

# A Comparative Study on Sustainable Jamdani Saree Manufactured with Sustainable Vegetable Dyes and Available Jamdani Saree Manufactured with Available Dyes

Dr. Engr. Mohammed Rubaiyat Chowdhury<sup>1</sup>, Dr. Engr. Ayub Nabi Khan<sup>2</sup>

<sup>1</sup>Dean, Faculty of Apparel Studies, BGMEA University of Fashion and Technology, Dhaka, Bangladesh

<sup>2</sup>Pro-VC, BGMEA University of Fashion and Technology (BUFT), Dhaka, Bangladesh

Email: [rubaiyat@buft.edu.bd](mailto:rubaiyat@buft.edu.bd), [provc@buft.edu.bd](mailto:provc@buft.edu.bd)

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**Abstract**— Jamdani is a UNESCO heritage. The tradition of Jamdani is very old and are basically made of hundred percent cotton Jamdani yarn. Now a days Jamdani saree is manufactured with silk filament polyester filament along with 100% cotton yarn. The main manufacturing area of Jamdani saree is at Narayanganj. The Jamdani saree is usually manufactured with different dyes. In this project a Jamdani saree which was already manufactured and a Jamdani saree which was manufacture with 100% cotton yarn and sustainable vegetable dye (Yeliona AHLS-31) were observed. It was found that Jamdani saree which was already manufactured had presence of some banned dyes and the saree made with sustainable vegetable dyes did not contain any banned amines. The manufactures use the banned dyes possibly for the cheap price but the long-time effect of these dyes are hazardous because it causes diseases like skin diseases, lung disease, rash on the skin, etc.

**Keywords**— Natural dye, banned amines and vegetable dyes.

## I. INTRODUCTION

The word Jamdani was derived from two Persian words jam stands for flower, and Dani stands for a vase, or a container, mostly used for Sarees. Jamdani is also used for scarves and handkerchiefs the present day. Jamdani has transformed from the earliest making techniques of Bengal since the 16<sup>th</sup> century [1].

Jamdani saree weaving takes 7 to 30 days in some cases more than 30 days to produce a saree. Jamdani is the time durative and labor-intensive method of fabric manufacturing by hand on a conventional loom mostly built with wood and bamboo. The main features of Jamdani is that the designs are created on the saree by weaving directly on the fabric and not by embroidery or printing. This delicately weaved product is the most finely woven cotton fabric and the only hand-woven fabric in the history. The product is very light in weight [2]. Jamdani sarees are

mainly produced in Narayanganj. The weavers are extremely skilled and they weave the Jamdani with maximum concentration and high importance. The Jamdani is very comfortable to wear in the hot weather.

It exhibits the heritage of Bangladesh's history of textile. Jamdani is still in demand for the increasing popularity among the people of Bangladesh as well as abroad. The women of Bangladesh wears Jamdani during various festivals like 1<sup>st</sup> day of Boishakh the opening day of Bengali new year and during other occasions like wedding and different cultural events.

The main characteristic of Jamdani is the application geometry in designing the Jamdani design. The skilled and experienced weavers put the designs from their imagination. They use different designs of flowers or monuments and they use names like jhalar, butidar panna

hajar etc. The modern Jamdani sarees have geometric patterns of rose, jasmine and lotus etc. [3].



(a)



(b)



(c)

Fig.1 (a) Vegetable dyes; (b) Dyeing; (c) Weaving Jamdani saree

It is to be stated that there are very few papers published on Jamdani. Most of the papers discuss about the wages, daily lives, and motifs that are used on Jamdani. Jamdani is the most expensive product of the products that are made in looms since it requires almost 3 to 4 weeks to produce. The geometric patterns of jamdani include plants and flowers,

and that side to have an influence by pass and designs of antique due to the methods of production Jahmani wire, expensive, and only aristocrats and royal families were able to afford the Jamdani sarees [4].

Dr. Partha Prasad Chowdhury and Dr. Shibli Ahmed Khan in the paper Perceptions towards Jamdani Saree: A Study on the Young Female Consumers of Dhaka City showed that the young female consumers are interested to Jamdani saree for fashion and style and there is a demand for Jamdani saree to the young female consumers in Bangladesh. But the study did not discuss about the raw materials and dyes used in the Jamdani saree [2].

The chemicals that are used to introduce color effects and appearances on particular product dyes are used in fabrics to create tones of color. In the broad sense, dyestuffs may be divided into natural and synthetic types. The natural dyes long known to men were obtained from berries, roots, bark, flowers, and marine growth, such as indigo, woad, madder and logwood from plants and Tyrian purple from shells. Synthetic dyes are chemically compounded by man through many processes from coal tar or other sources of hydrocarbon molecules and have practically eliminated use of natural dye staffs. Synthetic dyes maybe classified chemically into some 26 or more structural groups of molecules. Of wider general significance, however, is there classification into 10 groups according to application method. These are VAT, Azoic or Ice, sulfur, direct, developed or diazo, basic, acid, chrome, acetate or dispersed and fiber reactive [5].

