



Continuous issue-7 | June - July 2016

## Traditional Knowledge on dyeing of yarn with Acacia catechu and Lac in Kachchh, Gujarat and developing a standardized colour palette.

### ABSTRACT

*Kachchh is recognized as hotspots of the use of natural dyes, which was used by local community. In Kachchh natural dyeing is linked with the Khattris, who were dyers of the cloth, but the expertise of yarn dyeing was a part of the weavers. Natural resources like Madder, Indigo, Harada, Turmeric, Pomegranate peels, Desi Babool and black soil, Lac are a few of them. The present study attempts to document the traditional knowledge of indigenous resources used for colouring of yarn which has been practiced in past. This was done because modernization and globalization are taking a toll in the inherent essence of the craft. The traditional methods and use of resources have been fading out, flickering only in isolated pockets. The objectives were to document the indigenous resources and its dyeing process. For further use colour palette was developed. Data regarding the craft was collected from a purposively selected sample practicing the craft in traditional natural dyeing.*

**Keywords:** Traditional knowledge, Indigenous resources, Natural dyeing.

### INTRODUCTION

The men of most communities of Kachchh wore blankets of different kinds called Dhabaras, Dhabla or Khattas. Almost all the traditional woollen textiles of Kachchh are woven in natural sheep wool colours and used without any post loom dyeing with exceptions such as the Rabari women's unstitched draped garments. The Rabari are Hindu pastoralists in Kachchh who associate wool with Lord Krishna. They celebrate its sacred attribute by clothing themselves in it throughout the year. Apart from its religious connotation, wool also serves as an insulator to the desert heat.

The women of the Rabari community can be distinguished by their use of dark coloured woollen and unstitched or draped lower garments. Which require post loom dyeing in shades ranging from maroon to black. The use of black was common to all the Rabari in Kachchh. Black colour was developed by Acacia catechu leaves and Ferrous sulphate and maroon was produced by Lac.

Although the Rabari women largely depend on the Khatri or the Muslim traditional dyers of Kachchh for the dyeing of unstitched woollen garments that require skill and expertise, very often they dyed their plain lodki or pernus themselves. Practice of dyeing their own clothes was linked with their nomadic lifestyle especially of the Dhebaria Rabari which does not allow them to be stationed and wait for the Khatri every time.<sup>(1)</sup>

Rabaris were particular about their dark maroon shades on woollen yarn which was developed by Lac and Tamarind. Sometimes natural black woollen yarn was not available so black colour was developed by Desi babool leaves and ferrous sulphate.

## METHODOLOGY

For the collection of primary data about the traditional dyeing methods with indigenous resources, reliable information was collected by interviewing the craftsmen and observing the men at work. The study main aim was documenting the indigenous resources used for colouring of yarn from a dyers perspective. To fulfill main objective a descriptive study was planned for which a questionnaire was structured and purposive sampling method was implemented. To develop a colour palette, pre-treatment and dyeing were done with indigenous resources and their proportion was used according to dyers perspective. For continuity and progress of craft quantification of indigenous resources was done and to give scientific approach Spectrophotometer analysis was done.

## RESULTS AND DISCUSSION

The main purpose of this study was the conservation of the knowledge of traditional art of dyeing and the use of indigenous resources therein, which have seen a gradual decline. The present study was an attempt to document, audit, and calculate proportions of the oral traditional recipes so that the dyeing craft traditions of western India and the indigenous resources used there in are well documented for any person to understand and further practice it.

**Table: 1**Traditional and Existing Process of Yarn dyeing:

Sr.No	Traditional Process	Existing Process	Indigenous resources used
1	Woollen yarn	Woollen yarn/ cotton yarn	Yarn
2	Washing with Aritha	Scouring	Aritha
3	Dyeing with Desi babool leaves, bark, Ferrous sulphate	Discontinued	Acacia catechu leaves, Ferrous Sulphate
4	Dyeing with indigo	Dyeing with indigo	Indigo
5	Dyeing with Lac	Dyeing with Lac (If orderd)	Lac powder. Tamarind
6	-	Dyeing with Synthetic dyes	-
7.	Weaving	Weaving	-
8.	Weaved Dhabala was Put in cowstable	Omitted	-

▪ **Indigenous resources used to develop colour:**

➤ **Pre-treatment:**

1. **Water:** Water was an incredibly important source for colouring of textiles. In Earlier times yarns and fabrics were hand spun and unprocessed so to prepare final product proper washing was needed In some stage after mordant print, fabric required washing in running water.

