

UNIVERSITY GRANTS COMMISSION  
BAHADUR SHAH ZAFAR MARG  
NEW DELHI – 110 002

PROFORMA FOR SUBMISSION OF INFORMATION AT THE TIME OF SENDING THE  
FINAL REPORT OF THE WORK DONE ON THE PROJECT

1. Title of the Project Value addition of handloom cotton fabric through natural colour dyeing
2. NAME AND ADDRESS OF THE PRINCIPAL INVESTIGATOR Dr. Sanjay Ray Manjiv
3. NAME AND ADDRESS OF THE INSTITUTION Dept. of Silpa-Sadana, Visva-Bharati
4. UGC APPROVAL LETTER NO. AND DATE F-41/1307/2012(SR) 30.7.12
5. DATE OF IMPLEMENTATION 01.07.2012
6. TENURE OF THE PROJECT 2 Yrs
7. TOTAL GRANT ALLOCATED 1,60,000/-
8. TOTAL GRANT RECEIVED 1,20,000/-
9. FINAL EXPENDITURE 1,19,933/-
10. TITLE OF THE PROJECT Value-addition of handloom cotton fabric through natural colour dyeing
11. OBJECTIVES OF THE PROJECT Annexure - I
12. WHETHER OBJECTIVES WERE ACHIEVED Yes Annexure - II  
(GIVE DETAILS)
13. ACHIEVEMENTS FROM THE PROJECT Annexure - III
14. SUMMARY OF THE FINDINGS Annexure - IV  
(IN 500 WORDS)
15. CONTRIBUTION TO THE SOCIETY Annexure - V  
(GIVE DETAILS)
16. WHETHER ANY PH.D. ENROLLED/PRODUCED OUT OF THE PROJECT No
17. NO. OF PUBLICATIONS OUT OF THE PROJECT 04 Annexure - VI  
(PLEASE ATTACH)

Sanjay Ray Manjiv  
(PRINCIPAL INVESTIGATOR) 14/8/2024

सह-प्राध्यापक / Associate Professor  
शिल्प-सदन / Silpa-Sadana  
विश्वभारती / Visva-Bharati  
श्रीनिकेतन / Sriniketan

[Signature]  
कुलसचिव (कार्यवाहक)  
विश्वभारती  
Registrar (Acting)  
Visva-Bharati

[Signature]  
16/8/24

[Signature]  
16/8/24  
(PRINCIPAL)  
अध्यक्ष / Adhyaksha  
पल्ली संगठन विभाग  
Palli Sangathan Vibhaga  
(Seal)  
विश्वभारती, श्रीनिकेतन  
Visva-Bharati, Sriniketan

प्रधान / Head  
शिल्प-सदन / Silpa-Sadana  
विश्वभारती / Visva-Bharati  
श्रीनिकेतन / Sriniketan

## ANNEXURE - I

### Objectives of the project

Handloom textiles constitute a timeless facet of the rich cultural heritage of India and play a very important role in the country's economy. The importance of handloom sector in the national economy cannot be overemphasised on account of having the advantage of flexibility of small production run, uniqueness, switch over to new designs, adaptability to suit exports requirement and creation of exquisite design innovation. This sector can contribute towards export earnings and thus the export potential of handloom has therefore been identified as "Thrust Area" for the overall development of the sector. As per handloom census 2009-2010, it is estimated that handloom industry provides employment to 43.31 lakh workforces directly and there are about 23.77 lakh handlooms spread all over India, which constitutes almost 80% of world handloom. The production of handloom fabrics contributes almost 16% of total textile production in India. It is expected that with the increase in population and prosperity, the domestic and international market size will expand and per capita consumption will also be increased. Despite of its several advantages, the dispersed and unorganized nature of the industry in our country has been facing constraints on its sustenance due to present context of globalization and rapid technological changes. Handloom products are being increasingly replicated on power looms at much lower price. Hence product diversification through weaving, dyeing, innovative printing and surface ornamentations is very much essential for the survival of this rich cultural heritage.

On the other hand, eco-friendly fabric and clothing is the buzz words now-a-days. Designers, manufactures and retailers are busy to develop 'green' product range for the mass market and the eco-fabric thrust has been identified as an area where consumers are prepared to seek out and pay for fabrics that have a 'green' element. Although at present the percent of the market place is small, the eco-friendly apparel market is definitely growing and the consumer pressure to make environmentally friendly products has had an impact on the textile and other industries. Today's consumer understands the value for money and therefore organic non-toxic products in every field have created a new horizon. Sustainable fashion can be best realized when people, production process and the environment are interconnected. Presently consumers are demanding for ecologically and socially responsible processed textiles and companies are searching for tools to make their supply chains more sustainable. This growing consciousness about environmental preservations and control of pollution had renewed interest for use of natural dyes on textiles and it may provide an important alternative to

Sanyar Roy Manika  
P.T. 14/8/21  
सह-प्राध्यापक / Associate Professor  
शिल्प-सदन / Silpa-Sadana  
विश्वभारती / Visva-Bharati  
श्रीनिकेतन / Sriniketan

petrochemical-based dyes in view of growing emphasis and globally nurtured concept of sustainable product and process.