Jamdani sarees in the past used different natural dyes like indigo and other plant-based dyes. With increasing demand and based on the availabilities the weavers and manufactures are now using synthetic dyes.

In some cases, the manufacturer uses the banned dyes to reduce the manufacturing cost and for the availability. They procure cheap, synthetic, dies, and aware of the health, and aware of the danger of the health issues. The customers or the buyers of the Jamdani not aware of the risk of the health. They are only concerned the saree is Jamdani and are woven by handlooms. The synthetic dyes are easily available and the manufacturer can procure these dyes very quickly. Another concern is that they use bare hands during dyeing. They use these dyes for quick production like within 7-10 days in some cases. Dyeing with synthetic dies play vital role to reduce the manufacturing time but traditional Jamdani Sarees are only woven with 100% cotton yarn and dyed with ride with natural dyes on handlooms. But to produce the saree very fast, the manufacturers use the synthetic dyes that has several banned amines hazardous for health.

## II. METHODOLOGY

In this study a Jamdani saree sample collected from the manufacturer without any specifications and 100% cotton yarn dyed with sustainable vegetable dye (Yeliona AHLS-31) which was used to produce another Jamdani saree. This yarn was used in both warp and weft direction.

The samples were listed as Sample A and Sample B which is shown the figure no. 1 and in table no. 1

Table – 1 Sample List

Component no	Component Description With Color
Sample-1	-
A1	Red part of Yarn Dyed fabric
A2	Beige part of Yarn Dyed fabric
A3	Copper lurex part of Yarn Dyed fabric
Sample-2	-
B1	Yellow yarn



Fig.2- Jamdani Saree samples for test.

## III. RESULTS AND DISCUSSION

From table it can be observed that from the sample A1 and A2 parts are identified as natural fibre and A3 was identified as manmade fibre. The fibre for sample B was identified as natural fibre as well. Table 3 shows that the colorfastness to rubbing (color staining) for sample A in dry and wet state was found 4 and 2 and For sample B it was found 4-5 and 4 respectively. It may be stated that colorfastness to rubbing for Jamdani Saree dyed with banned dyes are less in wet state than the sarees dyed with natural vegetable dye. Furthermore, from table 3 it may be stated that the colorfastness to saliva (color staining) for both sample A and sample B in dry and wet state was found 4-5 which is similar and within the range. From Table 4 it was observed that sample A contains banned amines like 2,4-diaminoanisole and 2,4-Toluenediamine which are completely banned in the textile sector and hazardous for human health, environment and sustainability. was found. Table 5 shows that the yarn dyed with sustainable vegetable dyes used for the production of sustainable Jamdani saree does not contain any banned amines.

Table 2- Fibre Identification Test Result

Component no	Component Description With Color	Material
Sample-1	-	
A1	Red part of Yarn Dyed fabric	Natural
A2	Beige part of Yarn Dyed fabric	Natural
A3	Copper lurex part of Yarn Dyed fabric	Synthetic & Metallic fiber
Sample-2	-	
B1	Yellow yarn	Natural

Table 3 – Colorfastness to Rubbing and Colorfastness to Saliva Test results

Test Report No.BD/T(F)/23/016306

Dated 2023-06-19

Name of the Test	State	Result
<b>Colorfastness To Rubbing (Test method -ISO 105-X12 :2016)</b>		
Sample A Color Staining	Dry	4
Color Staining	Wet	2
Sample B Color Staining	Dry	4-5
Color Staining	Wet	4
Note: Tested on only length		
<b>Colorfastness To Saliva- (Test Method DIN 53160: 2010)</b>		
Sample A		
Color Staining	On Filter Paper (Option 1)	4-5
Color Staining	On Filter Paper (Option 2)	4-5
Sample B		
Color Staining	On Filter Paper (Option 1)	4-5
Color Staining	On Filter Paper (Option 2)	4-5

Table 4 – Banned amines Test Result for Sample A

Based on EN ISO 14362-1:2017 and EN ISO 14362-3:2017, Equipment Used: GC-MS/UPLC-DAD

Analytes	CASE No.	A1	A2	A3
4-aminobiphenyl	92-67-1	ND	ND	ND
Benzidine	92-87-5	ND	ND	ND
4-chloro-o-toluidine	95-69-2	ND	ND	ND
2-naphthylamine	91-59-8	ND	ND	ND
o-aminoazotoluene	97-56-3	ND	ND	ND
2-amino-4-nitrotoluene	99-55-8	ND	ND	ND
p-chloroaniline	106-47-8	ND	ND	ND
2,4-diaminoanisole	615-05-4	553.44 ppm	ND	ND
4-4'-diaminodiphenylmethane	101-77-9	ND	ND	ND
3,3'-dichlorobenzidine	91-94-1	ND	ND	ND
3,3'-dimethoxybenzidine	119-90-4	ND	ND	ND
3,3'-dimethylbenzidine	119-93-7	ND	ND	ND
3,3'-dimethyl-4,4'diaminodiphenylmeth	838-88-0	ND	ND	ND
p-cresidine	120-71-8	ND	ND	ND

