

Entrepreneurship development through *eri* silk dyeing with datura dye- A study of Kokrajhar district

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Research Paper

^{*1}Smita Bhuyan, ²Nabaneeta Gogoi, ³Gobin Ch Bora and ⁴M.K Bhuyan

¹Krishi Vigyan Kendra, Kokrajhar, Gossaigaon, Assam, India.

²College of Home Science, Assam Agricultural University Jorhat-13, India.

³Regional Agricultural Research Station, Gossaigaon, Assam, India.

⁴Krishi Vigyan Kendra, Kokrajhar, Gossaigaon, Assam, India.

*Corresponding Author E-mail: Bhuyansmita.gohpur@gmail.com

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Dyeing can be a good entrepreneur work if it is done with the help of locally available dye source. Dye obtained from leaves of *Datura stramonium* applied on bleached *eri* silk yarns is a good source of dyeing. All the three mordanting methods can be used for dyeing pre, post and simultaneous mordanting with selected mordants namely alum, copper sulphate, ferrous sulphate and stannous chloride. Various optimized conditions were recorded such as wavelength (545 nm), 75 min extraction time, alkali concentration of 2.5%/100 g of yarn, 45 min dyeing time, 5% dye material concentration, mordant concentration of 6% alum, 3% copper sulphate, 2% ferrous sulphate and 2% stannous chloride and 30 min mordanting time for all mordants. Colourfastness to washing, sunlight, perspiration, pressing was also studied on four different colour shades and found copper sulphate

mordanting sample as the best method. The experiment was conducted during 2011-12 at AAU Jorhat and survey was conducted in village of Kokrajhar district during 2014 after another trial in the same village and 30 members were randomly selected. A questionnaire was prepared through which the background of the respondents such as caste, marital status and education qualification was studied. The preference of datura dye was also studied and found that 80% women preferred the dye and want to use it for future dyeing. Dried form of datura dye was stated to be better as fresh form may be unavailable in all seasons.

Key words: Dye, *Datura stramonium*, mordants, extraction time, dyeing time, colour fastness.

INTRODUCTION

Income is the most crucial index for accelerated economic growth and development in any meaningful developmental strategy. People that generate income through ability and willingness to start, organize and manage a business venture along with all the risks that comes in the path of success is the real entrepreneur. In economics, entrepreneurship combined with land, labour, natural resources and capital can produce profit. Entrepreneurial spirit is characterized by innovation and risk-taking, and is an essential part of a nation's ability to succeed in an ever changing and increasingly competitive global market (Goyal, 2007). *Datura* is

considered to have various medicinal properties and the atropine extracted from *datura* is used for ayurvedic medicines (Gohain, 2012). Colouring of *eri* silk with *datura* dye enhances the quality of fabric as well as its aesthetic value. It can act as herbal fabrics to cure pain, skin problems etc. Colouring also makes the natural grey or beige colour *eri* silk more attraction. Khan et.al (2005) also stated that natural dyes have been a part and parcel of men's life excavation at Mohanjadaro and Harappa, Egyptians mummies, Ajanta caves painting and Mughal paintings shows the use of natural dyes. Natural dye have a revival and heading towards a period of renaissance.

They are compatible with the nature due to their non-hazardous nature and produce colour that are gentle, soft, and subtle which create a restful effect (Mahela et.al.,2006). *Eri* silk does not create any environmental problem at the stage of production or use and maintain ecological balance (Choudhury,1982). Combination of datura dye with *eri* silk will produce product which are better biodegradable and generally high compatible over the environment. Dyeing adds a natural value to the *eri* silk by making it attractive and more scope for making diversified products so as to, popularizing its demand in the society. Considering the importance of marketability, eco friendly dyeing and vast potentiality of *eri* silk, it was decided to carry out an investigation with the following objectives.

- (a) To optimize the dyeing condition of selected dye on *eri* silk yarns.
- (b) To study the background information of the respondents.
- (c) To analyse the preference of datura dye among the respondents.

