Gossypium *Malvaceae*

Gossypium is derived from classical Latin *gossypion* the cotton plant.

Independently cotton weaving methods were discovered on all continents other than Europe where cotton plants were unknown. According to archaeological finds in south central Asia cotton cloth was being woven by at least 3000 BC, a conclusion reached upon the basis of pieces of cloth found in what is now Pakistan. (Some authorities believe however that the site in question only dates back to 2500-1700 BC.) Cultivated on the Indian Continent for centuries, the Indian method of producing cloth was introduced from there to China and ancient Egypt in about 500 BC. (There are some authorities who claim that cotton cloth only reached Egypt in Roman times and that before this the Egyptians relied on the coolness of linen made from flax *Linum usitatissimum*. However archaeological discoveries in Egypt have indicated that cotton seeds were probably being used as animal feed at least 1000 years earlier ie. 1500 BC.) The Arabs have grown cotton and traded in the fabric for centuries. Eventually they also came to use cotton rags as one of the main ingredients in papermaking – a method they developed further from the old Chinese process and practised until the 19th Century.

It is understood that botanists are as yet unable to agree on the original parents of this genus which is dominated by *Gossypium arboreum* and *Gossypium herbaceum* (from the Old World), and *Gossypium hirsutum* and *Gossypium barbadense* (from the New World), except that the parents of the latter pair are from northern Peru and Africa (*Gossypium raimondii* and *Gossypium herbaceum* respectively). High quality cotton cloth is made from fibres of *Gossypium barbadense* (and its cultivated varieties) and is often referred to as Sea Island cotton, Egyptian cotton and Pima cotton. Both the American species have longer fibres than relatives from other continents which makes them particularly suitable for spinning and weaving.

Records show that a species of cotton *Gossypium barbadense* was being grown on the Peruvian coast in at least 8000 BC and was being systematically cultivated by 2500 BC. Between then and the Spanish invasions in the 15th and 16th Centuries AD (some four thousand odd years), spinning and weaving the cotton had been brought to such a fine art by the coastal and highland cultures that their work was much sought after in trading. It included not only simple, plain woven cloth but also cotton cloth of very fine weave and intricate design which would sometimes be decorated by tie-dyeing, painting or printing. Like the ancient Egyptians on the opposite side of the globe (who it is thought were still using linen woven from flax *Linum usitatissimum* at that time), coastal Peruvians practised mummification. The bodies, which were preserved in dry sand, were wound in great lengths of cotton cloth. Part of the cloth from one such ceremony performed by the Chancay people (who lived north of Lima between 100 BC-1200 AD) still exists and has been painted with an intricate geometrical design using a reddish-brown dye.

Meanwhile in northern Brazil authorities believe another cotton species grew, *Gossypium hirsutum*, and this spread both eastwards and to the north to Mexico where it was already being cultivated by about 3000 BC. Cotton cloth will have been woven by the Olmecs, the Mayas (who recognized their moon goddess Ixchel as patron of weavers) and the

Aztecs. During the Mayan civilization clothes of fine cotton were only worn by the élite and their entourage.

In the past South and Middle American Indian tribes used cotton not only for clothing but also for making sails for their ocean-going rafts.

From Mexico the cotton is believed to have crept north and gradually many of the North American Indian tribes became familiar with it and absorbed it into their rituals. The Hopi tribe are believed to have been cultivating cotton long before the arrival of the Europeans on the American continents. As recently as 1879 their ceremonial clothing was still being woven from the native cotton although for the Hopi by the 1930s this was being superseded (apart from material required for specific vestments) by commercial cotton twine. Raw fibre (or down) and woven cotton cords played significant roles in rituals performed by Zuni rain priests with whom they were particularly associated. A newborn baby's wrists and ankles were draped with the cords while the rain priest prayed that crops would receive enough water to flourish and nourish the child through life. The rain priests were not only dressed in cotton but their masks were covered in cotton down. Even in death the cotton continued to symbolize the rain priest's duties in this world and the next as the down was used to cover his head.

While coarser linen and woollen fabrics were generallly commonplace to Europeans up to about the 15th/16th Centuries, other parts of the world had long been producing fine fabrics from cotton and European travellers brought news of this from as far afield as China, Japan and India. The first cotton cloth to reach Europe in large quantities was acquired and imported by the Venetians on camel trains from India, and in the 15th Century European herbalists were depicting what they called 'Vegetable lamb' or 'Zoophyte' as a plant (even a tree) which produced a white 'plant wool'. Their picture of the source of cotton is not as unreasonable as it might seem today if one remembers that wool, which was most familiar to them then, was cut from an animal's back. But this homespun misunderstanding was destined to be amended very quickly.

The Venetian monopoly of the cotton trade was irksome to fellow Europeans. It encouraged, for instance, the British to investigate alternative sources and led to the establishment of cotton plantations in the early 1600s in the southern United States and the Caribbean with seeds from Indian plants (of the *Gossypium herbaceum* species). At the same time plantations were also stocked with the species already in the West Indies and Mexico (*Gossypium hirsutum*, and *Gossypium barbadense*) that had by then passed between the local peoples up from Peru. These were supplemented in 1732 by seeds grown in the Chelsea Physic Garden in London that actually established the ensuing United States' cotton industry – and by the early 1800s Britain dominated world trade in cotton material through its port of Liverpool. By the mid-1800s cotton cloth formed 50% of all British exports.

