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EXPLORING ALKANNA TINCTORIA BARK NATURAL DYE EXTRACTS FOR SUSTAINABLE FASHION

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ABSTRACT

Natural dyes made from plants are becoming more and more well-liked because they are sustainable and kind to the environment. In order to dye fabrics using a natural mordant made from banana peels, this study looks into the process of extracting dye from Alkanna tinctoria, also known as alkanet root, an old source of red and purple dyes. The goal of the study is to assess the dyed fabric's colour fastness by putting it through a variety of tests on a hobo bag, such as rubbing, washing, and exposure to sunshine. The banana peel mordant was chosen for its environmentally beneficial qualities, providing a substitute for synthetic mordants, while the alkanet bark was picked for its potential for rich colour. Tannins found in banana peel improve the dye's durability and absorption on textiles, resulting in a vivid yet long-lasting hue. After soaking the alkanet bark in water, the extracted dye was applied to fabric that had already been treated with a banana peel mordant. Several tests of fastness were performed to evaluate the performance of the coloured fabric is sunlight fastness (exposing the cloth to prolonged UV radiation), washing fastness (using various detergents and wash cycles), and rubbing fastness (both dry and wet). The fabric mordanted with banana peel and dyed with alkanet bark demonstrated acceptable to good colour fastness in every test, according to the results. There may be a need for more dyeing process optimization since the dye displayed a moderate resilience to rubbing and sun exposure, with a small fading seen after prolonged washing cycles. This work offers important insights into the feasibility of employing alkanet bark for dyeing using banana peel as a mordant, highlighting the possibilities of integrating natural plant-based dyes and mordants for sustainable textile applications. The encouraging outcomes imply that these natural dyeing methods might be expanded for usage in environmentally aware fashion, particularly in artisanal and handcrafted goods like hobo bags. To achieve industry standards for colour fastness, more research into enhancing the dyed fabrics' durability and vibrancy is advised.

Keywords: Alkanet bark, Natural dye, Sustainable dye, Rich colour, tie and dye, Handcrafts.

INTRODUCTION

Natural dyeing is an age-old technique that uses colorants derived from plants, minerals, and other natural sources to impart color to textiles. In recent years, there has been a resurgence in interest towards natural dyes due to their eco-friendly, biodegradable, and non-toxic nature, making them a sustainable alternative to synthetic dyes. This project explores the application of natural dyeing on cotton fabric, a widely used natural fibre known for its high absorbency and comfort, which makes it ideal for natural dye uptake.

The dyeing technique applied in this project is the tie and dye method, specifically the square folding technique, which is known for creating unique, symmetrical patterns through resist dyeing. The fabric is folded into square patterns, tightly bound, and then dyed, resulting in a visually appealing and artistic effect. After dyeing and drying, the fabric is tailored into a hobo bag—a trendy, practical accessory known for its slouchy shape and versatility.

