JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

DYEING OF COTTON WITH NATURAL DYE EXTRACT FROM COCONUT HUSK AND PURPLE CABBAGE

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ABSTRACT

This study investigates the possibility of using purple cabbage and coconut husk as natural dye sources for textile dyeing. In order to liberate the dye components, the coconut husk and purple cabbage were boiled separately in water for a long time during the extraction procedure. Samples of cotton fabric were then dyed using the extracted colors, both with and without the addition of mordants like baking soda, alum, salt, and lemon. The dyeing procedure was tuned for several factors, including dye concentration, pH, and dyeing time. Standard techniques were used to assess the dyed samples for hue and color fastness. The outcomes demonstrated that, when mordants were used, the extracts from coconut husk and purple cabbage produced vivid and long-lasting colors on cotton fabric.

Keywords – coconut husk, purple cabbage, cotton dye, mordants, Abrasion tester, crock meter

1.INTRODUCTION

Natural dyes are significant for a number of reasons, including as their historical and cultural significance, environmental sustainability, and potential health benefits. Here are a few main justifications for the importance of natural colour. Natural dyes have a long history and have been used extensively in the cultural and creative traditions of many cultures [1]. They are usually associated with heritage, artistry, and age-old weaving methods. Natural dyes are a sustainable substitute for synthetic dyes and have been used for centuries to colour textiles and other materials. Purple cabbage and coconut husk are two excellent sources of natural dyes because they can produce a variety of hues [2]. Often regarded as a waste product, coconut husks contain tannins and other compounds that can give them brown, tan, or even green hues. However, the water-soluble pigments called anthocyanins found in purple cabbage can produce blue and purple tones. In this study, we will investigate the dye extraction process, the colour produced, and the fastness of these colour on cotton fabric to explore the dyeing potential of natural dyes from coconut husk and purple cabbage [3][4]. Understanding the dyeing properties of these natural sources can help promote sustainable textile dyeing practices.

OBJECTIVES

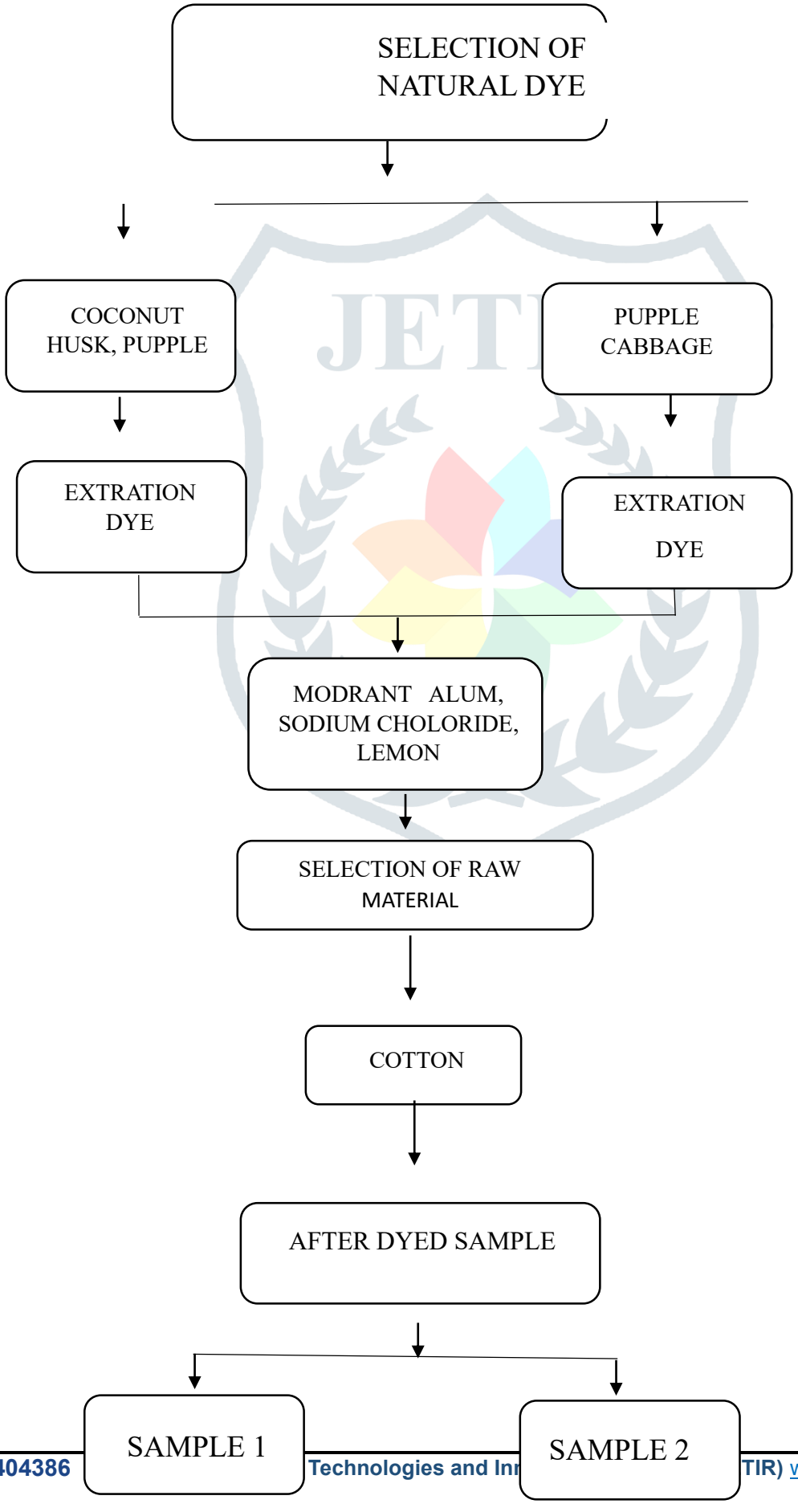
Hence the specific objectives of the study are to

