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Design And Development Of Cold Climate Clothing Using Madder Root Natural Dye In Cotton Fabric

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Abstract: The research on design and development of clothing for cold climate has been carried out by using Madder root natural dyed cotton fabric as inner layer, silk as middle layer and polyester as top most layer. Mordanting the fabric is done to remove the starch from the fabric People frequently wear coats when going outside in the winter. Coats keep us warm due to the material they are made of. The three-layered jacket keeps our body to generate heat, which the material helps to trap and prevent from escaping into the air. Cotton fabric lacks in absorption and has good deodorizing properties, so dyeing with Madder root improves its properties drastically. The uniqueness of this research is to bring three layered jackets for winter clothing in North India, Jammu and Kashmir. The layering of the jacket will bring warmth and comfortableness to peoples. The jacket was constructed by using foam material and suitable accessories.

Keywords: Sustainable fashion, Natural dye, madder dye, winter jacket.

INTRODUCTION

The primary function of winter clothing is to protect oneself from the natural environmental. the research is about the designing and developing of winter jacket. The winter jackets are often having a good water resistance, and multiple layers of fabrics to protect and insulate against low temperature. The design and development of the protective clothing is critical because it involves the selection of appropriate textile materials and strategies for their use individually and collectively, so that the protective clothing causes minimal physical stress on the wearer while effectively protecting him from cold and allowing him to attend to his combat duties. During winter season the demand for winter jackets are high. The research is mainly focused for peoples in Jammu and Kashmir.

Since ancient times, wool and woollen pile fabric have been the oldest materials used to provide protection against cold. Following the advent of synthetic fibres, the usage of acrylic and polyester fibres in various forms was developed for use in cold protection apparel. The material used to make cold weather protective clothing is chosen with the goal of minimising heat loss from the body to the environment, so that metabolic heat generated by the body is not lost to the environment and instead keeps the body warm.

The research is mainly focused on peoples in Jammu and Kashmir. The average temperature in Jammu and Kashmir, India is 13.5 degrees Celsius (56.3 degrees Fahrenheit). The range of average monthly temperatures is 21.6 °C (38.9 °F), which is below mild. The mean daily temperature varies/ranges by 12.5 °C (22.4 °F).

Jackets are worn to give warmth, which means we are avoiding illnesses such as colds, fevers, coughs, and other contagious diseases. Aside from that, wearing a protective coat, jacket, or winter clothing might help your body fight hypothermia and frostbite during the winter season. An outer shell, an insulating fill, and a lining are the three primary components of any winter jacket. Make sure your jacket has good insulation and isn't too heavy that it causes you discomfort.

OBJECTIVES

- Objective 1 - Market survey was conducted for 30 peoples from Jammu and Kashmir to collect the information.
- Objective 2- After the preliminary survey and interview 4 conceptual designs were developed and best one is selected for final garment construction through conducting survey for 30 peoples.
- Objective 3 – preparation of dye

METHODOLOGY

Sample test- Madder root dye in white cotton fabric.

Taking a 10 by 10 sample of white 100 percentage cotton fabric and dyed with Madder root powder.

- Madder root powder
- 1;40 ratio dye is taken
- The fabric is kept in the dye solution for 60 to 90 minutes, at 100 degrees Celsius
- The fabric was on movement during the process.
- It is then washed until there is no bleeding of madder root from the fabric.
- The fabric is then dried under shade

Fig 1. Madder dyes sample on cotton fabric

DYEING OF WHITE COTTON FABRIC USING MADDER ROOT

Grinding the madder root into powder form. Before dyeing the fabric, the white cotton fabric has to be mordanted. The white cotton fabric is mordanted using potassium aluminum sulphate. Preparation of dye bath, Madder root powder is added to the water according the calculation and stirred it well. After stirring the dye well, the solution is filtered using cotton fabric. The filtration is of dye is done for 5-6 times. After filtration the fabric is dipped inside the dye solution for 45 minutes.

Fig 2. Grinding the madder root into powder form

Mordanting the fabric is done to remove the starch from the fabric. Mordanting is done using Potassium aluminum sulphate. Boiling the water for 10-20 minutes. Stir the water well to dissolve the alum. After preparing the mordant solution immerse the white cotton fabric to the solution and keeping it for 30 minutes. After 30 minutes squeeze the fabric to remove the water from the fabric. Now the fabric is ready for dyeing.