2. **Aritha:** The *Sapindus mukorossi* (Aritha) tree is one of several that bear fruits that are commonly referred that soap nuts. Aritha are solitary, round nuts 2.25 on diameter fleshy, yellowish brown in color. The seed is enclosed in a blank, smooth and hard globose covering. The soapnuts from the aritha tree have the highest saponin content. Saponin is a natural detergent commonly used for cleaning among many other things. Main chemical components are saponins, sapindoside, kaempferol, quercetin, B- sitosterol, palmitic, stearic, oleic, linolec and eicosenoic acids, glycerides.<sup>(5)</sup>

In earlier times when soaps were not discovered aritha was the main source for cleaning and washing. Laundering with aritha leaves rendered clothes/yarn incredibly soft without the need for fabric softness or conditioners. Aritha are all natural, hypoallergenic, biodegradable, ecological and economical.

3. **Hingora:** Hingora was fruit of a spiny, evergreen tree, which was grown in the drier parts of India. The plant is drought-hardy, common in open sandy plains and can be propagated by root suckers. It was used by yarn dyeing artisans to wash cotton yarns.

The pulp of the ripe fruit has a sweet, but disagreeable taste. The fruit pulp contains steroidal saponins. The saponins, on hydrolysis give diosgenin, glucose, xylose, arabinose and rhamnose. The diosgenin content of the fruit varies from 0.3 to 3.8 percent. The ripe fruits also contain cryptogenin. It can be used for the production of soap.<sup>(4)</sup>

➤ **Dyeing:**

1. **Desi Babool leaves and bark:** The main colouring pigment found in Cutch is Catechin.<sup>(3)</sup> With different mordants it produces yellow to black shades. To prepare dye mixture the bark was cut into pieces and crushed. For extraction bark powder and leaves were extracted and filtered and then filtrate was cooled and utilized for dyeing.

2. **Ferrous Sulphate :** Ferrous sulphate was used as a mordant in textile dyeing where was termed as a saddening agent because it dulls or darkens the dye colour. It is a blue-green crystalline material that has been used in inks, dyes, and the manufacture of Iron. It has been used in dyeing and printing crafts. It was also known as Hirakashi by the Indian dyers. Ferrous sulphate was also used in conjunction with ferrous Acetate to obtain a deep black colour where large areas were to be dyed black and was also used as a mordant and for dyeing with natural dyes. It was used with *Acacia catechu* leaves to form an under black colour on yarn.

3. **Lac:** Lac is the resinous protective secretion of the tiny lac (Genus *Laccifer*) which is a pest on a number of plants both wild and cultivated. The building blocks of lac were mainly hydroxyaliphatic and sequiterpenic

acids which are present in the proportion of 50:50 lac contained a water soluble red dye, laccaic acid, and an alkali and spirit soluble yellow dye erythroluccin.<sup>(2)</sup>

The harvested stick lac was crushed and sieved to remove impurities. The sieved material was then repeatedly washed to remove insect parts and other soluble material. The resulting product is known seed lac. Stick lac was ground into course powder water was then added and the solution was stirred and left standing for 24 hours and then extracted for 30 minutes at boil solution was filtered and the filtrate extract was used for dyeing.

**4. Tamarind:** The tamarind is a slow growing long lived, massive tree. It derived its name from the Persian word 'tamar-e-hind'; meaning 'dates-of-India' due to its brownish pulpy appearance when ripe. Its fruits are flattish beanlike, irregularly curved and bulged pods. Unlike the dates the tamarind fruits are sour in nature and hence acidic. The pH of the tamarind extract usually Acidic.



Plate :1 Aritha



Plate:2Hingora plant



Plate: 3 Hingora Fruit



Plate: 4 Acacia catechu leaves



Plate:5 Acacia catechu bark



Plate:6 Ferrous Sulphate



Plate:7 Lac Powder



Plate:8 Tamarind tree



Plate:9 Tamarind

### Indigenous resources used for develop colour

#### ▪ Experiment with procured indigenous resources:

Indigenous resources like Aritha, Hingora were used in washing, bleaching, softening. Pre-treatments played a major role to get best results of dyeing and for that reason they were very important for the Artisan. The use of indigenous resources and technique of its use at the specific stages of pretreatment and dyeing were done. The same procedure which was artisan taught, followed at the lab to reproduce the dyeing results.

