



REVIEW OF RESEARCH



PEEPAL BARK AS A NATURAL COLOURANT FOR KALAMKARI



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ABSTRACT

The global world is now changing at every moment with change in technology at very fast pace. In the modern era each individual wants to adopt new lifestyle with modern clothes and fabrics. To fulfil the ever-growing demands of the population most of the textile industries has the production at large level. This process involves lots of chemicals, artificial chemical dyes, colours and many chemical components and reactions. This has increased the problems of health hazards and subsequently addition to pollution and global warming; hence, there is a strong urge of eco-friendly harmless, naturally dyed textiles. In the present study peepal bark is used as natural colourant for the Kalamkari on khadi cotton fabric. Black colour was prepared for kalamkari by using Peepal bark extract. Effect of mordants ferrous sulphate (Iron); Potassium Dichromate and Sodium Molybdate were observed on khadi cotton fabric painted with Peepal bark extract. Fastness properties of washing, sunlight and rubbing were assessed.

KEYWORD : Khadi Cotton, Peepal bark extract, Kalamkari, Mordants, Fastness Properties.

INTRODUCTION

Recent research into natural dyes suggested a number of innovations of conventional dyeing techniques. Natural dyes have the potential to replace some carcinogenic dyes. *Ficus religiosa* Linn. is commonly known as Peepal belongs to family Moraceae. Peepal bark occurs in flat or slightly curved pieces, varying from 1.0-2.5 cm or more in thickness; outer surface brown or ash coloured; surface uneven due to exfoliation of cork; inner surface smooth and somewhat brownish; fracture- fibrous; taste-astringent. (Sonawane et.al.2015). Preliminary photochemical screening of *Ficus religiosa* Linn. barks showed the presence of tannin and flavonoides. (Babu et.al. 2010)

The traditional art form of kalamkari work can be traced back to the time period between 13th and 19th centuries in Andhra Pradesh. Kalamkari is done in the several parts of India. In Andhra Pradesh the two villages Srikalahasti and Masulipatnam are recognized as major centre for kalamkari. In Srikalahasti the painting is done with hands where as in Masulipatnam blocks are used for painting, which can be known as kalamkari printing. In the present work attempt has been made to use peepal bark as a natural colourant for Kalamkari.

2. MATERIALS AND METHODS:

2.1. Materials

2.1.1. Textile Substrate: - Khadi cotton

2.1.2. Dye source: - Peepal bark (*Ficus Religiosa.L*)

2.1.3. Mordants: - Ferrous sulphate (Iron); Potassium Dichromate; Sodium Molybdate

2.2. Experimental Method

2.2.1. Collection and preparation of dye source: - Peepal bark was collected during the month of December from the Institutes campus. The bark was shade dried for optimum dyeing; dried bark was made in to powdered form in required amount.

2.2.2. Tannin Treatment (Harda Treatment) For Khadi Cotton: - samples of experimental group were treated with 10%harda powder on weight of fabric.

2.2.3. Optimization was done with following concentration: - To get the optimum results three different dye concentrations were tested i.e. 20 gram, 40 gram, and 60 gram. Ficus bark powder was added in 1000 ml. In separate beakers the 240 ml dye extract was prepared at 90⁰ C for 45 minutes. The extract was allowed to cool for 10 minutes. Dye extract was then filtered.

2.2.4. Optimization of ferrous Sulphate: - 1%, 2% and 3% ferrous sulphate on weight of fabric was taken and dissolved in required quantity of water. It was then added in the previously prepared dye extract.

2.2.5. Preparation of babul gum: - 25 gram babul gum was soaked in required amount of water for the required consistency. It was then added to each beaker of dye extract.

2.2.6. Preparation of Black colour for Kalamkari painting: - 30 ml from the prepared stock solution of ficus bark was taken. Ferrous sulphate dissolved in water was then added and mixed well, prepared paste of babul gum was added in the mixture of dye extract and ferrous sulphate. The dye extract was heated with constant stirring for 5minutes and allowed to cool.

2.2.7. Preparation of potassium dichromate: - 2% and 3% potassium dichromate on weight of fabric was taken and dissolved in required quantity of water. It was then added in the previously prepared dye extract.

2.2.8. Preparation of yellow ochre colour for Kalamkari painting: - 30 ml from the prepared stock solution of ficus bark was taken, potassium dichromate dissolved in water was then added and mixed well, prepared paste of babul gum was added in the mixture of dye extract and potassium dichromate. The dye extract was heated with constant stirring for 5 minutes and allowed to cool.

2.2.9. Preparation of sodium molybdate: - 2% and 3% sodium molybdate on weight of fabric was taken and dissolved in required quantity of water. It was then added in the previously prepared dye extract.

