

Assessment of Different Materials' Suitability for Resist Printing

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ABSTRACT

Textile dyeing and printing involves the production of a predetermined colored pattern on a fabric, usually with a definite repeat. It can be described as a localized form of dyeing, applying colorant to selected areas of the fabric to build up the design. The objective of this study was to find out various commonly available materials and techniques for resist printing as an alternative of wax. It was also tried to assess the resisting effect of the selected resisting agents by developing different samples. Crayon and glue were finalized for further study. These were applied on the fabric through brush whereas cone method was also used for only glue. It was found from the results that glue method with both the techniques (cone and brush) got the best result. Therefore this method was selected for the development of T-shirts and cushion covers. It can be concluded that glue can be used as cheaper and safer alternative for wax but both have their own beauty, appearance and effect. Where plain surface is required, glue is more suitable but for cracked effect, crayons are more suitable.

Key Words : Textiles, Dyeing, Resist printing, POP, Crayons

INTRODUCTION

India has diverse and rich textile traditions which are reputed all over the world and admired for beauty, texture and durability. There are various methods to adorn textiles like dyeing & printing, embroidery, weaving etc. Dyeing and printing is the most common method used worldwide. Textile dyeing and printing involves the production of a predetermined colored pattern on a fabric, usually with a definite repeat. It can be described as a localized form of dyeing, applying colorant to selected areas of the fabric to build up the design.

The three styles of printing are described below.

- Direct style
- Discharge style
- Resist or reserve style

Direct style :

This style is also referred as steam style because in most of the cases, the printed fabric is steamed to fix the color. In this style, the color is applied directly to the fabric in the form of a paste

containing the coloring matter, thickener or binder and required ingredients. After printing and drying, the color is fixed by steaming or curing.

Discharge style :

A classical discharge print is obtained when a fully dyed fabric is printed with an agent who will chemically destroy the ground shade and produce a white discharge. If dyes stable to the discharging agent are incorporated in the discharge paste, then colored discharges are produced by simultaneously destroying the ground shade and fixing the stable illuminating color.

Resist style:

Resist printing is a fabric printing method in which a dye resistant substance is applied to certain specified areas of the material prior to immersion in a dye bath and subsequently removed so as to permit the original hue to act as a pattern against the colored ground. The resist style, like the discharge style, related to the production of white and colored patterns on various colored ground but the difference between the two is applied to the cloth after it has been dyed whereas in resist style, the resist style is applied to cloth before it undergoes any dyeing. Thus in resist printing, the printing portions are treated in a manner that dyes will no longer take on them and a white pattern will be formed on the background of the dye. In the resist printing technique, material like thread, clay, wax and resins are used and applied over the area which is to be printed, to resist the dye. The fabric is then immersed in the dye bath. After dyeing, the resisting material attached to the fabric is removed. The seepage of dye into the edges of the resist areas creates a tonal effect. The tonal effect thus produced is subtle and soft. With the old method of physical resist printing, hydrophobic products or printing pastes were applied to the fabric to avoid contact and penetration of dyeing liquor. Now, the most diffused printing system is the chemical resist printing carried out with different printing methods, using pastes containing chemicals, which avoid fixation of background dyes.

Resisting Materials :

These are the substances which resist the dye from penetrating into the fabric.

– *Mechanical-resisting agents*: The Mechanical Resisting agents include waxes, fats, resins, thickeners and pigments, such as china clay, the oxides of zinc and titanium, and sulphates of lead and barium. Such mechanical resisting agents simply form a physical barrier between the fabric and the colorant. They are mainly used for the coarser and, perhaps, more decorative styles in which breadth of effect and variety of tone in the resisted areas are of more importance than sharp definition of the pattern. A classical, and nowadays almost unique, example of a purely mechanical resist is to be found in the batik style, using wax applied in the molten state.

– *Chemical-resisting agents* include a wide variety of chemical compounds, such as acids, alkalis, various salts, and oxidizing and reducing agents. They prevent fixation or development of the ground color by chemically reacting with the dye or with the reagents necessary for its fixation or formation. The actual choice of chemical-resisting agent depends, therefore, on the chemistry of the dye being used and its fixation mechanism. Consequently, as in discharge printing, a working knowledge of the relevant chemistry is necessary when choosing effective resisting agents.

