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Block prints of flame of forest dye on silk

The use of natural dyes on silk is on increase in recent days for their distinctive print effect with soft and pastel shades. The authors dwell upon the use of dye stuff prepared from flame of forest on silk with block prints, and present the results of their study on its colour fastness with different treatments and mordants. Details.

Flame of forest flower

The art of hand block printing passed from generation to generation, has traditionally been done using natural dyes. Natural vegetative dyes have gained importance all over the world after a lapse of more than a century. In India, various garments like saris, kurtas, dupattas, skirts and household clothes like bedspreads, pillow-covers etc., are block printed with natural dyes. In recent times, the export of block printed garments has grown manifolds as its demand has increased especially in the western countries because of its distinctive patterns and shades developed. The revival of natural dyes like indigo, pomegranate rind, myrobalan, lac and manjistha using eco-friendly chemicals like alum and iron produced pleasing tones of blue, yellow, brown, green, rust-red, black, chocolate etc., on cotton, wool and silk. For fixing the colour to get proper print to the fabric, use of resist or mordant or combination of both is essential. This material is applied with the help of a brush or wooden block or through stencil to obtain print on fabric. Printing fabric with natural dyes involves the printing of mordant on fabric and dyeing in natural dye extract which react with mordant applied on the cloth.

Flame of forest tree

Traditionally, use of natural dyes for printing of textile was limited to cotton fabric. But due to distinctive effect of the print and soft, pastel shades obtained on silk when printed with natural dyes, attempts were made to print silk with natural dyes. Natural dyes have better bio-degradability and generally high compatibility with the environment. They are non-toxic, non-allergic and non-carcinogenic.

Preparation of fabric

The sample silk fabric was scoured before printing. The fabric was soaked with 1% soap solution for one hour with material to liquid ratio at 1:20 to remove impurities and finishing agents. The fabric was then washed three to four times in plain water.

Myrobalan treatment

Myrobalan is a natural mordant and a pre-treatment with myrobalan gives better dye uptake to the silk. To impart 10% myrobalan treatment to silk fabric, myrobalan powder was soaked in water for twenty-four hours and then filtered. Silk fabric was introduced to the solution and soaked in it for three hours with material to liquor ratio as 1:20. The material was then exposed to direct sun by spreading it on plain surface for 3-4 days.

Preparation of printing paste

Different mineral salts act as mordant in natural dyeing. Three mordants namely alum, stannous chloride and ferrous sulphate were selected for printing silk. The concentration of the mordant was optimized with the help of subjective evaluation of

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the prints on the basis of clarity of design, sharpness of design and level of shade developed. The optimized concentrations of alum were 10 and 15%. Optimized concentration of Stannous Chloride and Ferrous sulphate were 4 and 5%. Starch jelly was prepared using rice starch as thickening agent for printing paste. Mordants were mixed thoroughly in the starch jelly to prepare the printing paste.

Printing with mordant paste

Once the paste was ready, the silk fabric was set on printing table. Sufficient amount of printing paste was added to the printing trough to keep its surface sufficiently moist with printing paste. The block was then placed on the surface of printing trough in different directions so that the design area of the printing block took enough printing paste. The printing block was then stamped directly on the fabric. The backside of the printing block was hammered with wooden mallet which results into complete transfer of printing paste from block onto the fabric. After printing the fabric was sun dried.

Washing

It is a very important stage of printing process because excess of mineral salts, thickening agents etc., are removed in washing. The silk printed with mineral salts was washed in a bath of flowing water by keeping printed side of the fabric touching water surface. While washing, the fabric was kept on continuous motion. The process was carried out inside the water surface. The printed fabric treated in water for 15-30 minutes, was squeezed very lightly and dried on the ground in flat condition.

Block printing with dye stuff

Development of colour with natural dye source

The printed material does not show any colour at this stage except the tones of mineral salts. The colours are seen when dyeing is done in the concentrated dye solution extracted from natural dye sources. Five percent was the optimized concentration of Flame of forest dye for dyeing silk. Dye bath was set with MLR 1:30 and dyeing was done with continuous stirring at 60° to 70°C. After dyeing, the fabric was treated 3-4 times in the plain water and shade dried. The dye reacts with mordant in printed area giving it a different shade of colour other than the background colour.

After-treatment

After dyeing, the samples were given after-treatments in 5% solutions of vinegar, common salt, alum, lime juice and Sodium carbonate at room temperature for 30 minutes.

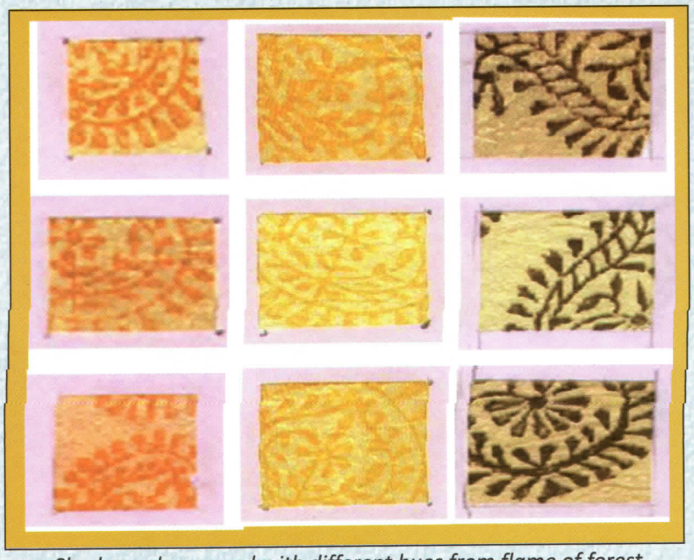
TABLE: FASTNESS GRADES OF AFTER-TREATED PRINTED SILK SAMPLES DYED WITH FLAME OF FOREST DYE

