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A Review on Bundle Dyeing and Ayurveda Dyeing on Cotton with Heena

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ABSTRACT

Ayurvedic dyeing is an ancient method of dyeing using plants, roots, flowers, seeds, barks, leaves and natural minerals. It uses natural mordants for fixing shades and natural gums for holding the goodness of herbs into the fabric. The focus of Ayurvedic Dyeing is to make the fabric wellness with the goodness of the herbs. The use of fabrics and garments to deliver health solutions is actually a very old concept called Ayurvastra. Ayurvastra is a Sanskrit word where 'Ayur' means health and 'Veda' means wisdom and 'Vastra' is cloth or clothing. It is totally organic, sustainable, and biodegradable. Heena is indigenous herb known in ayurveda and easily available in the kitchen garden and one's surroundings . This is anti-fungal, anti-bacterial, and anti-viral. In the present research, this herb is used to make natural dye as this is well known for their medicinal properties. Mordant used was alum, which has antiseptic properties and is safe for skin and environment. The objective of the study was to make the technique of natural dyeing easy to carry out for home dyers using ingredients from the kitchen garden and to encourage the traditional sustainable practice of preparing Ayurvastra, the organic healing cloth. A review was done on the research already done in the field of natural dyeing with special focus on dyeing on Cotton fabric with vegetable dyes specially, Heena and bundle dyeing with Marigold and Rose petals . Besides that it was also tried that review papers were found on the technique of Bundle dyeing. After a thorough review ,analysis was done on which techniques have already been applied by previous research and where the gaps were there so as to provide a detailed road map for upcoming scholars on this., also modules need to be prepared on these and without previous review of research this is not possible . This is especially important for researchers who want to repeat natural dyeing again and again with established results because the only drawback of natural dyeing is that same color combination is not achieved. So, standardization of this technique is important. A study of K/S value was also done, a review on this was also done.
So as to standardize the process through chemical methods and also to enhance the empirical validity of this study.

Keywords: Ayurvedic dyeing, Ayurvastra, Herb dyeing, Eco-Printing, Bundle Dyeing, Mordant, Color Fastness, Sustainability

I. INTRODUCTION

1.1 Natural Dye

Natural dye refers to any type of dye product made from natural ingredients, including plants, flowers, and foods. Unlike synthetic dyes, natural dyes are free from harmful chemicals and carcinogens- neither of which you want to breathe in or have your hands or clothes. And because they're made from organic materials, you also don't have to worry about them doing any harm to the natural environment (Laura Mueller, 2021). Natural dyes are known to be used since historic times for coloring food substrate, leather, as well as common textile fibers like cotton, wool and silk. However due to the advent of synthetics dyes and their good fastness properties in comparison to natural dyes, the use of natural dyes have suffered drastically. In the present scenario there has been a rise in concern of eco-friendliness and sustainability of the products used by the consumers for which natural dyes are again starting to experience slight rise in popularity (Pubalina Samanta, 2019).

1.2 Effects of Synthetic Dyes

Synthetic dyes are relatively easily available and cheap and have become big business. This has caused indigenous knowledge of the extraction and processing of natural dyes to diminish. Also the production and use of synthetic dyes has made the textile processing industry one of the most polluting industries in the world.

1.3 AYURVASTRA - A Healing Herb Dyed Fabric

The concept of Ayurvastra was practiced in India before the industrialization of the textile industry. Even today, in some parts of south India, ayurvedic herbal dyed clothes are used to carry anew born child, which will act as an antibacterial barrier for the child.

Plate 1.1: Herbs

source -https://textilevaluechain.in/in-depth-analysis/articles/textile-articles/ayurvastra/3

1.3.1. Principles of Ayurvastra

1. Herbal dyeing without chemicals.
2. Protects human skin from many diseases by body transpiration
3. When skin comes in contact with “Ayurvastra”, body loses toxins & its metabolism is enhanced.
4. The most effective time to wear ayurvastra is during sleep.

1.4 Sources for Dyeing

1.4.1. Heena

Heena is a plant-based Natural Dye from the leaves of the herbaceous Henna plant. . Leaves are useful in wounds, ulcers strangury cough, bronchitis, dysentery etc. It lowers body temperature to soothe headaches, fevers and burning feet. It is also help in the treatment of smallpox in its early stage.{Kolte.P.P., et al., (2015) }

Plate1.2: Dry Leaves

source: https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.nutrixia.in%2Fproducts%2Fmehendi-patta-heena-leaves&psig=AOvVaw1HgkN3J1Y9B5ikLm06mQOV&ust=1674908378300000&source=images&cd=vfe&ved=0CBAQjRxqFwoTCLCn_Yve5_wCFQAAAAAdAAAAABAE