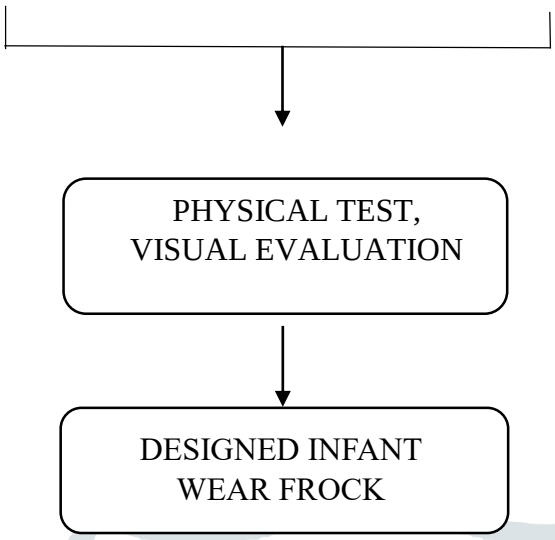
- Extraction of dye from natural source
- Dyeing cotton woven using the extracted dye with coconut husk, purple cabbage
- Mordant the fabric before dyeing using alum.
- To valuate the performance of dye using objective & subjective analysis

- Designing & construction of garment using the dyeing fabric

2. EXPRIMENTAL PROCESS

2.1 FLOWCHART





2.2. NATURAL DYE

Natural dyes like coconut husks and purple cabbage require careful selection to ensure colour outcomes and environmental sustainability. Mature husks with high tannin content yield richer colours. Opting from organic or sustainably managed plantations minimizes environmental impact and ensures purity of the dye material. Selecting mature husks from these sources is crucial for achieving desirable colour outcomes [5]. By carefully selecting and responsibly sourcing natural dye materials, textile designers and artisans can create beautiful, eco-friendly products [13].

2.3. SELECTION OF RAW MATERIAL

Cotton is the true "miracle fiber" states Mendelson (2005). Cotton is the king of "fibers. Cotton fabric, dating back thousands of years, originated in the Indian subcontinent around 5000 BCE and spread globally through various civilizations. Cotton production in ancient Egypt began as early as 3000 BCE, renowned for its quality and softness. The Industrial Revolution in the 18th and 19th centuries significantly improved cotton fabric production, with Eli Whitney's invention of the cotton gin in 1793 revolutionizing the process [6].

2.3 COCONUT HUSK

The use of coconut husk dye has a long history that dates back millennia, mostly in tropical areas with an abundance of coconuts. The husk has been used for centuries to produce a variety of hues, ranging from earthy browns to rich reds, thanks to its natural tannins and dyes. Communities have historically utilized this dye for body decoration, crafts, and textiles, demonstrating its flexibility [4]. Although its precise origins are unknown, the usage of coconut husk dye is ingrained in cultural customs and practices and is a sustainable, environmentally beneficial colouring technique. Craftspeople and local communities are still using dyes to their full capacity, maintaining a craft that is closely linked to the natural world.

2.4 PUPPLE CABBAGE

Purple cabbage, also referred to as purple cabbage, has long been used as a natural colour. It has been utilized since ancient times to colour food and clothing. The natural pigments in purple cabbage known as anthocyanins, which are soluble in water and generate a range of hues depending are responsible for the vegetable's ability to be dyed [8]. Purple cabbage's anthocyanins were first investigated by scientists in the early 20th century for its possible health advantages and antioxidant qualities. Purple cabbage dye is prized for its organic and environmentally benign qualities and is still utilized in some traditional textile dying techniques today [12].

