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A Study on Natural Dye Application on Cotton Fabric using *Clitoria* Ternatea

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Abstract:- In this fast fashion era dyeing is considered as a major cause for the textile pollution. It is also a cause for many deadly diseases due to the poor usage of synthetic dyes and most of the textile industry does not care about the workers and their protective wears and the workers suffer from health hazardous due the emitted effluents that gets emitted from the dyeing process. During the dyeing the synthetic dyes produce strong fumes, and these are highly carcinogenic and while disposing the dye there are proper treatment for the disposal otherwise this will create a huge damage to the environment. The present study focuses on colour ant that is extracted from *clitoriaternatea* flower on cotton fabric has been studied using alum. The wash, rub, light, and perspiration fastness of the dyed samples have been tested. It is discovered that *clitoriaternatea* dye can be successfully used for the dyeing of cotton to obtain a wide range of colours by using various mordant. In regard to colour fastness test samples exhibit excellent fastness to sunlight, washing, crocking, perspiration, and saliva.

Keywords:- *100% Cotton Fabric, Natural Dyes (Clitoria Ternatea), Mordant (Alum), Analysis of Colour Fastness.*

I. INTRODUCTION

Natural dyes are one of the ancient dyes that have been used by our ancestors for ages. Basically, these natural dyes are obtained from vegetables, fruits, bark leaves and animals. In the late 19 th century the suddenly synthetic dyes have grabbed the complete market of textile industry and replaced natural dyes

Due to their easy application and durability synthetic dyes are used in every textile industry. Besides its colour quality longevity the production and cost are considerably lower than the natural dye. After so many decades there is so much research that is done to reduce the toxins and allergies and environmental pollution that is made through synthetic dyeing. Many countries have banned synthetic dyestuffs and their byproducts due to their hazards. The current trend on eco consciousness the researchers show much interest on natural dye and natural dyeing techniques.

Cotton is the oldest and most important textile fiber. Cotton is always defined as the king of Textiles because of its versality and the physical and chemical properties. Cotton is a plant source fiber. This present study is made with the extraction of natural dye from the flower *clitoriaternatea.*

Table 1: Flower Clitoria Ternatea

Kingdom	**Plantae**
Subclass	Rosidae
Class	Magnoliposida
Order	Fabales
Family	Fabaceae
Genus	*Clitoria*
Species	*ternatea*
Botanicalname	*Clitoriaternatea*

The ClitoriaTernatea plant finds its applications in modern medicine. It's well-known for its use inherbal tea preparation for centuries. The tea gets a peculiar deep blue tint owing to the colour of its petals.

In Thailand and Vietnam, butterfly blue pea tea is mixed with honey and lemon. This increases acidity and changes the beverage to a pink- purple colour.

A. Dyes

The deep blue tint produced by the plant has been used as a dye for centuries. A deep blue shade which is a versatile shade that has been widely used by our ancestors for ages. This shade of dye is most common in Indian attire.

B. Culinary Uses

In Southeast Asia, it is used for colouring food items. It is also a popular ingredient in Burmese and Thai cuisines.

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C. Medicinal Uses

The plant is used in Ayurvedic medicine. It is known to have anti-inflammatory, anti- asthmatic, analgesic, antipyretic, anti-diabetic, anti-arthritic, anti-lipidemic, antioxidant, and wound-healing properties.

D. Nutrients in Butterfly Pea Flower

Butterfly pea flowers have a good amount of an thocyanin compounds known as ternatins, which give the plant its vibrant colour. As per studies, ternatinshel preduce inflammation and prevent cancer cell growth.

II. SELECTION OF NATURAL DYE

Recent days, people have been used various parts of the plant for dyeing. In that clitori aternatea is the flower was used for natural dyeing in this research. The flower is available in rural areas with many gardens. It was selected based on its attractive colour and their excellent so many medical properties.

Fig 1: Clitoria Ternatea

A. Clitoriaternatea Flower Selection of Mordants

The mordant is known as dye fixing agent, which helps to fix the dye into the fabric uniformly. There are many natural mordants used for dyeing. In this research work Alum is used as a mordant.

