Development of cotton *Kurtis* using *Madhubani* motifs

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■ **ABSTRACT :** The Sanskrit word *Kala* (art) means the divine characteristic, which direct human acts and thoughts. Every tract of land in India has its own style and pattern of art, which is generally known as its folk art. Inspired from *Madhubani* painting an attempt was aimed towards developing new designs for cotton *Kurtis* using *Madhubani* motifs with pigment dyes utilizing hand painting technique. Motifs were documented from *Madhubani* painting and twenty motifs were shortlisted and categorized into five different categories animal and bird motif, floral motif, tree of life motif, human motif and sun motif by a panel of ten judges. One motif was selected and adapted from each category of motif for the development of twenty designs with different colour combinations and placement. The developed designs were shown to a panel of ten judges and were asked to choose one best design for the development of final cotton *Kurtis*. Five cotton *Kurtis* were developed using selected five designs and placements with pigment dyes of red, green, yellow, blue, black, skin colour and orange colours. The colour fastness grades were evaluated for these pigment dyes to various agencies including: washing, light, rubbing and perspiration. Pigment dye black and red shows excellent (5) grades for wash fastness and perspiration. Good (4) rubbing fastness grades and very good (6) light fastness grades were obtained by red and black pigment dyes. An inventory was prepared to record the views of thirty consumers. In this part the consumers preferred the *Kurti* K1 with fish motif the most on the basis of design placement, colour combination and overall appearance.

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The term 'Folk paintings' refers to art of Indian villages, where people gratify in art without any proper training, for ornamentation of their habitation and for the portrayals of their Gods for rituals, chiefly in the form of wall and floor painting. *Madhubani* paintings of Bihar and *Warli* paintings of Maharashtra were the most renowned folk paintings of India. The wall paintings or Mural paintings of *Mithila* region of Bihar are very popular all over the world (Anonymous, 2013 and 2015a). Bihar has a very rich tradition of folk art and craft which portraits its intense rich tradition of artistry and innovation. The handicrafts of Bihar are recognized all over the world because of their colossal aesthetic value and their fidelity to tradition. The word "*Madhubani* is derived from *Madhu*-honey, *Ban*- forest or woods and trees. It means forest of honey (Parkask, 1994). *Madhubani* paintings have been restrained to a dense geographical region and have been passed on to

young generation through centuries. The origin of *Mithila* paintings can be documented to the time of the *Ramayana*, when King Janaka ordered his kingdom to be beautified for the wedding of his daughter Sita to Lord Rama (Anonymous, 2015b and c). These paintings were earlier done on walls freshly plastered with mud and floors of huts, but in recent times people have started doing painting on paper and contemporary articles like jute bags, *Sarees*, other apparel, pen holder, mobile cover etc. *Madhubani* paintings are contrived from the paste of powdered rice. Women contrived images of Gods, Goddesses, animals and mythological characters. Now a day's male members also practiced this art form (Kumar, 2003 a and b). An assembly of symbolic images, represented fertility and proliferation of life have been originally depicted by these paintings, such as images of lotus plant, the bamboo grove, fishes, birds and snakes in union (Das, 2013). Traditionally *Madhubani* painting was practiced by the women of Brahman, Dushadh and Kayastha communities in *Mithila* region of Bihar as well as in Nepal. These have paintings for each occasions and festivals such as birth, marriage, holi, *Surya shakti, Kali puja, Upanayanam, Durga puja* etc. *Madhubani* painting deals with the five main styles; *Bharni, Katchni, Tantrik, Godna* and *Gobar* painting (Thakur, 1982).