In view of the above, this report depicts the extraction, characterization and process of dyeing and printing with some selected natural dyestuffs in presence and absence of some innocuous inorganic salts or mordants in order to produce value-added handloom textiles. Since it is also the fundamental requirement that coloured, textiles should withstand the conditions encountered during processing and subsequent usage and hence assessment of different colourfastness properties viz. washing, light and rubbing are also assessed and reported in this study.

Sankar Roy Mandal  
P.T.  
14/8/2021  
सह-प्राध्यापक / Associate Professor  
शिल्प-सदन / Silpa-Sadana  
विश्वभारती / Visva-Bharati  
श्रीनिकेतन / Sriniketan

## Annexure - II

### 12. Whether objectives were achieved

Handloom textiles constitute a timeless facet of the rich cultural heritage of India and play a vital role in the economy. The importance of the handloom sector in the national economy cannot be overemphasised on account of having the advantage of the flexibility of small production run, uniqueness, switch over to new designs, adaptability to suit export requirements, and the creation of exquisite design innovation. The export potential of handloom has been identified as a "thrust area" for the overall development of the sector. Despite its several advantages, the dispersed and unorganised nature of the industry in our country has been facing constraints on its sustenance due to the present context of globalisation and rapid technological changes. Hence product diversification through weaving, dyeing, innovative printing and surface ornamentations is essential for the survival of this rich cultural heritage.

On the other hand, eco-friendly fabric and clothing are the buzzwords nowadays. Designers, manufacturers and retailers are busy developing a 'green' product range for the mass market, and the eco-fabric thrust has been identified as an area where consumers are prepared to seek out and pay for fabrics that have a 'green' element. The eco-friendly apparel market is growing, and the consumer pressure to make environmentally friendly products has had an impact on the textile and other industries. Consumers are currently demanding ecologically and socially responsible processed textiles, and companies are searching for tools to make their supply chains more sustainable. This research depicts the extraction, characterisation and process of dyeing and printing with some selected natural dyestuffs in the presence and absence of some innocuous inorganic salts or mordants to produce value-added handloom textiles. These value-added handloom textiles with natural dyes will undoubtedly give a market for the people associated with this traditional craft. The fundamental requirement is to withstand different agencies during its uses, which this project has also achieved.

Sankar Ray Manlik  
P. I. 14/8/2021

सह-प्राध्यापक / Associate Professor  
शिल्प-सदन / Silpa-Sadana  
विश्वभारती / Visva-Bharati  
श्रीनिकेतन / Sriniketan

### Annexure – III

#### 13. Achievements from the project

This project has two distinct achievements; i) academic and ii) a new printing process developed with natural dyes. Traditionally application with natural dyes involves painting or printing with dyestuffs on the fabric, either pre-treated with mordants or painting or printing with mordants on the dyed fabrics. Those processes have their limitations, viz. time-consuming, poor colourfastness to washing, challenging to use print paste containing metal salts in the presence of gum after 2-3 hrs, etc. The present project develops the process of painting/printing on handloom cotton fabric with some selected natural dyestuffs more scientifically and technologically, making them higher performing, and scope for producing value-added diversified handloom textiles. Similarly, in the past few decades, batik work on textile materials has gained popularity among the young generations who quickly adapted the easy-to-do method for individualising their shirts, trousers, jeans and casual clothing. Therefore, product diversification through batik work with natural dyes is one way to create a fancy effect on the handloom products for the ever-changing fashion market.

These processes developed had been published in a peer-reviewed journal from NISCAIR in the year 2014.

1. Sankar Roy Maulik, Lina Bhowmik and Khusbu Agarwal, *Batik on handloom cotton fabric with natural dye*, *Indian Journal of Traditional Knowledge*, 13 (4), 2014, pp 788-794. ISSN: 0972-5938.
2. Sankar Roy Maulik and Khusbu Agarwal, *Painting on handloom cotton fabric with colourants extracted from natural sources*, *Indian Journal of Traditional Knowledge*, 13 (3), 2014, pp 589-595. ISSN: 0972-5938.