2.5 MORDANTS

Baskar (1998) reveals that mordant is the term applied to substance which serve as double purpose namely they unite both with the fibre naturally with the colouring matter, and thus-fix the latter on the fibre, and at the same time the new chemical compound formed by mordant and dye stuff itself being in fact the real

dye.)[10].Storey (1992) and Gillow (1999) defines mordant as metallic salt has an affinity to both the colouring matter and the dye in the fibre forms an insoluble precipitate]. Different mordant will often yield different colours from the same natural [11].

Mordant - Alum, Baking Soda, Lemon, Na2

2.6. ACTUAL DYEING

With the result of Pilot Study, actual dyeing was done [9]. About 180 grams of dye powder of coconut husk and 180 grams of purple cabbage rind powder were taken with 3 litres of soft water in a vessel for simultaneous mordanting and mix the alum powder3grm, baking soda 1grm (M:I ratio 1:50). The solution was brought to boiling by placing the vessel on a gas stove. The dye liquor was extracted at 90°C temperature for 30 minutes [7]. The extracted dye liquor was filtered using a muslin cloth. The dyeing time was 30 minutes. Finally add lemon The dyed material was removed from dye bath and rinsed under running water to remove excess dye particles present on the surface.

3. RESULT AND DISCUTION

The study's experimental approach includes utilizing lemon to extract natural pigment from purple cabbage and coconut husk. The coconut husks were first gathered and thoroughly cleansed to get rid of any dirt or contaminants. After that, they were cut into little pieces and let to soak in water for the entire night to become softer. The softened coconut husks were then cooked for approximately an hour in a big saucepan of water. The liquid was filtered to extract the solid husk particles after it had boiled, leaving the dye solution behind. The purple cabbage was sliced into small pieces after the outer leaves were removed. After that, these pieces were cooked in water for almost half an hour. After boiling the purple cabbage and coconut husk, lemon juice was added to the colouring solutions. As a mordant, the lemon juice helped to set the dye into the cloth. The fabric samples were submerged in the dye solutions after the lemon juice was added. To find the ideal dying duration, the samples were soaked for several lengths of time. The fabric samples were dyed, dried, and then washed with water to get rid of any leftover colour. A colorimeter was then used to measure the dyed cloth' colour intensity. I have finished my sample made with natural dye to transform a baby outfit.