Madhubani paintings were not known to the outside world until the massive earthquake which occurred in Bihar, in the year 1934. During that time British colonial officer William and Mildered Archer made an effort to reveal these paintings. They took black and white photographs of these paintings and also published their work. In the early 1970s Yves Vequad, a French novelist and journal wrote a book on the basis of his research on *Mithila* painting and produced a film 'The Women Painters of *Mithila* (Archer, 1949 and Agarwal, 2015). *Madhubani* painting received official appreciation in 1970, when the President of India gave an award to Jagdamba Devi, of Jitbarpur village near *Madhubani*. Other eminent painters, Mahasundari Devi, Godavari Dutt, Sita Devi, Bharti Dayal and Bua Devi also achieved National awards for their paintings. For the people of *Madhubani*, these paintings are a culture, a way of life. They live and breathe with their craft (Anonymous, 2015c).

Apparel and Textile Science Department under Punjab Agricultural University is a premier institute working in the field of synthetic and natural dyes.

Traditionally *Madhubani* paintings were done with natural dyes. The traditional natural dyes process have their own limitations, *viz.*, time consuming, poor colorfastness to washing etc. *Madhubani* painting have great potential in the international market because of its authenticity and rich heritage. Indian paintings inspire us to create new designs using traditional motifs in textiles to keep our designs and motifs alive (Rekha, 2010). Hence, the work article has been planned as an effort to add another dimension in the application of *Madhubani* designs on textiles. The effort has been targeted towards the finding the possibility of applying *Madhubani* painting motifs on cotton *Kurtis* utilizing the hand painting technique with selected pigment dyes.

■ **RESEARCH METHODS**
Cotton fabric :
    Plain woven cotton fabric having 60 ends/dm and 50 picks/dm, weighting 17 g/m² was used for the study.

Pigment dyes:
    Pigment dyes red, green, yellow, black, blue, orange and skin colour was used for painting with flat brushes (No. 2 and 4) and round brushes (No.000).

Documentation of motifs from *Madhubani* painting:
    The secondary sources such as internet, libraries, studying encyclopedia and books etc. were used to collect and document the motifs used in *Madhubani* painting. After the documentation of motifs, all the possible motifs of different kind were categorized into suitable categories by the panel of ten judges from the Department of Apparel and Textile Science. The distinct categories of these motifs were animal and bird motifs, abstract motifs, floral motifs, human motifs and religious motifs.

Development of designs for cotton *Kurtis* :
    Four motifs were selected from each of the five categories of motifs. Thus total twenty motifs were short listed. One motif was selected from each category and adaptations were done for the preparation of design. Four designs were prepared from each of the selected five motifs showing different designs and colour combinations. Total twenty designs were developed out of which five designs (one best from each category) were selected for the preparation of *Kurtis*. For development of twenty designs for *Kurtis*, different

placements were shown with the use of acrylic colours and hand painting technique. Total five designs for *Kurtis* with different placements were selected from each category of design/motifs for the development of final cotton *Kurtis*. For the preparation of designs for *Kurtis*, standard measurement of 32 size dress form was taken and used as basic female figure.

Evaluation of designs :

The data collected through interview schedule were coded, tabulated and analysed. To quantify the data regarding the assessment of designs for *Kurtis*, the weighted mean score was calculated and ranks were allotted. The designs were evaluated by the panel of 10 judges from the Department of Apparel and Textile Science and Family Resource Management, Punjab Agricultural University, Ludhiana. Each judge was asked to select one best design from each category of twenty designs. Subsequently ranks were assigned to the designs on the basis of weighted mean scores (WMS). The design that got the highest rank was considered the best design for cotton *Kurtis*.

Painting of cotton *Kurtis* :

The preferred designs were used to prepare five cotton *Kurtis* with pigment dyes using hand painting technique. Painted *Kurtis* were steamed for the proper absorption of dye by the fibres and evaluated for colour fastness grades. After this interview schedule was constructed for research work by taking the preferences of the respondents for painted cotton *Kurtis*. The respondents were asked to give their preferences regarding design placement and colour combination of prepared *Kurtis*.

Preparation of painting paste :

Painting paste of all dyestuffs were prepared by adding 19 g of binder, 0.35 ml of fixer and pigment dyes according to the darkness and lightness of shade. Painted *Kurtis* were steamed at 170° C for proper fixation and absorption of pigment dyes by the fibre. Optimum time for the steaming was 10 minutes. After steaming process, *Kurtis* were washed in running water under tap.

