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Extraction and application of eco-friendly ratio natural Dye from Jamun on different fibers by using ratio Combination of Mordents

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ABSTRACT: This paper reports to studies available on the characterization of the colorant extracted from the Jamun Bark dyeing on different fibers have been studies using different combination ratio 1:1, 2:1 of various mordant such as FeSO4oxalic acid, Sncl2, alum. It is found that Jamun Bark dye can be successfully used for the dyeing of Jute to obtain wide range of colors by using various combination of mordents. Development of new shade and analysis of colour parameter for textile dyes with Jamun Bark natural dyes with regard to colour fasteners properties. The test samples exhibit good to excellent.

Keywords: Jute, Dyeing, Mordant, Natural Dye, Jambolan (Jamun).

INTRODUCTION

Majority of natural dye from people have dyes their textile using common locally available material such dyestuff that produce brilliant permanent color such as JamunBark (Maran et al., 2013). Natural dyes were less expensive, supplied a wide variety of new colors, and gave the dye material better proportion(S. et al., 1991). As old as textile marking itself is natural dye. Only a small portion of textile dyes used to color clothing or other textiles were natural dyes made from plants. Since consumers became aware of the ecological and environmental issues associated with the usage of synthetic dyes, there has been a recent increase in interest in natural dyes(Migliato, 2005; SamantaAK & Agarwal, 2009; Siva, 2007). Jambolan fruit and bark comparison study. The family Myritaceae includes the enormous, evergreen Syzgiumcumini Linn (Jambolan) tree. The jambolan plant is well known for its syongum, sometimes known as black plum. Indian black berry Jamun, Tanba, Jambool and duhat which is upto 25 meter talk with grayish white young stem and lower bark which is course and discolored. Jamuntree is family fast growing and stem bark is mentioned(R. L. M. Allen, n.d.; Bechtold T. &Mussak, 2009; Samanta & Agarwal, 2009). To the most powerful parts. Tanneries mainly gallic acid is responsible for astringency effect. The purple colour of the fruit is due to the presence of the cyaniding-diglycerides (Hunger, 2003). The ripe fruits of family Myrtaceae are used for making drinks, as preservative, squashes, jellies and wine etc (Feng et al., 2007; Kim, 2006; Sivaramakrishnan, 2008). In association to its dietary use, the seeds are used to treat a range of ailments, the most important being diabetes mellitus. Diverse parts of the jamun were moreover detailed for its antioxidant, anti- inflammatory, neuropsycho-phar-mecological, antimicrobial, anti- bacterialanti-HIV and antifungal nitric oxide rummaging,

free radical rummaging, anti-diarrheal, antifertility, anorexia-genic gastro defensive and anti ulcerogenic and radio-protective exercises(M. W. Allen & Bain, 2008). Various work on tannin, flavonoide essential oil, between acid was reported to have diverse pharmacological 2004 Van Jodha like gastro protection, anti ucerogenic, antibacterial, anti-infective, anti-material, anti-inflammatory(Dahl et al., n.d.; Hang & Yang, 2005; Sarkar A. K. &Dhandapani, 2009), hydogolycemic, anti-bacterial, anti-oxidant and radio protective. Astringent decoration is prepared from Jamun bark and used for gargles.

The dyeing process based on the herbal resource including three major steps.

1. First being the extraction of coloring matter from the plant part stem or bark.
2. Extracted coloring matter is creating a bound between the coloring mater and fiber to be dyed and last is actual dyeing. The creation of bond between the coloring matter and fiber is called mordating. Therefore, to obtain newer shade with acceptable colour fastness behavior and reproducible colour yield.
3. Natural dyes are mostly non-substantive and must be applied on textile by the help of mordants i.e. Sn, Cl2, Alum FeSO4, Oxalic acid etc

Species of Jamun in suitable location it attains nearly 20 to 25-meter height and 2 to 3-meter girth is nearly 100 years. Medicinal value is due to presence of maleic acid, oxalic acid, gallic acid and tannin(Das et al., 2014; Tayade et al., 2015; Teklemedhin & Gopalakrishnan, 2018). The entire plant is used to the traditional medicine however the leaves and stem bark is mentioned. To the most powerful parts. Tanneries mainly gallic acid is responsible for astringency effect. The purple colour of the fruit is due to the presence of the cyaniding-diglycerides (Chauhan & Saklani, 2013; Elbanna et al., 2016).

Various work on tannin, flavonoide essential oil, between acid was reported to have diverse pharmacological like gastro protection, anti-ulcer genic, antibacterial, anti-infective, anti-material, anti-inflammatory(Chavan & Kadam, 2012; Guan et al., 2013), hydoglycemic, anti-bacterial, anti-oxidant(Zhang et al., 2016) and radio protective. Astringent decoration is prepared from Jamun bark and used for gargles.

METHOD

The preparation of raw material

The raw material of Jambolan bark are cut from the trunk of Jambolan tree and they are cleaned with water by brushing to remove the impurities and allowed to soak in warm water for 12 hours then heated and boiled for 1-2 hour. After than slowly heated and boiled for 2-3 hours at 90°C reduce the extraction time silvaaetal L007.

One hundred gram of Jambolan bark powder are placed in a round bottom flask with 500 ml of water are added into it. The flask is heated in water bath at 60°C for one hour. The above processes repeated 3 times at 60°C. the extracted dye soln. put into the petridish for evaporation of water. After extracting the dye from dye, soln. is dried in the oven at 60°C. in this dyestuff is extracted as powder from after evaporation.

Post mordanting technique are applied for dye the Jute. It is technique which applied after dyeing the fiber a mordant can give colour. The dyed material is treated with a mordant which are used

the fix a dye with fiber ad give the colour. They also improve the take up quality of fiber, color ad light fastness.

Colour Fastness To Washing

The dyed sample Jute was shaked with detergent coln. For 30 min. report that rinsing procedure once more with a new renising float. Dried the sample and the extent of fading examined the wash fastness rating was assessed using grey scale.

Instruments.D400IR dyeing machine (SDL Atlas England); Launder meter (Roaches), Per spirometer kit (SDL Atlas England); oven Ci 3000 + Xenon: weather meter (Atlas England); water bath; grey scales for staining (ISO 105 A03); grey scale for change in shade (ISO A02); crockmeter 9SDL Atlas England); multifiber (DW).

Chemicals.

Detergent ECE (without optical brightener) sodium per borate, 1-histidine monochloride monohydrate, sodium dihydrogen orthophosphate, distilled water, sodium carbonate, sodium hydroxide, acetic acid, Sulphuric acid, and perchloroethylene solvent. All the chemicals and solvents used were of AR grade.

Collection of bark and extraction of colour.

The most often used parts of plant for dyeing are leaves and fruit husk (Onal et al. 2004). In this study only Jaman Bark was used for extraction of the dye. Jaman bark was purchased from Murree market and thoroughly washed with water and dried. It was ground into powder and sieved through 22 mesh size strainer. 500 g bark powder was soaked in 5 litre water over might, boiled for 2 to 3 h and then subjected to stirring for 3 to 4h at simmering temperature. A dark brown colored due solution obtained was filtered and kept for dyeing and other tests (Kongka-chuichay et al., 2002).

