



Sustainable Approach to Rebuild Dyeing in Traditional Craft of Chamba Embroidery

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Introduction

Chamba state of Himachal Pradesh was famous for embroidery known as *Pahari* embroidery. The most popular article made was embroidered coverlets and hangings known as *Dhkanu* (square coverlets) or *Chhabu* (circular coverlets) used for covering the ceremonial gifts as well as offerings made both for Gods and rulers (Sharma, 2009). In later centuries, unavailability of silk yarns and inappropriate use of colours adversely affected the quality of embroidered products. Hence, a sustainable approach was adopted to achieve the aesthetics of embroidery and to explore new possibilities under changed circumstances. The study was undertaken to develop standardized recipes for dyeing base cloth and untwisted yarns used for embroidery in traditional colour palette using natural dyes available locally. This would comprise of extraction, application of selected natural dyes on cotton fabric and silk yarns as well as testing of dyed material for color fastness properties. Natural sources of dyes that were easily available to the artisans in Chamba were selected for dyeing. Also, due to limitations of infrastructure available with artisans, ease and simplicity of application of dyes was of utmost importance.

Bleached cotton fabric was dyed in a colour used traditionally for embroidery. The shades developed for embroidery yarns were in line with those used in earlier times in 18th century. Dyed fabric and embroidery yarns were colour fast to washing, dry cleaning and light. Intervention with the artisans was carried out by conducting interactive workshops and follow up field visits to Chamba. Interventions through workshops helped in capacity building of the artisans and proved invaluable. They helped the artisans to reorient themselves towards sustenance of the traditional form of craft.

Methodology

Dyeing of raw material included application of natural dyes on base cloth and embroidery yarns to develop the traditional colour palette. Dyed raw material was tested for their colour fastness with respect to washing, dry cleaning and light. Identification and selection of indigenously available natural dyes was done during the field trips made by the investigator.

Dyeing of base cloth with *Harad*

To prepare the fabric for dyeing, it was de-sized by soaking in lukewarm soapy water for 4-5 hrs. The dyeing liquor was made with 30% dye (*Harad*) on weight of the fabric (owf).

The m.l.r taken was 1:40. The grounded dye particles were dissolved in little water (approximately 50 ml) at room temperature to form a dye solution. This solution was sieved and added to required quantity of water to make up the dye bath. The pre-soaked cotton fabric was entered into the dye bath at room temperature for 45 minutes with intermittent stirring. After dyeing, the fabric was rinsed in cold water and soaped with a mild detergent.

Dyeing of embroidery yarn

Five ply untwisted mulberry silk yarns was used for experiments. The traditional color palette was developed using different pre mordanting and post mordanting procedures using selected natural dyes. The dyes used were turmeric 50% (*curcuma longa*), *Heena* 50% (*Lawsonia inermis*), *Ratanjot* 100% (*Arnebia nobilis reichb.f.*), *Manjistha* 100% (*Rubia cordifolia*), *Tesu* 100% (*Butea monosperma*), Pomegranate rinds 100% (*Punicum granatum*), red onion skin 100% (*allium cepa*), wood bark of 80% (*Pinus sabiniana*), Cone of 80% (*Pinus sabiniana*), *Katha* 50% (*Acasia katechu*), Calcium carbonate + turmeric 5%, 12%, 20% (1:1). The mordants used were *Phitkari* (Alum), Ferrous sulphate and Copper sulphate. For premordanting 10% of these foresaid mordants were used and for postmordanting 1% quantity of these mordants was used. The procedure for dyeing with *Tesu* has been shown below. The same procedure was followed for all the dyes.

Preparation of yarn for dyeing

The silk yarns were degummed in a solution containing 3% soap and 0.5% of soda ash using 2.5 litres for 100 gms of yarn at 80°C temperature for 45 minutes (figure 1). After treating the yarns for 45 minutes, the yarns were removed from the solution and hung vertically to drain out excess of water. The yarns were subsequently washed in cold water thoroughly.



a. Soda ash added to soap solution



b. Silk yarns immersed in degumming solution



c. Position of rubber strap changed

Figure 1: Process showing preparation of degumming solution

Collection and preparation of dye material

Dyes were obtained in the form of powder (*turmeric*, *heena*, and combination of calcium carbonate+ *turmeric* (1:1)), peel (*ratanjot*) as well as in solid form (*katha*, *manjistha*, pomegranate rind, pine tree bark).the solid pieces of the dye were manually broken into smaller pieces which were used for dye extraction.