Origin of the Research Problem:

Batik is a traditional technique for surface ornamentation which is practiced all over the world. In this printing, molten wax is used for resisting the dye. It is cheap and easy to use but constant heating is a problem where a heating system is not available. Apart from this, handling of molten wax requires care. It is impossible to achieve shaded or serrated effect on the fabric or paper. Some experts say that it is a costly exercise, its method of application & removal is difficult and lengthy. Therefore need for non-toxic, water-based resists which are easy to clean up other than wax was felt. Meanwhile, as an alternative to produce a less expensive batik effect, the local raw materials can be explored as they are cheap, easily available and can meet up the demand of local market. Although this is often molten wax, it may also be any other dye proof substance like starch, clay and other pastes. In this study efforts have been directed towards exploring materials, which are easily available, easy to apply and eco-friendly. There are so many products which have resisting quality, means, water or other liquids cannot pass through surface on which these materials are applied. These materials include rice paste, plaster of Paris, glue, crayons etc.

Objectives :

1. To find out different materials and techniques for resist printing as an alternative of wax.
2. To assess the resisting effect of the selected resisting materials by developing different samples.
3. To develop cushion cover and T-shirt by using the best resist material and technique.

Review of literature :

Jane Dunnewold (2012) used flour paste resist and simple batik tools to create a crackly background that is the trademark of batik design. She created some custom fabric prints with a flour resist dyeing techniques. She used simple school glue for resisting the dye. Lisa Kerpoe (2012) used corn syrup as an economical alternative to sodium alginate to create her easy batik fabric prints. Karen (2011) used rice flour as a resisting agent to create design. The paste resist served to block cloth areas when applied through a stencil. The blocked areas may be the original white (undyed) portion of the fabric, or may be areas that have already been dyed that has been protected from further dyeing. John Marshall (2011) stated that the rice paste is typically made from sweet rice, which has high starch content and is therefore rather sticky. He has been looking for an easier, dry-cleaning free method of getting the same effects. Interestingly, there are other traditions that use starchy pastes for the resist, like rice paste in Japan or cassava flour in Africa. In North America, wheat flour is used. Cynthia St. Charles (2011) in her article "Dyeing Fabric: Easy Batik Design Technique using Gel Glue" stated that glue can be used for resisting the fabric surface from getting colored. It is very cheap and easy to apply. Children can also work with it harmlessly. Gurvee Chauhan and Pankaj Gill (2009) used POP as resisting material with different concentration, dipping time and other factors.

METHODOLOGY

This chapter deals with various methods and procedures adopted for the study and development of different samples using different resist materials, selection of final samples, developing products i.e. T-shirt and cushion cover and assessing the acceptability of the product. The methodology of the present work has been described under the following phases:

Phase I :

In this phase review related to the study was collected.

Phase II

Selection of fabric :

Cotton fabric was selected for developing different samples. First of all, cotton fabric was scoured by standard method.

Selection of resisting materials :

Different commonly available resisting materials like potato, mud, sago, glue, wheat flour, tooth paste, crayons, POP etc, were assessed for their resisting quality and then only glue and Crayons were selected for the further study.

Selection of design to be created on samples :

4 designs for each resisting method were decided to creates therefore 8 designs in total were created.

Preparation of Samples :

Preparation of samples was divided in several steps:

- Preparation of fabric : Scoured and ironed cotton fabric was used.
- Tracing the design : Selected designs were traced on fabric using tracing table. Central and all over arrangement of motif was used in developing samples.
- Applying resisting material : After tracing the designs, all resisting materials were applied on samples. Following were the methods which were used for resist material application.

I. Crayons- A. Melted crayons by brush. B. Direct designing using crayons

II. Glue- A. By brush B. By cone

Drying the resisting material :

After application of resisting material, all the samples were air dried. Some samples, where resisting material was applied on both side of fabric, were dried for longer.

Dyeing the samples :

Samples were dyed using naphthol dyes. First all the samples were dipped in base and then salt bath. After that samples were kept for drying.

Removing the resisting materials :

Various methods like boiling in water, rubbing, ironing between the news paper were used for removing the resisting material. Glue was removed by boiling the samples in hot water for 5 minutes whereas crayons from the samples were removed by ironing between the newspaper and all the samples were rinsed under tap water.

Finishing the samples :

Samples were finished by ironing and then mounted on paper sheets.

Phase III :***Development of products :***

Best technique that was glue by brush and cone method was selected for the development of cushion cover and T-shirt.

Sample Assessment :

Ten experts and 20 students from the field of fashion and textiles designing were selected for assessment of developed samples. On the basis of study, 5 point rating scale (Excellent-5, Good- 4, Fair- 3, Average-2, Poor- 1) was used for evaluation of resist printing product design.