Dyeing with Jamun bark.

20 g Fabric of cotton, Jute and silk each were dyed with the same depth of jamun bark dye bark dye extract in the D400 IR dyeing machine (SDL Atlas England) with programmes to control temperature (100°C), time 1 h and speed of circulation 1.5 rpm. The two dyed fabrics were used to study the colour fastness to washing, perspiration, rubbing three, light.

Fastness determination.

Wash fastness test of all the three dyed fabrics was determined according to ISO 105 C06 method. Light fastness was examined according to ISO 105 standard method procedure B02. Rubbing fastness (dry and wet) test was carried out according to ISO 105x12 standard test procedure. Colour fastness tests to dry cleaning, water, sea water, and perspiration (acidic and basic) were carried out according to ISO 105: D01, E01, E02 and E04 methods, respectively. Colour fastness to spotting of acids and alkalis test were performed according to ISO E05 and E06 methods, respectively (BS 1006:1990).

Washing Fastness:

Washing fastness was determined by preparing the soap solution containing 4 g detergent and 1 g sodium perborate per litre of distilled water. Then pH was adjusted to 10.5+0.1 by addition of approx. 1 g of sodium carbonate. Jute, cotton and silk fabric pieces of size. 10x4 cm were attached to multifiber DW of the same measurements by sewing along with n e of the sorter sides. The three composite specimens were put into glasses of launder meter (Roaches) for 30 min at 60°C having liquor ratio 50:1. Launder meter or Washtec consists of a water bath containing a rotatable shaft which supports radially, stainless steel container (75+5 mm diameter x 125+10 mm height) of capacity 550+50ml, the bottom of the container being 45+10 from the centre of the shaft. The shaft/container assembly is rotated at a frequency of 40+2/min. After 30 min, samples were removed from the Washtec. Stitches were removed and the specimens were dried at temperature not more than 60°C. The change in stain and in shade was assessed with the help of grey scale.

Colour fastness to perspiration.

Test were carried out by dipping the fabrics in 1-histidine monohydrochloride monohydrate solution according to ISO 105 E04 method. Specimens of Jute, cotton and silk of 4 cm x 10 cm measurement were attached to pieces of multifibre of the same measurement by sewing along with one of shorter sides and dipped separately into alkaline and acidic solutions for 30 min having liquor ratio 50:1. Then the Jute, cotton and silk specimens were placed in the per spirometer kits and the desired pressure was applied. Per spirometer kits are test devices each consisting of a frame of stainless steel into which a weight piece of ass 5 kg and base of 60 mm x115 mm is closely fitted so that a pressure of 12.5 kpa can be applied on test specimens measuring 40 mm x 100 mm, placed between glass or acrylic resin plates measuring 60 mm x 115 mm x 1.5mm. The test device is constructed in such a way that a pressure of 12.5 kpa remains unchanged. The per spirometer kits (acidic and basic) for tests of the three fabrics were placed in the vacuum oven for 4 h and then the kits were removed from the oven and the stitches were opened except on one shorter side. Specimens were dried at 60°C by hanging in air. Change in the colour of each specimen and staining of the adjacent fabric (DW) were assessed with grey scale(DanAzumi & Bichi, 2010; Sudha et al., 2014).

Rubbing fastness.

Dry rubbing on Jute was carried out with the help of crockmeter under a pressure of 9 N in to and fro movements on standard rubbing cloth. The sample cotton of 5 cm x 14 cm measurement was taken. Both warp and weft readings were noted. Same procedure was adopted for jute and silk and values were taken with the help of grey scale(Xu W, 2006).

Wet rubbing.

Wet rubbing on Jute fabric was done under the same conditions of crockmeter as in the dry rubbing except the standard rubbing soaked into 100% deionized water. Same procedure was repeated with cotton and silk fabrics and the change in colour and in stain was assessed with the help of grey scale(Gupta, 2004; Khan, 2003).

Light fastness.

Light fastness was carried out according to ISO 105 standard procedure B02; in weather meter by Atlas. Xenon arc lamp was used which is an artificial light source representative of natural day light D65. Fabrics of measurement 7 cm x 12 cm of cotton Jute and silk were exposed to Juman bark Dye and Colour Fastness.

Xenon arc lamp for 24 h, at standard testing conditions using blue wool as standard reference fabric. The above three treated fabrics were compared with grey scale for evaluation.

Colour fastness to dry cleaning.

Undyed Jute twill bags of 10cm x 10 cm measurement were stitched around three sides and Jute. Jute silk pieces of 4 cm x 10 cm measurement were placed into separate bags along with 12 non-corrodible steel disks and the fourth side of the bag was sewed. Then the bags were placed in separate containers of Washtec containing 200 ml of perchloroethylene solvent and agitated for 30 min at 30+2°C. Afterwards the bags were removed from the container. The samples were squeeze to remove surplus solvent and dried in the air by hanging them at a temperature of 60+5 °C. Assessment of change in colour of samples and change in colour of solvent was carried out with the help of grey scale.

Colour fastness to water.

Colour fastness to water was evaluated in the same manner as for the colour fastness to perspiration. ISO-105 E01 and E02 methods was used for water and sea water, respectively. In case of water, fabrics were dipped in deionized water, while for colour fastness to sea water, fabrics along with multifibers were dipped in NaCl solution (30 g/l) for 30 min(Cardamone, 2002; Hebeish, 2012; singh, 2005). For both water and sea water the above three treated composite fabrics were put in per spirometer kit. These kits were placed in the oven for 4 h at 37+°C. Then the specimens were dried at temperature not more than the specimens were dried at temperature not more than 60°C. Change in shade and in stain were noted with the help of grey scale.

Colour fastness to dry heat.

Dry hot pressing was done according to ISO 105 XII. Specimens of Jute, cotton and silk were pressed at temp. 110+2 °C with hand iron and change in colour was assessed with grey scale.

Colour fastness to spotting acids and alkali.

Scope of acetic acid 300 g/l, Sulphuric acid 50 g/l, tartaric acid 100 g/l and Na2CO, 100 g/l of water were put on the specimens and change in shade was assessed with ISO-105 A02 grey scale.

RESULT AND DISCUSSION

The dyed textile was immersing in separate vessel in the artificial perspiration soln. placed the specimen between two glass plates in the apparatus and loaded it with a weight of 4.5 Kg, placed it in the oven at 37+2°C for three hours at 37+2°C for houses in colour of scale. (AAtCC-1995).

At the end of this period sample was removed and the test piece was separate from the two pieces of the untreated fabric and dried in air at a temperature not exceeding 60°C(Grifoni et al., 2009; Mongkholrattanasit, 2011).
The dyed sample of Jute fabric wet/dry Jute fabric. These samples were placed over the end of finger of testing device and rubbed. Over to end of the finger of the testing device and rubbed it to and form in a straight line. The pieces were dried at room temperature. The degree of fabric was evaluated with to help of grey scale and the numerical rating were assigned(Hoffmann K, 2001; Wang et al., 2009).