Preparation of cotton *Kurtis* :

Finally five cotton *Kurtis* developed using preferred design and placement by the judges.

Assessment of colour fastness grades :

All the painted samples were evaluated for colourfastness to washing (IS: 3361-1979), light (IS: 2454-1985), rubbing (IS: 766-1988) and perspiration (IS: 971-1983) by the methods prescribed by the Bureau of Indian Standards.

Assessment of colourfastness to washing :

Colourfastness to washing of cotton fabrics painted with pigment dyes was assessed in a launder-o- meter in accordance with a method prescribed in 3361-1979. Two fabric pieces, each measuring 10 cm × 4 cm were taken. One of the fabric pieces taken were wool and other one was cotton. The painted fabric to be tested was placed between these two samples of wool and cotton. The samples were sewn on all the four sides. The required quantity of soap solution of 5g/lt of water and all the composite specimens were prepared as above were weighted and prepared for keeping the material to liquor ratio of 1:50. One composite specimen was placed in each of the eight containers of a Launderometer along with 10 steel balls and soap solution previously heated to 50 ± 2° C was added to it. The composite specimen was treated for 45 minutes at 50 ± 2° C was added to it. Later washed in cold tap water and finally dried in air. The change in colour of original painted samples and staining on adjacent fabrics were rated between 1-5 using five step grey scales for evaluating change in colour and for evaluating staining on adjacent fabric, respectively, where a rating 5 indicates excellent and a rating 1 indicates very poor fastness properties.

Assessment of colourfastness to light :

The colourfastness of the painted samples to light, the test prescribed by the BIS in the IS: 2454-1985 was used. The test was exposed to the light of MBTL fading lamp for standing time period that is at least 5 hours. The exposure was continued until specimen faded to correspond equal to grade 8 on the grey scale. The exposure was continued until specimen faded to correspond equal to grade 8 on the grey scale. The approximate number of hours required to fade each blue wool standard to a contrast equal to grade 8 of the grey scale on such exposure, where a rating of 8 (640 hours) indicates outstanding and rating 1 indicates very poor light fastness properties.

Assessment of colourfastness to rubbing :

The colourfastness of all the painted samples against

dry and wet crocking, the test prescribed by the BIS in the IS: 766-1988 was used. For testing fastness to dry rubbing, a test specimen was prepared by adding the painted fabric in lengthwise direction on rectangular cardboard of size 14 cm × 5 cm. The white cotton samples of size 5 cm×5 cm was fixed at the base of the rubbing device. The test specimen was rubbed too and fro on painted pieces, with a downward force of 900 g in a straight line along a track of 10 cm for 10 times in 10 seconds. Similarly, fastness to wet rubbing was tested by rubbing wet painted cotton sample of the test specimen. The dry and wet crocked samples were assessed against standard grey scale for colour change and colour staining.

Assessment of colourfastness to perspiration :

To determine the fastness to perspiration, the samples were tested by the test IS: 971-1983 prescribed by BIS. The acidic test liquor was prepared by dissolving 2.65 g of Sodium Chloride and 0.75g of urea/litter and adjusting the ph of the solution to 5.6 with addition of Acetic Acid. The preparation for alkaline test liquor by dissolving 3g of Sodium Chloride/litter and adjusting the pH of the solution to 7.2 with addition of Sodium Bicarbonate. For preparing a composite specimen, test specimen of 5 cm × 4 cm was placed between the two adjacent fabrics of 5 cm × 5 cm size, one being wool and other was cotton. The sample was sewn on all the four sides. After that at room temperature the test specimen were soaked in the acidic and alkaline test solutions as prepared above separately with material to liquor ratio 1:50 for 30 minutes. The treated samples were kept between two glass plates of Perspirometer under a force of 5kg. The apparatus was kept in hot air oven for four hours at 37 ± 2° C. After that, the test sample was removed from the oven. The samples were air dried at temperature not exceeding 60° C. The numerical grading for colour change of test pieces and for staining of two adjacent pieces was done using a grey scale. The acidic and alkaline perspiration sample was assessed against standard grey scales for colour change and colour staining.