Analysis of data:

For the analysis of data, average was used.

$$\text{Average} = \frac{\text{Rank given by respondents}}{\text{Total no. of respondents}}$$

Development of samples:***Resist printing using Glue :***

To make resist printing more child-friendly and eco-friendly process, wax can be replaced with white glue. This technique can be used to make various exciting resist printing crafts and projects. It is applied on fabric surface through various means *i.e.* cone, direct through bottle, or it can be liquefied and applied by a simple paint brush. It is easily available, cheap, easy to handle and foremost effective for limited use. Glue was applied on scoured and ironed cotton fabric, and then glue was allowed to dry. Then ice dyeing was used to dye the samples. To remove the glue, fabric was boiled in warm water for 3 to 5 minutes. The glue was softened as it soaks longer. We can speed up the process by rubbing on the areas with glue. After all the glue had been removed, the fabric was allowed to dry.

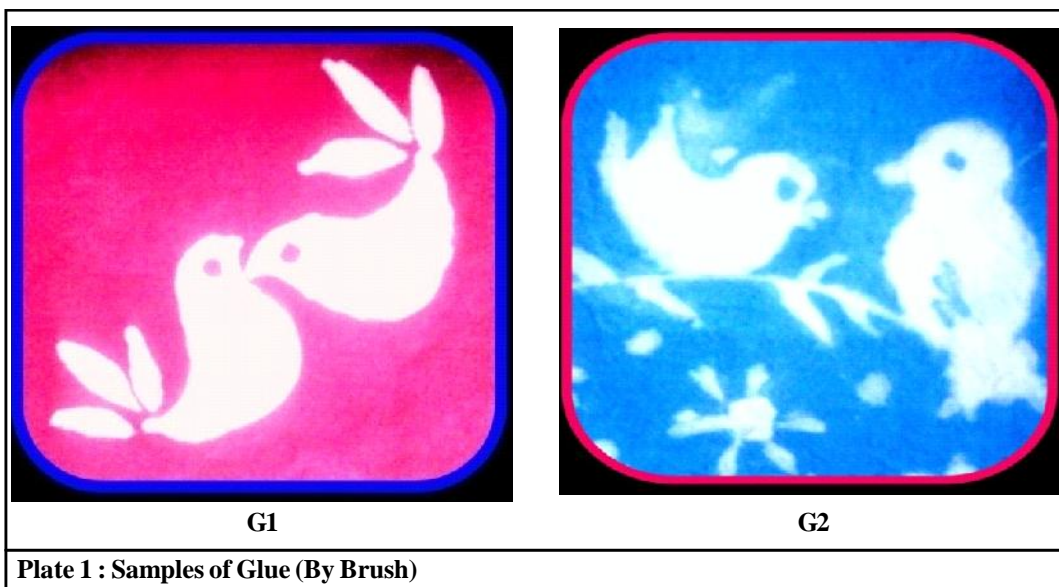


Plate 1 : Samples of Glue (By Brush)

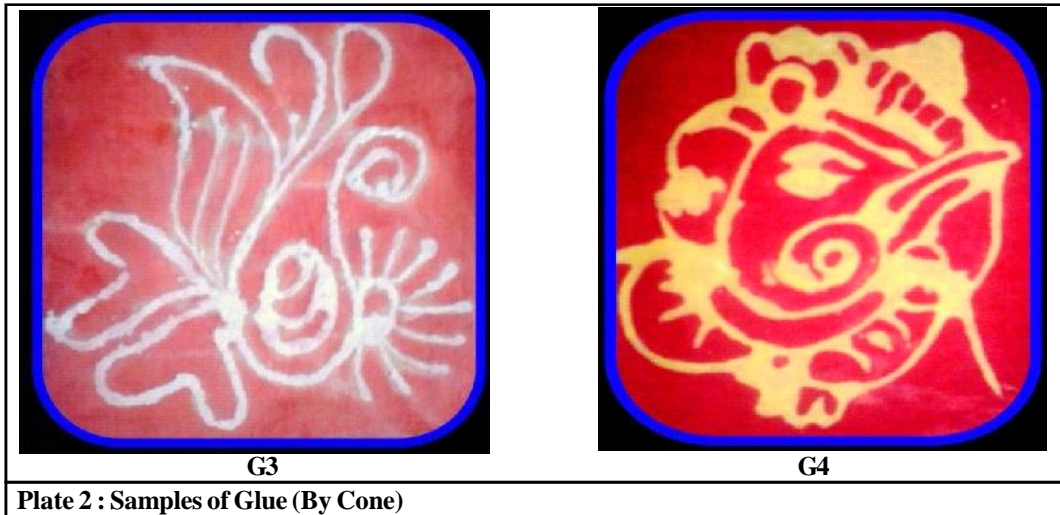


Plate 2 : Samples of Glue (By Cone)

Resist Printing using Crayons :

A crayon is a stick of colored wax, charcoal, chalk or other materials used for writing, coloring, drawing, and other methods of illustration. In this project, crayons were applied by two techniques.