MATERIALS AND METHODS

Collection of leaves and dye extraction

Datura stramonium leaves were collected from Assam Agricultural University campus and were washed with running tap water and grinded well to extract the dye. *Eri* silk yarns collected from Lakhimpur district were degummed and bleached before dyeing. The dye liquor was scanned using spectrophotometer between 500-570 nm as it is the wavelength for green colour.

Optimization of parameters

Various dyeing conditions were optimized such as alkali concentration with a few drops of citric acid, extraction medium, dye extraction time, dye material concentration, mordanting concentration, mordanting time and mordanting methods was calculated using the formulae:

$$\% \text{ of dye Absorption} = \frac{\text{OD of the liquor before dyeing} - \text{OD of the liquor after dyeing} \times 100}{\text{OD of the liquor before dyeing}}$$

Evaluation of colour fastness

Colourfastness properties like colour fastness to washing of dyed *eri* silk yarns were tested by using sasmira launder-o-mete. The wash fastness rating was rated by using grey scale rating from 1-6. Colourfastness to perspiration (acidic and alkali) was assessed. The test specimen of coloured textiles were wet out in alkali and acidic perspiration solution with fixed mechanical

pressure and allowed to dry slowly at a slightly elevated temperature.

Survey Methodology

Data was collected with the help of questionnaire and interview method. For Sampling 30 women were selected as samples from three village of Kokrajhar district. Makhtaigon, a village of Kokrajhar district had been selected based on random sampling method. Data was collected through personal interviews with the help of questionnaire from the samples. Data collected from the sample was computed and analyzed in simple frequencies and percentage.

RESULTS AND DISCUSSION

The wavelength of the dye was found to be 545 nm. It will help to know the colour which the dye will produce. Alkaline medium was selected as the best medium for dye extraction. Alkali concentration 2.5%/100 g of yarn showed highest absorption value. The optimum dye concentration was found to be 5%. The dyeing time was optimized as 45 min similar to the results shown by Bordoloi, (2008) on dyeing *eri* silk yarns with bark of carambola. Extraction time was found as 75 min. Similar results has been shown by Brains et al. (2005) on extraction of Peach (*Prunus persica*) dye The mordant concentration was found to be 6%/100 g of yarns for alum, 4%/100 g for copper sulphate, 2%/100 g for both ferrous sulphate and stannous chloride. Dyeing time was found to be for 30 min for all mordant, the optical density value decreased as the yarns were unable to absorb dye after reaching the maximum absorption point. Similar result has been shown by bordoloi, (2008) will dyeing *eri* silk will (*Averrhoa carambola*) carambola bark.

Simultaneous mordanting method was considered as the best method for alum. Similar result has been shown by Bansal *et al.* on dyeing of silken yarn with berberry dye., copper sulphate and ferrous sulphate while post mordanting method was best for stannous chloride mordanted samples. The colour obtained from datura dye on *eri* silk yarns were found to be light yellow green without mordant, light green mordanted with alum, camouflage green when mordanted with copper sulphate, ferrous sulphate mordanted produce brown colour and lime colour obtained when mordanted with stannous chloride.

Copper sulphate mordanted sample showed good colour fastness and no colour staining. The alum mordanted sample showed good fastness to crocking, perspiration (alkali) and pressing (dry and wet) and very fair fastness to washing and acidic perspiration while fair fastness to sunlight and slightly stained on acidic perspiration. Ferrous sulphate mordanted sample

Table 1. Ratings for colourfastness properties of dyed samples.

Mordant used	Sunlight	Washing		Crocking				Perspiration				Pressing			
				Dry		Wet		Acidic		Alkaline		Dry		Wet	
		CC	CS	CC	CS	CC	CS	CC	CS	CC	CS	CC	CS	CC	CS
Without mordant	3	4	5	5	5	4	4	4	4	5	5	5	5	5	5
Alum	3	4	5	5	5	5	5	4	4	5	5	5	5	5	5
Copper sulphate	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Ferrous sulphate	5	4	5	5	5	4	4	5	5	4	4	5	5	4	4
Stannous chloride	3	4	5	5	5	5	5	4	4	5	5	5	5	5	5

CC : Colour change, CS : Colour staining, CC Ratings: 1 = very poor, 2 = poor, 3 = fair, 4 = very fair, 5 = good, 6 = very good
CS Ratings: 1= heavily stained, 2= considerably stained, 3= noticeable stained, 4=slightly stained, 5= negligible or no staining..

