

# Eco-friendly textiles : A boost to sustainability

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■ **ABSTRACT** : This article presents an overview of the textile industry highlighting major processes, techniques and practices that are used to make textile industry more sustainable. There is an essential need to identify the stages in various steps of textile production that are said to be the greatest cause for environmental degradation with a special focus on substances that are likely to cause harm to eco- balance. Now a days various processes, techniques and practices related to textile production have been developed to cure the world from being affected by the hazardous effects of chemicals etc. which are either used in textile industry or released as a by-product by the textile industries. These all sustainable methods and techniques to be adopted by textile industries in order to save environment and to foster sustainability in the field of textiles.

■ **KEY WORDS** : Sustainability, Textiles, Eco-friendly fibres, Green dyes

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**S**ustainable textiles are textiles (or fabrics) that are grown and created in an environmentally friendly way, using minimal chemicals. Because chemicals are not used in sustainable textiles, there are less health problems that are associated with chemicals such as headaches, allergies, skin irritation, and respiratory problems.

For a textile to be sustainable, it has to be made from a renewable resource, it has to have a good ecological footprint (how much land it takes to bring it to full growth and support it), and it should not use any (or use little) chemicals in the growing and processing of it.

The most suitable definition of sustainability recommended by the world Commission on Environment and Development is 'meet the needs of the present without compromising the ability of future generation to meet their needs and desires'. (World Commission on Environment and Development u.d.)

In recent times sustainability is a leading characteristic of textile fashion products. Textile fashion companies are focusing more on sustainable products these days, so that they can meet the environmental and social aspects. For getting competitive advantage in fashion business the companies have to take care of social, political and

economical issues, and they must be aware of current trends of the market. Sustainable fibers provide solution for the companies facing issues regarding environmental problems; these fibers are also favorable to meet the market demands of quality products these days.

## Some sustainable textiles include:

### *Organic cotton:*

Conventional cotton is very environmentally unfriendly as the extensive use of pesticides and insecticides used when growing the cotton cause pollution and also ill health. Organic cotton however is grown without the use of chemicals, making it much more environmentally friendly.

### *Hemp:*

Pesticides or insecticides are not needed when growing hemp and hemp actually improves the condition of the soil that it is grown in. It is also drought resistant and can be grown in most climates. The fabric can be made from the hemp plant without using toxic chemicals and it can be processed locally, reducing the costs and pollution associated with transport.

**Bamboo:**

As a plant, bamboo is very fast growing, helps to improve the quality of the soil, and can help to rebuild eroded soil. It is very sustainable. Bamboo fabrics can be made mechanically or chemically. Because strong solvents are used in the chemical method, it is not considered a sustainable way to create fabric. However, there are newer manufacturing methods that are environmentally friendly. Look for a label from an organic or sustainable certification body.

**Soya:**

Soya cloth is made from a by-product that occurs during the food manufacturing of the Soya bean. The fabric is soft, drapes well, and is comfortable. Look for soya cloth that is certified organic.

**Wool:**

Wool can be an environmentally friendly fabric with some conditions – the animals need to be treated well and live in humane conditions. The sheep manure should not enter the water supply. Another consideration is how the wool is manufactured – environmentally friendly wool will not use bleach or chemical dyes.

**Pina fabric:**

Pineapple leaves are used to obtain Pina, a textile fiber that is used to make fabrics. The pina fibers are extracted from the pineapple leaves by hand scraping, decortications or retting.

**Sustainable technologies and practices includes:****Green dyes:**

- Extraction from plants.
- Extraction from arthropods and marine invertebrates (e.g., sea urchins and starfish).
- Extraction from algae (e.g., blue-green algae).
- Production from bacteria and fungi.

**Processes:**

- Cold Pad Batch preparation and dyeing.
- Continuous processing of knits.
- 1 and 2 stage vs. 3-stage preparation of wovens.
- Combined scour and bleach for knit and yarn.
- Foam dyeing, finishing and coating.
- Pad/dry vs. pad/dry/pad/steam.