Extraction of the dye

The extraction of all the natural dyes in the study was carried out in aqueous medium. The amount of natural dyes used for extraction of dyes is given earlier. The required amount of dye was added into 2.5 liters of water and boiled for 20 minutes at 100°C temperature with constant stirring. Extracted dye was sieved through a strainer.

Pre mordanting

Mordanting was carried out by dissolving the required amount of mordant in water using 2.5 litres for 100 gms of yarn. The yarns were immersed in the mordant solution for 60 minutes at room temperature. At the intervals of 10 minutes

each, the yarns were lifted out of the solution, rotated and immersed in the solution again. All the layers of yarns in the hank were exposed to the mordant solution by changing direction of yarns from inside out and vice versa. The samples were squeezed and dried without washing.

Application of dye

Pre mordanted yarns were thoroughly wetted in plain water, squeezed and beaten on the floor two to three times (figure 2a). The process was repeated till the yarns became heavy and sank under water in the bucket (figure 2b).

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a. Yarns squeezed and beaten on floor two-three times

b. Yarns sunk in water and ready for dyeing

Figure 2: Process showing preparation of silk yarns before dyeing

The wetted yarns were pre-soaked in the extracted dye solution prepared earlier for 10- 15 minutes at room temperature (figure 3). Direction of yarns were changed continuously and beaten on floor three to four times.

Yarns were suspended from rubber straps when immersed in hot dye solution (figure 4a). The dye solution was heated to a temperature of 80°C and pre soaked yarns were entered into the dye bath for 10- 15 minutes (figure 4b). Yarns were stirred and position of rubber strap was continuously changed (figure 4c). After dyeing, the yarns were left in the dye bath for 10 minutes (figure 4d). Finally, yarns were dried (figure 4e) and post-mordanting procedures were carried out.



a. Yarns dipped in cold dye bath

b. Yarns exposed to dye solution

c. Yarns beaten on floor

Figure 3: Process showing pre soaking of silk yarns before dyeing



a. Rubber straps tied for dyeing

b. Yarns entered in hot dye bath

c. Position of rubber strap changed

d. Yarns left in dye bath

e. Yarns hung on rod for drying

Figure 4: Process showing dyeing of silk yarns

Post mordanting

For post mordanting 2.5 litre of water was taken for 100gms of yarn and required amount of mordant was dissolved in water. The dyed yarns were immersed in the mordant solution for 10 minutes at room temperature. This was followed by soaping of yarns in *reetha* solution at room temperature for 10-15 minutes. This was followed by rinsing in cold water for two to three times and yarns were dried in shade.

Colour fastness of dyed raw material

The standard used for testing wash fastness of dyed fabric and yarns were is/iso 105- c10: 2006. The standard used for evaluating colourfastness to dry cleaning for dyed fabric and yarn is: 4802:1988. The standard used for evaluating colour fastness to light for dyed fabric and yarn is: 2454: 1985.

Results and discussion

The results of colourfastness to washing, dry cleaning and light for dyed fabric and yarns are discussed as follows:

Dyed fabric

Bleached cotton fabric was dyed with *harad* (figure 5) to obtain the colour used traditionally for embroidery (figure 6). The rating for colourfastness of fabric with respect to washing and dry cleaning was excellent (4-5) for change in colour and negligibly stained (4-5) for staining. The rating for colourfastness to light was good (3-4)