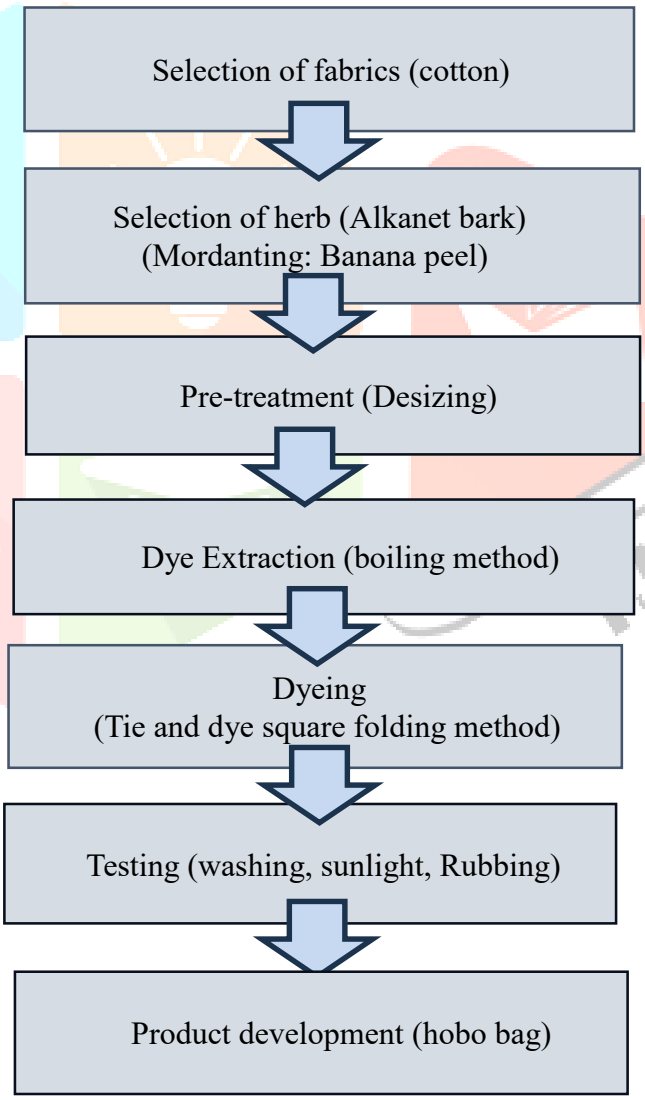
In this study, alkanet bark is used as the natural dye source. Alkanet, derived from the roots of Alkanna tinctoria, produces shades ranging from purple to deep red, depending on the mordant and fabric type. The dye is extracted through a soaking and heating process to release its pigment, which can then be applied to fabric. To enhance the dye's fixation and color fastness, banana peel is used as a mordant. Banana peel, rich in potassium and natural tannins, acts as a sustainable and biodegradable mordant that helps bind the dye molecules to the cotton fibers.

Through this project, we aim to highlight the potential of natural resources like alkanet bark and banana peel in sustainable fashion, while incorporating traditional craftsmanship techniques like tie and dye into modern accessory design.

OBJECTIVE

- To promote eco-friendly and sustainable fashion by using natural dyes and biodegradable materials.
- To study the interaction between alkanet root dye and cotton fabric in terms of color absorption, shade variation, and mordanting effects.
- To analyze the market potential for naturally dyed bags in sustainable fashion.
- To contribute to the reduction of textile pollution by using biodegradable and non-toxic materials.

METHOD AND MATERIALS



SELECTION OF FABRIC

COTTON

I have purchased the cotton fabric for 1 meter (205GSM) which is durable and comforatable I have done one sample using this fabric. Cotton fabric are natural fibre structure, high absorbency, and resilience. Being a natural fiber, cotton effectively absorbs dye. Cotton fabric is the more affordable to make the bags for daily uses and the cotton fabrics are having high durability.

n fabric

SELECTION OF HERB ALKANET BARK:

I used alkanet bark as a dye agent. Alkanet have excellent colour which is red,grey,purple.these can be achieved by using the agent with different modarant and in different ratios. The quantity of the herb used for a bag is 350grams. I have boiled the a the dye from it.

Fig 02: Alkanet bark

MORDANTING: BANANA PEEL

I have used banana peel as a mordant to make the fabric more dye absorbency which is also a food waste which is commercially available in everywhere. Banana peel contain antimicrobial agent and anti-fungal agent. It is most essential property for the bag to prevent the bags from fungus and increase the durability of the bag.

Fig 03: Banana peel

PRE-TREATMENT PROCESS

DESIZING

Desizing is the process of removing sizing agents from fabric to improve its absorbency and prepare it for further treatments like dyeing. This process can be achieved by adding a fabric into the 1 litter of water along with the 4 gram of salt to remove the starch from the fabric surface.

