

Dyeing Fabrics using Indigenous Materials

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Abstract: *This Study attempted to test the appropriate fabric using indigenous materials.*

This study focused on dyeing fabrics using indigenous materials like acacia, mongo, mahogany, star apple and paper tree. This study tested the level of acceptability of color and odor of different barks in dyeing fabrics like cotton, silk and wool using indigenous materials such as paper tree, star apple, acacia, mango and mahogany. The evaluators of this study were the selected students from Bachelor of Technical Teacher Education major in Garments Fashion and Design at Isabela State University San Mateo Campus, San Mateo, Isabela.

The result of the study revealed the level of acceptability in terms of color and odor. The color of the barks of mahogany was rated "very attractive" and "odorless" by the evaluators.

Meanwhile, as to the effectiveness, there is no significant difference in the level of effectiveness of dyeing agent in terms of color and odor, in terms of acceptability, there is no significant difference in the level of acceptability of dyeing agent in terms of color and odor.

The BTTE major in Garments Fashion and Design students and Faculty are encouraged to conduct and develop future researches related to this study for its further improvement.

INTRODUCTION

It is an ancient art which predates written records and was practiced during the Bronze Age in Europe. Dyed textile remnants found during archaeological excavations at different places all over the world provide evidence to the practice of dyeing in ancient civilizations. Natural dyes were used only for coloring of textiles from ancient times until the nineteenth century. As the name suggests, natural dyes are derived from natural resources. Coloring materials obtained from natural resources of plant, animal, mineral, and microbial origins were used for coloration of various textile materials. Different regions of the world had their own natural dyeing traditions utilizing the natural resources available in that region. Use of natural dyes started to decline after the invention of synthetic dyes in the second half of the nineteenth century. Concerted research efforts in the field of synthetic dyes and rapid industrialization of textile production resulted in almost complete replacement of natural dyes by synthetic dyes on account of their easy availability in ready-to-apply form, simple application process, consistency of shades, and better fastness properties. The tradition of using natural dyes could survive only in certain isolated pockets.

Recent environmental awareness has again revived interest in natural dyes mainly among environmentally conscious people. Natural dyes are considered eco-friendly as these are renewable and biodegradable; are skin friendly and may also provide health benefits to the wearer. Natural dyes can be used for dyeing almost all types of natural fibers. Sujata and Raja (2014)

Dyes can be derived from nature through herbs and plants, flowers, seeds, barks, and roots. Natural dyes give subtle, rich warm colors that are unique. They have a mystery and life that fascinates and satisfies. Coloring a fiber can be accomplished by three basic methods: staining, pigmentation or dyeing. Staining is a temporary coloring where the color is simply rubbed or soaked into the fiber without any fixative to retain the color. Pigmentation is when the color is fixed to the fiber by an adhesive medium. Dyeing is when the color is deposited on the fiber in an insoluble form from a solution containing the colorant.

Gradually, dyeing processes became more complicated that people came to use synthetic dyeing practices. Presently, there is an excessive use of synthetic dyes, estimated at around 10,000,000 tons per annum, the production and application of which release vast amounts of waste and unfixed colorants, causing serious health hazards and disturbing the eco-balance of nature. (Jothi, 2008).

Yet, it may be better if people realize that Philippines have vast natural resources which can be utilized for sources of natural dyes. The qualities of a good dye include colorfastness, stability during washing, and color intensity. This study determined the feasibility of producing dye from coconut lumber sawdust. We also tested the quality of the dye extracted by using it on two different fabrics, silk, and cotton. Department of Science and Technology, Philippines (2014).

Natural dyes proved to have better biodegradability and generally higher compatibility with the environment, ecofriendly, non-toxic, non-allergenic as these are obtained from animals, plants, trees or vegetables matters without chemical processes and produced very uncommon, soothing and soft shades as compared to synthetic dyes. On the other hand, synthetic dyes, which are widely available at an economical price and produce a wide variety of colors, sometimes cause skin allergy and can harm the human body. These produce and release toxics/ hazardous chemicals during their synthesis.

For this reason, the researcher study about dyeing fabric using indigenous materials to develop dyeing agent out of indigenous using bark of trees such as *paper tree, starapple, acacia, mango and mahogany*. Specifically, this study seeks to determine the processes in the preparation of dyeing agent using bark of trees the processes applied to *cotton, silk and wool*. Furthermore, the resulting color when applied in cotton, silk and wool has been taken into consideration and level of effectiveness of the application to the three kinds of fabrics. Yet, the level of acceptability of the dyeing agents in terms of color and odor was included. Moreover, after satisfying the process the significant difference in the

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level of effectiveness and acceptability of dyeing agent in terms of color and odor has been studied.