Table 1. Fastness grades of Jute dyed with Jamblon colorant with at optimum dyeing condition using SnCl3 oxalic acid

Mordanting	Mordanting Proportion or ratio combination	Light Fast-ness	Wash Fastness			Rub Fastness Dry			Wet	Fastness Perspiration		
			CC	CS	CJ	CC	CS	CJ	CC	CS	CC	CJ
Post Mordanting by $SnCl_2$+ Oxalic Acid	1.1	4-4.5	5	5	5	5	5	5	4.5	5	5	5
	1:2	4-4.5	4	5	5	5	5	5	4.5	5	5	5
	1:3	4-4.5	4.5	5	5	5	5	5	4.5	5	5	5

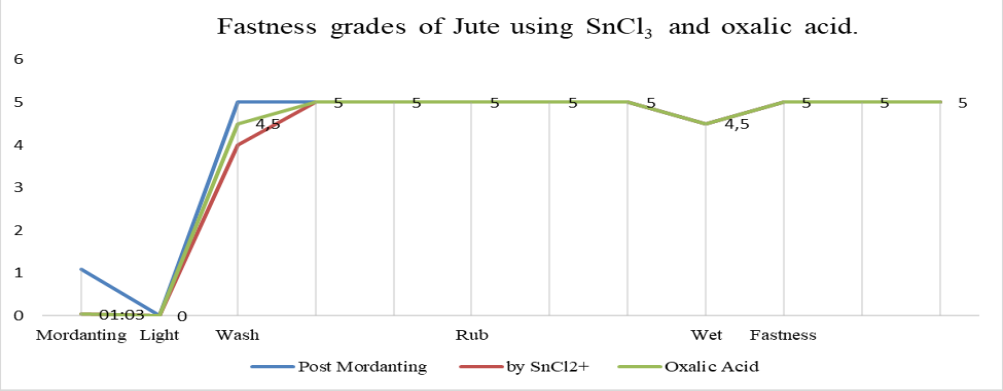

Figure 1. Fastness grades of Jute using $SnCl_3$ and oxalic acid

Table 2. Fastness grades of Jute dyed with Jambolon Colorant at optimum dyeing condition using SnCl2: Ferrous sulfate.

Mordanting	Mordanting Proportion	Light Fastness	Wash Fastness			Rub Fastness Dry			CJ	Perspiration Fastness		
			CC	CS	CJ	CC	CS	CJ	CC	CS	CC	CJ
Post Mordanting bySnCl₂+ Feson Sulphate	1.1	4-4.5	5	5	5	5	5	5	4.5	5	5	5
	1:2	4-4.5	4	5	5	5	5	5	4.5	5	5	5
	1:3	4-4.5	4.5	5	5	5	5	5	4.5	5	5	5

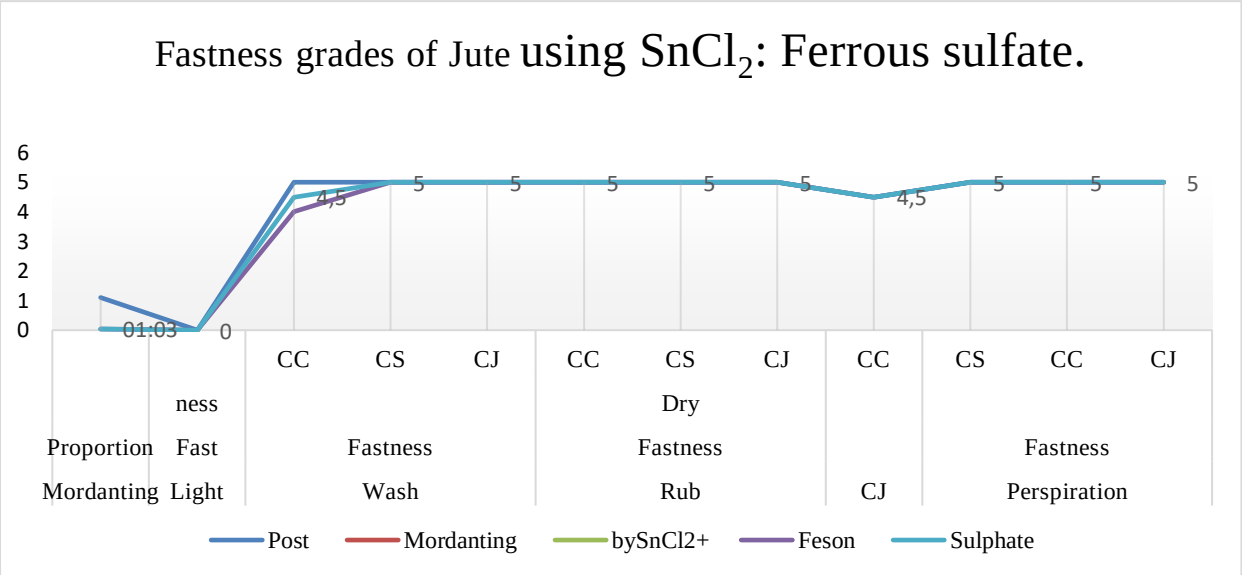

Figure 2. Fastness grades of jute using SnCl2: Ferrous sulfate

Table 3. Fastness grades of Jute dyed with Jambolon Colorant at optimum dyeing condition using SCl2: Alum. Dyed at optimizing dyeing condition

Mordanting	Mordanting Proportion	Light Fastness	Wash Fastness			Rub Fastness Dry			CJ	Perspiration Fastness		
			CC	CS	CJ	CC	CS	CJ	CC	CS	CC	CJ
Post Mordanting bySnCl₂+ Potash	1.1	4.5	5	5	5	5	5	5	4.5	5	5	5
	1:2	4.5	4	5	5	5	5	5	4.5	5	5	5
	1:3	4.5	4.5	5	5	5	5	5	4.5	5	5	5

C = Cotton
S = Silk
J = Jute

Discussion and preparation i.e. fastness to light, washing rubbing and preparation of dyed Jute samples.

There is a growing demand for eco-friendly non-toxic colorant. The purpose was also to investing to the dyeing behavior and fastness properties on Jute. The dyeing of Jute with aqueous extracts of these plant done by using post mordanting method of dyeing comparison between dyeing with and without mordants were made vegetable dye is a type of natural dye. Natural dyes have been used for dyeing of Jute by using the extract of different plants(Sarkar, 2004).

Change in staining.

When the washing fastness characteristics of cotton, jute cotton, and silk were tested, it was found that the staining performance of jute and silk textiles was excellent on a diacetate band of multifiber DW for jute fabric. Staining was good for jue fabrics rating and for cotton fabric for multifiber cotton band. Cotton fabric produced outcomes for the nylon band of multifiber that were satisfactory and good for jute and silk. All fabrics for polyester band received the same grade of 4. All three fabrics for the polyacrylic and cotton band received an outstanding stain grade (Basak et al., 2018).