**Table:2 Recipes for pretreatment and dyeing of yarn with indigenous resources**

Sr. No	Resource	Procedure of Extract	Time and M:Lration for Extraction	p <sup>H</sup> / Tem	Time and M:Lratio for Treating	Used As	Proportion in Yarn/Fabric
1	Aritha [Fruit]	Powdered or fruit soaked for 24 hours	30 min at 1:40 M:L	6pH 60° to 80° Temp.	30 min. 1:20	Washing	30 gms in 1 kg Yarn
2	Hingora [Fruit]	Soaked fruit for 24 hours	1 hour 1:20 M:L	7pH 60° to 80° Temp.	45 min. 1:20	Washing	50 gms in 1 kg Yarn
3	Ferrous Sulphate	-	-	-	-	Mordanting	5 gms in 1 kg yarn
4	Lac	Soaked our night	45 minute at 1:10 M:L	6pH 60°to80°C	45 min. at 1:20 M:L	Dyeing	100 gms in 1 kg yarn
5	Acacia catechu	Powder and soaked for 15 minute	45 minute at 1:20 M:L	7pH 60°to80°C	45 min. at 1:20 M:L	Dyeing	500 gms in 1 kg yarn

➤ **Pre-treatment of Fabric with indigenous resources:**

**1. Procurement of Yarn:** The main colours used by Kachchh people was black and maroon for the experimental procedure handspun woollen yarn were procured from Kachchh, Gujarat.

**2. Washing with Aritha and Hingora:** Aritha and Hingora were used as natural soap for washing of yarns. The region of Kachchh is home to this soap nut plant and has a good yield. Traditionally woollen yarns were scoured with Aritha, and cotton yarns were washed with Hingora which was available in the local area. Aritha and Hingora have the saponin content in it which was main component for washing and also have glyceride which makes the fabric or yarn smoother and softer.

Aritha fruit was deseeded, Hingora was peeled and both were soaked in water for 24 hours. Next morning it was mashed by hand in the same soaked water, stirred well and strained to obtain the soapy filtrate. Yarns were soaked in extracted solution and held for 1 hour, gently turning the yarn hanks at regular intervals. After 1 hour the yarn were removed from solution and washed with normal water 2 to 3 times and allowed to hang and dry.

➤ **Dyeing of yarn with indigenous dye sources:**

**1) Dyeing with Acacia catechu leaves, Bark and Ferrous sulphate:** Acacia catechu and ferrous sulphate were used to develop black colour on woollen yarn. Traditionally these resources were used to dye woollen yarn used for weaving of Dhabala. Ferrous sulphate was used as mordant with *Acacia catechu* dye. It played a colour saddening role as it dulled or darkened the dye colour.

Leaves and powder of bark were soaked in water and extracted for 45 minutes by maintaining M:L ratio to 1:20 and heating the solution to 60° to 80°C on flame. The pH of the solution was recorded and ferrous sulphate was added to the solution, stirring the solution ensured the dissolution of ferrous sulphate; which was then strained with strainer. Dyeing of yarn for 1 hour in this extraction, gently turning the hanks of yarn at regular intervals. Dyeing was carried out at 7 p<sup>H</sup>, for uniform dyeing the samples were stirred regularly. The yarn was removed after 1 hour and washed with tap water 2 to 3 times and allowed to hang evenly over a non-reactive rod (stainless steel, plastic) until it dried completely. After drying dyed yarn were washed with Aritha solution.

**7) Dyeing with Lac:** Lac was oldest dyestuff which was obtained from the secretion of lac insect *Lacciferlacca*. It was used in dyeing of woollen yarn in Dhabala weaving and to dye *lodki* a dark coloured veil used by women of Rabari community. Lac dye produced a dark maroon to red colour on woollen yarn. Acacia stick lac contained a water soluble red dye and an alkali and spirit soluble yellow dye. It reacted as an acid dye. Tamarind was used to make the dye solution acidic.

Lac was soaked in water overnight. Next morning the soaked solution was mixed thoroughly and extracted with tamarind solution for 45 minutes and strained. The yarn was wetted in tap water and hung on rods. Dyeing of woollen yarn was done in the prepared lac extract for 1 hour at 6 pH and 70° to 80°C. The hank was turned at regular intervals of time and removed after one hour, cooled to room temperature and washed with

tap water 2 to 3 times and allowed to hang over a non-reactive rod (stainless steel, plastic) for complete drying. After drying, dyed yarn were washed with Aritha solution.