RESEARCH DESIGN

The experimental method of research was used by the researcher in developing dyeing agent out of indigenous materials like bark of trees of paper tree, guava, acacia, mango and mahogany. The study was undertaken in ISU San Mateo Campus, San Mateo, Isabela, since this campus offered Garments Technology. Furthermore, the researcher used the survey questionnaire in gathering the data. Furthermore, the researcher used Weight Average Mean to analyze and interpret the data. The ANOVA to determine the significant difference on the acceptability to the three prepared fabrics.

RESULTS AND DISCUSSION

1. Processes in the Preparation of the Dyeing Agent

The following are the processes in preparing the dyeing agent:

Processes
1. Get bark of star apple tree, paper tree, mango tree, mahogany tree and acacia tree.

2. Cut the bark to small pieces separately.
3. Weigh the bark of trees into 1 kilogram accordingly.
4. Wash the chopped bark separately with a clean water for three times.
5. Place the chop bark of trees in a separate casserole.
6. Put 3 liters of water per casserole.
7. Boil it for an hour.

2. Processes in Applying the Dye to Fabrics

The following are the processes in applying the dyeing agent to fabrics like cotton, silk and wool:

Processes
1. Put the boiling water of the bark of trees in a separate bowl with cup.
2. Put the fabric (cotton), (silk) and (wool) in the bowl separately.
3. Soak and stain the fabric in the bowl for twelve hours.
4. Remove the stained fabrics separately.
5. Sun dry the fabrics for three hours.
6. When the fabrics are dried, analyze the stain effectiveness of the indigenous dye.

3. Result of the Dye to Color Fabric

Table 1. Resulting Color to Silk Using the Indigenous Dyeing Materials

Materials	Intensity	Texture	Odor	Appearance
1. Bark of Star apple tree	Bright	Soft	Odorless	Attractive
2. Bark of Mango tree	Bright	Soft	Odorless	Attractive
3. Bark of Mahogany tree	Very Bright	Very Soft	Odorless	Very Attractive
4. Bark of Acacia tree	Dull	Rough	Odorless	Not Attractive
5. Bark of Paper tree	Dull	Rough	Odorless	Not Attractive

As to the result of color to silk, bark of mahogany tree gave the best result. The intensity of the color is *bright*, the texture is *very soft* and *odorless*. As a whole the silk fabric colored by the bark mahogany tree is *very attractive*. Meanwhile, barks of star apple and mango tree gave an *attractive appearance*. The intensity is *bright*, the texture is

soft and it is *odorless*. On the other hand, barks of acacia and paper tree did not register an *attractive appearance*. The color intensity is dull, the texture is *rough*. However, it is *odorless*.

Table 2. Resulting Color to Cotton Using the Indigenous Dyeing Materials

Materials	Intensity	Texture	Odor	Appearance
1. Bark of Star apple tree	Bright	Soft	Odorless	Attractive
2. Bark of Mango tree	Bright	Soft	Odorless	Attractive
3. Bark of Mahogany tree	Very Bright	Very Soft	Odorless	Very Attractive
4. Bark of Acacia tree	Dull	Rough	Odorless	Not Attractive
5. Bark of Paper tree	Dull	Rough	Odorless	Not Attractive

As to the result of color to cotton, the bark of mahogany tree gave a *very attractive* appearance. Followed by barks of star apple and mango tree which gave an *attractive* appearance. On the other hand, barks of acacia and paper

tree did not show an *attractive* appearance. The color intensity is dull, the texture is *rough*. Nevertheless, it is *odorless*.

Table 3. Resulting Color to Wool Using the Indigenous Dyeing Materials

Materials	Intensity	Texture	Odor	Appearance
1. Bark of Star apple tree	Bright	Soft	Odorless	Attractive
2. Bark of Mango tree	Bright	Soft	Odorless	Attractive

3. Bark of Mahogany tree	Very Bright	Very Soft	Odorless	Very Attractive
4. Bark of Acacia tree	Dull	Rough	Odorless	Not Attractive
5. Bark of Paper tree	Dull	Rough	Odorless	Not Attractive

As to the result of color to wool, the bark of mahogany tree gave a *very attractive* appearance. While, barks of starapple and mango tree gave an *attractive* appearance to wool. But barks of acacia and paper tree did not give an

attractive appearance to wool. The color intensity is dull, the texture is *rough*. Yet, *odorless*.