Change in shade.

Jute received a satisfactory assessment for the results of the change in colour. Jute receives a grade of 4, while silk has a bad rating compared to the other two textiles. Table 1 shows the results for shade changes for jute, cotton, and silk dyed with walnut bark extract.

Jute fabric. The results of acidic and basic sweat on a jute cloth on diacetate band were favorable. Acidic and basic sweat on a jute and nylon band produced staining results of 4. Both basic and acidic sweat produced great results for the polyester band. Excellent for acidic perspiration and good for basic perspiration were discovered for polyacrylic band. Results for both perspirations for wool band were favorable(Vankar, 2007) . For acidic sweat, the change in shade was 4, however for basic perspiration on jute cloth, it was good.

Jute fabric.

Excellent rating was given for the multifiber diacetate band by acidic and basic sweat. For Jute bands, the stain change for both acidic and basic sweat was favorable. The staining for the nylon band was the same, or. Both sweat and polyester and polyacrylic band staining were excellent. Wool band also produced good and excellent staining for basic and acidic sweat, as well as good and outstanding shade changes for both types of perspiration(Glover & Pierce, 1993; Hwang et al., 2008).

Silk fabric

The diacetate band demonstrated outstanding rating for basic perspiration and good rating for acidic perspiration for silk fabric treated with walnut dye. For multifiber Jute bands, the stain change was good for basic sweat and outstanding for acidic sweat. For both acidic and basic sweat, polyester band staining received an excellent rating. Excellent for basic perspiration and good for acidic perspiration for silk fabric were the results for polyacrylic band. Basic and acidic perspiration from nylon bands produced satisfactory results on silk. Silk fabric received a favorable assessment from the wool band for both acidic and basic sweating. The rating for basic perspiration was outstanding (five), while the rating for acidic perspiration was good (four to five).

Light fastness

Results of the light fastness test for jute, wool, and silk dyed with extract of walnut bark are displayed in Table 2. While cotton received a decent grade, jute and silk received a rating of 4. **Dry cleaning**. Results of color change for jute, cotton, and silk materials were outstanding. Excellent solvent color change was also seen for all three textiles.

Rubbing fastness:
Dry rubbing fastness.
While silk fabric displayed outstanding rating for dry rubbing fastness along warp and weft, jute and cotton both provided good ratings for this property.

Wet Rubbing fastness.

Wet rubbing along the warp for jute fabric was, which was satisfactory and acceptable. There were four weft wet rubbings. Wet rubbing fastness along warp and weft for woolen fabrics was, which is also acceptable. Silk fabric received a good wet rubbing fastness grade along the warp and weft. The outcome is displayed in Table 2.

Instruments.

Water shower; dark scales for recoloring (ISO 105 A03); dark scale for alter in shade (ISO A02); crockmeter (9SDL Map book Britain); multifiber (DW); D400IR coloring machine (SDL Map book England); Launder meter (Cockroaches); Per spirometer unit (SDL Map book Britain); stove Ci 3000 + Xenon; weather meter (Chart book Britain).

Chemicals. Sodium perborate, 1-histidine monochloride monohydrate, sodium dihydrogen orthophosphate, refined water, sodium carbonate, sodium hydroxide, acidic corrosive, Sulphuric corrosive, and perchloroethylene dissolvable are the ingredients of Detergent ECE (without optical brightener).

All of the chemicals and solvents used were AR-reviewed for bark collection and color extraction. The most frequently used plant parts for coloring are the leaves and the husk of the natural product (Onaletal. 2004). In this case, jamun bark was used to extract color.

Jaman bark was purchased from the Murree display, thoroughly cleaned with water, and then dried. It was reduced to a powder and put through a strainer with a 22 work estimate. 500 g of bark powder was sprayed into 5 liters of water, allowed to bubble for 2 to 3 hours, and then mixed for 3 to 4 hours at stewing temperature. A due arrangement that was received in a dull brown color was filtered and saved for coloring and other tests (Kongka-chuichay et al., 2002).

With Juman bark, color. Each 20 g texture of cotton, jute, and silk was colored using the same amount of juman bark color extracted inside the D400 IR coloring machine (SDL Map book Britain) with temperature (100°C), duration (1 hour), and circulation speed (1.5 rpm) control programs. The color quickness to washing, sweating, rubbing, and three different types of light was investigated using the two colored textures. According to ISO 105 C06 approach, the wash speed test results for all three colored textures were determined. Light responsiveness was evaluated in accordance with ISO 105 standard approach B02. According to the ISO 105x12 standard test procedure, the rubbing speed (dry and moist) test was conducted. According to ISO 105: D01, E01, E02, and E04 methods, independently, color speed tests were conducted on dry cleaning, water, ocean water, and sweat (acidic and fundamental). According to ISO E05 and E06

strategies, respectively, tests on color speed to spotting of acids and soluble bases were conducted (BS 1006:1990).

Planning the cleanser arrangement, which contains 4 g of cleanser and 1 g of sodium perborate per liter of distilled water, allowed for the determination of washing speed. By expanding approximately 1 g of sodium carbonate, pH was then brought to 10.5+0.1. Pieces of jute, cotton, and silk texture. By sewing alongside one of the sorter sides, 10x4 cm were joined to multifiber DW of the same dimensions. The three composite samples were placed in launder meter (cockroach) glasses for 30 minutes at 60°C with a 50:1 alcohol ratio. The Launder meter or Washtec consists of a water shower with a rotational shaft that supports a stainless steel holder with dimensions of 75+5 mm in width by 125+10 mm in height and a capacity of 550+50 ml. The foot of the holder is located 45+10 from the shaft's midpoint. The shaft/container gathering rotates with a 40+2/min recurrence. Tests were removed from the Washtec after 30 minutes. The specimens were dried at a temperature of no more than 60°C after the fasteners were removed. The use of a dim scale was used to assess how the recolor and shade had changed.

Sweating speed by color. The tests were conducted by placing the textures in an arrangement of 1-histidine monohydrochloride monohydrate in accordance with ISO 105 E04 guidelines. Examples of jute, cotton, and silk measuring 4 cm x 10 cm were sewn to multifiber pieces measuring the same size along with one of the shorter sides before being immersed separately for 30 minutes in antacid and acidic solutions with an alcohol content of 50:1. After that, the appropriate weight was linked and the Jute, Cotton, and Silk samples were placed inside the per spirometer packs. per spirometer packs are test devices that each have a stainless steel outline with a weight piece that weighs as much as 5 kg and a base that measures 60 mm by 115 mm so that a weight of 12.5 kpa can be connected on test examples that are 40 mm by 100 mm and placed between glass or acrylic gum plates that are 60 mm by 115 mm by 1.5 mm. The test apparatus is designed so that a weight of 12.5 kpa does not change. The per spirometer kits (acidic and necessary) were placed in the vacuum broiler for 4 hours in order to conduct the tests on the three textures. Following this, the packs were removed from the oven and the fasteners were opened, but only on one shorter side. Examples were hung in a discussion to dry at 60°C. Each specimen's color variation and recoloring of the nearby texture (DW) were assessed using a dark scale.