2.2.10. Preparation of orange colour for kalamkari painting: - 30 ml from the prepared stock solution of ficus bark was taken. Sodium molybdate dissolved in water and then added and mixed well, prepared paste of babul gum was added in the mixture of dye extract and sodium molybdate. The dye extract was heated with constant stirring for 5 minutes and allowed to cool.

2.2.11. Preparation of kalam: - It is known by its definition that kalamkari is a process, which utilizes "kalam" made of bamboo sticks. Bamboo sticks are cut into pieces of 10-12 inches with outer skin attached to it. Size of the kalam depends on the use, whether it is used for outlines or for filling. One end of the bamboo stick is sharpened up with the help of blade or cutter. The end, which is sharpened, should not be sharpened up to the end. In the centre of stick, a soft cotton fabric is wounded like a spindle with the help of a thread. Sharpened edge is burned and rubbed on the floor and now it is ready to use as a kalam. Accordingly, the investigator has prepared the kalams of different type i.e. sharp tipped ones, which are used for outlines and round broad tipped kalams for filling.

2.2.12. Selection of design on khadi cotton for painting: - 4 designs were selected for painting which are Peacock, Elephant, Krishana and Geometrical floral motif. Selected motif was traced on fabric using design paper.






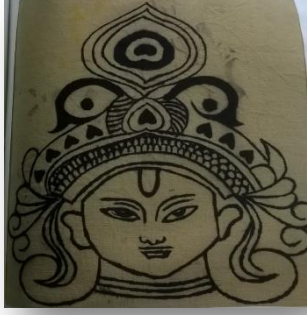
2.2.13. Outlining and filling of colour in design: - Traditional black colour was prepared by fermentation method using jiggery and iron filling. Black colour obtained with traditional method of Kalamkari leaves

odour in the painted sample. Therefore it was an attempt to replace traditional method of preparation of black colour. In the present study black colour was prepared using *ficus religiosa* bark powder. Jet black colour was obtained and applied for outlining of the 4 selected designs. Filling of 4 different designs was done with orange and yellow ochre colour. Out of 4 selected designs, peacock design was filled with only orange colour. Another design of elephant was filled with yellow ochre. 4th design of geometrical floral design form was obtained with black colour and filled with both orange and yellow colour.

2.2.14. Ageing: - The painted fabric was then kept for ageing of 24 hours.

2.2.15. Steaming: - Steaming was carried out to enhance the absorbency of dyes for 30 Minutes.

2.2.16. Washing: - After steaming, all the painted samples were thoroughly washed with cold running water and finally dried in shade.

Selected Motifs	Painted Motifs on fabric
	
<p>Figure 1: Motif of Peacock</p>	<p>Figure 1: Motif of Peacock</p>
	
<p>Figure 2: Motif of elephant</p>	<p>Figure 2: Motif of elephant</p>
	
<p>Figure 3:-Motif of Krishna</p>	<p>Figure 3:-Motif of Krishna</p>

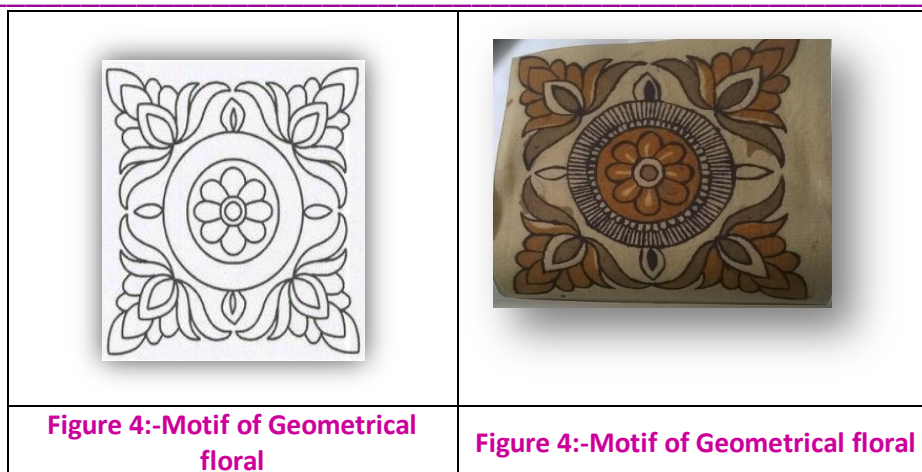


Figure 4:-Motif of Geometrical floral

Figure 4:-Motif of Geometrical floral

Effect of Peepal Bark as Natural Black and other three mordants In Kalamkari Painting.

3. RESULTS AND DISCUSSION

In the present work colour from Peepal bark was extracted and use to prepare three different colours using three different mordants.

Optimization of mordants concentration was carried out by taking 2% and 3% mordant concentration. Ferrous sulphate, Sodium molybdate and Potassium dichromate were selected as mordants and it was noted that 3% concentration showed optimum depth of colour on the khadi cotton.