Table 4. Level of Effectiveness of Indigenous Dyeing Materials to Silk

Indigenous Materials	Mean	Qualitative Description
1. Bark of Star apple tree	3.30	Moderately Effective
2. Bark of Mango tree	3.29	Moderately Effective
3. Bark of Mahogany tree	3.64	Effective
4. Bark of Acacia tree	2.06	Not Effective
5. Bark of Paper tree	2.39	Not Effective
Total	2.94	Moderately Effective

As to the level of effectiveness of the five indigenous materials in dyeing silk, the bark of mahogany tree has been

Level of Effectiveness of the Dyeing Agent

evaluated as “*effective*”. This goes to show that the bark of mahogany tree can be used to dye silk effectively. And with the presence of other staining materials it would become more effective. Furthermore, star apple and mango tree were “*moderately effective*”. This implies that these materials are a little bit effective for silk. This goes to show that these indigenous materials still need other dyeing materials to make it more effective. On the other hand, bark of acacia tree and paper tree were “*not effective*”. This shows that the two dyeing materials do not have the staining colors to dye silk.

As a whole, the five indigenous dyeing materials were evaluated “*moderately effective*”. This goes to show that the materials are not much effective for dyeing silk. However, these materials are still capable to dye silk and if it will be mixed with coloring chemicals, then they will very effective.

Table 5. Level of Effectiveness of Indigenous Dyeing Materials to Cotton

Indigenous Materials	Mean	Qualitative Description
1. Bark of Star apple tree	3.11	Moderately Effective
2. Bark of Mango tree	3.00	Moderately Effective
3. Bark of Mahogany tree	3.61	Effective
4. Bark of Acacia tree	2.13	Not Effective
5. Bark of Paper tree	2.30	Not Effective
Total	2.83	Moderately Effective

As seen in the Table, the bark of mahogany tree is “*effective*” in coloring cotton fabric. This goes to show that if the bark of mahogany tree can be used to dye silk effectively, the same is true to cotton. This goes to show that the coloring substance of mahogany is much better than the other materials. Meanwhile, bark of star apple and mango tree were “*moderately effective*” in coloring cotton. This shows that these indigenous materials still need other dyeing materials to make it more effective. On the other hand, the bark of acacia tree and paper tree were “*not*

effective” in dyeing cotton. It can be said that these dyeing materials do not have the staining colors to dye cotton.

As a whole, the five indigenous dyeing materials were evaluated “*moderately effective*”. This goes to show that the materials are not much effective for dyeing cotton unless mixed with other dyeing materials. However, these materials are still capable to dye cotton and if it will be mixed with coloring chemicals, then they will very effective.

Table 6. Level of Effectiveness of Indigenous Dyeing Materials to Wool

Indigenous Materials	Mean	Qualitative Description
1. Bark of Star apple tree	3.24	Moderately Effective
2. Bark of Mango tree	3.16	Moderately Effective
3. Bark of Mahogany tree	3.52	Effective
4. Bark of Acacia tree	2.11	Not Effective
5. Bark of Paper tree	2.33	Not Effective
Total	2.87	Moderately Effective

As to dyeing wool, it is seen, that the bark of mahogany tree is “*effective*” in coloring wool fabric. This shows that the bark of mahogany tree is effective to dye wool. Furthermore, the bark of star apple and mango tree were “*moderately effective*” to dye wool. However, the bark of acacia tree and paper tree were “*not effective*” in dyeing wool just like in silk and cotton. It can be said that these

dyeing materials do not have the staining colors to dye fabrics.

As seen, the five indigenous dyeing materials were evaluated “*moderately effective*”. This means that the



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materials are not much effective for dyeing wool.

Summary of Evaluation on the Level of Effectiveness of the Five Indigenous Dyeing Materials in Dyeing Silk, Cotton and Wool.

Table 7. Summary of Evaluation on the Level of Effectiveness of the Five Indigenous Materials in Dyeing Cotton, Silk and Wool

Indigenous Materials	Fabric			Mean	Qualitative Description
	Silk	Cotton	Wool		
1. Bark of Starapple tree	3.30	3.11	3.24	3.21	Moderately Effective
2. Bark of Mango tree	3.29	3.00	3.16	3.15	Moderately Effective
3. Bark of Mahogany tree	3.64	3.61	3.52	3.59	Effective
4. Bark of Acacia tree	2.06	2.13	2.11	2.1	Not Effective
5. Bark of Paper tree	2.39	2.30	2.33	2.34	Not Effective
Total	2.94	2.83	2.87	2.88	Moderately Effective

As seen in the Table, the bark of mahogany is “effective” in dyeing silk, cotton and wool. Meanwhile, the barks of starapple and mango tree are “moderately effective”. However, barks of acacia and paper tree are “not effective”. As a whole, the five indigenous materials are “moderately effective” in dyeing silk, cotton and wool.