After the moderating process, preparation of dye bath is done. Add madder root dye powder into the water bath and stir it well so that the dye will be equally treated. Boil the dye solution for 30 mins. Once the dye gets into the water and the color come out the next step is to filter the dye solution. Filtration is an important process we have to be very careful while filtering. The process is done 5-6 times so that there will not be any patches on the fabric while dyeing. Filtration is done using white cotton fabric.

Fig.3 Immerse the cotton fabric for Mordanting

Fig 4. Adding madder root dye into water

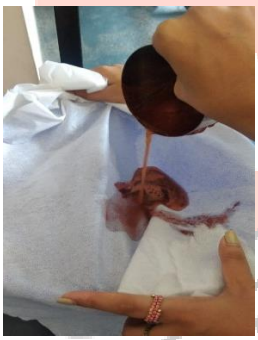

Fig 5. Filtering the dye solution

Once the fabric is immersed into the dye solution and dyed. Keep the fabric for 5-10 minutes in dye solution to set. Then take out the fabric out and wash it and see if the color fades or not. after first wash, again wash the fabric and see for the color fastness of the fabric. Washed the fabric using detergent. Washing process is done for 3 times and color was not fading.

Fig 6. Immersing the fabric into dye solution

Fig 7. Madder root dyed fabric

CALCULATIONS

Table 1. calculation of dye

	percentage	Total weight of fabric	Total
Dye [Madder root powder]	40 percentage	100*3= 300	300*40/100= 120 grams
Bath ratio	1;20 ratio	60*3= 180	180*20000/1000=3600= [3.6 liters]

Weight of the fabric 1m = 100gms
1:20 bath ratio = 30 liters for 1kg

- 120 grams of madder root powder is required and 3.6 litres of water is required.
- 3.6 litres of water are required for dyeing

Color fastness to washing

- during the first wash after dyeing there was little bleeding of dye.
- during the second wash using water there was no bleeding of dye.
- during the third wash using detergent there was no bleeding of dye
- during the fourth was using detergent there was no bleeding of dye.

Fig 8. Color fastness of washing the dyed fabric

DIGITAL RENDERING OF THE GARMENT

Fig 9. Flat sketch and digital sketch of the garment

FINAL GARMENT

Fig 10. Final garment shoot

CONCLUSIONS

The twenty-first century, is known as the era of ecological environment, the term "environmentally friendly" is gaining popularity in all fields. This is the result of widespread recognition that the ecological environment's problem is directly related to our survival. Natural dyeing is currently gaining popularity because it is more environmentally friendly than synthetic dyes and seeks the functional aspect of natural dyeing, which has benefits such as high functionality, high sensitivity, and natural color expression. People frequently wear coats when going outside in the winter. Coats keep us warm due to the material they are made of. The three-layered jacket keeps our body to generate heat, which the material helps to trap and prevent from escaping into the air. Cotton fabric lacks in absorption and has good deodorizing properties, so dyeing with Madder root improves its properties drastically. When dyed with madder root, the fabric's absorption, deodorizing, and antibacterial properties improved to a great extent. Thus, making winter jacket. The dyeing process with madder root is both natural and sustainable. As designers, we must consider sustainability as priority

while designing. Synthetic dyes are very much harmful to our body, not only to our body but also to the environment Textile industry plays an important role in water pollution. Textile plant effluents are a significant source of water contamination because dyes, detergents, and other pollutants in the wastewater experience chemical and biological modifications, absorb dissolved oxygen, kill marine organisms, and endanger human health because all of these contaminants are extremely hazardous in nature. Cotton is a massive raw material in the apparel industry. A cotton T-shirt and jeans require approximately 20,000 liters to manufacture. Conventional cotton farming also made frequent use of fertilizers, which can contaminate surrounding bodies of water. The textile industry may have a detrimental effect on water worldwide, but the positive news is that we can reduce its environmental risk. Several big corporations are seeking to minimize the negative effect of the ecosystem.

Sustainable goods are commodities which can be replicated within a limited time, which impose little or no environmental pressure,

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