Application of Natural Dye from Babool Bark on Cotton Fabric Using Mordants

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Abstract: Natural dyeing is an age-old practice. It was the result of the quest of man for coloring his body which made him discover the coloring matter from natural sources such as plants and animals. Natural dyes are those colorants which are obtained from plant, animal or mineral sources with little or no chemical processing at all. This is to dye the cotton fabrics with Babool Bark powder using eco-friendly mordants, for extraction of dyes from the selected sources. It can be followed such parameters dyeing concentration, time, temperature, M I: ratio and mordanting technique. The material was used by highest concentration, temperature, time, M I: ratio and techniques for the dark shade. The performance of the sample using the natural dye Babool Bark and the mordants Alum and Myrobalan was evaluated by doing colorfastness' tests. The colorfastness tests of the samples using Alum showed good performance compared the myrobalan as mordant. Based on the performance of the material dyed with Babool bark and mordanted alum and myrobalan, babool bark can be used as one of the good sources for natural dyes. The color of dyed material was brown, this group of colors has a remarkably light feeling. Cotton is a most suitable fabric for children garment, material convert into a value product, designed and constructed for the new born. This is to explode natural mordants and mordanting techniques with Babool Bark dye, different shades of brown can be achieved, this natural brown color dye can be recommended for the commercial product of fabric for Children's Garment.

Keywords: Babool Bark, Myrobalan, Alum, Children Garment

Introduction:

The pollution problems, gaining gigantic proportions beyond the control of natural recycling eco-system, the day is not far away when man may starve for even a drop of pure water, fluid of life or a mouthful of unpolluted food. The pollution is defined as creation of imbalance between nature and environmental life cycle, by human beings and other living inhabitants on earth, due to their day-to-day input activities. This causes unhealthy surroundings, deforestation, ecological degradation, soil erosion and deletion of natural resources, creation of industrial slumps and ugly dwellings. Environmental awareness and consciousness have been increasing all over the globe and has become a basic requirement in textile industry. Hence the use of natural dyes on textiles has been just one of the consequences of increased environmental awareness. Natural dyes which can be obtained from any part of the plant viz., leaves, fruits, seeds, flowers, barks and roots. Natural dyes procured from natural wealth like plants, minerals and insects are fairly non-polluting; more challenging have rare color ideas and unlimited scope to generate new shades. In India, efforts are being made by National Handloom Development Corporation (NHDC) to initiate and promote the use of pre-prepared extracts of natural dyes. In view of this, India should make the best use of traditional knowledge it has on natural dyes and talented entrepreneurs should forge ahead in this expanding market. It is said that "Nothing succeeds like success".

Advantages of Natural Dyes

- They are obtained from renewable resources
- > No health hazards, sometimes act as healthcare.
- > Practically no or mild chemical reactions involved in their preparation.
- ➢ No disposal problem.
- > They are harmonized with nature.

Babool Plant (Acacia Nilotica)

The Babool tree is a moderate size tree with golden yellow flowers, long white thorns and characteristic-whitish-Tormentose torulosis pods which are eaten by cattle. The bark of the tree is rough and is dark brown, wood reddish brown, hard and strong, useful for agriculture and much other purpose. The bark of the tree gives light brown color which in combination with different mordants, gives different shades. Babool is suitable for cotton fabrics. It produces black, brown and khaki shades. Considering the toxic and carcinogenic effects of synthetic dyes, eco-friendly natural dye Babool, were selected and used for the study. In this study, an attempt has been made to extract dye from Babool bark; a plant abundantly found in waste lands and utilizes the same for dyeing cotton fabric.

COTTON MATERIAL

Selection of the material is an important step for the study. Cotton fabric was selected for the study because of its eco-friendliness and its desirable properties. Cotton is a natural and eco-friendly fiber. Cotton, the 'King of Fiber' is one of the cheapest among

natural fiber having definite inherent advantages. Cotton being a natural fiber merges with the soil after sustained use. The natural dyed cotton represents a good opportunity for making clothing and value-added utility. Cotton fiber is one of the oldest and the most important natural fiber used for textile purposes. Cotton constitutes over 80 percent of total fiber consumption within India and therefore occupies a pre-eminent position among the textile fiber. Cotton, a gift of nature plays a vital role in our lives. Half the clothes used by man are made up of cotton. Cotton is the back bone of the world's textile trade. Many of our everyday textile fabrics are made from cotton. Cotton is the whitest and the cleanest natural fiber. It can be laundered easily, for it withstands high temperature well. The beauty of cotton is that it is acceptable by all, young and old, modern and conservative men and women. The use of cotton as an important textile material is not only due to its economy and abundance but also due to some properties like absorbency, strength, durability.

SELECTION OF THE DYE



Babool bark dye powder

Natural dyes are more preferred for its eco-friendliness. The source of natural dyes is from leaves, barks, roots, fruits and flowers. For this study, Babool Bark was collected. The natural dyes especially vegetable colorants have aroused considerable interest in dyeing of textile due to their perceived eco-friendly nature. During last two decades, natural dyes have witnessed a process of revival. The study on dyeing of cotton fabric with Babool Bark was carried out in the following steps.

SELECTION OF MORDANT



mordant - alum

mordant – myrobalan

Mordant are very important factor for dyeing. While dyeing with natural dye many mordant from natural and synthetic sources are available. Alum and Myrobalan give good color fastness and appearance. Mordanting is the process of pre-treatment of fibers which allows the applied dye color to be permanently fixed in to the garment. Hence the mordants selected Alum and Myrobalan which was easily available.

