DEVELOPMENT OF ECO-PRINTED HANDBAG USING MORINGA LEAVES BY HAMMERING METHOD

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1. ABSTRACT

Applying colour to fabric in the form of a specific pattern or design is known as printing. Plant pigment is transferred to textiles using the mechanical force of hammering in the eco-printing technique. In order to ensure environmental sustainability, eco printing is crucial in the fabric printing process. There are several elements today that are hurting the environment and contributing to pollution. The textile sector is one of the biggest causes of environmental pollution. This method has been applied on many products for various applications in various parts of the world at various times. New print designs are produced via eco-printing using only natural ingredients. These printed patterns are distinctive and catch customers' attention since they look and feel natural. The method is not strictly concerned with reproducing the outcomes. Several plants that aren't thought of as typical dye plants generate vibrant prints, and classic dye plants occasionally do too when used to make eco prints. Its print's colours and shapes are both well-defined and nicely dispersed on the cotton cloth. An enormous amount of flowers are thrown away each year after being used just once at places of worship and on special occasions throughout the world. Improper trash dumping can lead to issues including the growth of eels and worms, water and soil contamination, and bad odours. Eco-printing is becoming more and more well-liked as a sustainable way to dye and print textiles. As a way to add value to floral waste, this project also sought to investigate methods for eco-printing flowers and leaves onto cloth to create botanical prints.

KEYWORDS: Eco-printing, Natural printing, Environmental consciousness, Plant material, Hammering.

2. INTRODUCTION

Textile surface decoration has given garments variety, life, and interest. The practise of printing has made a great contribution to both the aesthetic appeal of the planet and the aesthetic appeal of textiles. The term "textile printing" refers to the process of painting or printing patterns onto fabric. To get the desired results, printing also needs a variety of highly specialised tools, materials, skills, and aesthetic sense. India has used natural printing techniques for thousands of years; it is an integral element of the country's culture [1]. Natural dyes come from natural materials, as the name implies. Until to the middle of the 19th century natural dyes were the principal colourants available for textile dyeing and printing operations. Due to the demands of rapid fashion, low cost, easy, and reproducible printing processes, the use of natural procedures and natural dyes for printing has been drastically reduced since the introduction of synthetic dyes [2].

On the basis of sustainability, green chemistry, and ecological methods, there is currently significant interest in the revival of natural printing and natural products [3]. Natural dyes are valuable for printing on textiles and have historical, cultural, and economic significance. Natural printing techniques are regarded as eco-friendly since they are regenerative and biodegradable, kind to the skin, and may even improve the wearer's health. To adhere the print to the textile fibres, many natural printing dyes require the addition of compounds referred to as mordants. Mordants are metal salts that can combine with natural printing dyes and fibres to create a stable molecular coordination complex. Alum was formerly the most popular mordant (potassium aluminium sulphate - a metal salt of aluminium).

Eco-printing is one of the natural printing processes that doesn't utilise any synthetic chemicals or colours. There has been a lot of research done recently on the use of bio waste and agricultural waste in natural dyeing

[4]. Many studies are also being done to find a helpful and environmentally friendly technique to valorize these wastes. The leftover flowers and leaves from various locations, such as temples, as well as other flowers used as decorations at events were also gathered and used for eco-printing. The species of Moringa Oleifera utilised here is a member of the family Moringaceae, also known as the moringa family. The plant is a significant medicinal herb that is found throughout India and is employed for a variety of therapeutic applications.

3. MATERIALS AND METHODS

3.1. FABRIC SELECTION

WOVEN COTTTON FABRIC

PLATE-I (Cotton fabric)

100% pure cotton is utilised in the weaving of the cotton cloth for this eco-printing. It is bought from a Coimbatore native dealer. The way that fibres absorb dye is thought to be very significant in many ways. A fibre that is good at absorbing water will likewise be good at absorbing or consuming dye. The fibre, which is almost entirely made of cellulose, is typically spun into yarn or thread and used to create a supple, breathable textile.

3.2. HERB SELECTION

MORINGA OLEIFERA

PLATE- II (Moringa oleifera)

Native to the Indian key, Moringa oleifera is a fast- growing, failure- resistant tree in the Moringaceae family. Popular names for this factory include benzolive, forelimb, horseradish, and moringa. Due to this factory's high color content, it was chosen.