Sankar Ray Maulik  
P. I. 14/8/2024

सह-प्राध्यापक / Associate Professor  
शिल्प-सदन / Silpa-Sadana  
विश्वभारती / Visva-Bharati  
श्रीनिकेतन / Sriniketan

## Annexure - IV

### 14. Summary of the findings (in 500 words)

India has a rich tradition of using natural dyes. Dyeing and painting with natural dyes contribute to the value addition of handloom textiles and also responses to the increasing demand for compatibility with the environment. Dyeing and printing/painting on handloom cotton fabric with colourants extracted from natural resources can be effectively accomplished in the presence of innocuous inorganic salts following different mordanting techniques. Compared to the traditional process, the process adopted in the project is superior in terms of ease of application, colourfastness properties, the storage stability of printing/painting paste, and achieving clear white ground. Through this painting process, one can give a crafty look to the handloom cotton fabrics used for apparel and home furnishing purposes. The colourfastness to light, wash and rubbing of cotton yarn/fabric dyed and/or printed with natural colourants in the absence and presence of mordants caused an excellent lightfastness rating of the dyed substrates for most of the natural dyes except *Curcuma longa* (turmeric). Turmeric is very much susceptible to light because they emit fluorescence, and also from the structure of Curcumin, one can say that this dye is not forming metal-complex with the mordants and hence shows poor lightfastness, and the samples are substantially faded within the first 3-4 h of exposure time.

In recent years, naturally dyed fabric is gaining momentum due to the fast-changing fashion trend and the demand for eco-friendly handcrafted products worldwide, especially in the European market. Designers, manufacturers and retailers are busy developing a 'green' product range for the mass market, and the eco-fabric thrust has been identified as an area where consumers are prepared to seek out and pay for fabrics that have a 'green' element. Today's consumer understands the value for money, and therefore organic, non-toxic products in every field have created a new horizon. Eco-friendly natural dyed apparel has scorched the ramps as fashion designers have rediscovered the beauty in natural dyes. However, the mass-market clothes are yet to get touched by natural dyes. The retailers are yet to display and sell natural dyed ranges in their stores. For this purpose, an attempt has been made to produce apparel out of 100% cotton handloom fabric using the yarns dyed with colourants extracted from natural sources. Since handloom itself is an eco-friendly process of manufacturing fabrics

Sankar Ray Manlik  
P. D. 14/8/2021  
सह-प्राध्यापक / Associate Professor  
शिल्प-सदन / Silpa-Sadana  
विश्वभारती / Visva-Bharati  
श्रीनिकेतन / Sriniketan

and hence use of natural dyes in the presence or absence of different innocuous inorganic salts completes sustainable textiles.

In recent years, the demand for natural dyed hand batik on cotton fabric is gaining momentum due to the fast-changing fashion trend and the demand for eco-friendly handcrafted products worldwide, especially in the European market. As new as they are old, batik's work with natural dye captures tremendous attention and is being explored, updated, and combined in highly imaginative ways. Most of the natural dyes are polygenetic; hence there is a tendency to use all types of metal salts for achieving a variety of shades without considering their toxicity impact on the environment. So, before selecting the metal salt as mordants, it is essential to check their maximum permissible limit in the ultimate products for different Eco-marks. However, there is no upper limit on aluminium, iron, and tin, and the upper limit on copper is also reasonably high (50 ppm). Hence the salts of those metals could safely be used for the mordanting purpose in the batik process. However, their quantities should be optimised to minimise the pollution load.

#### **Annexure -V**

##### **15. Contribution to the Society**

Artisans and ethnic communities are practising vegetable dyeing generation after generation, following old traditional dyeing methods without proper scientific documentation. It has been noticed that many communities have shifted to another profession from their traditional profession of natural colour dyeing, and as a result, their knowledge has not been documented or transferred for further research and commercial interest. One of the significant imperatives to using natural dyes is the knowledge gap and non-availability of the dyes in a standardised form. Hence, there is plenty of scope for rapid development in agricultural production, processing and application technique of this colour on textile. This technology can generate revenue, employment and create a strong base for renewable resources for the dye industry. To promote the use and production of natural dyes, more young people should be trained scientifically and encourage them by providing some employment-oriented scheme in rural areas.

Sanjay Ray Maulik  
P. I  
14/8/2021

सह-प्राध्यापक / Associate Professor  
शिल्प-सदन / Silpa-Sadana  
विश्वभारती / Visva-Bharati  
श्रीनिकेतन / Sriniketan

## Annexure - VI

### List of publications

1. Painting on handloom cotton fabric with colourants extracted from natural sources, *Indian Journal of Traditional Knowledge*, 13 (3), 2014, pp 589-595. ISSN: 0972-5938
2. Batik on handloom cotton fabric with natural dye, *Indian Journal of Traditional Knowledge*, 13 (4), 2014, pp 788-794. ISSN: 0972-5938
3. Eco-friendly woven and printed apparel made from handloom cotton fabric, *Asian Dyer*, 13(6), 2016, pp 51-54. ISSN: 0972-9488
4. Paper entitled "Natural and eco-friendly apparel made from handloom fabrics" was presented and published in *International Conference "Emerging Trends in Traditional and Technical Textiles"* organized by Department of Textile Technology, Dr. B R Ambedkar National Institute of Technology, Jalandhar, during 11-12 April, 2014 ISBN:978-93-6156-700-4

Sankar Ray Manlik  
P.I 14/8/2021

सह-प्राध्यापक / Associate Professor  
शिल्प-सदन / Silpa-Sadana  
विश्वभारती / Visva-Bharati  
श्रीनिकेतन / Sriniketan