Fig 2: *Clitoriaternatea Flower Selection of Mordants*

B. Alummordant Preparations for Dye Extraction

The Fresh Clitoriaternatea flower was washed thoroughly for three times with running water and drained. And then grinding the flower was carried out in the mixie. The fine grinding solution was taken out in the vessel and then used for dyeing. Plate 3.2 shows the dye extraction with butterfly pea flower. Plate 3.3 shows the dye extraction with alum mordant.

Fig 3: Dye Extraction with Butterfly Pea Flower

Fig 4: Dye Extraction with Alum Mordan T

C. Dyeing of Cotton Fabric using Clitoria Ternatea Flower

The dyeing was carried out by manual home dyeing method. The flower extracts shade dried *clitoriaternatea* was taken into the bow land adding required water and mordant to the fabric. Wash the fabric and allow it into the boiling dye solution for dyeing. And maintain the temperature at 100^0c for 60 minutes. After dyeing the fabric is taken, rinsing, dried and cured. The same dyeing method is used in Alummordant sample. Plate 3.4 shows the dyeing of cotton fabric with *clitoria ternatea* flower blue dyeing.

Fig 5: Without Mordant

Fig 6: With Alum Mordant

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D. Objecte Valuation of Clitoria Ternatea Flower Dyed Fabric

BDF*(Clitoriaternatea*) dyed fabrics were subjected to the objective evaluation such as fabric weight.

- Fabric Weight: The control sample and BDF (*Clitoriaternatea)* fabric was subjected to the evaluations such as fabric weight.

S. NO	Sample	Fabric weight in g/m2		
		Control sample	BDF(Clitoria ternatea)	
			Without modrant	With mordant
1	Cotton	121.4	117.2	117.1

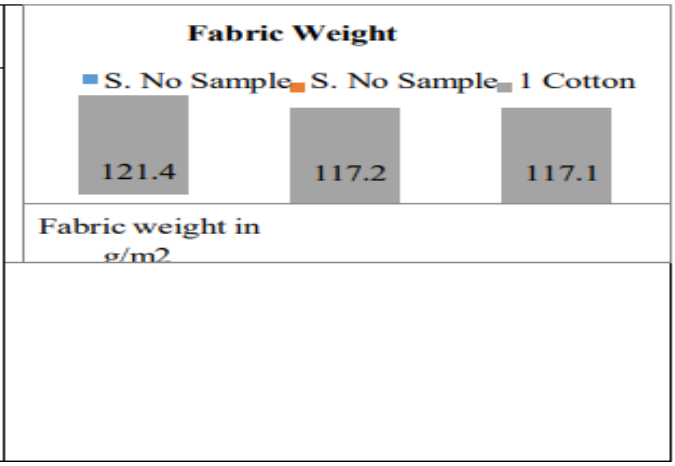

Fig 7: Fabric Weight

It is found that, the BDF (*ClitoriaTernatea)* (without mordant) fabric and BDF (*ClitoriaTernatea)* (with mordant) fabric117.2 GSM, with mordant 117.1 GSM, and the control sample shows 121.4 GSM, in fabric weight accordingly.

III. COLOUR FASTNESS TEST

The BDF(*Clitoria Ternatea*)fabric subject to colour fastness test such as colour fastness to washing, sunlight, crocking, and perspiration, saliva respectively.

A. Colour Fastness to Sunlight

The BDF (*ClitoriaTernatea*) fabric (with mordant) and (without mordant) colour fastness to Sunlight.

S. No	Sample	Colour Fastness to Sunlight
1	BDF(Clitoria Ternatea)without mordant	2
2	BDF(Clitoria Ternatea)with mordant	2

