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Dyeing with *Morinda citrifolia*: In Pursuit of Sustainable future

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Green and sustainable practices are the future of fashion. It aims to nurture the environment through effective use of resources in order to minimize the cruel impact for both producer and customer. It employs techniques of environmentally friendly ways of growing, extracting, producing and processing fabrics.

Fashion industry as such involves highly unsustainable practices as there is always an urgent need to get faster and uniform results. It has a high carbon footprint as each stage of clothing lifecycle generates environmental and occupational hazards. Socially committed fashion takes into account the place of production, producers well-being and conditions under which the fabric or garment is made. It also takes care of fair trade practices, healthy ambience at work, transparent work culture and fair wages for all workers.

It is possible to practice completely sustainable systems with concern for environment, society and commercial profitability in craft sector. This has been clearly evident in works of individuals, craft communities and organization.

Natural Dyeing in Craft Sector
In India, traditional methods of textile production are still practiced which includes natural dyeing, handloom weaving and block printing which has ensured more original and economic production of small quantities of textiles to be custom made for a niche segment. A traditional craftsman is a storehouse of indigenous knowledge, which is not always documented. Some of these orally passed on traditions are lost forever, especially at this juncture, when the artisan is looking for avenues to cater to the tastes and needs of an unknown urban market.

One such craft, which was taken up for research was the Aal (*Morinda citrifolia*) dyed, handloom woven textiles used mainly as sari by the women of the tribal societies and as turban or shoulder cloth by their men. Theses textiles have been made in India in Bastar in Chhattisgarh and the neighbouring Koraput in Odisha for many centuries. This central Indian region is also home to the tribal culture and traditions nurtured by the local ironsmith, weaver, potter and many other artisan communities.

The weavers in the region belonging to Panika community are worshippers of Sant Kabir, a sufi weaver himself. Sant Kabir was a 15th Century mystic poet and saint, whose writings influenced Hinduism's Bhakti movement and his verses are found in Sikhism's scriptures too.

Various Aal dyed textile for tribal people are woven manually on pit looms. These textiles are worn by the people of tribal communities of Sundi, Maria, Muria, Gond and few others. Men wear it as a shoulder cloth or as head cloth. The women drape it as a sari which is generally 3.5 meter long and almost a meter wide. (Lynton, 1995) The cotton of 14s and 20s count is generally woven, hence the fabric is coarse and thick (Illustrations 1.1 & 1.2).
Aal dyed fabrics fall into the sustainable textile category, as only cotton and silk, both natural fibers are used. Kotpad cluster is known for its traditional Aal (*Morinda citrifolia*) dyeing. Historically, the region is well known for its handicrafts, which have a distinctly developed identity as tribal in terms of material, techniques and style. Handlooms of the region have produced textiles mainly for the local consumption. Due to easy availability of alternate mill-made cheaper textiles, the handloom crafts of the region have suffered immensely, seriously affecting the livelihoods of traditional weaving community.
However, unlike many other regions of the country, there has been limited action in the region, towards development of the handlooms in terms of bridging the domain of product development to the changing or totally new requirements of existing or potential markets.

**Aal (Morinda citrifolia) Dye**

*Morinda citrifolia* is also known as Indian mulberry. It is a tall tree with a straight trunk, with broad elliptical bright green leaves and white flowers. It was earlier cultivated throughout India but now Aal trees are grown mainly in Kalahandi and Malkangiri forests of Odisha.

The roots of *Morinda citrifolia* spread out and are not too deep in the ground. These are dug out when the plant is three to four years old; the root bark is dried and sorted to be used for dyeing. Roots thicker than 1.3 centimeters are discarded as worthless. The coloring matter resides in the root bark and is present to the maximum extent when the plants are three to four years old. Mature trees hardly contain a trace of it. For dyeing, the roots are chipped and given a preliminary steeping in water to wash off the free acids. Best results in dyeing are obtained from a neutral dye-bath of washed *Morinda* roots. Red, maroon and chocolate shades are produced on mordanted cotton. When necessary precautions are taken, the dyeing power of *Morinda* excels that of madder.

The coloring principle of *Morinda citrifolia* root is morindone (trihydroxy methylanthraquinone) C₁₃H₂₀O₅, present in the bark mainly as the glucoside morindin C₂₇H₃₀O₁₄ on hydrolysis. Morindin yields glucose, rhamnose and morindone.

![Anthraquinone](image)

Red dyes are based on anthraquinone structure. These dyes are characterized by good fastness to light.