Level of Acceptability of the Color and Odor of the Indigenous Dye

Table 8. Level of Acceptability of the Color Produced by the Indigenous Dyeing Materials along Silk

Indigenous Materials	Mean	Qualitative Description
1. Bark of Star apple tree	3.13	Moderately Acceptable
2. Bark of Mango tree	3.42	Acceptable
3. Bark of Mahogany tree	3.51	Acceptable
4. Bark of Acacia tree	2.21	Not Acceptable
5. Bark of Paper tree	2.35	Not Acceptable

Table 9. Level of Acceptability of the Color Produced by the Indigenous Dyeing Materials along Cotton

Indigenous Materials	Mean	Qualitative Description
1. Bark of Star apple tree	3.87	Moderately Acceptable
2. Bark of Mango tree	3.47	Acceptable
3. Bark of Mahogany tree	3.53	Acceptable
4. Bark of Acacia tree	2.12	Not Acceptable
5. Bark of Paper tree	2.3	Not Acceptable
Total	3.05	Moderately Acceptable

As seen in the Table, barks of mango tree and mahogany are “acceptable” to color cotton. This shows that mango and mahogany barks created striking and eye-catching colors to cotton. Meanwhile, bark of star apple produced “moderately acceptable” color to dye cotton. This means that the color is not appropriate to cotton as compared to the combining colors of mango and mahogany. On the other hand, the colors produced from barks of acacia and paper tree are “not acceptable” to dye cotton. It could be implied

Total	2.92	Moderately Acceptable
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As to the level of acceptability of the dyeing material to color silk, barks of mango tree and mahogany are “acceptable” based from the evaluation of the evaluators. This goes to show that mango and mahogany barks produced attractive and decent colors to silk as compared to other indigenous dyeing materials. Meanwhile, bark of starapple produced “moderately acceptable” color. This means that the color is a little bit dull to silk as compared to the combining colors of mango and mahogany.

However, the color produced from the barks of acacia and paper tree is “not acceptable” to color silk. It could be implied that these indigenous dyeing materials are not suitable for producing good color applicable to silk. As a whole, the evaluators gave an evaluation of “moderately acceptable” to color silk. This implies that the colors that have been produced by the dyeing materials to color silk are moderately preferred by the evaluators.

that these indigenous dyeing materials are not suitable for producing good color applicable to cotton. Generally, the evaluators gave an evaluation of “moderately acceptable” to the colors produced by the dyeing materials to color cotton. This implies that the colors that have been produced by the dyeing materials are moderately chosen by the evaluators to color cotton.

Table 10. Level of Acceptability of the Color Produced by the Indigenous Dyeing Materials along Wool

Indigenous Materials	Mean	Qualitative Description
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1. Bark of Star apple tree	3.01	Moderately Acceptable
2. Bark of Mango tree	3.5	Acceptable
3. Bark of Mahogany tree	3.51	Moderately Acceptable
4. Bark of Acacia tree	2.24	Not Acceptable
5. Bark of Paper tree	2.3	Not Acceptable
Total	2.91	Moderately Acceptable

As to the level of acceptability of the color produced by the dyeing material to wool, Table 10 presents the data of interest. It can be seen that bark of mango tree and is “*acceptable*” to color wool. This shows that mango bark produced attractive colors to wool. But, barks of star apple and mahogany produced “*moderately acceptable*” color to dye wool. This means that the color is not much appropriate to wool as compared to the combining color of mango.

On the other hand, the colors produced from barks of acacia and paper tree are “*not acceptable*” to dye wool. It

could be implied that these indigenous dyeing materials are not suitable for producing good color.

As a whole, the evaluators gave an evaluation of “*moderately acceptable*” of all the colors produced by the dyeing materials to color wool. This implies that the colors that have been produced by the dyeing materials are moderately preferred by the evaluators to wool.

Summary of Evaluation on the Level of Acceptability of the Color Produced by the Indigenous Dyeing Materials along Silk, Cotton and Wool

Table 11. Summary of the Level of Acceptability of the Color Produced by the Indigenous Dyeing Materials along Silk, Cotton and Wool

Indigenous Materials	Fabric			Mean	Qualitative Description
	Silk	Cotton	Wool		
1. Bark of Star apple tree	3.13	3.87	3.01	3.33	Moderately Acceptable
2. Bark of Mango tree	3.42	3.47	3.5	3.46	Acceptable
3. Bark of Mahogany tree	3.51	3.53	3.51	3.51	Acceptable
4. Bark of Acacia tree	2.21	2.12	2.24	2.19	Not Acceptable
5. Bark of Paper tree	2.35	2.3	2.3	2.31	Not Acceptable
Total	2.92	3.05	2.91	2.96	Moderately Acceptable