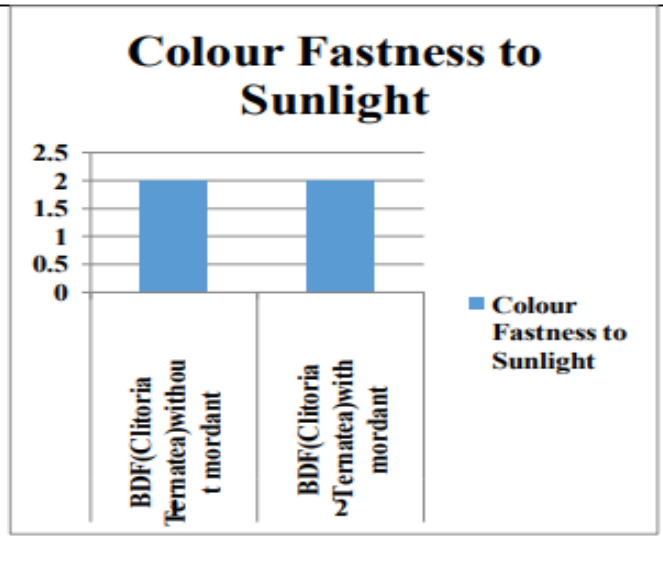

Fig 8: Colour Fastness to Sunlight

It is shown that, the BDF (*Clitoriaternatea*) (Without mordant) dyed fabric samples and BDF*(Clitoriaternatea*) (With mordant) dyed fabric samples shows excellent values in colour fastness to sunlight.

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B. Colour Fastness to Washing

Table 2: Colour Fastness to Washing

Colour Fastnessto Washing : Test 1 ***AsperIS/ISO105- C10:2006 (RA 2021) A(1)***	**BDF(Clitoria Ternatea) without Mordant**	**BDF (Clitoria Ternatea) with Mordant**
Changeincolour	1-2	1-2
Stainingon	.	.
Wool	4	4
Acrylic	4-5	4-5
Polyester	4-5	4-5
Nylon	4-5	4-5
Cotton	4	4
Acetate	4-5	4-5

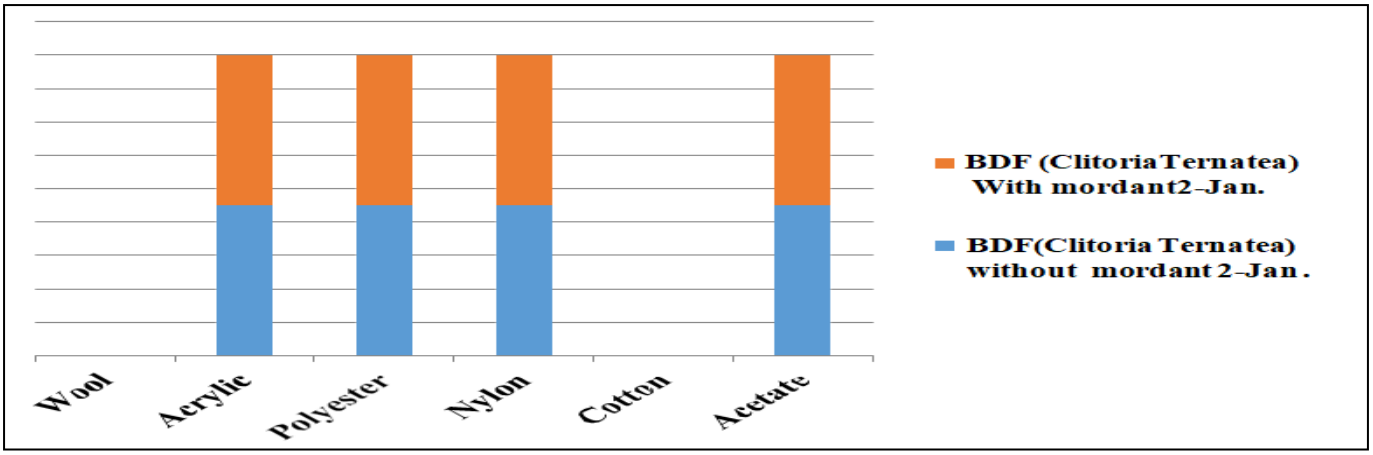

Fig 9: Colour Fastness to Washing

It is shown that, the BDF (*Clitoria ternatea*) (Without mordant) dyed fabric samples and BDF*(Clitoria ternatea*) (With mordant) dyed fabric samples shows excellent values in colour fastness to washing.

C. Colour Fastness to Crocking

The BDF(*Clitoria Ternatea*) fabric (with mordant)and (without mordant) colour fastness to Crocking and their result.