Desizing of Cotton Fabric

The fabric was bought in bleached state; therefore, Desizing was performed as follows. The fabric was wetted and treated with 2% HCI solution at room temperature for a period of nine hours. In order to avoid evaporation of water during storage, wetted gunny cloth was placed on the fabric. After the fabric was hydrolyzed starch was removed after washing with water after Desizing

cold water will reduce the solubility of the degraded material. So, the fabric is naturalized by treating it with sodium carbonate. Then the fabric is again rinsed with cold water thoroughly.

Flowchart for the Extraction of Dye:



The selected dye plant Babool Bark (Acacia Nilotica) a barks pieces were cleaned. It was dried under shade, chipped and powdered well. This dye powder obtained from Babool Bark (Acacia Nilotica) was used for extraction process.

Dye Concentration:

The concentration of the dye 5%, 10%, 15% of the dye proportions were selected. The fabric samples of size 7"x7" were taken and dyed with the selected three dye proportions in the material liquor ratio 1:20. The concentration which gave the maximum dye absorption was taken as optimum.

Dye Extraction Time

The dye extraction time each concentration of the dye powder was extracted for 30, 45, 60 minutes. The extraction time which gives the maximum color density was taken as optimum.

Dyeing Temperature

The dyeing temperature the fabric sample were dyed for 80, 90, 100 minutes. Dyeing temperature which gave the maximum shade was selected.

Dyeing Ml: ratio

The MI: ratio of the fabric sample was dyed for 1:20, 1:30, and 1:40 ratio. Dyeing M I: ratio which gave the maximum dye was taken as optimum.

Mordants and Mordanting techniques

The simultaneous mordanting techniques employed. The mordants and mordanting technique which gave best results. Based on the results of the questionnaire by the panel of judges the recipe for the original sample was selected.

S. No	Parameters	Levels (ALUM)	Levels (MYROBALAN)
1	Fabric	500 gms (3 mts)	500 gms (3 mts)
2	Wt of the dye	500 gms	500 gms
3	Mordant (Alum& Myrobalan)	5 % (1), 10 % (2), 15% (3)	5 % (1), 10 % (2), 15% (3)
4	Water Ratio	Water Ratio	Water Ratio
5	Temperature	1000	1000
6	Time	1 hour	1 hour
7	Dye Liquor	10 lt (10000ml)	10 lt (10000ml)

DYEING WITH ALUM AND MYROBALAN AS MORDANT

Three meters of the white sample was taken and used. The dye liquor was prepared and used as per the recipe given above. Three meters of material was stepped into the dye liquor once when the dye bath was at 70 c. heat. After one-hour soda ash was added evenly into the dye liquor. The fabric was worked in the dye solution for one hour maintaining the temperature at 100° c. After one hour the mordant was added and kept for 1 hour into the dye solution and this gave enough time for the dye penetration. The dye sample is then removed from the dye solution and rinsed thoroughly with water and squeezed dry. The above procedure was repeated using Myrobalan as mordant. The dyed sample was immersed in 0.5% soap solution and kept for 20 minutes, after which the samples was removed and rinsed in soft water and dried under shade.

COMPOSITION OF PERSPIRATION SOLUTION:

S. No.	Chemicals	Acid	Alkali
1	Sodium Chloride	10gm	10gm
2	Lactic Acid U.S. P. 85 Percent	1 gm	-
3	Ammonium Carbonate U.S.P		4 gm
4	Di Sodium hydrogen Phosphate	1gm	1 gm
5	pH	5.6	7.2
6	Temperature	Room Temperature	

The acid and alkaline test liquors were prepared separately by dissolving the respective chemicals in a litter of distilled water. The samples were thoroughly damped with the acidic and alkaline medium separately for half an hour, at room temperature. Later, they were removed and placed between glass plates of the Sasmira Per spirometer under a load of 4.5 Kg. The apparatus was placed in a hot air oven for four hours at $37 \pm 2^{\circ}$ C, after which the samples were removed and dried out separately at room temperature. The samples were evaluated for color change and staining using respective grey scales.

Conversion into product - NEW BORN - GARMENT



The material was converted in the form of New Born Garment. The following measurements were used. **Style of the garment**: JABLA,

Measurements: Chest: 28cm - Full length

Drafting details:

Take two layers for front and back each, with folds at 3-2.

Square lines from 0, = one-fourth chest, = full length + 1 cm, 3-1=2.5 to 3cm, 4-3= one fourth

Chest less 1 cm, Square down from 4 to 5,6-1= one fourth chest plus 4 cm,

7-2= same as 6-1 plus about 4 cm, Joint 6-7, 8-7=2cm shape 2-8, Keep about 3 cm above 3-4 and

4 cm below 2-8 for in turns, Length of suspenders = one fourth chest plus 12.5.

Conclusion:

We can conclude that the material dye Babool Bark (Acacia Nilotica) can be used as one of the good sources for natural dyes. The color of dyed material was brown; this group of colors has a remarkably light feeling. These colors can be used as main theme colors in an outfit because they combine well with other colors. The material converted into a value product of Children's Garment was selected. Material was designed and constructed for the new born; cotton is most suitable fabric for New Born. The scope of this research can be to explode natural mordants and mordanting techniques with Babool Bark dye and different shades of brown can be achieved by various aspect. This natural brown color dye can be recommended for the commercial product of fabric for New Born Children's Garment.

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