■ RESEARCH FINDINGS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Selection of motifs for the preparation of designs:

The preferences of the judges regarding the selection of motifs from the documented motifs were taken for the preparation of designs. Four motifs were selected for each category of motif, thus a total of twenty motifs were selected by the judges. One best motif was selected from each category, thus total five motifs were selected for the development of designs.
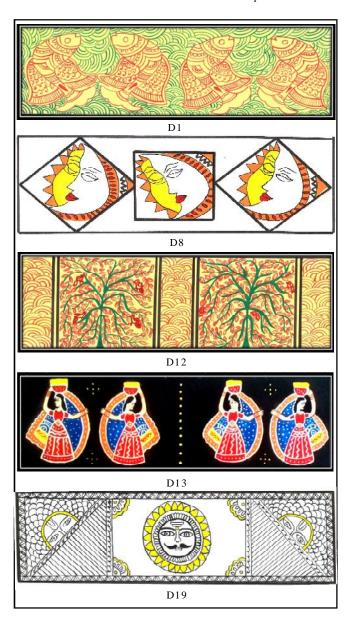
Table 1 : Selected motifs from each category of motifs	
Categories of motifs	Selected motifs
Animal and Bird motif	Fish M2
Abstract motif	Sun and moon M5
Floral motif	Tree of life M12
Human motif	*Radha* M13
Religious motif	Sun M18

M2   M5

M12   M13   M18

Selection of designs :

The most preferred motifs were adapted and used to prepare four designs from each category. Thus total 20 designs were developed from each of the selected

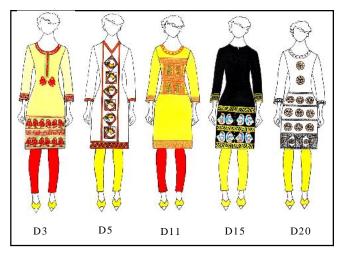| Table 2 : Selected design from each category of motifs	
Category of motif	Selected design
Animal and Bird (Fish)	Design D1
Abstract (Motif of sun and moon)	Design D8
Floral (Tree of life)	Design D11
Human figure (*Radha*)	Design D13
Religious (Sun)	Design D19

D1

D8

D12

D13

D19

motif using hand painting technique. The preference was taken from the panel of ten judges on the basis of different types of designs and colour combination. One best design was selected for the design development for *Kurtis*.

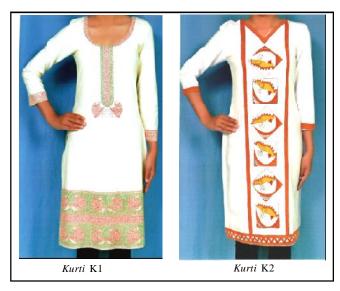**Evaluation of the designs for development of cotton *Kurtis* :**

The most preferred designs were used to prepare four designs for *Kurti* from each of the selected design. Thus total 20 designs for *Kurti* were developed by showing different placements using hand painting technique. The preference was taken from the panel of

ten judges on the basis of different types of design placements on *Kurtis*. One of the best design for *Kurti* was selected for the development of final cotton *Kurtis*.

Table 3 : Selected designs for *kurtis*	
Category	Selected designs for *kurtis*
Animal and bird motif	DK3
Abstract motif	DK5
Floral motif	DK11
Human motif	DK15
Religious motif	DK20

D3　　D5　　D11　　D15　　D20

Existing trends of *Kurtis* :

The investigator took preferences for the length of *Kurti* and sleeves from the panel of ten judges. Standard measurement of 32" dress form was used to prepare the final cotton *Kurtis*.