Rubbing quickness. With the aid of a crockmeter and a weight of 9 N in to and fro developments on common rubbing fabric, dry rubbing on jute was conducted. A sample of test cotton measuring 5 cm by 14 cm was obtained. Twist and weft readings were both well-known. Jute and silk values were determined using the same methodology and a dark scale.

Damp rubbing. The identical crockmeter conditions as for the dry rubbing were used for the damp rubbing on the jute texture, but the standard rubbing was soaked in 100% deionized water. The same approach was used again with cotton and silk textures, and the dark scale was used to assess how the color and recolor changes affected them.

with a lightness. According to ISO 105 standard method B02, light rapidity was performed in a weather meter using a chart book. A produced light source agent of D65 common day light, Xenon circular segment light, was used. Jamunbark Color and Color Speed were exposed to cotton, jute, and silk textures of 7 cm by 12 cm.

Xenon bend light was tested under typical settings for 24 hours, with blue fleece used as the standard reference texture. The dim scale was used to compare the three textures that had been

processed. Speed to dry cleaning for color. Undyed 10 cm × 10 cm Jute twill packs were sewn around three sides of the Jute. 12 non-corrodible steel disks and jute silk pieces measuring 4 cm x 10 cm each were placed into separate sacks, and the fourth side of the pack was sewn. The packs were then placed in Washtec partitioned containers with 200 cc of dissolved perchloroethylene and left undisturbed for 30 min at 30+2°C. The packets were eventually ejected from the holder. The experiments were hung up to dry at a temperature of 60+5 °C after being pressed to remove excess soluble. With the aid of a dim scale, the assessment of sample color change and dissolvable color change was done.

Colour fastness to water.

The same criteria used to evaluate color speed to sweat were also used to evaluate color quickness to water. For water and ocean water, respectively, ISO-105 E01 and E02 techniques were used. Water-related textures were submerged in deionized water, whereas multifiber textures and textures were submerged in a NaCl solution (30 g/l) for 30 minutes to simulate ocean water. The more than three processed composite textures were included in the per spirometer kit for both freshwater and ocean water. These kits spent 4 hours at 37+°C in the stove. At that stage, the samples were dried at a temperature of no higher than 60°C. Changes in color and tone became well-known with the help of dark scale.

Warmth of color's dry time.

The dry hot squeezing followed ISO 105 XII guidelines. Examples of jute, cotton, and silk were hand-pressed at a temperature of 110 + 2 °C, and the color change was measured using a dim scale.

Speed of color to spot acids and soluble base. The instances received a scope of acidic corrosive 300 g/l, Sulphuric corrosive 50 g/l, tartaric corrosive 100 g/l, and Na2CO, 100 g/l of water. The change in shade was measured using the ISO-105 A02 dark scale.

Alter in recoloring.

When the washing rapidity of cotton, Jute cotton, and silk were compared, it was seen that the recoloring of the Jute texture on the diacetate band of multifiber DW received a fantastic rating of 5, while the recoloring of the Jute and Silk textures received wonderful ratings (4-5). Recoloring was excellent for jue textures rating and for cotton texture for multifiber cotton band. Cotton fabric received a passable grade for the nylon band made of many fibers, whereas jute and silk received excellent ratings. All textures for polyester band had the same rating of 4. All three textures provided an exceptional (5) grade for staining for polyacrylic and cotton bands (Table 1).

Alter in shade.

Change the shade. Jute had a pleasant (3–4) rating because to changes in shade. Jute receives a rating of 4, while silk receives a grade (2-3) in comparison to the other two textures. Table 1 lists the effects of color changes for Jute, cotton, and silk dyed with walnut bark extract.

The effects of acidic and basic sweat were strong in the Jute texture and On diacetate band of Jute texture (4-5). Acidic and necessary sweat appears on nylon band for Jute advertisement when it comes to recoloring; there were 4. Both basic and acidic sweat produced excellent (5) results for polyester band. Excellent (5) for acidic sweat and excellent (4-5) for vital sweat were found for

polyacrylic band. Both perspiration outcomes for the fleece band were excellent (4-5). For acidic sweat, the change in shade was 4, however for vital sweat on jute cloth, it was excellent (4-5).

Jute texture.

Excellent (5) rating was given for the multifiber diacetate band by acidic and necessary sweat. For Jute groups, the stain change was favorable (4-5) for basic and acidic sweat. The color change for nylon bands was the same, or (4). Band recoloring for both sweat types on polyester and polyacrylic was astounding (5). Additionally, the fleece band provided fantastic recoloring (wonderful 5) for necessary sweat and good (4-5) for acidic sweat; fantastic (4-5) shade changes were provided for both acidic and vital sweat.

Silk texture. Diacetate band displayed fantastic (5) rating for vital sweat and good (4-5) rating for acidic sweat on silk fabric dyed walnut. For multifiber jute bands, the change in recolor was fantastic (5) for acidic sweat and great (4-5) for basic sweat. Recoloring for both acidic and basic sweat was amazing (5) for polyester band rating. It worked well (4-5) for acidic sweat for silk texture and fantastic (5) for vital sweat for polyacrylic band. On silk, the fundamentals of the nylon band and acidic sweat received a great (4-5) assessment. Additionally, the fleece band earned a superb (4-5) grade for the silk texture for vital and acidic sweat. For basic perspiration, the change in shade yielded an amazing rating of 5, and for acidic sweat, a great rating of 4-5.

Light quickness. Table 2 shows the effects of light speed for Jute, wool, and silk dyed with extracted walnut bark color. Jute and silk received ratings of 4, while cotton had excellent ratings of 4-5.

Dry cleaning.

Amazing color changes occurred in the textures of jute, cotton, and silk. The color change of the solvents was too fantastic (5) for all three textures.

Rubbing fastness.

Dry rubbing speed. Although the silk texture appeared to have an amazing grade of (5) for dry rubbing rapidity along twist and weft, jute and cotton also had great ratings (4-5).

Damp Rubbing speed. Three to four damp rubs along the twist of jute were acceptable and deserving. 4. Along damp rubbing weft. It is also satisfactory that the moist rubbing speed along the warp and weft for woolen texture was 3–4. Silk texture received a superb (4-5) rating for moist rubbing rapidity along twist and weft. The results are shown in Table 2.

Jaman bark was purchased from the Murree display, thoroughly cleaned with water, and then dried. It was reduced to a powder and put through a strainer with a 22 work estimate. 500 g of bark powder was sprayed into 5 liters of water, allowed to bubble for 2 to 3 hours, and then mixed for 3 to 4 hours at stewing temperature. A due arrangement that was received in a dull brown color was filtered and saved for coloring and other tests (Kongka-chuichay et al., 2002). With Juman bark, color. Each 20 g texture of cotton, jute, and silk was colored using the same amount of juman bark color extracted inside the D400 IR coloring machine (SDL Map book Britain) with temperature (100°C), duration (1 hour), and circulation speed (1.5 rpm) control programs. The two colored textures were used to investigate the color responsiveness to washing, perspiration, rubbing, and three, light sources.

speed guarantee. According to ISO 105 C06 approach, the wash speed test results for all three colored textures were determined. Light responsiveness was evaluated in accordance with ISO 105 standard approach B02. According to the ISO 105x12 standard test procedure, the rubbing speed (dry and moist) test was conducted. According to ISO 105: D01, E01, E02, and E04 methods, independently, color speed tests were conducted on dry cleaning, water, ocean water, and sweat (acidic and fundamental). According to ISO E05 and E06 strategies, respectively, tests on color speed to spotting of acids and soluble bases were conducted (BS 1006:1990).