▪ **Colour obtained and reflectance spectrophotometer data of the dyes**

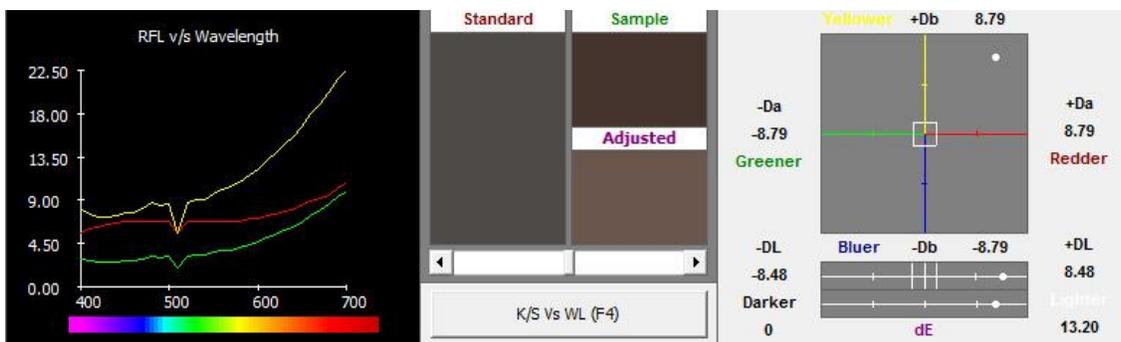


**Plate:1**Acacia catechu and

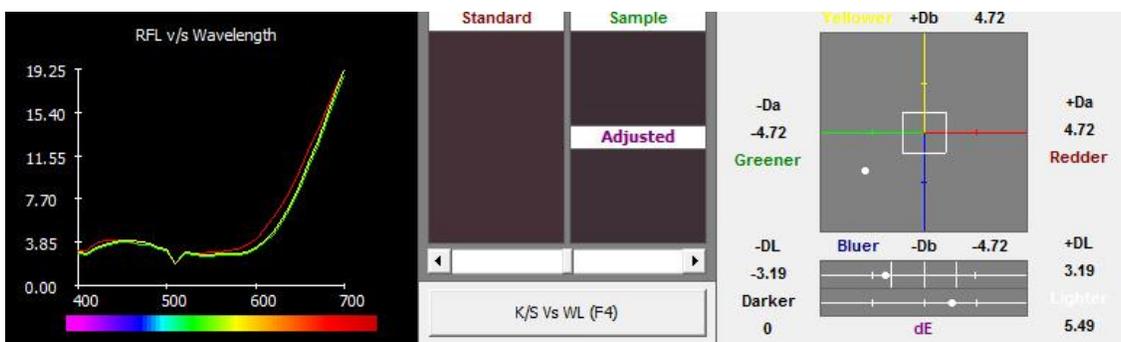


**Plate:2** Lac

**Ferrous sulphate**



**Graph no: 1** Reflectance value of Acacia Catechu and Ferrous sulphate on Yarn



**Graph no: 2** Reflectance Value of Lac dye

**Table:3 Reflectance values of dyed yarn samples:**

	Control	Acacia catechu and Ferrous sulphate	Lac
DL*	-	-9.204	-11.978
Da*	-	-2.214	-13.200
Db*	-	-9.585	-13.019
Dc*	-	-8.254	2.787
DE*	-	13.472	22.073
k/s		7.868	23.714

The readings shown in **Table: 3** represents data of yarns dyed with different natural dye. It was observed from the data that all the samples showed negative DL\* values which was indicative of the darkness of all samples. The visual inspection of the sample dyed with acacia catechu was dark in nature. It was also observed in negative DL\* values of sample show that the sample was darker compared to its control sample indicating that the sample had dyed a deep shade. It was observed that the Da\* values of sample with lac dye had a reddish tone on it. The k/s values of

Sr.No	Sample	Wash Fastness		k/s Values	
		Change in Colour	Staining on White	Standard Sample	Wash Sample
1	WAD.Fe	1-2	1-2	7.868	24.199
2	WAL	2	3-4	23.714	24.743

sample was 23.714.

▪ **Wash fastness testing method:**

It was done according to Test method IS 764:1979, based on ISO, 105/C- 1982.To evaluate the fastness of the dyed sample a launder-o-meter was used. The geometric grey scale by ICI (As specified by the Society of Dyers and Colorists) was used for visual assessment to evaluate the rate of staining and colour change of the dyed sample. For the evaluation of the rate of staining of un-dyed cloth, was done by comparing the difference in colour of stained cloth with the difference represented by the scale. For the evaluation of the change in colour, the rating was done by comparing the difference in colour of tested specimen and the original textile yarn with the difference represented by the scale.

**Table:4 Wash fastness of dyed yarn samples:**

WA=Washed with Aritha, Fe=Ferrous Sulphate, D=Acacia Catechu, L=Lac,

**CONCLUSION:**

The indigenous resources were used in limited occasion and quantities due to low availability and poor market and also its cost. So before this traditional knowledge on indigenous resources faces extinction it was imperative to document for sustained interest and continuity of practice. In process to develop the colour has changed to a great extent in order to meet the growing demand of the market. The colours which were developed by craftsmen's recipes were darker in nature. Scientific approach of this study will help a new dyer to understand and use of the natural dye.

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