D. Colour Fastness to Crocking

Table 3: Colour Fastness to Crocking

Colour Fastness to Rubbing. ***IS/ISO 105 X12:2016***	**BDF(Clitoria Ternatea) without mordant**	**BDF(ClitoriaTernatea) With mordant**
DryRubbing(Staining)	4-5	4-5
WetRubbing(Staining)	4	4

E. Colour Fastness to Crocking

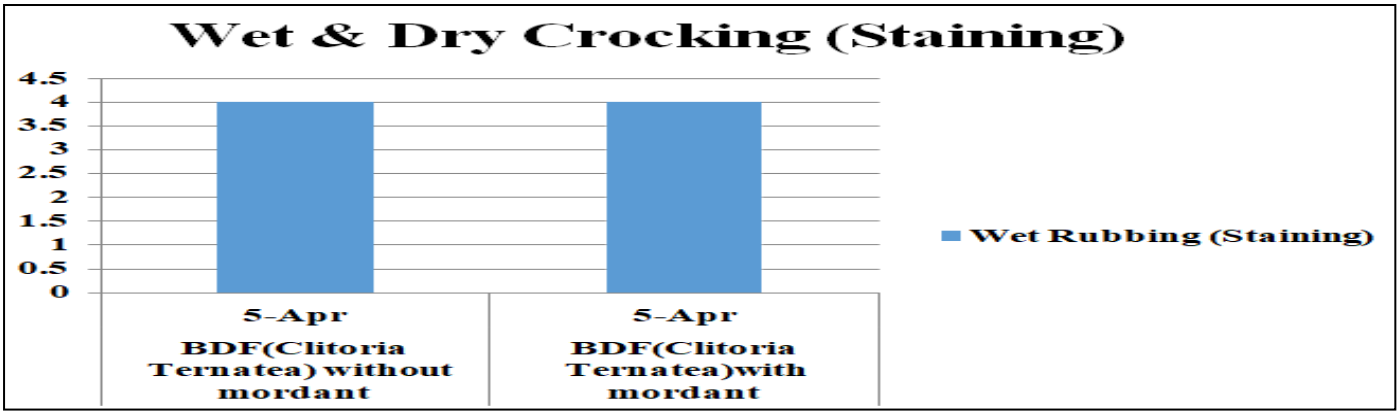

Fig 10: Colour Fastness to Crocking

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It is shown that, the BDF (*Clitoriaternatea*) (Without mordant) dyed fabric samples and BDF *(Clitoriaternatea*) (With mordant) dyed fabric samples shows excellent values in colour fastness to Crocking.