Table 1b. Age Group of Respondents

Age group	Women respondents (%)
21-31	72
31-50	21
50 and above	7

Table 1(c) Educational level of respondents.

Educated				Non- educated
65% Level of Education				35%
Primary	Middle school	High secondary	Graduates	
37%	18%	8%	3%	

showed good fastness to sunlight, dry crocking, acidic perspiration and dry pressing while very fair fastness to wet crocking, wet pressing and alkaline perspiration and slightly stained in wet pressing and wet crocking.

Stannous chloride mordanted sample showed good fastness to dry and wet crocking, dry and wet prssing alkaline perspiration, very fair fastness to acidic perspiration and washing and fair fastness to sunlight while without mordanted sample showed good fastness dry and wet pressing, alkali perspiration and dry crocking while very fair fastness to washing, wet crocking and acidic perspiration while fair fastness to sunlight

and it showed slightly stained in wet crocking and acidic perspiration (Table 1).

Background information of the respondents

Personal profile, family profile, acceptance of datura dye by the rural folk is discussed with the help of tables and graphs. Regarding the personal profile of the respondents", the study reveals that majority of the women weavers were Hindus and the rest were Christians.

Caste wise distribution shows that 95% women belongs to schedule tribe and only 5% belongs to other backward caste. Marital status of the

respondents were analyzed and found that 81% of the samples were married and 19% were unmarried girls (Graphs 1- 4).

Table 1(a) shows that majority (72%) of them belong to age 31-50 years and more than 21% of them belongs to the age group of 21-31 years and only 7% respondents are above 50 years. About 65% of them were educated but they did not have high level of education (Tables 1b and c). 38% of them had only primary education and 19% have education only up to middle level, 8% up to higher secondary and 3% graduates. 32% of them reported that they could only write their names and do simple calculation.

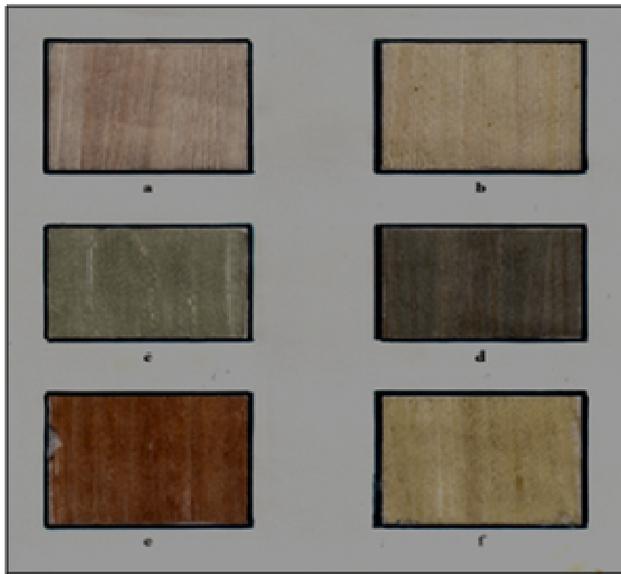
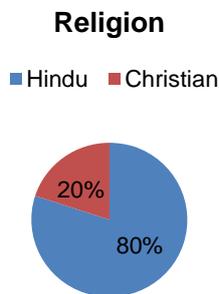


Figure 1. Colour Shade of Datura dye

a= Original, b= Without mordant (Light yellow green colour), c = Alum mordanted (Light green colour) d = Copper sulphate mordanted (Camouflage green colour), e= Ferrous sulphate mordanted (Brownish green colour), f= Stannous chloride mordanted (Lime colour).

