sample-1 were dyed with the recipe reactive dye (Procion Blue H-ERD)-2%, NaCl(GPL)-35, Na₂CO₃(GPL)-12, M:L ratio-1:30,temperature-60°C for about 75 minutes. D sample-1 were dyed with direct dye(Orange TGCC)-2%, NaCl(GPL)-20, M:L ratio-1:30, temperature- 90 °C for about 60 minutes. RD sample-2 and D sample-2 were de-sized with recipe HCl-1%,TRO-0.5%, temperature-60°C for about 60 minutes. The de-sized RD sample-2 was dyed with reactive dye (Procion Blue H-ERD) with the procedure followed to dye RD sample-1 and also de-sized D sample-2 was dyed with direct dye(Orange TGCC). RD sample-3 and D sample-3 were de-sized and scoured with recipe Na₂CO₃ -2%, NaOH-2%, TRO-0.5%, M:L ratio-1:20, temperature-90°C for about 90 minutes. De-sized and scoured RD sample-3 dyed with reactive dye (Procion Blue H-ERD),D sample-3 dyed with direct dye(Orange TGCC). RD sample-4 and D sample-4 were de-sized, scoured and bleached with the recipe H₂O₂-10%, Na₂SiO₃-10%, TRO-0.5%, M:L ratio-1:20, temperature-90°C for about 60 minutes. The processed RD sample-4 is dyed with reactive dye (Procion Blue H-ERD) and processed D sample-4 is dyed with direct dye(Orange TGCC).RD sample-5 and D sample-5 were de-sized, skipped the scouring process and bleached. Processed RD sample-5 is dyed with reactive dye (Procion Blue H-ERD) and D sample-5 is dyed with direct dye(Orange TGCC).
3. RESULTS AND DISCUSSIONS

Figure 1. Light fastness values for the Grey fabric + Dyeing.

Figure 1. Depict the test results of light fastness of RD sample-1 and D sample-1, this shows that both the samples have good light fastness.

Figure 2. Rubbing fastness values for the Grey fabric + Dyeing.

Figure 2. Depict the test results of rubbing fastness for samples (RD-1,D-1), both the samples have good fastness on dry rubbing, whereas on wet rubbing D sample-1 has fair fastness than RD sample-1.

Figure 3. Wash fastness values for the Grey fabric + Dyeing.

Figure 3. Depict the test results of wash fastness, where RD sample-1 has good fastness than D sample-1.

Figure 4. Light fastness values for the De-sized + Dyeed Fabric.

Figure 4. Depicts the test results of light fastness for samples (RD-2,D-2), it is noted that D sample-2 has excellent fastness than RD sample-2.

Figure 5. Rubbing fastness values for the de-sized + dyed fabric.

Figure 5. Depict the test results of rubbing fastness for samples (RD-2,D-2), D sample-2 has good dry rubbing fastness than RD sample-2, on the other side RD sample-2 have fair fastness on wet rubbing than D sample-2.

Figure 6. Wash fastness values for the de-sized + dyed fabric.

Figure 6. Depict the test of wash fastness for the samples (RD-2,D-2), D sample-2 has good fastness than RD sample-2.
Figure 7. Light fastness values for the de-sized + scoured + dyed fabric.

Figure 7 depict the test results of light fastness for the samples (RD-3,D-3), both the sample has good fastness towards light.

Figure 8. Rubbing fastness values for the de-sized + scoured + dyed fabric.

Figure 8 depict the test results of rubbing fastness for the samples (RD-3,D-3), D sample-3 have good fastness towards dry rubbing than RD sample-3, whereas both the samples have fair fastness on wet rubbing.

Figure 9. Wash fastness values for the de-sized + scoured + dyed fabric.

Figure 9 depict the test results for the wash fastness for the samples (RD-3,D-3), where RD sample-3 has good fastness towards wash than D sample-3.

Figure 10. Light fastness values for the de-sized + scoured + bleached + dyed fabric.

Figure 10 depict the test results of light fastness for the samples (RD-4,D-4), RD sample-4 have good fastness on light than D sample-4.

Figure 11. Rubbing Fastness values for the de-sized + scoured + bleached + dyed fabric.

Figure 11 depict the test results of rubbing fastness for the samples (RD-4,D-4), RD sample-4 has good dry rubbing fastness than D sample-4, on the other side D sample-4 have fair wet rubbing fastness than RD sample-4.

Figure 12. Wash fastness values for the de-sized + scoured + bleached + dyed fabric.

Figure 12 depict the test results of wash fastness for the samples (RD-4,D-4), D sample-4 has good wash fastness than RD sample-4.
Figure 13 depict the test results of light fastness for the samples(RD-5,D-5), RD sample-5 has excellent fastness towards light than D sample-5.

Figure 14 depict the test results of rubbing fastness for the samples(RS-5,D-5), RD sample-5 have good dry rubbing fastness than D sample-5, whereas both the samples have fair fastness on wet rubbing.

Figure 15 depict the test results of wash fastness for the samples(RD-5,D-5), both the samples have good fastness towards wash.

4. CONCLUSION

From the work carried, We come to conclusion that both reactive and direct dye have similar affinity when dyed without any processing. From de-sized + dyed fabric, direct dye have higher affinity than reactive dye. From de-sized + scoured + dyed fabric, both the dyes have similar affinity towards the fabric. From de-sized + scoured + bleached + dyed fabric, reactive dye has more affinity towards the processed fabric than direct dye. From de-sized + bleached + dyed fabric, again reactive dye proves it's affinity is higher towards the processed fabric than direct dye. Even though direct dye proves itself in certain process reactive dye becomes superior. On comparing reactive dye and direct dye for bamboo woven fabric, it is better to go with reactive dye for better dye ability and for the fabric to be color-full for prolonged period.

5. REFERENCES

[1].Ajay Rathod, Avinash Kholhatkr; Analysis of physical characteristics of bamboo fabrics; International journal of research in engineering and technology; Volume 3, Issue 8, Aug-2014.

[2].Marilyn Waite; Sustainable textiles: The role of bamboo and a comparison of bamboo textile properties; The journal of textile and apparel, Technology and management; Volume 6, Issue 2(2009).

[3].Wenbin Yao, Wei Zhang; Research on manufacturing technology and application of natural bamboo fibre; Fourth International Conference on Intelligent Computation Technology and Automation(2011), pages(143-145)


[5].Le Y C and Wang G H; Structure and properties of bamboo fiber and its product development; 2004

[6].Liu J F; Green natural fiber—bamboo. 2004


[10].YUAN Xia, GAO Jie-ping; Application of alkali substitute to reactive dyeing of cotton/bamboo viscose; CNKI Journal, 2012


[17]. P R Brady; Diffusion of dyes in natural fibres; Wiley online library, Volume 22, Issue 1; Pages 58-78.