3.1 RESULT OF PHYSICAL TEST

The results of the dyed samples' Physical test displays

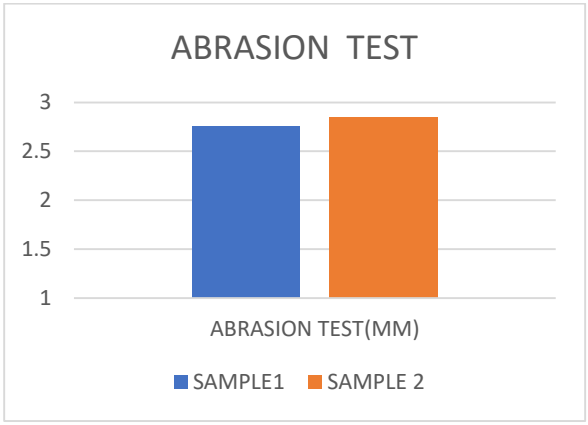


Fig.1.Abrasion test result in bar chart

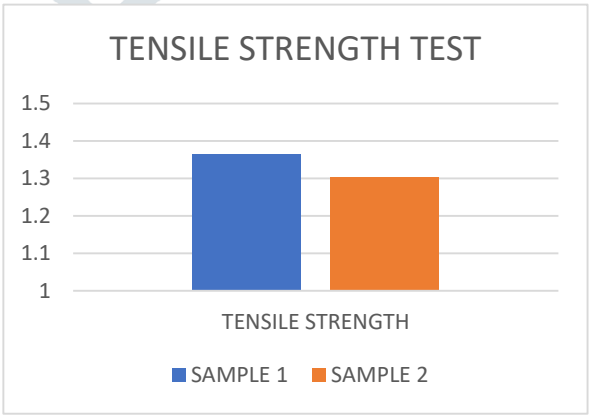


Fig.2. Tensile strength test result in bar chart

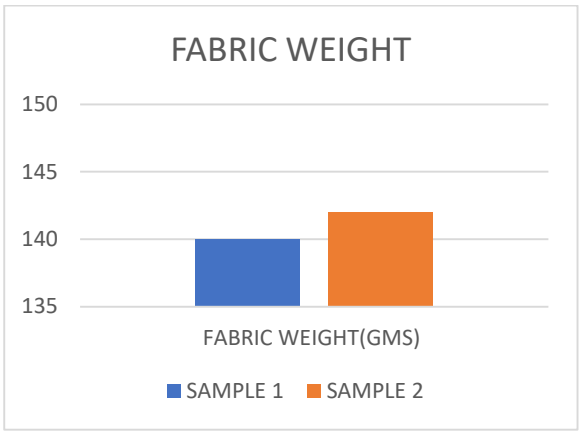


Fig.3.Fabric weight result in bar chat

3.2. VISUAL EVALUATION

The results of the dyed samples' visual examination display

From Table I it is clear that the sample SAMPLE 1 was rated as good by 96% of judges for general appearance, 94% of judges rated the colour of the Samplo as luminescent. Regarding ovonness, 33% of judges evaluated the SAMPLE 2 sample as an oven, whereas 96% of judges said the sample had a soft texture.97% of judges gave the SAMPLE 1 sample a good rating for overall appearance, while 98% of judges gave the sample a brilliant rating for color. Regarding the evonnoss sample, 98% of the judges gave it an excellent rating, and 94% of the judges gave the sample an amiable score of SAMPLE 3.The majority of Judgos evaluated the visual ovaluation of the samples SAMPLE 2 and SAMPLE 1 as good in gonoral appoaranco, bright in color, oven in ovenness, and smooth in toxturo.

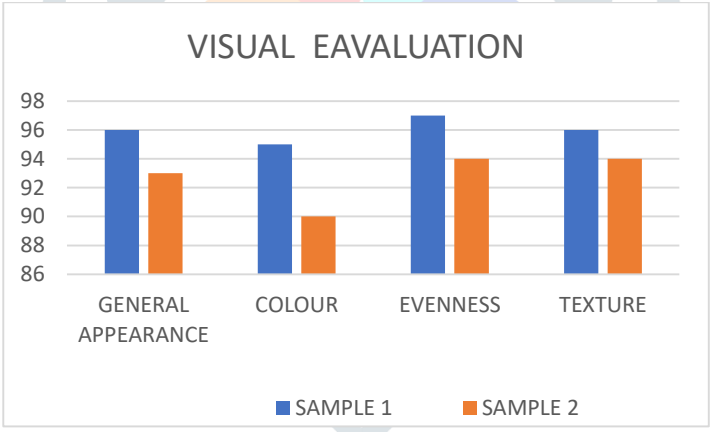


Fig4.Visual evaluation result in bar chat

3.3. BEESLEY BALANCE

The Beesley Equilibrium When moving a marker over a 32-count fabric, you would count the number of times the fabric tips to one side (typically the right), signifying the location of a warp yarn (the fabric's vertical strand). Every inch has 32 warp threads. Thus, the Beesley Balance would be 28/32, or around 0.875, if you move the marker over one inch of the cloth and it tips to the right 28 times.This indicates that the evenness or irregularity of the fabric's weave is shown by the marker tipping to the right for about 87.5% of the warp strands for every inch of fabric. Thirty-two yarn counts are available

3.4. COLOUR FASTNESS TEST

Table III clearly shows that the samples CHPL2 and APCL1 are APCL1 and CHPL2 demonstrated good color fastness in terms of color fastness samples. In the case of wet crocking, sample APCL1 demonstrated very good color fastness, sample AHPL2 outstanding color fastness, and sample CHPL2 great color fastness in the case of dry crocking.

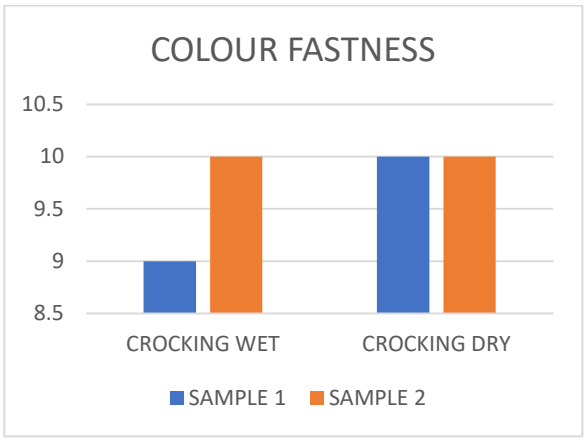


Fig. 5 . Colour fastness test result in bar chat

3.4. DESIGNED GARMENT IN NATURAL DYE

Fig.6. Sample 1 dyed fabric

Fig.6. Sample 2 dyed fabric

4.CONCLUSION

This study has been designed with the following goals in mind, considering the considerations. Extraction of dye from natural sourceDyeing cotton woven using the extracted dye. By mordanting your fabric before dyeing with coconut husk, you can achieve more vibrant and longer-lasting colours. After dyeing, rinse the fabric gently to remove any excess dye. The grey dyed treated samples were subjected to visual evaluation, physical tests, and colour fastness tests. Finding of the study includes. The visual evaluation indicates that most judges found the samples Sample1 and Sample 2 to be good in terms of overall appearance, colour, evenness, and texture. Sample 2 Is In the visual tests, Sample 2 performs better than Sample 1.

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