Application of Shibori Tie Dyeing Using Natural Dyes on Cotton Fabric

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ABSTRACT

Tie dye is a process of applying coloring matter directly on the fabric in a decorative way. Natural dyes were used for coloring textile products till the nineteenth century. As the name suggests, the natural dyes are derived from the natural sources like plant, animal, minerals and microbial origins. Nowadays, dyeing have been became the most advanced area in textile colourings.

In this paper, the natural dyes are extracted and fabric is tie dyed with these natural dye extracts. At first stage, the extraction of dye is made from the clitoria ternatea. This gave different color varieties when different types of citric acids are added. The citric acids are extracted from citrus Limon. The citric acid extraction from citrus Limon gave purple color to the dye extract. The fabric is tie dyed using the extracts from clitoria ternatea. For the fixation of dye, alum is used as mordants. The blue color and purple color are obtained from clitoria ternatea. The tie dyed fabric was tested by rubbing fastness, light fastness and wash fastness.

KEY WORD: natural dye, clitoria ternatea, alum, rubbing fastness, washing fastness, perspiration.

INTRODUCTION:

Today dyeing is complexed, specialized science. All the dye stuffs now produced are synthetic compounds. This synthetic compounds are long terms but not natural. The cost of the synthetic dyes is more reasonable than natural dyes. So all the practitioners prefer synthetic dyes. But natural dyes have its own beauty in application. It was foundthat evidence of textile dyeing dating back to the Neolithic period. More than 5,000 years, china was found to be dyeing with plants, barks and insects.

Many natural dyes requires mordant as a fixing agent to fix the dye to the textile fibres; from oak galls - tannin, salt, natural alum - myrobolan, vinegar, and ammonia was taken from stale urine were used by early dyers. Many of the mordants, and some dyes themselves, produce strong odours.

In the early 21st century, the market for natural dyes in the fashion industry is experiencing resurgence. Western consumers have become more concerned about the health and environmental impact of synthetic dyes in manufacturing and there is a growing demand for products that use natural dyes. Nowadays, natural dyes are used only in handcrafts.

Clitoria ternatea, commonly known as Asian pigeon wings, blue bell vine, blue pea, butterfly pea, cordofan pea and Darwin pea, is a plant species belonging to the Fabaceae family. The flowers of this vine were imagined to have the shape of human female genitals. Hence the Latin name of the genus" Clitoria" is from "clitoris".

Table1. Scientific Classification of clitoria ternatea

S.no	**Scientific Classification**	
1.	Kingdom	Plantae
2.	Order	Fabales
3.	Family	Fabaceae
4.	Genus	Clitoria
5.	species	C. ternatea

Chemical compounds isolated from C. ternatea include various triterpenoids, flavonol glycosides, anthocyanin and steroids Cyclic peptides known as cliotides have been isolated from the heat-stable fraction of C. ternatea extract.

TRADITIONAL MEDICINE:

In traditional Ayurvedic medicine, it is ascribed various qualities including memory enhancing, nootropic, antistress, anxiolytic, antidepressant, anticonvulsant, tranquilizing, and sedative properties In traditional Chinese medicine, the plant has been ascribed properties affecting female libido due to its similar appearance to the female reproductive organ.

Sensitivity tests were performed by disc diffusion with standard antibiotics, following Kirby-Bauer method (Baueret al., 1966).The assessment of antimicrobial activity was done based on measurements of the diameter of inhibition zones (NCCLS, 1998) .Of the four extracts ,methanolic extract has given interesting results and the aqueous extract showed no killing. Since it has anti-microbial activity, it can be a skin friendly dye product with medicinal values.

METHODOLOGY:

Material:

We have taken the 100% cotton as substrate.the flower of clitoria ternatea for the extraction of dye.

Mordants:

The basic chemicals used are alum and salt are used as mordants.

PROCESS PARAMETER:

a) M: l (material to liquor ratio) – 1:20

b) Temperature – as required

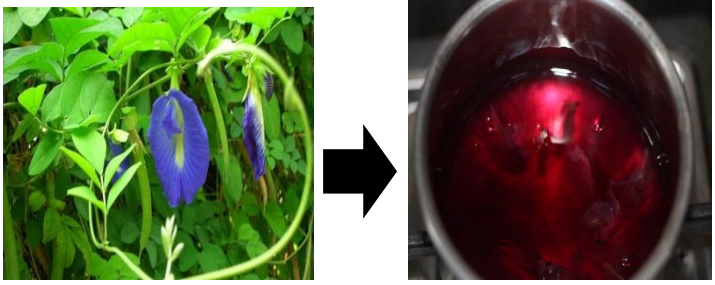
c) Time - as required

TESTING:

Washing fastness: 5 mins,10 mins and15 mins.