Plate1.3: Heena Powder

source: https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.exportersindia.com%2Fproduct-detail%2F50kg-bag-natural-henna-powder-377394.htm&psig=AOvVaw36pe6LwOV-zb9esqaW8GzP&ust=1674908712968000&source=images&cd=vfe&ved=0CBAQjRxqFwoTCODT7rDf5_wCFQAAAAAdAAAAABAE

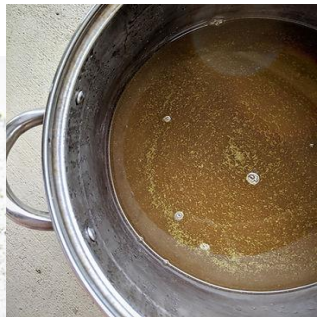

Plate1.4: Heena Powder Diluted

source: https://static.wixstatic.com/media/a27d24_543a091663c740ecaf78b970281bf4c2~mv2.jpg/v1/fill/w_360,h_480,al_c,q_80,usm_0.66_1.00_0.01,enc_auto/a27d24_543a091663c740ecaf78b970281bf4c2~mv2.jpg

1.4.2. Alum

Alum was used as mordant to increase the intensity of the color. Alum is non-toxic mordant because it has long been used as an additive to both foods and drinking water. It improves light and wash fastness of all natural dyes and keeps colors clear.

Plate 1.5 : Alum

source:https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.researchgate.net%2Ffigure%2Fa-Alum-crystal-and-b-Alum-powder_fig2_344503969&psig=AOvVaw3YZo0oUPm-le73WE0HJ29Q&ust=1674909769865000&source=images&cd=vfe&ved=0CBAQjRxqFwoTCNDf1qLj5_wCFQAAAAAdAAAAABAE

1.5 Mordants

Mordant or dye fixative is a substance used to set (i.e. bind) dyes on fabrics by forming coordination complex with the dye, which then attaches to the fabric (or tissue).The method of mordanting animal fibers is with aluminum sulfate . Aluminum Sulphate is a metallic salt derived from bauxite, a mixture of minerals.

1.6 Bundle Dyeing

Bundle dyeing is a process of transferring color from plant material onto a cloth. You can get the contact prints by bundling materials between layers of fabric. Wrapping them tightly and steaming. Marigold and rose petals were used for bundle dyeing. These flowers are easily procured from the local market and also procured as waste from temple offerings.

II. REVIEW OF LITERATURE

2.1 Natural Dye

According to Verma.S&Gupta.G , (2017) ,Dyes derived from natural materials such as plant leaves, roots, bark, insect secretions, and minerals were the only dyes available to mankind for the coloring of textiles until the discovery of the first synthetic dye in 1856. However, environmental issues in the production and application of synthetic dyes once again revived consumer interest in natural dyes during the last decades of the twentieth century. In the earlier days, dyes were derived only from natural sources. But natural dyes suffer from certain inherent disadvantages of standardized application and the standardization of the dye itself as dyes collected from similar plants or natural sources are influenced and subjected to the vagaries of climate, soil, cultivation methods etc.

Conclusion

The review above papers on natural dyeing show that the textile industries are destroying ecosystems because of the generation of huge wastewater containing toxic substances. However, environmental issues in the production and application of synthetic dyes once again revived consumer interest in natural dyes during the last decades of the twentieth century. To save our environment there is no alternative to natural dye

2.2 AYURVASTRA - A Healing Herb Dyeing

2.2.1 Rangari .N.T, et al. ,2012 described that Ayurvastra cloth is used by Ayurveda health clinics in the treatment of a broad range of diseases such as diabetes, skin infections, eczema, psoriasis, hypertension, high blood pressure, asthma, arthritis, rheumatism, cardiac problems and as general health products. The Ayurvastra reinforces the importance of sustaining the planet for future generations and for the well being of the current generation using age-old practices, which do not add up to global warming but help in minimizing it. It is expected that unique technology and thereby opening up a new area of entrepreneurship, job orientation and economic stability will be welcomed by the society as a whole. job opportunity for young people on one hand and on the other contribute towards offering economic stability to the nation.

2.2.2 According to Singothu.J , (2016)Ayurveda is the ancient medicine in India to treat many diseases by using herbs. Ayurveda is composed of two different words. These are Ayur and Veda. Ayur means life or lifespan and Veda means knowledge. When it combines the meaning is ‘Science of Life’ or ‘Wisdom of Life’. The roots of Ayurveda dates back 1000 BC. This is the only medicine available before

industrialization. Even today some parts of India believe that Ayurveda is the only answer to treat or to give relief for some diseases. Parts of the plant will be used for the treatment in Ayurveda. Adding the medicinal value to the fabric by dying the fabric in a dye prepared by Ayurvedic herbs and achieving great results in treatment of many diseases is a great idea. A new technology launched and developed by the with a great view of giving medicinal value to the fabric, this herbal clothing is formally known as Ayurvastra. Ayurvastra is not only to treat the illness but also takes care of the environment as the process is nontoxic and eco friendly.