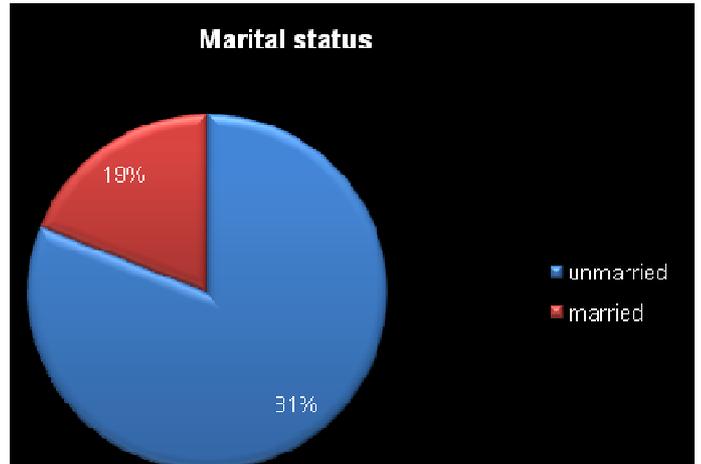


Graph 1. Religion of Respondents.

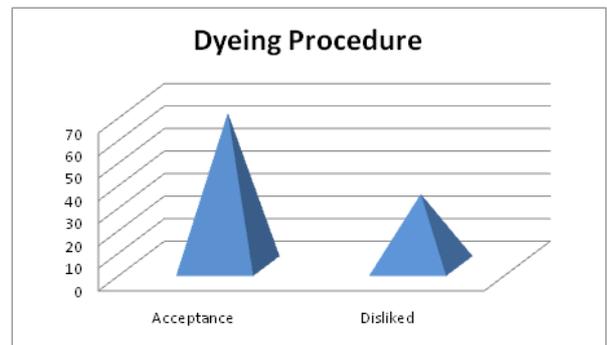
The study reveals that about 55% of them came from joint families comprising of 8-10 members. The rest 45% have very small families having less than 5 members. The statistic showed that joint families are decreasing day by day hence, home dyeing had decreased due to less working family member.

Acceptance of Datura dye by the Respoandents

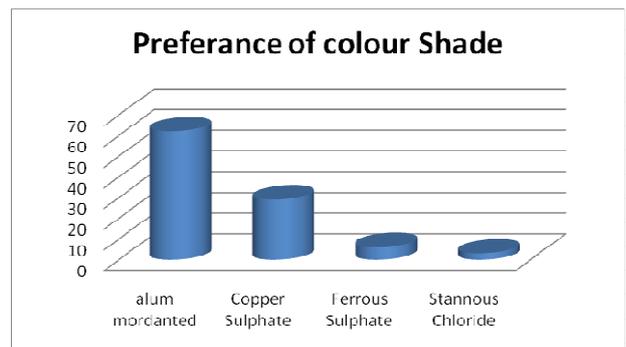
Among the selected sample 80% had found datura dyed fabric can help to reduce the use of synthetic dye and it is better for use while 20% respondents had found Annato dye is more better than synthetic dye.



Graph 2. Marital Status of Respondents.



Graph 3. Dyeing Procedure of Datura Dye.



Graph 4 Dyed Colour Preferred by Respondents.

Regarding the process of dyeing 68% respondents said that the process of natural dye is good for adopting while 32% said that it is a very laborious process. Most of the respondents said that fresh leaves using as natural dye can hamper their enterprise as in some seasons datura leaves quantity diminished. Colour shade acceptance

62% respondents preferred datura dye mordanted with Alum i.e light green colour as subtle and eye pleasing colour shade which can be use for summer wear. 29% respondent prefer datura mordanted with copper sulphate camouflage green shade was better as it is the darkest shade among the all shades. 6% prefer datura dye mordanted with ferrous sulphate as eye attractive while only 3% responded stated stannous chloride mordanted sample as nice.

Conclusion

Dyeing is a traditional craft for ornamenting textiles. Dyeing of eri silk yarns with datura dye produces various soft and subtle natural shades. Sample mordanted with copper sulphate showed good fastness to sunlight, perspiration, pressing, washing and crocking. On the other hand, *Datura stramonium* plant has various medicinal properties which can serve as additional benefit other than colouring textiles. Rural folks specially the women found dyeing as a exciting process and cannot be think it as a labourious and time wasting activity. 80% of the respondent commented that correct dyeing procedure will produce brilliant shades and be able to capture the market of fabrics with it skin friendly property. Alum mordanted sample has been considered as better colour shade for summer wear.

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