EXTRACTION OF DYE FROM CLITORIA TERNATEA:

- The flowers of clitoria ternatea are collected and washed thoroughly with water to remove any impurities.
- They are dried at room temperature.
- Then boil it for about 2 hours in a hot water bath for quick extraction of natural dye.
- At the end of 2 hours, the total color was extracted.
- The solution was double filtered and used to carry out our study. They are shown in the figures below.



PRE- TREATMENT:

- Soaked in warm water containing soap solution.

PROCEDURE:

- Water is heated until it gets warmer.
- Then soap solution is added to the water.
- After mixing the solution to the water, the fabric is dipped in the solution.
- This set up is left for 30 minutes.
- Then the fabric is washed.

PREPARATION OF SAMPLES AND DYES:

Preparation of sample:

- The sample was tied using shibori tie dye techniques. Those techniques were
  - Kumo shibori (pleated bound)
  - Itajimae shibori (shape resist)

Preparation of dye:

- Cotton fabric was taken and chemicals dye and water is taken in a required quantity in a beaker.
- Dye extraction was added to the required quantity of water.

- Then alum was added as mordant to the dye liquor.
- Then the prepared samples are soaked in the dye liquor.
- This setup is left for about 20 minutes.
- Till the end of the process the dye liquor is maintained at 100*c.
- Then the sample is taken out and washed.

RESULTS AND DISCUSSION:

FASTNESS TEST:

Washing fastness test:

- Tie dyed fabric sample is taken and is placed between two adjacent fabrics and stitched.
- The sample and the adjacent samples are washed together.
- After soaping treatment the specimen is removed.
- Then rinsed twice in cold running tap water.
- Squeezed and dried in air at a temperature not exceeding 60◦c.
- The value of colour is evaluated by using grey scale.

Results and discussions:

The result of washing fastness test was taken on grey scale and the results are as follows:Washing fastness scale reading: 3 – 4.

Since, naturally obtained dyes do not have too much affinity towards fibre. But by the usage of mordants to the dye extract, we can keep the color fixed in the fabric for several washes. The color started bleeding after 12 minutes from the fabric. This proves that the mordants make the dyes great affinity to the fabric.

RUBBING FASTNESS:

a) **Dry rubbing:**

- The specimen is mounted on the holding clamp on the base board of the crock meter. The large specimen is placed parallel to the rubbing material.
  Mount a dry rubbing cloth flat over the end of the peg and hold it tightly by using spring clip.
  Rub the specimen back and forth for about 50 complete cycles.

b) **Wet rubbing:**

- In this process, the rubbing cloth is made wet by dipping in water.
- Then the sample is squeezed and clamped over the peg.
- As same as dry rubbing, wet rubbing also carried out for 50 complete cycles.
- Allow the wet rubbing cloth to dry at room temperature.

The result of dry rubbing and wet rubbing was taken on the grey scale. The results are given below.

S.no	Methods	Result
1.	Dry rubbing	3.7
2.	Wet rubbing	2.1

In dry state, the color held properly to a certain rotating cycles. After completing 50 cycles, only fewer amounts of colors are fixed on the rubbing fabric. But in the wet state, the color

started to stick to the rubbing material at the starting stage. This result that wet rubbing fastness results very poor.

SAMPLES:



Dyed only with mordants:


Dyed using citric acid from limon:


CONCLUSION:

We used different type of tie dye techniques and the citric acids from Limon to get variety of designs and color variations. This natural dye was extracted with the help of boiling process. In this process, due is applied to 100% cotton fabric with the help of mordant alum. We got results in various testing methods such as wash fastness, dry rubbing and wet rubbing.

Here we got better results with dry rubbing fastness test. The results on using dried clitoria ternatea were satisfied than fresh ones.

This flower clitoria ternatea was easily available. After drying it is useful in many ways like stress relieving drink and anti-oxidants in medicine. This natural dye doesnot have any effect on human body. The result obtained from the flower of clitoria ternatea was quite satisfactory.

Ouranalyse was to choose proper dyeing recipe for shibori tie dye technique, so that we could get the optimum results. From our research we came to know that the natural dyes plays good in addition to the mordants by giving better results on 100% cotton fabric.

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