**Chemicals and dyes:**

- Cat ionization for salt-free dyeing.
- Stable chemistries for 1 or 2-stage vs. 3-stage prep.
- High fixation dyeing with reduced salt.
- Enzymatic desizing and scouring.
- Size recovery and recycle.
- Liquid indigo and sulfur dyes.
- Pigment printing and dyeing.

–Right first time (RFT) dyeing.

**Equipment :**

- Low liquor ratio jets with LR <8/1.
- Low liquor ratio package dyeing with LR <6/1.
- Filtration of process water for recycle.
- Caustic recovery and re-use.
- Insulated dyeing, drying and stenter machines.
- Solar heating of water.

**Systems, control and management:**

- Empowered environmental teams.
- Automatic dyes and chemicals dispensing.
- Advanced equipment and process control.
- Various system approaches to reduce WEC.

**Waste water treatment:**

- Physical, biological and activated carbon systems.
- High technology filtration systems.
- Recycle internal process water.
- Waste water treatment sludge used/sold for fuel.

**Coloration and eco- friendly bleaching :****Reduce, reuse and recycle :****Bio-processing of textiles :**

Bio-processing can simply be defined as the application of living organisms and their components to industrial products and processes, which are mainly based on enzymes. Like for example.

**Enzymatic desizing:**

By using amylase bacteria.

**Enzymatic bio scouring (by using lipase/cellulase enzyme):**

Saves water by 30 per cent and energy upto 60 per cent, less fabric weight loss and strength loss, better fabric quality and enhanced color brightness after dyeing and low TDS in discharge.

**Enzymatic bleaching:**

Catalases/lactases for removal of H<sub>2</sub>O<sub>2</sub>) saves water, energy, shorten bleaching process cycle, eco friendly process and consistent bleaching result, saves chemicals.

**Bio polishing and Enzymatic based softeners (Cellulase) etc:**

Enzymatic bio-finishing yields a cleaner surface, softer hand-feel, reduces pilling and increases luster.

**Bio-stone washing (Denim finishing):**

Using a special cellulase enzyme instead of pumic

stones. Cellulase works by loosening the indigo dye on the denim in a process known as 'bio-stonewashing'. A small dose of enzyme can replace several kilograms of pumice stones. The use of less pumice stones results in less damage to garment, machine and less pumice dust in the laundry environment; in addition, it's possible to fade denim without risk of damaging the garment.

#### *Decolorization of dye house effluent by enzyme:*

Laccase enzyme produced from fungi like *Trametes Modesta* or *Trametes Versicolor* etc. as Fungi are used for dye decolorization in effluent treatment which is major factor for environmental issue.

#### **Air dye technology:**

AirDye technology manages the application of color to textiles without the use of water. It was developed and patented by Colorex, a California-based sustainable technology company. The process of making textiles can require several dozen gallons of water for each pound of clothing. The AirDye process employs air instead of water to help the dyes penetrate, a process that uses no water and requires less energy than traditional methods of dyeing, the technology works only on synthetic materials.

#### *Key features of AirDye technology:*

- Does not pollute water in the color application process. By using air instead of water to convey dye, no hazardous waste is emitted and no water is wasted.
- Greatly reduces energy requirements, thereby lowering costs and satisfying the strictest standards of global responsibility.
- Does not use boilers, screen printing machines, drying ovens, or cleaning and scouring chemicals, thereby eliminating major sources of pollution.
- Eliminates water in the color application step and simplifies the process, creating revolutionary possibilities of new industry and employment in unfarmable, arid regions of the world.
- Gives consumers a way to choose style and sustainability at a realistic price at the point of purchase, thereby initiating world change.