Plate 04: Desizing process

DYE EXTRACTION

Weight the amount of both alkanet bark(350)and banana peel (300). Place the measured materials into a stainless steel pot and add 2ml of water to cover them completely. Heat the mixture for 100℃ and stir it. Boil the mixture for 45 minutes, stirring occasionally to help extract the color and mordant substances. After boiling, filter the mixture to obtain the dye solution. Finally, soak the fabric in the prepared dye solution for 30 to 60 minutes.

ALKANNA TINCTORIA BARK DYE EXTRACTION PROCEDURE

MEASUREMENT

S.NO	INGREDIENTS	VALUE
1	Alkanna tinctoria bark	350G
2	Mordant (Banana peel)	300G
3	M:L ratio	3 ML
4	Temperature	100□
5	Time	45MIN

DYEING TIE AND DYE

I have dyed using the fabric using the tie and dye method to create square patterns with using natural alkanet bark and banana peel dye solution.

FOLDING TECHNIQUE:

Begin by laying the fabric flat. Fold the fabric in an square pattern style horizontally, then repeat folding vertically to form a square. Secure the folded fabric using rubber bands in both directions. Once secured, apply dye to different sections of the fabric as desir

Fig: 06: Square Folding method

PATTERN MAKING & STITCHING:

Cut Fabric:

- Cut two pieces of fabric in a square shape one for front, one for back of the bag
- Cut two fabrics in same size and shapes for the inner lining.
- The length of the fabric is 18 inches and width of the fabric is 42 inches.
- Draw the square in the fabric using tailor chalk to get the proper shape.
- Cut the fabric according to the drawn square using fabric shears.

Sew Outer Bag:

- Place the two outer fabric pieces right sides together.
- Do the same with the lining pieces, but leave a small gap at the bottom to turn the bag later.
- Pleat the sewn fabric and turn the right side of the fabric to left side and sew the edges of the fabric.

Attach Strap:

- Cut strip of fabric for the strap
- Fold the fabric paper fan method inside the strap. Plate:06 stitching

Plate:05 cuting

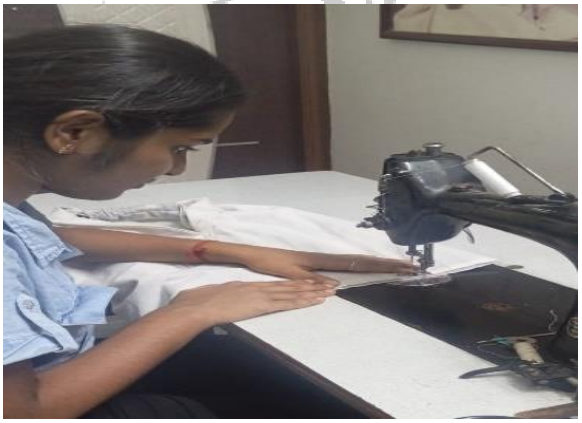


Plate:06 stitching

RESULT AND DISCUSSION:

COLOUR FASTNESS TO WASHING:

The fabric sample is washed either by hand with a detergent solution of 6 g/liter. The water temperature is maintained at 40°C, and the fabric is washed for15-20 minutes. After the wash cycle, the sample is thoroughly rinsed and dried..