Table 11 presents the summary of the level of acceptability of the color produced by the indigenous dyeing materials along silk, cotton and wool. It can be seen that barks of mango and mahogany tree have produced “*acceptable*” colors in dyeing silk, cotton and wool. Meanwhile, the bark of starapple produced “*moderately*

acceptable” color. However, barks of acacia and paper tree have produced “*not acceptable*” colors to dye silk, cotton and wool. As a whole, the five indigenous materials have produced “*moderately acceptable*” colors in dyeing silk, cotton and wool.

Table 12. Level of Acceptability of the Odor Produced by the Indigenous Dyeing Materials to Fabrics

Indigenous Materials	Mean	Qualitative Description
1. Bark of Starapple tree	3.13	Moderately Acceptable
2. Bark of Mango tree	3.42	Acceptable
3. Bark of Mahogany tree	3.51	Acceptable
4. Bark of Acacia tree	2.21	Not Acceptable
5. Bark of Paper tree	2.35	Not Acceptable
Total	2.92	Moderately Acceptable

As to the level of acceptability of the odor of the dyeing materials to fabrics, barks of mango tree and mahogany produced “*acceptable*” odor. Meanwhile, bark of star apple produced “*moderately acceptable*” odor. This means that mango and mahogany are more scented than star apple. However, the smell of acacia and paper tree when used as dyeing materials is “*not acceptable*”. As a whole, the

evaluators gave an evaluation of “*moderately acceptable*” as to the odor of the indigenous dyeing materials when applied to fabrics.

Significant Difference in the Level of Effectiveness and Acceptability of Dyeing Agent in terms of Color and Odor

Table 13. Significant difference in the level of effectiveness and acceptability of dyeing agent in terms of Color and Odor.

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Effectiveness	Mean	MD	df	Critical value	t-value	Result
Color	14.39	0.23	8	1.860	0.09034	Not Significant
Odor	14.62					
Acceptability						
Color	14.8	0.18	8	1.860	0.196341	Not Significant
Odor	14.62					

As to the significant difference in the level of effectiveness and acceptability of dyeing materials of color and odor, it can be seen that the level of effectiveness and acceptability of dyeing agent in terms of color and odor showed a “not significant” result.

CONCLUSION

It is concluded that the bark of mahogany tree gave the best result in coloring silk, cotton and wool fabrics. Likewise, barks of starapple and mango tree gave an attractive color to silk, cotton and wool. Nevertheless, barks of acacia and paper tree did not produce attractive color to silk, cotton and wool.

Furthermore, the indigenous dye is reasonably effective in dyeing cotton, silk and wool. Equally, the color and odor of the five indigenous coloring materials are a little bit preferred when applied to silk, cotton and wool. The effectiveness and acceptability of dyeing agent are not significantly related in terms of color and odor.

RECOMMENDATIONS

Based on the foregoing findings and conclusions, the following recommendations are offered:

1. Since the bark of mahogany tree presented a very attractive appearance and bright color, thorough analysis should be applied in order to determine its strengths and weaknesses.
2. In this case, the research department of the campus should allocate funds for that purpose.
3. Intensive campaign on using indigenous materials should be supported by the school authorities as livelihood to alleviate the living condition of the people.
4. Thorough campaign on planting mahogany tree within the vicinity of the municipality so that there are always available materials in conducting the research.
5. Seminar and training along dye making should be designed and supported by the administration to strengthen the staff development of the faculty in the Tech.Voc. Department.
6. Encourage faculty to conduct research further particular in dyeing which is to design on the fabric using the mahogany tree.
7. Research similar to this study using other indigenous materials should be conducted for comparison and will serve as their reference of the researcher.

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USEFUL INTERNET ADDRESSES

- <http://www.slonet.org/~crowland/index.html> Carol Todd's Natural Dyeing Homepage. Sells books and electronic database of plants and natural dyes.
- <http://www.hillcreekfiberstudio.com/Workshops.html> HillcreekFibre Studio. Runs workshops on weaving and natural dyeing. Based in the USA.
- http://www2.ptri.dost.gov.ph/index.php?option=com_frompage&Itemid=1&limit=6&limitstart=12
- http://www2.ptri.dost.gov.ph/index.php?searchword=dyeing+fabrics&option=com_search&Itemid=
- <http://www.thefreedictionary.com/dyeing>
- <http://www.businessdictionary.com/definition/fabric.html#ixzz3U6IUdRrI>