4,4'-methylene-bis-(2-chloroaniline)	101-14-4	ND	ND	ND
4,4'-oxydianiline	101-80-4	ND	ND	ND
4,4'-thiodianiline	139-65-1	ND	ND	ND
o-toluidine 2-aminotoluène	95-53-4	ND	ND	ND
2,4-Toluenediamine	95-80-7	57.87 ppm	ND	ND
2,4,5-Trimethylaniline	137-17-7	ND	ND	ND
2-methoxyaniline	90-04-0	ND	ND	ND
p-aminoazobenzene	60-09-3	ND	ND	ND
2,4-xylydine	95-68-1	ND	ND	ND
2,6-xylydine	87-62-7	ND	ND	ND

Table 5 – Banned amines Test Result for Sample B

Based on EN ISO 14362-1:2017 and EN ISO 14362-3:2017, Equipment Used: GC-MS/UPLC-DAD

Analytes	CASE No.	B1
4-aminobiphenyl	92-67-1	ND
Benzidine	92-87-5	ND
4-chloro-o-toluidine	95-69-2	ND
2-naphthylamine	91-59-8	ND
o-aminoazotoluene	97-56-3	ND
2-amino-4-nitrotoluene	99-55-8	ND
p-chloroaniline	106-47-8	ND
2,4-diaminoanisole	615-05-4	ND
4-4'-diaminodiphenylmethane	101-77-9	ND
3,3'-dichlorobenzidine	91-94-1	ND
3,3'-dimethoxybenzidine	119-90-4	ND
3,3'-dimethylbenzidine	119-93-7	ND
3,3'-dimethyl-4,4'diaminodiphenylmeth	838-88-0	ND
p-cresidine	120-71-8	ND
4,4'-methylene-bis-(2-chloroaniline)	101-14-4	ND
4,4'-oxydianiline	101-80-4	ND
4,4'-thiodianiline	139-65-1	ND
o-toluidine 2-aminotoluène	95-53-4	ND
2,4-Toluenediamine	95-80-7	ND
2,4,5-Trimethylaniline	137-17-7	ND
2-methoxyaniline	90-04-0	ND
p-aminoazobenzene	60-09-3	ND
2,4-xylydine	95-68-1	ND
2,6-xylydine	87-62-7	ND

Remark: ND = Not Detected

Limit of Quantification = 5 ppm (mg/kg)

ppm = parts per million = mg/kg

#### **IV. CONCLUSION**

As jamdani saree is the heritage and tradition so to achieve sustainability use of dyes that contains banned amines need to be avoided. More study in this regard should be conducted to have a complete picture of the Jamdani saree and the application of dyes. The weavers, dyers and the manufacturers are still using these dyes ignorantly for availability and cheap price. But the root level weavers are not getting proper price. The weavers sell the sarees to the local market at low price. But the buyers who has showrooms, big brands and shops sell at a higher price to the customers. The weavers are not given any message that they should not use these dyes to avoid the health issues. The buyers who sell the sarees to the customers should inform the weavers and take different awareness steps to encourage the manufacturers and weavers to search alternatives for the dyes and use sustainable vegetable dyes. The weavers should also be informed about the positive effect of using sustainable dyes for manufacturing the jamdani saree.

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#### **REFERENCES**

- [1] International Journal for Multidisciplinary Research (IJFMR) E-ISSN: 2582-2160 Volume 5, Issue 4, July-August 2023
- [2] AIUB Journal of Business and Economics, Volume 19, Issue 1, January 2022
- [3] [https://www.researchgate.net/publication/367190648\\_A\\_Study\\_on\\_the\\_Traditional\\_Art\\_of\\_Jamdani\\_Weaving\\_A\\_Representation\\_of\\_Intangible\\_Bangladeshi\\_Cultural\\_Heritage](https://www.researchgate.net/publication/367190648_A_Study_on_the_Traditional_Art_of_Jamdani_Weaving_A_Representation_of_Intangible_Bangladeshi_Cultural_Heritage) January 2023.
- [4] International Journal for Multidisciplinary Research (IJFMR) E-ISSN: 2582-2160 Volume 5, Issue 4, July-August 2023
- [5] Wingate Isabel B. Third edition: Fairchilds Dictionary of Textiles, Newyork, USA, Fairchild Publications Inc., 1974.