Table No 3.1 Visual analysis of the painted sample by peepal bark extract

Sr. No	Mordant	Mordant concentration	Coding	Colour Obtained
1	Ferrous Sulphate	2% and 3%	FRKCFS3	Black
2	Sodium Molybdate	2% and 3%	FRKCSM3	Orange
3	Potassium Dichromate	2% and 3%	FRKCPD3	Yellow ochare

Table No 3.2 washing fastness of Khadi cotton painted with Peepal bark extract

Sr. No	Mordant	Mordant Concentration		2%		3%	
				(CC)	(CS)	(CC)	(CS)
1	Ferrous Sulphate	2%	3%	5	5	5	5
2	Sodium Molybdate	2%	3%	3	5	4	4.5
3	Potassium Dichromate	2%	3%	4.5	5	5	5

Khadi cotton painted with Peepal bark extract using ferrous sulphate, sodium molybdate and potassium dichromate as mordants were subjected for the wash fastness test.

Table 3.2 exhibits the ratings given towards the wash fastness. In case of ferrous sulphate 2 and 3% mordant concentration showed excellent results which rated (5) on gray scale, with absolutely no colour change in black which was used for the outlining of the design.

Orange colour which was imparted when sodium molybdate was used as mordant in preparation of painting paste along with Peepal bark extract and babul gum. Table reveals that 2 % concentration of sodium molybdate showed fair fastness in terms of colour change and no staining was observed in adjacent fabric with excellent (5) rating. In case 3% mordant concentration showed improved results exhibited, good wash fastness in terms of colour change and very good results rated 4/5 towards colour staining.

Potassium dichromate exhibited yellow ochre colour. It can be seen from table that 2% mordant concentration showed very good results which rated (4/5) towards wash fastness whereas increase

concentration i.e. 3% mordant concentration exhibited excellent wash fastness which rated 5 on a gray scale. From the above result it can be said that the colour obtained with the use of ferrous sulphate, sodium molybdate and potassium dichromate in preparation of painting paste for painting of khadi cotton is suitable with fair to excellent wash fastness.

Table No 3.3 Sunlight fastness of painted textile substrate

Sr. No	Mordant	Mordant Concentration		2%	3%
		2%	3%	(CC)	(CC)
1	Ferrous Sulphate	2%	3%	4.5	5
2	Sodium Molybdate	2%	3%	3.4	5
3	Potassium Dichromate	2%	3%	4.5	5

Tables 3.3 reveal the sunlight fastness of 2% and 3 % mordant concentration of selected mordants. 2% ferrous sulphate and potassium dichromate showed very good i.e. in (4/5) sunlight fastness when rated with gray scale where as 2% sodium molybdate as mordant showed fairly good and 3% mordant concentration showed good sunlight fastness. Where as in case of 3% ferrous sulphate and potassium dichromate as a mordant resulted in excellent sunlight fastness which rated (5) on gray scale.

Table No 3.4 Dry and wet rubbing fastness of painted textile substrate

Sr. No	Mordant	Mordant Concentration		Wet rubbing				Dry rubbing			
				2%		3%		2%		3%	
				CC	CS	CC	CS	CC	CS	CC	CS
1	Ferrous Sulphate	2%	3%	4.5	5	4.5	5	5	5	5	5
2	Sodium Molybdate	2%	3%	5	5	4	5	5	5	5	5
3	Potassium Dichromate	2%	3%	5	5	5	5	5	5	5	5

Table 3.4 exhibits the rating of dry and wet rubbing fastness of the khadi cotton painted with peepal bark extract. Khadi cotton samples were painted with a outlining and colour extracted from peepal bark .Subjected for wet and dry rubbing. Tested samples were then evaluated towards the fastness. When 2% and 3% ferrous sulphate was used in painting paste of peepal bark as mordant. Exhibited very good wet rubbing fastness Dry rubbing exhibited excellent fastness when 2 and 3% ferrous sulphate was used as a mordant. All the painted sample which were mordanted with sodium molybdate and potassium dichromate with both 2 and 3 as mordant exhibited excellent dry and wet rubbing fastness except 3% sodium molybdate which showed slight decrease in fastness which rated (4) as good fastness absolutely no staining was noted in case of all the undyed adjacent fabric which rated (5) with excellent dry and wet rubbing fastness.

4. CONCLUSION: -

In the present work focus has been given on the preparation of black colour. Peepal bark extract was used to obtain black colour. Study was undertaken to reduce the step of fermentation. Taking this into consideration optimization of 2% and 3% ferrous sulphate as mordant was used to prepare black colour. Study highlights the use of other mordants i.e. sodium molybdate and potassium dichromate which imparted orange and yellow ochre colour when used with peepal bark extract. The painted samples were evaluated in terms of washing, sunlight and dry and wet rubbing fastness. Painted samples had good results with jet black obtained with peepal bark extract and fastness properties. Therefore the modified method of obtaining black colour with peepal bark for kalamkari painting is found suitable.

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