However the 'fabric' of the whole exercise in retrospect was fragile. It depended not only upon cheap labour supplied by the slave trade but also upon the relationship between settlers in the New World and the 'mother country', Britain, and the relationship (within North America itself) between settlers residing in the north and the south of the Continent. With regard to the relationship with Britain, the latter was some weeks away in terms of travel and communication and some 'light years' away in terms of lifestyle. While on the North American Continent relationships there were getting fraught as 'fur' was beginning to fly between North and South. The rich northern bankers (to whom the southern farmers were perpetually indebted) were the brokers for the commodity being moved to Liverpool and, viewed from the South, they just seemed to get richer and richer at the South's expense. The first significant shift in the relationship with Britain had occurred in 1776 when the settlers' declaration of Independence was celebrated on 4th July. This was followed in

1807 by the official 'death' of the slave trade which had been declared in Britain and in 1861 the American Civil War (the fight between North and South) began on 15th April. The decline of the British cotton industry and of the Liverpool cotton merchants was assured.

Meanwhile use of the cotton plant for other purposes than cloth (or paper, which could still involve the use of cotton rags) was beginning to emerge. Christian Schonbein (1799-1868), a German chemist, wiped up some spilt sulphuric acid and saltpetre with his cotton apron. The apron turned into cellulose nitrate and as it dried exploded. This was in 1846. The news spread among scientists who immediately thought in terms of new explosives. But other discoveries were to follow. One invention that arose on the western side of the Atlantic must have seemed extremely bizarre at the time – billiard balls. The American inventor, John Wesley Hyatt (1837-1920), became involved in finding an alternative substance for ivory which was then used to make dominoes and billiard balls. In 1868 he won a $10,000 prize for making the first successful billiard ball in plastic. The plastic was made by mixing cotton fibres (which are almost pure cellulose) with acids to give nitro-cellulose and adding camphor to this to produce what he called, 'celluloid'. Then in 1885 the English physicist and chemist, Sir Joseph Swan (1828-1914) discovered how to produce artificial silk from the shorter cotton fibres and used this (in the form of filaments and yarn) as the elements in his electric lamp which he had originally invented in 1860. Viscose (again from the shorter cotton fibres) was discovered and patented by three British scientists in 1892 and shortly after this they developed another derivative suitable for solid plastic or for spun fibres. Today cotton is still used to produce paper when it needs to be flexible but very strong, such as that for legal documents or for bank notes. The shorter cotton fibres are used to produce the cellulose needed as thickener or suspending agent in a diverse range of products from detergent, paint and printing inks to convenience foods, cosmetics and toiletries.

Today at the beginning of the 21st Century there are over 30 species of cotton in Africa, the Americas, Asia and Australia and although for thousands of years it was collected by hand it can now be harvested by machines. By the end of the 20th Century 95% of cotton was coming from the *Gossypium hirsutum* species and was grown in the southern United States and in Russia. [At the beginning of the 21st Century reports indicated that the second largest cotton exporting region in the world by then was Uzbekistan and Turkmenistan east of the Caspian Sea, countries which had identified major natural gas and oil reserves. Although they wished to exploit the latter and reduce their agricultural dependence, these reports noted that the importance of cotton seemed to continue and that its production appeared to rely upon bonded (slave) labour as whole villages were required to work in the cotton fields for no – or relatively no – return.] Its pre-eminence is due in part to a greater resistance (than that of other members of the family) to the boll weevil. Native to Mexico the boll weevil travelled north and infested crops to such an extent that cotton yields dropped by 50%. But this has now been reduced to 5%. One of the results of this however (combined with the perpetual search for improved efficiency in harvesting, quality of crop, etc.) has been the use of ever more chemicals. It seems there is now concern about environmental pollution.

On a much lighter note the American actor and singer, Burl Ives (1909-1995) included a *Boll Weevil* song among his collection of American folk songs in which the boll weevil explains that his interest in the cotton plant is benign as all he is doing is looking after his family.

Cotton which is naturally absorbent used to be the sole constituent of cotton wool. This is now so expensive however that it has been superseded by other materials although the term 'cotton wool' persists.

Cotton is included in the shield of the green and white national coat of arms of Pakistan and is depicted in the Angolan national coat of arms too.

So far mention has only been made of the fibre but there is the seed to consider as well. Until about 1880 the seeds were believed to be valueless and were discarded. It was then realized that they contained an edible oil that, from then on, began to be extracted. A 'processed' 500 lb. bale of cotton would have contained 900 lb. of seeds. Cottonseed oil can be used to make paint, it can be an ingredient in salad oils and could be used as a vegetable oil in margarine too. In the Middle East the seeds used to provide a food.

Medicinally, parts of the plant have been used not least in the treatment of period problems but also (today still) as a type of purge. The seeds have provided a treatment for intermittent fevers, particularly in the southern United States. Also in the southern United States the root bark was used to aid childbirth and milk made from the seeds was drunk by nursing mothers. Intravenous doses of emulsions of the seed oil have been prescribed for severe nutritional deficiencies or when a nitrogen-free diet has been essential. At the turn of the 20th and 21st Centuries the oil from the seed has been the subject of research as the source of a male oral contraceptive. (During the 1930s cottonseed oil had been used for cooking in the province of Jiangsu in China. While this oil was employed no children were born and the reason was eventually traced to the oil's bitter, yellowish pigment.)