**Dyeing with Aal**

The Aal dyeing was limited to Kotpad village of Koraput District of the state of Odisha. It was found that the wives of the weavers belonging to the Panika Community, dyed yarns with Aal, for the weaving activities in their own family as well as supplied dyed yarns to other weavers in Kotpad and the villages in the neighboring state of Chhattisgarh. It is a very lengthy, time consuming and tedious job. There were no age or gender dependent activities noticed or reported in the cluster. However, the girls started helping their mothers when they were 9-10 years old and were able to independently process the yarn for Aal dyeing at the age of 15.

The dyers were dependent on Muria, Parjas and Gadvas tribes, who sold dried root bark of *Morinda citrifolia* in the weekly markets. The dried roots of Aal were washed thoroughly and dried in the sun on the streets. The dried bark was then either taken to a flour mill for milling or
milled at home in hand-mill. Five different shades of red and chocolate brown were derived; dull brick red, bright brick red, deep maroon red, blackish maroon and chocolate brown.

**Dyeing Process**

It was observed that the dyers processed the yarns in hank form. Normally one bundle of yarn, weighing around 4.5 to 5 kilograms, was dyed in one lot. In hot summer months, the dyers preferred to dye the stocks, as no dyeing took place during the monsoons.

- **Division of bundles of yarn**- While processing, hanks of yarns are tied together loosely to undergo treatment in earthen pot with a wide mouth, before dyeing with Aal. The peculiarity of dyeing with Aal is that the pre-dyeing treatment is long drawn and tedious and takes at least 12-15 days.

- **Treatment with castor oil**- Each hank is then dipped in a solution made by mixing water with castor oil (*Ricinus communis linn*). Hanks of yarns are completely immersed inside it and then rubbed with hands in section. The hanks of yarns are then squeezed and placed on a wooden plank, to be rubbed by stamping with feet for better penetration of the oil. The process is repeated till the yarns are completely saturated and soft. Castor oil contains fatty acids which act as dispersing agents for aluminum and calcium lakes (Illustration 1.7).

- **Cow dung treatment**- In the same pot, a semi-solid solution of cow dung is made with water to make into a paste of running consistency. Yarns are dipped into the solution and again the extra solution is squeezed out. The cow-dung mixed with alkaline medium, produces ammonia, when exposed to strong sunlight.

  The yarns are then placed on the wooden plank for stamping with feet. Some more cow dung solution is applied on the hanks by hands before they are spread on the bamboo rods for drying in the sunlight (Illustration 1.4).
• **Ash washing process** - In a separate container ash from the kitchen hearth is mixed well in water and is kept overnight. The ash settles down on the base of the container. The clear water from the top is taken out in the earthen pot. Cow dung coated dried yarns are sprinkled with ashwater and are stamped again with feet on the wooden plank (Illustration 1.5). The ashes of local wood contains alumina, which ensure richer, deeper and intense red colour.

The hanks are then dried in the sunlight. This process is repeated two or three times daily till foam starts oozing out, on application of ashwater. This is an indicator that the yarns are now receptive to take up the dye. The hanks of yarns are then washed in the river by beating on stone and are dried thoroughly, before dyeing with Aal. At this stage, these sun bleached yarns have dull off white colour.

• **Dyeing using Aal powder** - For dyeing, Aal powder is added to the boiling water in a wide mouthed vessel and mixed thoroughly. The sun-bleached yarns are then dipped in the dye bath and rubbed with hands to spread water and Aal powder into the hank (Illustration 1.6).
Additional Aal powder mixed with hot water is then poured into it. The yarns are again kneaded for 10 to 15 minutes and then the pots are kept in bright sunlight for the whole day ensuring the yarns are completely immersed in dye. Next morning the pots are placed on fire to boil until the water evaporates (Illustration 1.7). The pot is stirred with wooden stick to ensure that the yarns remain moist and do not char.

- **Final washing** - The yarns are washed at the water bodies located on the outskirts of the village. The right shade does not actualize immediately. For deeper shades hanks are dyed again and the process is repeated till the required shade is achieved. Normally, yarns are dyed with Aal twice to achieve rich and bright terracotta hue (Illustration 1.8).
• **Dyeing for a deeper shade** - For dark coffee shade, iron fillings were used in the third dyeing solution along with Aal dye. The iron fillings were taken from the waste material at iron smith’s house. It was mixed with jaggery and water and was kept for fermentation for 3-4 days. The foul smelling liquor from this was added to the Aal dye bath. Finally the yarns are washed at the pond outside the village by beating on a stone. Then they are dried to be stored for selling or weaving.

