

Cotton

Cotton is a soft fiber that grows around the seeds of the cotton plant, a shrub native to the tropical and subtropical regions of Europe and America. The fibre is most often spun into thread and used to make a soft, absorbent and breathable textile used for making clothing, sheets and towels. Cotton is a valuable crop because only about 10% of the raw weight is lost in processing. Once traces of wax, protein, etc. are removed, the remainder is a natural polymer of pure cellulose. This cellulose is arranged in a way that gives cotton its unique properties of strength, durability, and absorbency. Each fibre is made up of twenty to thirty layers of cellulose coiled in a neat series of natural springs. When the cotton boll (seed case) is opened the fibres dry into flat, twisted, ribbon-like shapes and become kinked together and interlocked. This interlocked form is ideal for spinning it into a fine yarn.

Cotton In India

Cotton is the most famous textile material associated with the Indian Subcontinent. The export of fast dyed cotton cloth to Europe revolutionized the garment and furnishing fashions, agricultural practices and the textile manufacturing industries of the seventeenth and eighteenth centuries. Cotton has been cultivated within the Indian Subcontinent for the manufacture of textiles since 1750 BC, the date ascribed to the Mohenjodaro fragments of the Indus Valley Civilization. The perennial form of cotton plant is a slow growing and warmth and water demanding shrub. Its cultivation in the north was therefore limited. By the sixth or seventh century AD the more robust annual variety, *Gossypium herbaceum*, was grown in India. By the thirteenth century, its cultivation spread across the west and south-east Asia.

History of Cotton

For centuries Cotton has been used to make very fine lightweight cloth in areas with tropical climates. Some authorities claim that it was likely that the Egyptians had cotton as early as 12,000 BC, and evidence has been found of cotton in Mexican caves (cotton cloth and fragments of fibre interwoven with feathers and fur) which dated back to approximately 7,000 years. There is clear archaeological evidence that people in South America and India domesticated different species of cotton independently thousands of years ago.

The earliest written reference to cotton is in India. Cotton has been grown in India for more than three thousand years, and it is referred to in the Rig-Veda, written in 1500 BC. A thousand years later the great Greek historian Herodotus wrote about Indian cotton: "There are trees which grow wild there, the fruit of which is a wool exceeding in beauty and goodness that of sheep. The Indians make their clothes of this tree wool." During the late medieval period, cotton became known as an imported fibre in northern Europe, without any knowledge of what it came from other than that it was a plant; people in the region, familiar only with animal fibres (wool from sheep) could only imagine that cotton must be produced by plant-borne sheep. John Mandeville, writing in 1350, stated as fact the now-preposterous belief: "There, in India grew, a wonderful tree which bore tiny lambs on the ends of its branches. These branches were so pliable that they bent down to allow the lambs to feed when they are hungry." This aspect is retained in the name for cotton in many European languages, such as German *Baumwolle*, which translates as "tree wool." By the end of the 16th century AD, cotton was cultivated throughout the warmer regions of Africa, Eurasia and America. The Indian cotton processing industry was eclipsed during the British Industrial Revolution, when the invention of the Spinning Jenny (1764) and Arkwrights spinning frame (1769) enabled cheap mass-production of cotton cloth in the UK. Production capacity was further improved by the invention of the cotton gin by Eli Whitney in 1793. In the United States, growing the three crops, cotton, indigo and tobacco

historically were the leading occupations of slaves. After emancipation, the share cropping system evolved which in many cases differed little from the systems of slavery.

Cotton Processing

After cultivation, cotton is harvested at the farm, and goes through multiple processes. Before processing, there are 3 stages. When cotton arrives at a textile mill, it is fed into the cleaning machines with the help of several blenders. Here, the trash is removed from the cotton by mixing and breaking it into smaller pieces. This is called ginning. Then the cotton is sucked through a pipe into picking machines where it is repeatedly struck by the beaters in order to knock out the dirt and separate lumps of cotton into smaller pieces. Cotton then goes to the carding machine, where the fibers are separated and trash and short fibers are removed. Some cotton goes through a comb that gives more short fibers and makes a stronger lustrous yarn. This is followed by the process of spinning.