Direct crayons :

Crayons were applied directly on the cloth according to design.

Melted Crayons :

In this technique, waste crayons were melted in a pan and applied through brush on the designs.

First, cotton fabric was cut into the desired size and it is framed then design was traced. Design can be made with crayons directly or melted crayons can be used. Plastic placemat was placed under the fabric in case the crayon seeps through. To remove the crayons, the fabric was soaked in warm water for 15 to 20 minutes. This process can be speed up by rubbing on the areas with crayons. After all the crayons have been removed, fabric was dried.

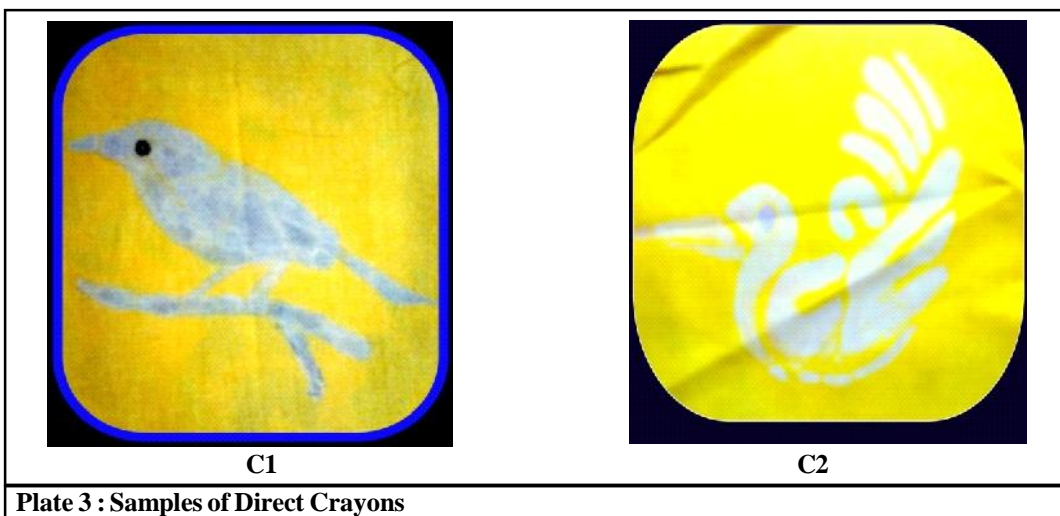


Plate 3 : Samples of Direct Crayons



Development of products (T-Shirt, cushion cover):

Best technique (glue) was applied in developing products. First of all, the t-shirts were scoured by standard method. Designs were traced on the upper centre front of each T-shirt. Glue was applied on both the side of T-shirt. It was allowed to dry for 24 hrs. Then T-shirts were immersed in dye bath prepared by methods discussed earlier.

In the same manner cushion covers were also constructed. Cotton fabric was used for cushion cover.

RESULTS AND DISCUSSION

Table 1 : Result analysis of the Glue sample

Sr. No.	Samples	Poor 1		Average 2		Fair 3		Good 4		Excellent 5	
		Rating	%	Rating	%	Rating	%	Rating	%	Rating	%
1.	G1 (Glue by Brush)	0	0	1	3.3	1	3.3	4	13.3	24	*80
2.	G2 (Glue by Brush)	2	6.6	1	3.3	7	23.3	14	*46.6	6	20
3.	G3 (Glue by Cone)	2	6.6	1	3.3	10	*33.3	12	40	5	16.6
4.	G4 (Glue by Cone)	0	0	1	3.3	2	6.6	7	23.3	20	*66.6

It can be seen from the above table that sample G1 in which glue is applied through the brush got the maximum percentage in excellent *i.e.* 80% where as sample G4 *i.e.* 66% got the second ranking which was prepared by using cone.