Dye	Color fastness to wash	Result
ALKANET BARK	1	Very poor

Bar diagram 1: colour fastness to washing test

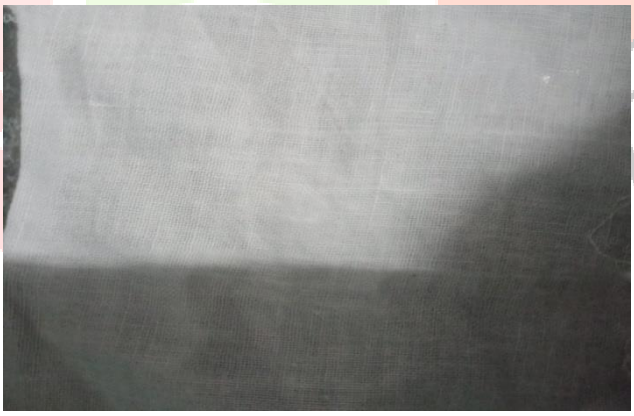
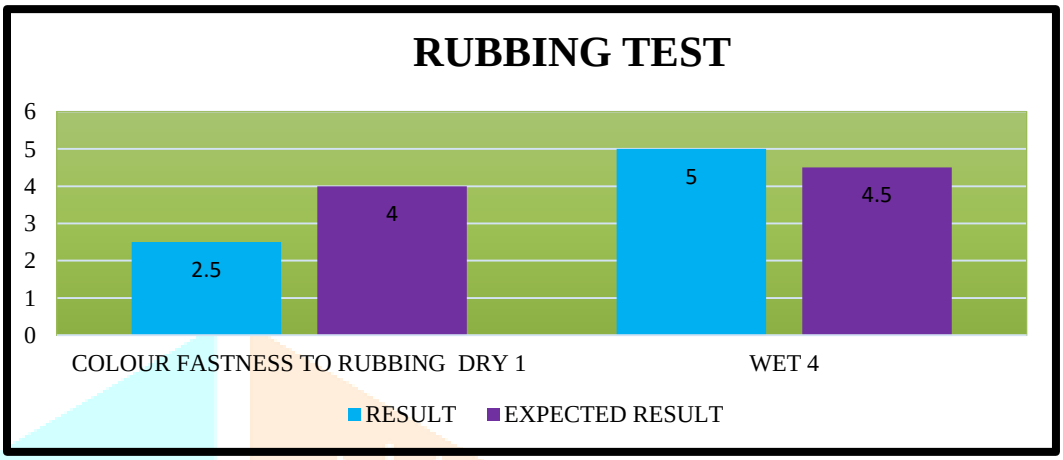


Plate6: colour fastness to washing test

COLOUR FASTNESS TO RUBBING:

The test is performed in two conditions dry and wet. For the dry rubbing test, the white cloth is rubbed on the dry dyed fabric, while for the wet test, the white cloth is moistened with water before rubbing. Each test typically involves ten complete strokes. After rubbing, the white cloth is examined for any colour transfer, which is then graded using a standard grey scale to determine the degree of staining.