Planning the cleanser arrangement, which contains 4 g of cleanser and 1 g of sodium perborate per liter of distilled water, allowed for the determination of washing speed. By expanding approximately 1 g of sodium carbonate, pH was then brought to 10.5+0.1. Pieces of jute, cotton, and silk texture. By sewing alongside one of the sorter sides, 10x4 cm were joined to multifiber DW of the same dimensions. The three composite samples were placed in launder meter (cockroach) glasses for 30 minutes at 60°C with a 50:1 alcohol ratio Launder meter or Washtec is made up of a water shower with a rotating shaft that supports a radially oriented stainless steel holder with dimensions of 75+5 mm in width by 125+10 mm in height and a capacity of 550+50 ml. The foot of the holder is located 45+10 mm from the centre of the shaft. The shaft/container gathering rotates with a 40+2/min recurrence. Tests were removed from the Washtec after 30 minutes. The specimens were dried at a temperature of no more than 60°C after the fasteners were removed. The use of a dim scale was used to assess how the recolor and shade had changed.

Colour speed to sweat. The tests were conducted by placing the textures in an arrangement of 1-histidine monohydrochloride monohydrate in accordance with ISO 105 E04 guidelines. Examples of jute, cotton, and silk measuring 4 cm x 10 cm were sewn to multifiber pieces measuring the same size along with one of the shorter sides before being immersed separately for 30 minutes in antacid and acidic solutions with an alcohol content of 50:1. After that, the appropriate weight was linked and the Jute, Cotton, and Silk samples were placed inside the per spirometer packs.

per spirometer packs are test devices that each have a stainless steel outline with a weight piece that weighs as much as 5 kg and a base that measures 60 mm by 115 mm so that a weight of 12.5 kpa can be connected on test examples that are 40 mm by 100 mm and placed between glass or acrylic gum plates that are 60 mm by 115 mm by 1.5 mm. The test apparatus is designed so that a weight of 12.5 kpa does not change. The acidic and necessary per spirometer kits for the tests of the three textures were placed in the vacuum broiler for 4 hours, following which the packs were removed from the oven and the fastens were opened, but only on one shorter side. Examples were hung in discussion to dry at 60 degrees Celsius. The dark scale was used to analyze changes to each specimen's color as well as recoloring of the nearby texture (DW).

Rubbing quickness. On common rubbing fabric, dry rubbing on jute was conducted with the aid of a crockmeter under a weight of 9 N in to and fro developments. The estimated test cotton measurement was 5 cm by 14 cm. Readings of the twist and weft were well known. The same approach was adopted for jute and silk, and values were determined with the help of a dark scale.

Damp rubbing. The identical crockmeter conditions as for the dry rubbing were used for the damp rubbing on the jute texture, but the standard rubbing was soaked in 100% deionized water. The same approach was used again with cotton and silk textures, and the dark scale was used to assess how the color and recolor changes affected them.

Light quickness. According to ISO 105 standard method B02, light rapidity was performed in a weather meter using a chart book. A produced light source agent of D65 common day light, Xenon circular segment light, was used. JumanbarkColor and Color Speed were exposed to cotton, jute, and silk textures of 7 cm by 12 cm.

Xenon bend light was tested under typical settings for 24 hours, with blue fleece used as the standard reference texture. The dim scale was used to compare the three textures that had been processed.

Speed to dry cleaning for color. Undyed 10 cm × 10 cm Jute twill packs were sewn around three sides of the Jute. 12 non-corrodible steel disks and jute silk pieces measuring 4 cm x 10 cm each were placed into separate sacks, and the fourth side of the pack was sewn. The packs were then placed in Washtec partitioned containers with 200 cc of dissolved perchloroethylene and left undisturbed for 30 min at 30+2°C. The packets were eventually ejected from the holder. The experiments were hung up to dry at a temperature of 60+5 °C after being pressed to remove excess soluble. With the aid of a dim scale, the assessment of sample color change and dissolvable color change was done.

Colour fastness to water. The same criteria used to evaluate color speed to sweat were also used to evaluate color quickness to water. For water and ocean water, respectively, ISO-105 E01 and E02 techniques were used. Water-related textures were submerged in deionized water, whereas multifiber textures and textures were submerged in a NaCl solution (30 g/l) for 30 minutes to simulate ocean water. The more than three processed composite textures were included in the perspiometer kit for both freshwater and ocean water. These kits spent 4 hours at 37+°C in the stove. At that stage, the samples were dried at a temperature of no higher than 60°C. Changes in color and tone became well-known with the help of dark scale.

Colour quickness to dry warm. The dry hot squeezing followed ISO 105 XII guidelines. Examples of jute, cotton, and silk were hand-pressed at a temperature of 110 + 2 °C, and the color change was measured using a dim scale.

Speed of color to spot acids and soluble base. The instances received a scope of acidic corrosive 300 g/l, Sulphuric corrosive 50 g/l, tartaric corrosive 100 g/l, and Na2CO, 100 g/l of water. The change in shade was measured using the ISO-105 A02 dark scale.

Alter in recoloring. When the washing rapidity of cotton, Jute cotton, and silk were compared, it was seen that the recoloring of the Jute texture on the diacetate band of multifiber DW received a fantastic rating of 5, while the recoloring of the Jute and Silk textures received wonderful ratings (4-5). Recoloring was excellent for jue textures (4-5) rating and for cotton texture (4) for multifiber cotton band. Cotton fabric received a passable (3–4) grade for the nylon band made of many fibers, whereas jute and silk received excellent (4-5) ratings. All textures for polyester band had the same rating of 4. All three textures provided an exceptional (5) grade for staining for polyacrylic and cotton bands (Table 1).

Alter in shade. Jute had a pleasant (3–4) rating because to changes in shade. Jute receives a rating of 4, while silk receives a grade (2-3) in comparison to the other two textures. Table 1 lists the effects of color changes for Jute, cotton, and silk dyed with walnut bark extract.

The effects of acidic and basic perspirations were significant on the diacetate band of jute texture (4-5). Acidic and necessary sweat appears on nylon band for Jute advertisement when it comes to

recoloring; there were 4. Both basic and acidic sweat produced excellent (5) results for polyester band. Excellent (5) for acidic sweat and excellent (4-5) for vital sweat were found for polyacrylic band. Both perspiration outcomes for the fleece band were excellent (4-5). For acidic sweat, the change in shade was 4, however for vital sweat on jute cloth, it was excellent (4-5).