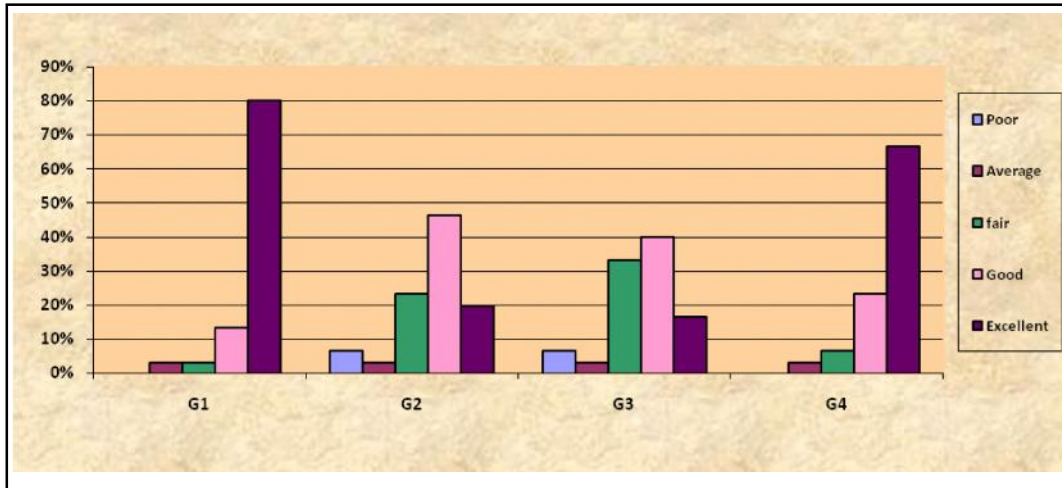


Fig. 1 : Analysis of the Glue sample

Table 2 : Result analysis of the Crayon samples											
Sr. No.	Samples	Poor 1		Average 2		Fair 3		Good 4		Excellent 5	
		Rating	%	Rating	%	Rating	%	Rating	%	Rating	%
1.	C1 (Direct crayon)	0	0	4	13.3	11	36.3	13	*43.3	2	6.6
2.	C2 (Direct crayon)	2	6.6	6	20	13	*43.3	8	26.6	1	3.3
3.	C3 (Melted crayon)	1	3.3	1	3.3	10	*33.3	9	30	9	30
4.	C4 (Melted crayon)	0	0	3	10	10	*33.3	8	26.6	9	30

It can be observed from the above table that sample C1 in which crayons are applied directly, got the maximum percentage in good i.e. 43.3% where as samples C3 and C4 got the second ranking (33.3% in fair) which was prepared through using melted crayon.

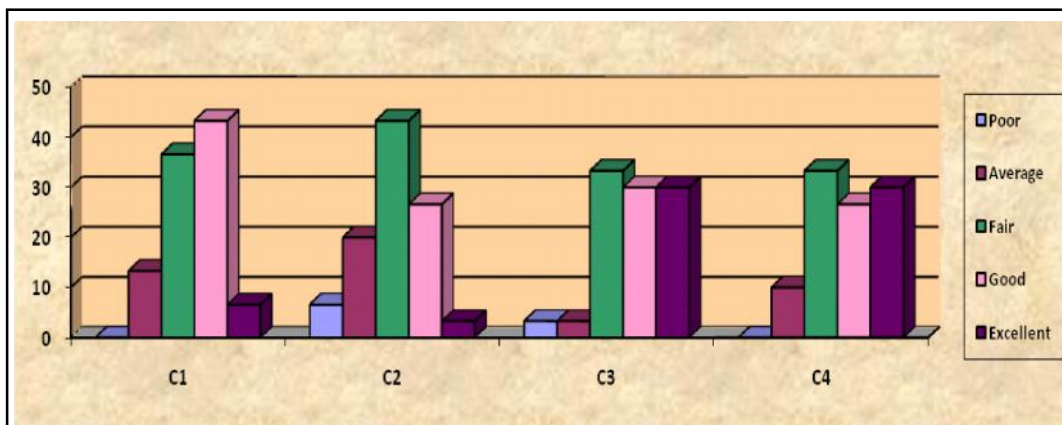


Fig. 2 : Analysis of the Crayon samples



Conclusion :

Textile dyeing and printing involves the production of a predetermined colored pattern on a fabric, usually with a definite repeat. It can be described as a localized form of dyeing, applying colorant to selected areas of the fabric to build up the design. The resist style, like the discharge style, related to the production of white and colored patterns on various colored ground but the difference between the two is applied to the cloth after it has been dyed whereas in resist style, the resist style is applied to cloth before it undergoes any dyeing. Thus in resist printing, the printing portion are so treated that dyes will no longer take on term and a white pattern will be formed on the background of the dye. Wax is the most widely used resist material in Batik, but it has some disadvantages too. Use of wax in batik has many times led to accidents. It is quite costly. Its method of application and its removal is difficult and time taking. It also causes air pollution as fumes are released during heating. Thus, studies were carried out on resisting materials other than wax batik which included the use of various starches, gums, clays, glue etc.

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