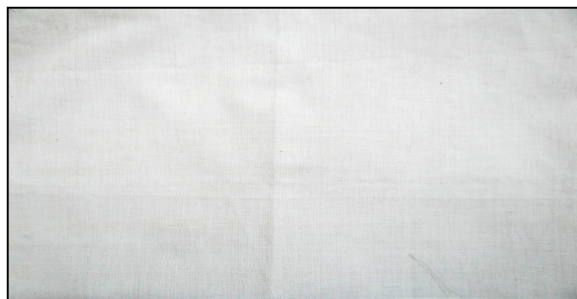


Figure 5: Bleached cotton fabric before dyeing

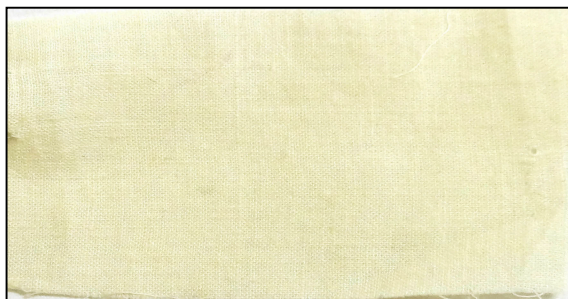






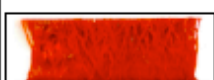
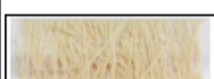
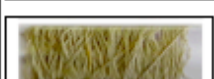




Figure 6. Fabric after dyeing with harad

Dyed embroidery yarns

Total eleven shades were developed using 11 dyes, 2 pre mordants and 2 post mordant combinations (pre mordant- dye- post mordant) (Table attached)

Color Obtained	Dye and mordant combination Pre mordanting- Dyeing- Post mordanting	Color Fastness				
		Washing		Dry cleaning		Rating on Blue Wool
		Change in Color	Staining on cotton	Change in Color	Staining of Solvent	
	10% alum, 50% turmeric, 1% alum	4	1-2	3-4	2-3	1
	10% alum, 100% <i>tesu</i> , 1% alum	3-4	4	4-5	4-5	2-3
	10% alum, 100% pomegranate rinds, 1% alum	3-4	4-5	4-5	4-5	3
	10% alum, 50% <i>heena</i> , 1% alum	4	4-5	4-5	4-5	3
	10% alum, 100% <i>ratanjot</i> , 1% alum	4	4-5	4-5	4-5	2
	10% alum, 100% <i>manjistha</i> , 1% alum	4	4-5	4-5	4-5	3
	10% copper sulphate, 50% <i>katha</i> , 1% alum	3	4	4-5	4-5	5
	10% alum, 80% pine wood bark, 1% alum	4	4-5	4-5	4-5	3-4
	10% copper sulphate, 80% pine wood bark, 1% ferrous sulphate	4	4-5	4-5	4-5	4
	5% calcium carbonate +turmeric, 1% ferrous sulphate	4	4	4-5	4-5	2-3
	10% alum, 20% calcium carbonate+ turmeric, 1% alum	4	2	4-5	4-5	2-3

Summary and conclusion

In present study, sustainable approach was undertaken to restore natural dyeing for sustenance of traditional craft of Chamba embroidery. In dyeing of base cloth, bleached fabric was dyed with *harad* to simulate the traditionally used unbleached fabric. The findings for colourfastness revealed that fabric dyed with *harad* was colour fast to washing, dry cleaning and light. Shade card in traditional colour palette was developed for embroidery yarns, which comprised of 11 shades with different pre and post mordant combinations. Most of dyed yarns were colour fast to dry cleaning as they showed excellent rating for change in colour and for staining of the solvent with the exception of turmeric which was not as good as others. Keeping the above results and the delicacy of the craft in mind dry cleaning was recommended, as most of the dyes were colour fast to dry cleaning. The colourfastness to washing was varied for different dyes and mordants. Most of the dyes showed colourfastness to washing between good to fair. The rating for staining on cotton was between negligibly stained to slightly stained for most of dyes except for turmeric and calcium carbonate +turmeric where it was considerably stained. The end use of the products was meant more for decoration purpose rather than personal use. Therefore, regular washing of articles made was not required and embroidered products should be washed separately and gently with minimum agitation. The colourfastness to light for dyes like *katha*, pine wood bark showed rating between good and rather good. Dyes like *heena*, *manjistha*, *tesu* and pomegranate rinds showed average colourfastness to light. Dyes such as turmeric, *ratanjot*, and calcium carbonate +turmeric showed colour fastness between average to low with few exceptions. Keeping the results of light fastness in mind most of the articles would be developed for indoor use.