Jute texture. Excellent (5) rating was given for the multifiber diacetate band by acidic and necessary sweat. For Jute groups, the stain change was favorable (4-5) for basic and acidic sweat. The color change for nylon bands was the same, or (4). Band recoloring for both sweat types on polyester and polyacrylic was astounding (5). Additionally, the fleece band provided fantastic recoloring (wonderful 5) for necessary sweat and good (4-5) for acidic sweat; fantastic (4-5) shade changes were provided for both acidic and vital sweat.

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Light quickness Table 2 shows the effects of light speed for Jute, wool, and silk dyed with extracted walnut bark color. Jute and silk received ratings of 4, while cotton had excellent ratings of 4-5.

Dry cleaning. Amazing color changes occurred in the textures of jute, cotton, and silk. The color change of the solvents was too fantastic (5) for all three textures.

Rubbing fastness: Dry rubbing speed. Although the silk texture appeared to have an amazing grade of (5) for dry rubbing rapidity along twist and weft, jute and cotton also had great ratings (4-5).

Damp Rubbing speed. Three to four damp rubs along the twist of jute were acceptable and deserving. 4. Along damp rubbing weft. It is also satisfactory that the moist rubbing speed along the warp and weft for woolen texture was 3–4. Silk texture received a superb (4-5) rating for moist rubbing rapidity along twist and weft. The results are shown in Table 4.

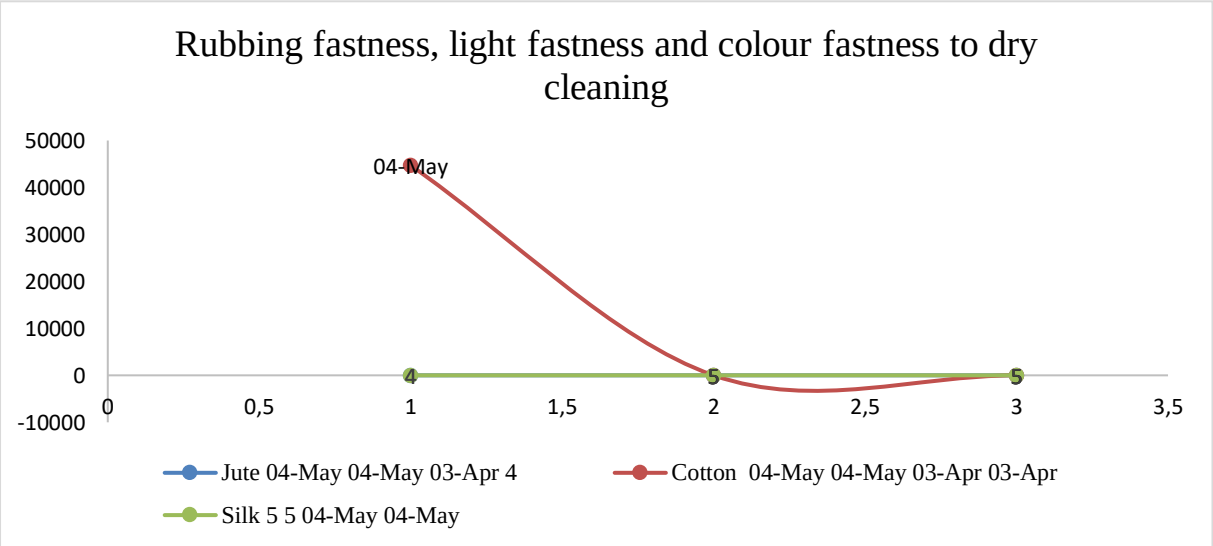
Table 4. Rubbing fastness, light fastness and colour fastness to dry cleaning.

Light fastness						**Colour fastness to dry cleaning**	
Rubbing fastness			**wet**	**rubbing**	**Change in**		
Fabric	**dry**	**rubbing**				**Change in**	**Change in**
	warp	**wet**	**warp**	**weft**	**Shade of fabric**	**Shade of fabric**	**Shade of solvent**
Jute	4-5	4-5	3-4	4	4	5	5
Cotton	4-5	4-5	3-4	3-4	4-5	5	5
Silk	5	5	4-5	4-5	4	5	5

Figure 4. Rubbing fastness, light fastness and colour fastness to dry cleaning

Colour fastness to water: Change in stain.

Diacetate band received a good grade for jute fabric. The assessment of stain change for fabrics made of wool and silk was outstanding. All three fabrics for the multifiber DW's jute band displayed the same grade, a respectable. For staining on nylon band, jute and silk had ratings of 4, whereas wool received ratings of. Results for the polyester band were excellent across all three



fabrics. Jute and silk received a reasonable grade on the polyacrylic band, whereas wool received an exceptional rating (5.0). For Jute staining, the wool band of multifiber gave a rating of 4, 4-5 for Jute, and a rating of 5 for silk fabric (Table 3).

Change in shade.

For all three materials, the rating for color fastness to water change was good (4-5). In Table 3, results are displayed.

Colour fastness to sea water.

Table 3 includes the results of color fastness to sea water.

Staining. Jute fabric demonstrated a staining grade of 4, wool demonstrated an exceptional rating of 5, and silk had a decent (4-5) rating. Excellent (5) grade for the staining of jute, wool, and silk with walnut bark dye was given to the multifiber jute band. Wool and silk received fair (4-5) results from nylon band, whereas jute fabric received an exceptional (5) rating. For Jute fabric, the polyester band gave a good staining grade and an exceptional rating for both wool and silk. Jute, wool, and silk received stain ratings of 5, 4-5, and 4 from the wool band of multifiber (DW) (Table 3).

Colour fastening speed to water

Change the color of. Diacetate band received a fantastic grade for jute texture. The modify in recolor rating for woolen and silk texture was amazing. All three textures for the multifiber DW's

jute band looked to be rated the same, at 4-5, which was excellent. Jute and silk provided ratings of 4 for recoloring in nylon band, whereas woolen provided ratings of. For all three textures, polyester band developments were excellent. Excellent grade for Jute and Silk and fantastic rating for Fleece were given to the polyacrylic band. For Jute's ability to change color, the fleece band of multifiber awarded it a rating of 4, 4-5, and 5 (Table 3).

Alter in shade For all three textures, the rating for how quickly colors changed in the presence of water was excellent. The results are shown in Table 3.

Colour quickness to ocean water. Table 3 also includes results of color reactivity to ocean water.

Recoloring. Jute texture looked to be rated at 4, fleece at rated at 5, and silk at rated at 4-5 for recoloring on the diacetate band. Jute band of multifiber looked fantastic, earning a grade of five (5), thanks to the addition of walnut bark color to jute, fleece, and silk. The nylon band gave fleece, silk, and jute a great (4-5) and great (5) rating, respectively. fantastic rating (5) for both fleece advertisement silk and fantastic (4-5) rating for Jute texture were given by the polyester band, along with great rating (4-5) for Jute recoloring. Jute, fleece, and silk, individually, received 5, 4-5, and 4 recolor ratings from the fleece band of multifiber (DW) (Table 3).