Thus, after almost 25-30 days, one lot of cotton yarn gets dyed in the required shade, which not only has colour of Aal but also dyers skill and hard work. The continuity of Aal dyeing and handloom weaving in the region has been maintained and has remained untouched by chemicals, because it is an integral part of lives of *Panika* dyers and weavers of Kotpad in Odisha.

**Medicinal Properties of Natural Dyes**

It is well known that skin functions not only as a protective barrier, but also as a conduit for outside substances to enter the body. Researches have proved that skin takes up toxins and chemicals from clothing and the environment. Hence it has the ability to absorb herbs and medicines found in natural dyes in clothing. Knowledge of these facts has led to renewed interest in fabrics dyed in natural dyes and herbs and plant extracts.

It has been recorded in Indian historical texts that Aal (*Morinda citrifolia*), madder (*Rubia cordifolia*) and indigo (*Indigofera tinctoria*) had cooling effect and hence the fabrics dyed with these colouring agents were used as head cloth or clothing especially by people who were involved in occupations which required them to be in the sun for long hours. Researchers have found that natural dyes do not pose any health hazard. So far, it has been found that the naturally found colouring matter act in many cases as health cures. Vegetal dyes are prepared from non-allergenic and non-toxic plants. Although tests are still being conducted, it has been observed that natural dyed cotton clothing, especially the ones mordanted with alum, impart deodorizing properties. These textiles also exhibit mosquito- and insect-repellent properties.
Another remarkable property of natural dyes is its ability to absorb ultraviolet light. Thus it provides the skin of the wearer with protection from the harmful effects of the sun emission. In traditional methods of dyeing with natural dyes, practically no or mild chemical reactions are involved.

Most parts of the *Morinda citrifolia* plant are reported to possess medicinal properties. The roots and leaves are used as a cathartic and febrifuge, and applied externally to relieve pain in gout or applied on wounds. Fruits are used for the treatment for spongy gums, throat complaints, dysentry and leucorrhoea.¹

**Colour fastness properties of Aal Dyed Textiles**

If the proper dyeing process is used with natural dyes, wash- and light-fastness ratings of dyed samples are good to excellent – comparable with synthetic dyes.² Aal dyed fabrics show good colour fastness properties when tested under laboratory conditions. It has good fastness towards washing, rubbing, perspiration, and excellent heat fastness - all the conditions a fabric undergoes during consumer usage.

**Product Development for Revival**

A new range of fabrics for garments, home textiles and accessories were designed and developed which were showcased to generate feedback from retailers. The main objective was to provide a new market to the traditional dyers and weavers of Kotpad and Bastar, in order to protect the languishing craft of aal dyeing and handloom weaving in the area of study. While designing new fabrics from the Kotpad cluster few things were kept in view. It was a conscious decision to use only locally available raw material, using traditional motifs for Product development. Designs were created according to the loom set up as it was not possible to make changes in the loom. An attempt was made to design engineered pattern layouts for new products (Illustrations 1.9-1.12).


Ill. 1.9 & 1.10: Apparel made with specially designed fabric

Ill 1.11: Collection of Cushion Covers
Overall feedback received on the products displayed during the exhibition was very encouraging. Weavers from the region were also introduced to few retailers in Indian metro cities to enable them to market their existing fabric and sari range in urban areas.

**Conclusion**

The craft of Aal dyeing and handloom weaving in the Bastar and Koraput districts of Chhattisgarh and Odisha has survived and has remained untouched by substitute methods or chemicals so far, because it is an integral part of lives of the traditional dyers and weavers in the region. The uniqueness of this cluster is the dyers self-reliance on raw material, processing material and production. Kitchen and animal waste is used in processing which is also disposed off efficiently, without causing harm to the environment.

Response to the newly developed products with traditional weavers was encouraging. Most of the visitors to the exhibition felt that aal dyed fabrics should be promoted for their eco-friendly, chemical free process and highlighted as a fabric for style statement. The promotional and information material developed for consumer awareness had a positive impact on consumers as well as traditional weaver. Encouragement to the weavers to develop new products, promotion of the uniqueness of the craft and teaching new skills such as entrepreneurial management and marketing to the next generation will keep the craft alive and sustain.

**REFERENCES**

• Switch Asia (2010). ‘Sustainable textiles for sustainable Development’ -Market Research study-India.