3.3. HERB COLLECTION

PLATE- III (Collection of moringa)

The Moringa oleifera leaves were gathered from a near ranch in a Coimbatore vill. The moringa leaves that are being collected should be clean, undamaged, and youthful.

3. 4. MORDANTING

3. 4. 1. MORDANT SELECTION

PLATE- IV (Alum)

Throughout history, a variety of aluminium composites have been utilised as mordants in cloth printing. Aluminium ions snappily act as a ground between different color motes and/ or between the fibre and color because they've a significant affinity for both cellulose and protein fibres.

3. 4. 2. THE MORDANTING PROCESS

PLATE- V (Mordanting)

1. Fill a teacup with four table ladles of alum.

2. Fill a mug with1/4 mug of hot water.

3. Combine the scorching water and alum. Until the alum is adulterated, roundly stir.

4. Snare a vessel and fill it with 2 litres of water.

5. Fill the vessel with the adulterated alum water. They should be completely mixed.

6. After dampening the fabric, precisely add it to the pot, making sure not to wrinkle it, and give it a gentle stir. Sluggishly toast the visage on the burner. Leave it stewing for an hour while giving it a many gentle

stirs to maintain the alum result distributed unevenly in the water. At this time, agitate the fabric inside the vessel to insure that it absorbs the caustic slightly. Till it cools, keep the fabric in the caustic bath.

7. After leaving it in the water over night, remove it the following day, and precisely dispose of the alum bath by evacuating it on the ground outdoors. Use the alum bath just formerly.

8. Remove redundant water from the fabric by squeezing. To dry the fabric, put it on a clothesline or a rustic hanger and hang it in the shade.

9. The fabric is now prepared for eco-printing.

3. 5. FINISHING

ECO-PRINTING USING A HAMMER

PLATE- VI (Hammer)

PLATE- VII (Hammering)

• Spread the fabric out and place the moringa leaves according to the instructions.

• To stop the splint colours from transferring, cover the area with a plastic serape. The leaves are tapped with the hammer.

• launch by smoothly forging, also apply more pressure as the image starts to transfer. Starting off sluggishly and vocally will help colors from swooshing out each over the place if you accidentally strike an unknowing splint.

• When forging the thick sections, similar as the stem, you can generally use more pressure until you have a satisfactory transfer.

• Pound as hard as the factory and fabric will allow.

• Lift the fabric precisely after forging the entire area.

• Check at the bottom for any areas you may have missed. Tap the layout with the flat side of the hammer.

• Let the leaves completely dry after forging it with the polythene paper entirely out.

• Take the dried leaves out of the fabric.

3.6. TESTING AND EVALUATION
3. 6. 1. QUALITY ANALYSES
3. 6. 1. 1. COLOR FASTNESS TO SUNLIGHT

The technique of determining whether printed material is resistant to fading or colour change as a result of exposure to sunshine is known as colour fastness testing to sunlight. Two print samples are created for this test, and one of the samples is then exposed to sunlight for three hours. The sample that has been exposed to sunlight is compared to the control sample after three hours. The outcome is thought to be the colour difference between them.

3. 6. 1. 2. COLOR FASTNESS TO WASHING

The practise of examining the colour change of printed material after washing it in warm water and a mild detergent is known as colour fastness testing to washing. Here, the cloth with the eco-print is washed four times, and the colour shift is measured against a control sample.

3. 6. 1. 3. ANTIBACTERIAL TEST

The extract from Moringa oleifera was tested for antibacterial properties. The testing's goal was to determine whether moringa leaf extracts had any antibacterial effects on Escherichia coli growth (E. coli)

3.6.1.4. AGAR DIFFUSION METHOD

One of the most often used methods for assessing the antibacterial activity is the agar diffusion method. Agar plates are infected with test microorganisms in this agar diffusion method. Leaf extracts are simply poured into the well and then positioned on the agar substrate. To allow the components of leaf extracts to seep into the agar medium, the agar plates are incubated. The efficiency of the extract being tested is then determined by the diameter of the growth inhibition zones surrounding the well.