Table 5. Results of Walnut Bark Dye and Color Fastness to Water and Sea Water, Dry Heat Fastness, and Sporting to Acids and Alkalis

Fabric	Dry heat fastness (at 110°C)	Acid spotting		Alkali
		Acetic acid (300 g/l)	Sulphuric acid (150 g/l)	Spotting Na_2CO_2 (100 g/l)
Jute	4-5	4-5	4	3-4
Cotton	4-5	4-5	3-4	3
Silk	4-5	4-5	4	4

Colour fastness to water							
Fabric	**Diacetate**	**Jute**	**Nylon**	**Polyester**	**Polyacrylic**	**Wool**	**Change in shade**
Jute	4-5	4-5	4	5	4-5	4	4-5
Cotton	5	4-5	4-5	5	5	4-5	4-5
Silk	5	4-5	4	5	4-5	5	4-5

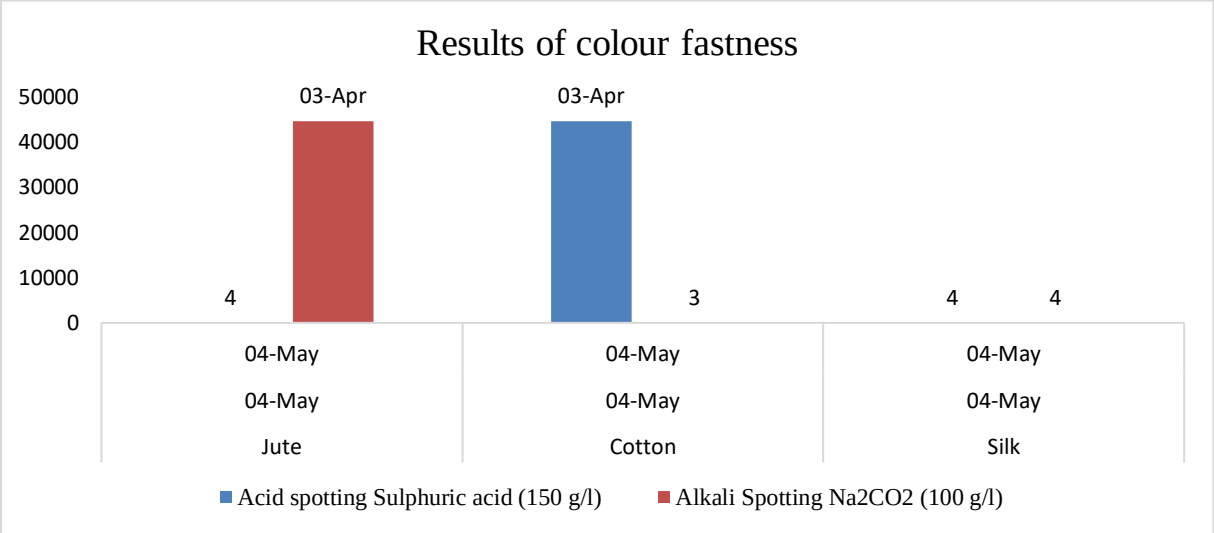


Figure 4. Results of color fastness

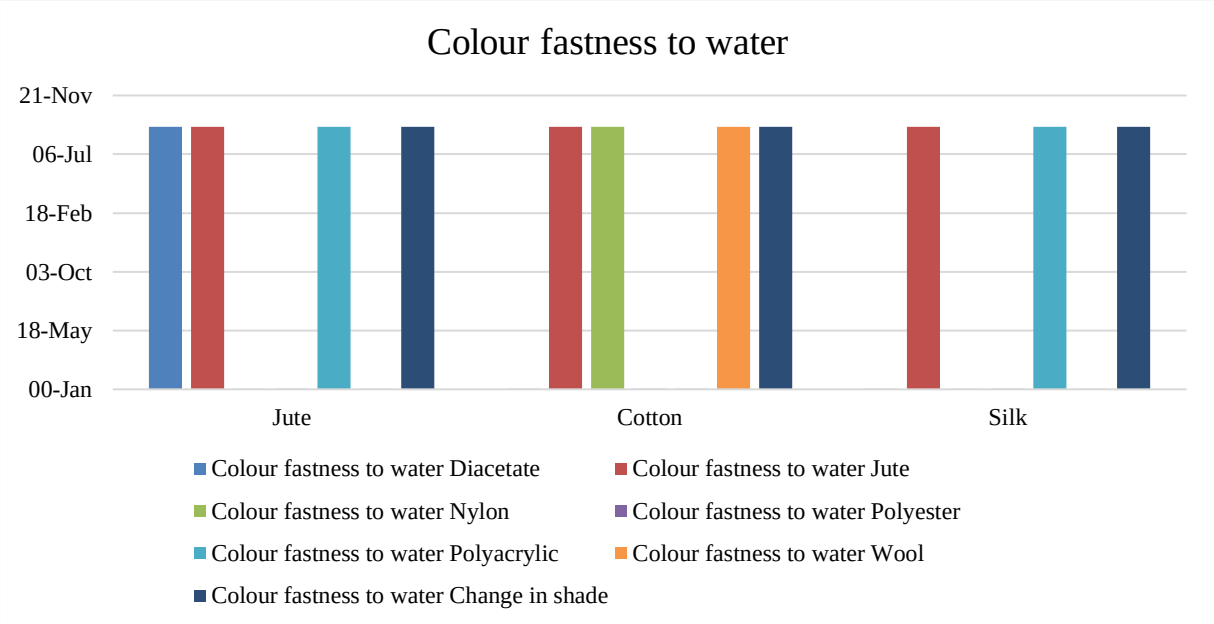


Figure 5. Color fastness to water

Change in shade for sea water. For all three of the materials treated using jaman bark dye, the colour change was satisfactory (4-5).

Dry heat fastness: Jute, Jute, and silk textiles performed well (4-5) during dry heat pressing at 110°C. In Table 3, results are displayed.

Colour fastness to acidic and basic spotting. Jute's shade changes. Jute and silk fabrics received a satisfactory rating (4-5) after being spotted with acetic acid (300 g/l). For Jute and silk, Sulphuric acid (150 g/l) spotting yielded a rating of 4, while wool had an acceptable (3-4) rating. Alkali

spotting (100 g/l Na2CO3) gave Jute and cotton fabrics an acceptable rating (3-4) while giving silk fabrics a rating of 4. The outcomes are listed in Table 3.

CONCLUSION

According to the findings, natural jaman bark dye possesses outstanding to good color fastness qualities. Colors are both quick and lasting. On Jute, cotton, and silk fibers, dye can be applied without a mordant and has acceptable saturation. It is safe for the environment and poses no health risks.

Results It has been discovered that the typical Jaman bark hue possesses wonderful to excellent color rapidity capabilities. Colors are immediate and enduring. Color may be connected without difficulty and has a significant impact on the textures of jute, cotton, and silk. It is a welcoming environment and has no health risks.

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