Dye	Color fastness to Rubbing	Result
ALKANET BARK	DRY : 1 WET:4	Very Poor Good



Bar diagram 2:colour fastness to rubbing

Plate 7: Rubbing test wet

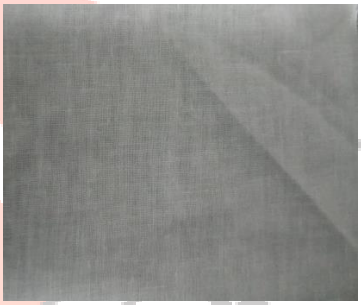
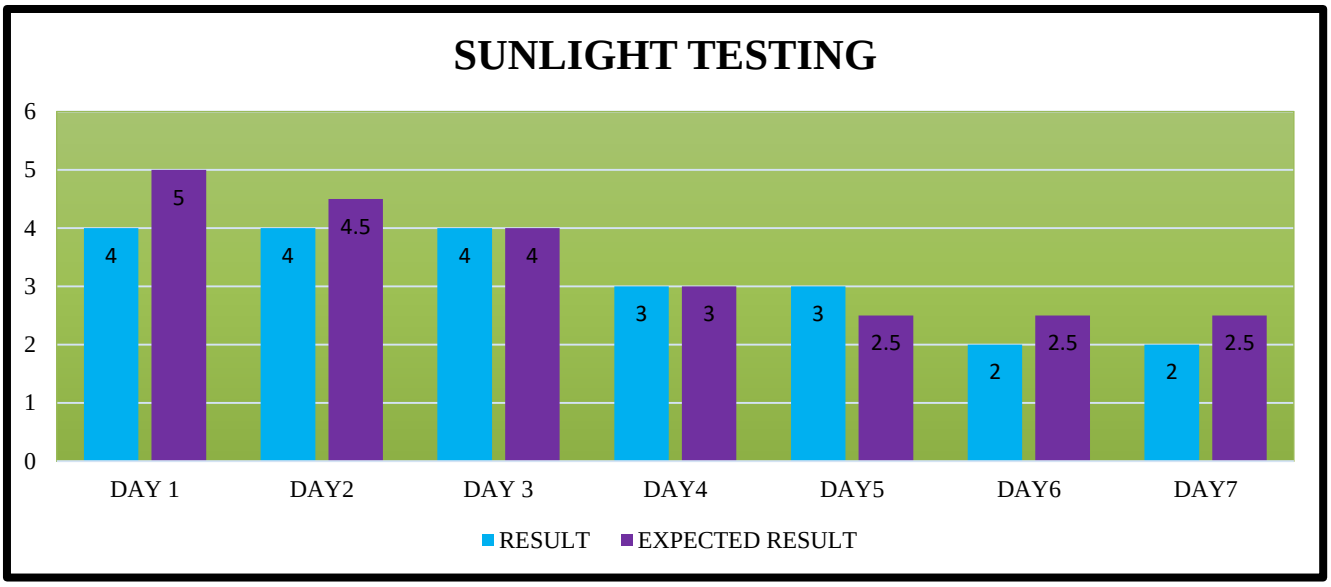


Plate8: Rubbing test dry

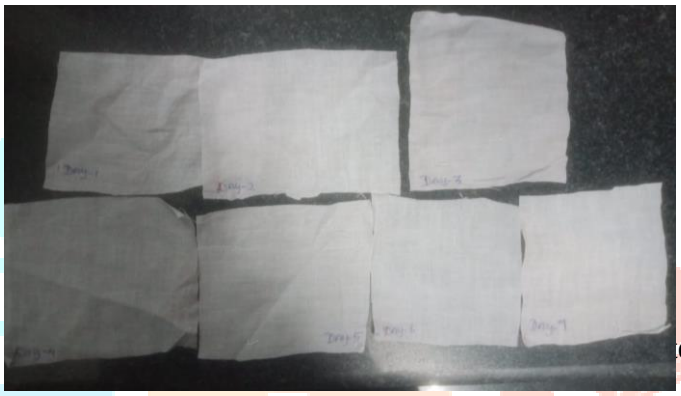
COLOUR FASTNESS TO LIGHT:

Colour fastness to sunlight refers to how well a dyed fabric can resist fading or changing colour when exposed to sunlight over

DAYS	1	2	3	4	5	6	7
ALKANET BARK	¾	¾	3/4	3	3	2	2



Bar diagram 3:colour fastness to sunlight



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SUMMARY AND CONCLUSION:

This project explores the creation of environmentally friendly hobo bags made from cotton fabric and dyed with a natural dye derived from Alkanet bark. By utilizing resources such as Alkanet bark and banana peel, the project effectively illustrates the integration of sustainable materials and techniques into fashion design. By substituting harmful synthetic materials with these environmentally friendly alternatives, the project plays a role in fostering a more sustainable fashion industry. The creation of eco-friendly hobo bags within this project not only demonstrates the viability of natural dyes and mordants but also serves as a call to the fashion industry to adopt more sustainable methodologies. by embracing natural, waste-derived ingredients like Alkanet bark and banana peel, the project underscores the potential for fashion to evolve into a more environmentally responsible industry, paving the way for a greener and more sustainable

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ANNEXURE

COST OF THE HOBO BAG:

Cotton Fabric = Rs 155 per meter
Natural dye = Rs 300
Mordant = Rs 50
Other cost =Rs 300
Labour cost =Rs 200(Dyeing & Stitching)
Final selling price = **Rs 1005**