3.6.1.5. BACTERIAL INOCULUM PREPARATION

On potato dextrose agar and nutritional agar slopes, stock cultures were kept at 4 °C. Bacterial cultures were cultured with agitation for 24 hours at 37°C in a shaking incubator, while fungal cultures were incubated at 27°C for 3-5 days. The active culture for experiments was created by transferring a loop full of cells from stock cultures into test tubes of 50ml nutrient broth. Afterwards, each test organism suspension was plated out onto potato dextrose agar and nutrition agar medium. Thereafter, fungal cultures were incubated at 27°C for 3–5 days whereas bacterial cultures were kept at 37°C for 24 hours. A single colony was transferred to nutrient agar media slants and incubated there for 24 hours at 37°C and for 3–5 days at 27°C using potato dextrose slants as the substrate. At 4 °C, these stock cultures were maintained. A loop of each test organism was put into 50 ml of nutrient broth and incubated individually for 18 to 20 hours at 37 °C for bacterial culture in preparation for experiments.

3. 6. 1. 6. WELL DIFFUSION METHOD

This approach was used to assess the antibacterial and antifungal activities of crude extracts (Bauer et al., 1996). Using sterile Petri plates, 20ml of molten medium were poured into create MHA plates. After the media had solidified, a homogeneous 20–25 l suspension of bacterial inoculums was swabbed. The sterile paper discs were submerged in the necessary solvents before being set in agar plates. The wells were then filled with 10 to 50 l of plant extract. The plates then underwent a 24-hour incubation period at 37°C. The assay was performed in triplicates, and control plates were kept as well. The distance in millimetres between the well's edge and the zone of inhibition was recorded. On a Mueller Hinton agar plate, the tested cell suspension was dispersed, and using sterile forceps, a potato dextrose agar well was inserted into the agar medium. Wells received a pouring of plant extract. Plates were then incubated for roughly 24 hours at 37°C while the control was likewise kept constant. From the clear zone, the zone of inhibition was measured in millimetres.

The agar diffusion method was used to perform antibacterial activity. 2001, Van der Watt et al. By inoculating nutrient broth media with the stock culture of bacteria (E. coli), the bacteria were received and grew at 37% for 18 hours. The above media's agar plates were made. Each plate was swabbed with germs from 18-hour-old cultures before being injected. Cut the five wells and add the extract in the amounts of 25 l, 50 l, 75 l, and 100 l. The diameter of the inhibitory zone on each plate was measured in cm after 24 hours of incubation at 37 °C.

The antibacterial activity and minimum inhibitory concentrations of plant extracts against Gram positive and Gram negative bacteria have been determined using the agar well diffusion method. Against the examined microorganisms, the extracts displayed antibacterial properties.

3. 6. 2. QUANTITATIVE ANALYSIS

A group of 15 persons were used to examine the developed product. On the basis of how the eco-printed product was used, a questionnaire was created. The opinions of consumers about the product are regarded as the key factors, and additional information regarding the product's positive and negative attributes was also examined.

4. RESULT AND DISCUSSION

4. 1. QUALITATIVE ANALYSIS

4.1.1. COLOR SUNLIGHT RESPONSE TIME

PLATE-VIII (Before sample) PLATE-IX (After sample)

When exposed to sunshine, the sample barely slightly changes colour. Thus, the eco-color print's fastness property when exposed to sunshine is good.

4.1.2. COLOR FASTNESS TO WASHING

PLATE-X (before sample) PLATE-XI (after sample)

When compared to the prior sample, the subsequent sample is lighter in colour. After washing, the colour has faded. Hence, the Moringa eco-washable print's colorfastness feature is medium.

4. 1. 3. ANTIBACTERIAL TEST

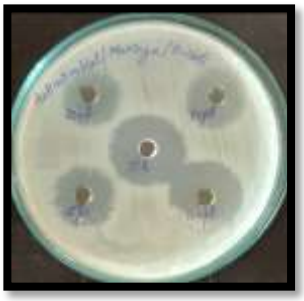

PLATE-XII (Anti-bacterial action of Moringa against E.coli)

Organisms	**E.coli**
25 µl	0.3cm
50 µl	0.4 cm
75 µl	0.6 cm
100 µl	1.0 cm
Standard (Chloramphenicol)	1.2 cm

TABLE-I (Anti-bacterial activity of Moringa against E.coli)

A zone of protection against the E. coli bacteria was created after treatment with the moringa extract in the amounts of 25, 50, 75, and 100 µl. The outcome shows that the moringa extract has excellent antibacterial activity.