Conclusion

The above review papers on Ayurveda dyeing show that it has a medicinal property which heals body from many diseases like diabetes, skin infections, eczema, psoriasis, hypertension, high blood pressure, asthma etc. 'Ayur' means 'life' or lifespan and 'Veda' means 'knowledge'. Parts of the plant are used for the treatment in Ayurveda. Adding the medicinal value to the fabric by dyeing the fabric in a dye prepared by Ayurvedic herbs and achieving great results in treatment of many diseases is a sustainable idea.

2.3 Sources of Dyeing

2.3.1 Heena

According to Md. Hasan.M., et al., (2015) The color which is obtained from the leaves of Henna, that is, *Lawsonia inermis* L., is used frequently in hair coloring. It is the chemical lawsone that is responsible for the reddish brown color. Its content makes it a substantive dye for dyeing the textile materials. This work concerns with the extraction and purification of natural dyestuff from a plant *Lawsonia inermis* L. and dyeing of cotton and silk fabric in exhaust dyeing method. The dye portion is isolated from the total extract by column chromatography and is evaluated by dyeing cotton and silk under different dyeing conditions. The color strength and fastness properties of the dye are undertaken by changing mordant and techniques of mordanting. The changes of colors have been noticed by using different types of mordant. The dye exhaustion percentage, wash, rubbing, and light fastness results reveal that the extract of henna can be used for coloration of cotton and silk fabric

Conclusion

The above review papers on heena show that as a source of dyeing , it has excellent results. It shows very good color fastness, washing fastness. This dye can be applied on cotton as well as silk by using different mordant.

2.3.2 Alum

According to Haar, S., et al., (2013) Two mordanting agents, aluminum potassium sulfate and aluminum acetate, in three concentrations (5%, 10%, and 20% owf) were evaluated for colorfastness to laundering and light of natural dye extracts (madder, weld, and coreopsis) on cotton print cloth. The type of aluminum mordant had a greater influence on colorfastness to laundering, whereas dye type had a greater influence on fastness to light. Aluminum acetate at 5% owf concentration gave slightly higher Gray Scale ratings for colorfastness to laundering of coreopsis and weld. All treatments had negligible to no staining on cotton. Weld had slightly better colorfastness to light ratings than the other dye types with 20% aluminum potassium sulfate rating highest. Even though the aluminum acetate mordant improved the colorfastness to laundering on weld and coreopsis at the 5% and 10% owf concentrations, it did not improve fastness to light and resulted in slightly lower fastness to light grades on coreopsis.

Conclusion

The above review papers on Alum show that as source of mordant , it has good color fastness and washing fastness .Natural dyes are eco-friendly, non-hazardous and sustainable. But the use of metal mordants such as copper, chromium, tin and zinc could make the application of natural dyes unsustainable since they are heavy metals. Hence, sustainable natural dyeing could be achieved with natural mordanting assistants such as alum.

2.4 Bundle Dyeing Process

Nuraeni.S., et al.,(2021) described that The development of dyeing from natural substances for silk fabrics has been rapidly growing in recent years. This study aimed to explore the plant species producing unique dyes and patterns on silk fabrics. The flowers and leaves of some plant species found at the research sites were assayed for their color and shape expression on the fabrics. The dyeing technique applied was the bundle dyeing or eco-printing technique on the fabric's surface with mordant alum and myrobalan. We obtained 297 plants consisting of 95 families and 181 genera. The plant species producing colors were trees (48.4%), shrubs (30.5%), and herbs, vines, ferns, and lycopods (21.1%). The plant species samples obtained were 213 (71.7%) producing color and 84 (28.3%) species not expressing color. The leaves and flowers producing colors and patterns on the fabrics suitable for bundle dyeing were 126 species and 19 species, respectively. The leaves produce colors without shape patterns; thus, they have potential roles as dyes for the dipping technique.

Conclusion

The above review paper on Bundle dyeing shows that ,the bundle natural dye technique dyeing has a lot of potential to be made into alternative natural dyes because the colors produced are always graded and have different characteristics of each fabric used as a transfer medium. For bundle dyeing with an early mordant of salt in all kinds of fabrics produces a shape patterns and printing perfect motifs, dense color and graded .

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