F. Colour Fastness to Perspiration and Saliva

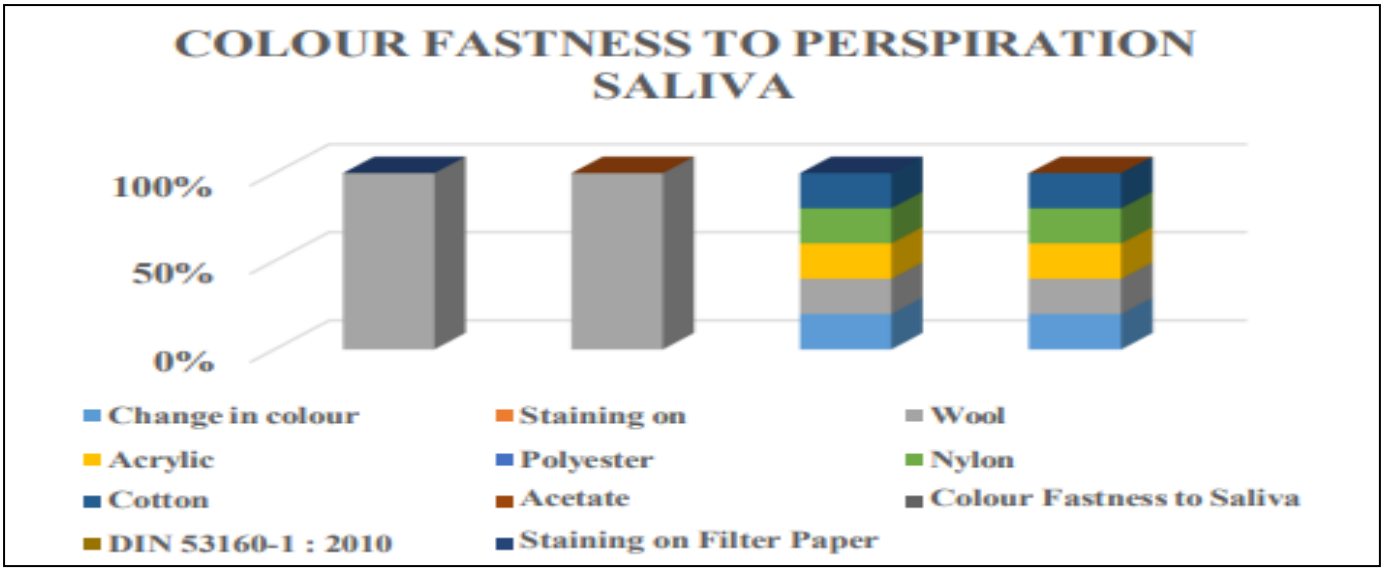

Fig 11: Colour Fastness to Perspiration and Saliva

The BDF(*Clitoria Ternatea*) fabric (with mordant) and (without mordant) colour fastness to Perspiration and their result

G. Colour Fastness to Perspiration and Saliva

Table 4: Colour Fastness to Perspiration and Saliva

Colour Fastness to Perspiration ***IS/ISO 105 E04-2008 (RA 2019)***	**BDF(Clitoria Ternatea) without mordant**		**BDF(Clitoria Ternatea) with mordant**	
	Alkaline	Acidic	Alkaline	Acidic
Change in colour	2	2	1-2	1-2
Staining on	-		-	
Wool	3-4	3-4	3-4	3-4
Acrylic	4	4	3-4	3-4
Polyester	4	4	4	4
Nylon	4	4	3-4	3-4
Cotton	3	3	2-3	2-3
Acetate	4	4	4	4
Colour Fastness to Saliva ***DIN 53160-1: 2010***	**BDF(Clitoria Ternatea) without mordant**		**BDF(Clitoria Ternatea) with mordant**	
Staining on Filter Paper	4		4	

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H. Colour Fastness to Perspiration And Saliva

It is shown that, the BDF (*Clitoria ternatea*) (Without mordant) dyed fabric samples and BDF*(Clitoria ternatea*) (With mordant) dyed fabric samples shows excellent values in colour

IV. CONCLUSION

It canbe concluded that *Clitoriaternatea*flower are excellent naturaldye sources, astheyproduceelegant and excellent colour naturally. These dyescould be applied on cotton fabrics, which could be successfully used as apparel. The mordant used for dyeing is alum. When compare with BDF (*clitoriaternatea*) dyed fabric, with mordant and without mordant have aboth are equal and excellent colour fastness property. The evaluation of dyed fabric also reveals the fact that they have very good colour fastness properties. The performance of the dyed fabrics is also highly satisfactory.

REFERENCES

[1]. Anderson B, Creative Spinning, Weaving and Plant Dyeing (Angus and Robinson, Singapore), 1971, pp 24.
[2]. Asaduzzaman et al., Journal of Textile Science & Engineering 2016, A study on the Effects of Per-treatment in Dyeing Properties of Cotton fabric and Impact on the Environments.
[3]. Bains S, Singh OP, Gorya G & Kang M, J TextAssoc, May-June(2003),pp 23.
[4]. Agarwal and R. Bhattacharyya, "Effect of Mordanting on Dyeing of Cotton with Natural Dye Extracted from Butterfly Pea Flower (Clitoriaternatea L.)", Journal ofNatural Fibers, 2017.
[5]. A. Bhat and S. M. Akhtar, "Sustainable Dyeing of Cotton with Butterfly Pea (Clitoria ternatea L.) Flower Extract", Journal of Cleaner Production, 2016.
[6]. Hasan and N. A. Anwar, "Natural Dyes from ClitoriaternateaL. forDyeingofCotton Fabric", Journal of Natural Fibers, 2017.