4. 2. QUANTITATIVE ANALYSIS

ECO-PRINTED PRODUCT SURVEY REPORT

QUESTIONS	YES	NO
HEARD ABOUT ECO-PRINTING PRIOR TO THIS	40%	60%
SIDE EFFECT WHEN USING MORINGA ECO-PRINTED HANDBAG	20%	80%
CONSIDERING ECO-PRINTED PRODUCTS	93.30%	6.70%
REDUCE ENVIRONMENTAL HAZARD WITH ECO-PRINTING	86.70%	13.30%
ADVICE FOR OTHERS	86.70%	13.30%
USEFUL PRODUCT	86.70%	13.30%
WILL CONTINUE TO USE THIS PRODUCT	73.30%	26.70%

TABLE-II (Survey from the users of eco-printed hand bag)
SURVEY OF THE PUBLIC FOR ECO-PRINTED HANDBAG

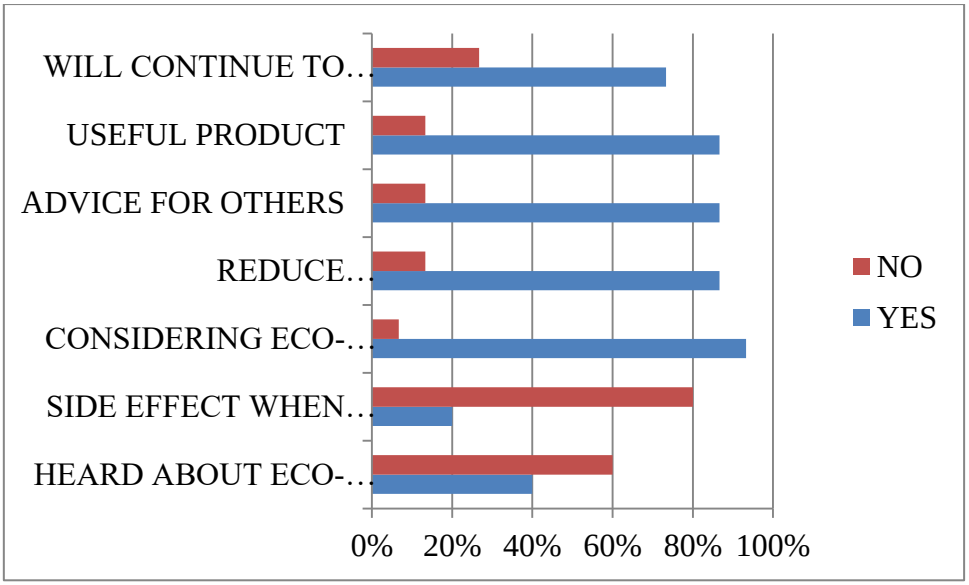

TABLE-III (Survey of the public for eco-printed handbag)

5. SUMMARY AND CONCLUSION

Thus, the eco-printed product is developed and tested according to Clinical laboratory standards. Use of natural dyes in printing processes is unique. As known, the earliest colourants used in printing were mineral pigments, but today there is a wide range of excellent organic methods and reliable mordants. Eco-printing shows the best way to use natural dyes in printing process. This taught us the ways to use different natural sources to make natural printing, from these different colours and patterns were created. These kind of prints, using the natural sources will increase people's attention towards ecological products and this will reduce the use of artificial dyes and chemicals, which will reduce the environmental hazards.

6. REFERENCES

1. Manzoor N., Yusuf M., Khan MI, Khan SA, Shahid M., Ahmad A., et al. 2012. DOI10. 1016/J.dyepig.2012.03.029; colorings and colors 95(1) 53 - 61

2. Shahid-ul-Islam M, Shahid FM. Journal of Cleaner Production, 57:2–18; 2013. DOI:10.1016/j.jclepro.2013.06.004

3. Ismal O. E. Yedi, Dokuz Eylul University's Guzel Sanatlar Faculty's Daily, 6, 23. (2011)

4. Ozlenen Erdem Ismal, "Patterns from Nature: Contact Printing," Journal of the Textile Association, 77(2):81-91; 2016.