Kurti K1　　　　*Kurti* K2

Kurti K3   *Kurti* K4   *Kurti* K5

Evaluation for colourfastness grades to washing, light, rubbing and perspiration :

The colour fastness tests were conducted to study the effects of fastness properties of pigment dyes painted on cotton *Kurtis*. Results for the colour fastness properties have been furnished in Table 1. The fabric painted with pigment colour had very good (6) colour fastness to light, except for skin colour pigment dye which took 40 hours to fade. Thus off white pigment dye was given 4 grade. In the case of colourfastness to wash, the colour change for pigment dyes had excellent (5) grades for red and black dyes. Slight colour staining was found on wool fabric for yellow, blue and orange pigment dyes and no colour staining was found on cotton fabric for red, green, black, orange and skin colour pigment dyes. All dyes showed good (4) colour fastness to dry rubbing. Sight colour staining was observed for dry rubbing for green, yellow, blue pigment dyes. In the case of wet rubbing the colour change was rated good for green and skin colour pigment dyes and colour staining ranged between noticeable to slight colour staining. Noticeable colour staining was found for yellow, blue,

black and orange pigment dyes and sight colour staining was found for the skin colour and green pigment dyes. In the case of colourfastness to perspiration, the fabric painted with pigment colour showed excellent (5) grades for colour change, except for skin colour pigment dye where the grades was in acidic medium. There was no colour staining on wool fabric in acidic medium for all pigment dyes. Slight colour staining was found on cotton fabric in acidic medium for red, green, yellow, blue and orange pigment dyes. When the painted fabric was kept in alkaline medium the grades observed for change in colour was excellent for all the pigment dyes. Slight staining was observed on wool fabric for blue pigment dye. No colour staining was observed in the case of cotton fabric in alkaline medium for green, black, skin colour pigment dyes.

Conclusion :

Bihar has a very rich tradition of folk art and craft which portraits its intense rich tradition of artistry and innovation. The style of *Madhubani* painting or *Mithila* painting are performed habitually in *Mithila* region of Bihar state of India and the adjacent parts of Terai in Nepal. Traditionally *Madhubani* paintings were done with natural dyes. The traditional natural dyes process have their own limitations, *viz.*, time consuming, poor colorfastness to washing etc. *Madhubani* painting have great potential in the international market because of its authenticity and rich heritage. Indian paintings inspire us to create new designs using traditional motifs in textiles to keep our designs and motifs alive. Painting with pigment dyes contribute to value addition of cotton kurtis with good colourfastness grade. Pigment dye black and red shows excellent (5) grades for wash fastness and perspiration. Good (4) rubbing fastness grades and very

Table 4 : Coloufastness grades to light, wash, rubbing and perspiration for painted cotton kurtis with pigment dyes													
Fabric	Light fastness Grades	Washing fastness grades			Rubbing fastness grades				Perspiration fastness grades					
		CC			Dry		Wet		Acidic			Alkaline		
			CS		CC	CS	CC	CS	CC	CS		CC	CS	
			W	C						W	C		W	C
Pigment Red	6	5	5	5	4/5	4/5	4	3/4	5	5	4/5	5	5	4/5
Pigment Green	6	4	5	5	4/5	4	4	3/4	5	5	4/5	5	5	5
Pigment Yellow	6	4/5	4/5	4/5	4/5.	4	4/5	4	5	5	4/5	5	5	4/5
Pigment Blue	6	4/5	4/5	4	4/5	4	4	3/4	5	5	4/5	5	4/5	4/5
Pigment Orange	6	4/5	4/5	5	4/5	4/5	4	3	5	5	4/5	5	5	4/5
Pigment Black	6	5	5	5	4/5	4/5	4	3/4	5	5	5	5	5	5
Pigment skin colour	4	4	5	5	4/5	4/5	4/5	4/5	4/5	5	5	4/5	5	5

good (6) light fastness grades were obtained by red and black pigment dyes. An inventory was prepared to record the views of thirty consumers. In this part the consumers preferred the *Kurti* K1with fish motif the most on the basis of design placement, colour combination and overall appearance.

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