#### **Herbal textile:**

Herbal Textile is dyed entirely with herbal extractions, without using any sort of chemicals. The herbs used are different from vegetable dyes as they are not only natural but also have medicinal value. These herbs are applied directly to the fabric with the help of natural ingredients, so that the medicinal value of the herbs can be kept intact. No chemical process is adopted while dyeing. Even bleaching of cloth is done naturally by exposing it to sunlight. The herbs also do not pollute the environment through contamination of water

resources in areas close to processing units. All kinds of shades of red, yellow, brown, orange and green etc. can be prepared with the help of these herbs.

#### **Healing effect of herbal textiles:**

Herbal textile is dyed with herbs having medicinal property, it is but natural that the end products made through it will definitely have some or the other health benefits. Herbal Textile can, in fact, fight diseases like hypertension, heart ailments, asthma and diabetes depending upon the herb used to make the dyes. Some of the examples will help to understand these healing effects of herbal textile.

#### *Indigo:*

This herbal dye helps fight skin disease.

#### *Cuscuta grass:*

It helps fight asthma.

#### *Turmeric:*

It can cure pain and is also beneficial for enhancing skin qualities.

#### *Sandalwood:*

It's mild fragrance has a soothing effect that helps in fighting stress.

Some of the other herbal dyes are catechu, pomegranate, tamarind, madder, castor oil, sweet basil, lime, wild turmeric, henna, curry leaf tree, aloe, certain herbal fruits etc. have their own healing effects.

#### ■ WEBLIOGRAPHY

<http://webecoist.momtastic.com/2012/11/12/eco-fabric-14-strange-and-amazing-textile-innovations/>

<http://cottontoday.cottoninc.com/Sustainability-Media/Cotton-Textile-Processing-Sustainable-Solutions/>

[http://www.homeimprovementpages.com.au/article/sustainable\\_textiles](http://www.homeimprovementpages.com.au/article/sustainable_textiles)

<http://www.teonline.com/articles/2008/11/herbal-textile-the-eco-friendl.html>

<http://www.teonline.com/articles/2009/03/wear-fruity-dresses-to-match-healthy-fruit-dessert-pineapple-fabric.html>

<http://www.teonline.com/articles/2009/03/all-about-eco-friendly-fibers-a-gift-for-environment-lovers.html>

<http://en.wikipedia.org/wiki/AirDye>

<http://www.fibre2fashion.com/industry-article/22/2142/airdye-technology-coloring-textiles-without-the-use-of-water1.asp>

**Sami, A.M.** (2013). Technology of eco friendly textile processing: A route to sustainability, 5 march, 2013 <[http://www.google.co.in/url?sa=t &rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CDQQFjAA&url=http%3A%2F%2Fwww.textiletoday.com.bd%2](http://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CDQQFjAA&url=http%3A%2F%2Fwww.textiletoday.com.bd%2)

*Ficta*2012%2Ficta\_content%2F1st\_day%2Feco-friendly-textile.pptx&ei=1i47UbGEOMbqrAedpYGwCg&usg=AFQjCNGVrwmK\_9drNBdA95gqv0xSW0JmrQ&sig2=-a4nFApGTTTrYcxas42N9tw&bvm=bv.43287494,d.bmk>.

**Sengupta S. and Singh B.R.** (2003). Natural green dyes for the textile industry. Technical Report No.57, University of Massachusetts Lowell, 2003. 5march 2013 <<http://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CDAQFjAA>

&url=http%3A%2Fwww.turi.org%2Fcontent%2Fdownload%2F3242%2F29575%2Ffile%2FReport%252057%2520-%2520sengupta.pdf&ei=fSA7UbjCKoTTrQf2wYCQBA&usg=AFQjCNGU8AeXikvG83fwL6jvTrs8t2qXw&sig2=afiDBelznEiEdrsY0Erw3w>.

**Sarwar, M.I. and Ali, M.A.** (2013). Sustainable and Environmental Friendly Fibers in Textile Fashion-A Study of Organic Cotton and Bamboo Fibers. Report No. 2010.9.14, 5march2013 <<http://bada.hb.se/bitstream/2320/6729/1/2010.9.14.pdf>>.

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