Mordant	Treatments	Fastness Properties						
		Sun-light	Washing		Wet crocking		Dry crocking	
			CC	CS	CC	CS	CC	CS
Alum	Vinegar	7	4-5	5	5	4	5	5
	NaCl	7	4-5	5	5	4	5	5
	Alum	6-7	*	5	5	4-5	5	5
	Lime juice	6	*	5	5	4-5	5	5
	Na2CO3	6-7	4	5	5	4-5	5	5
Stannous chloride	Vinegar	7	Cl	5	5	4	5	5
	NaCl	7-8	5	5	5	4	5	5
	Alum	7	Cl	5	5	4-5	5	5
	Lime juice	6-7	4	5	5	4-5	5	5
	Na2CO3	6-7	4-5	5	5	4-5	5	5
Ferrous sulphate	Vinegar	7-8	5	5	4-5	5	5	5
	NaCl	7-8	4-5	5	5	4-5	5	5
	Alum	7-8	Cl	5	5	4-5	5	5
	Lime juice	Cl	*	5	5	4	5	5
	Na2CO3	7-8	4-5	5	5	5	5	5

Note: CC - Colour change, CS - Colour staining, C - Cotton, S - Silk, * - Hue change

Evaluation of the printed silk

Subjective evaluation: A panel of 10 experts was constituted in order to conduct subjective evaluation of the prints of the samples. The judgment was done on a five-point scale. Subjective evaluation of the prints was based on clarity and sharpness of design and on level of shade. Subjective evaluation was also done for optimization of mordant concentration and also for the after-treated samples for different mordents. After-treated samples printed with alum and dyed with flame of forest dye showed fairly good to good clarity of design, sharpness of design and level of shade while ferrous sulphate and Stannous chloride mordant printed silk exhibited very good clarity of design, sharpness of design and level of shade.



Shade card prepared with different hues from flame of forest

Objective evaluation: Colour fastness tests were performed on the samples printed with different concentrations of mordants and after-treated samples for assessing their fastness to sunlight, washing and crocking both dry and wet by following the standard procedures laid by BIS.

Fastness grades of after-treated printed silk samples dyed with Flame of forest dye are illustrated in the Table. Sunlight fastness of alum printed silk samples after-treated with all the after-treating agents found to be excellent. There was hue change in the samples after treated with alum and lime juice in washing while silk treated with vinegar, common salt and Sodium carbonate had slight colour change. There was no colour staining in the after-treated samples in washing. All alum printed after-treated samples had no colour change and slight colour staining in wet crocking. Neither colour change nor colour staining was observed in the alum printed after-treated silk samples in dry crocking.

Stannous chloride printed silk samples after-treated with all the after-treating agents found to have excellent sunlight fastness. Colour increase was observed in the samples after treated with alum and vinegar in washing while silk treated with common salt, lime juice and Sodium Carbonate had slight colour change. There was no colour staining in the stannous chloride printed after treated silk in washing. All Stannous chloride printed after-treated samples had no colour change and slight colour staining in wet crocking. Neither colour change nor colour staining was observed in the stannous chloride printed after-treated silk in dry crocking.

Colour increase was observed in Ferrous sulphate printed silk samples after-treated with limejuice in sunlight test. Rest of the all after-treated silk samples found to have excellent to outstanding sunlight fastness. Hue change was observed in the samples after-treated with limejuice and vinegar and colour increase in sample after-treated with alum in washing while silk samples treated with common salt and Sodium Carbonate had slight colour change. There was no colour staining in the Ferrous sulphate printed after-treated silk samples in washing. All Ferrous sulphate printed and after-treated samples had no colour change and slight colour staining in wet crocking. Neither colour change nor colour staining was observed in these silk samples in dry crocking.

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News

FIRST WORLD HERITAGE SILK PLANT IN JAPAN

UNESCO declared the Tomioka Silk Mill and Related Sites in Gunma prefecture in Japan as an historic sericulture and silk mill complex established in 1872. Built by the Japanese government with machinery imported from France, it consists of four sites that attest to the different stages in the production of raw silk like production of cocoons in an experimental farm; a cold storage facility for silkworm eggs; reeling of cocoons and spinning of raw silk in a mill, and a school for the dissemination of sericulture knowledge.

UNESCO added that the mill illustrates Japan's desire to rapidly adopt the best mass production techniques, and became a decisive element in the renewal of sericulture and the Japanese silk industry in the last quarter of the 19th century. It marked Japan's entry into the modern, industrialized era, and propelled it to become the world's leading exporter of raw silk, notably to France and Italy.

The Japanese government expressed its deep satisfaction over the statement, and hoped that this recognition "serves as a chance for his role silk factory globally known better." These industrial facilities were "an important platform of technological innovation", and made possible "the mass production of high quality silk," the Ministry of Foreign Affairs of Japan said in a statement. The Tomioka Silk Mill combined incorporation of western technology to "traditional culture of silk in the region", which allowed Japan to become "the leading exporter of silk in the world," it added. The Tomioka Silk Mill is the 14th Japanese cultural heritage site to make UNESCO's World Heritage list.

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