The process of spinning includes

- Drafting or reducing the cotton to smaller structures
- Straightening the fibers
- Twisting the fibers into the yarn

Cloth is then made from the obtained yarn through weaving, knitting or other processes. After weaving, the fabric passes through several processing stages. After some stages the fabric can be directly used in the final product, for example unbleached cloth is used in grain bags.

Typical stages are:

Singeing : This weaved cloth is checked by the inspectors for its quality and strength. Then the cloth passes through a gas flame that singes the fuzz off its surface. Boiling the cloth in an alkaline solution removes natural waxes, coloured substances or discolourations.

Desizing : Desizing is the process of removing the size material from the warp yarns in woven fabrics.

Scouring : Scouring is the process of washing cotton in hot water and detergent to remove the contaminants and then drying it. It has always been an important step in cotton processing. A growing concern for the environment has led to increased demands on the scouring process.

Bleaching : Then the cloth is bleached in hypochlorite or peroxide. The cloth may then pass through a machine that prints design on it.

Mercerizing : Named after an English textile manufacturer who invented the process of strengthening a material, namely cotton, with a substance that will give the material strength and in some cases lends a silky appearance. It is the process of swelling the cross section of cotton fibre so that the handfeel / appearance of the garment can be improved.

Dyeing : Dyeing is the process of changing the color of a yarn or cloth by treatment with a dye.

Production of Cotton

Today cotton is produced in many parts of the world, including Europe, Asia, Africa, America and Australia using cotton plants that have been selectively bred so that each plant grows more fiber. In 2002, cotton was grown on 330,000 km² of farmland in Texas. 47 billion pounds (21 million t) of raw cotton worth 20 billion US dollars was grown that year. The cotton industry relies heavily on chemicals such as fertilizers and insecticides, although some farmers are moving towards an organic model of production, and chemical-free organic cotton products are now available. Historically, one of the most economically destructive pests in cotton production has been the boll weevil. Most cotton is harvested mechanically, either by a cotton picker, a machine that removes the cotton from the boll without damaging the cotton plant, or by a cotton stripper which strips the entire boll off the plant. Cotton strippers are generally used in regions where it is too windy to grow picker varieties of cotton and generally used after application of a defoliant or natural defoliation occurring after a freeze. Cotton is a perennial crop in the tropics and without defoliation or freezing, the plant will continue to grow. Cotton is a close relative of okra and hibiscus. The logistics of cotton harvesting and processing have been improved by the development of the cotton module builder, a machine that compresses harvested cotton into a large block, which is then covered with a tarp and temporarily stored at the edge of the field.

Care for your cotton fabrics For fabrics made of 100% cotton:

- Wash in cold water
- Iron the clothes at medium temperature
- While washing, set the washing machine at low setting
- Do not bleach the cotton clothes
- Hang to dry and do not tumble dry

For fabrics made of 50% cotton and 50% polyester

- While washing, turn the cloth inside out
- Wash with warm water
- Use only chlorine bleach to bleach the clothes
- Tumble dry with medium setting
- Iron the clothes at a medium temperature

Properties of cotton

- Cotton is soft and comfortable
- It absorbs perspiration
- It has a good color retention
- It is a good material for printing
- It wrinkles easily

Uses of cotton

In addition to the textile industry, cotton is used in fishnets, coffee filters, tents and in bookbinding. The first Chinese paper was made of cotton fiber, as is the modern US dollar bill and federal stationery. Fire hoses were once made of cotton. Denim, a type of durable cloth, is made mostly of cotton, as are most T-shirts. The cottonseed which remains after the cotton is ginned is used to produce cottonseed oil, which after refining can be consumed by humans like any other vegetable oil. The cottonseed meal that is left is generally fed to livestock.