

EGYPTIAN COTTON PRODUCTION TO MEET THE EXTRA LONG STAPLE COTTON REQUIREMENT IN THE COUNTRY

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Cotton belonging to the species *G. barbadense* is commonly referred to as the Egyptian Cotton as Egypt happens to be the major producer of this type of cotton and is the only species grown in the country. The Egyptian cottons are known for their Extra long staple fibre measuring 1 $\frac{3}{8}$ ” and above. ELS cotton is generally roller ginned and used in the manufacture of high quality ring spun yarn of 80s count and above. The common end uses are sewing thread, lace yarn blend with polyester and high quality fabrics.

Egyptian cotton area and Production

World Cotton area in 2006-07 was 343 lakh hectares. Of this the Egyptian cotton with 6.5 lakh hectares accounted for 1.9 per cent only. The ELS Cotton production during 2006-07 was 7.5 lakh tonnes which was just 2.9 per cent of the world production of 260 lakh tonnes (Table 1). Production and productivity of ELS cotton showed an increasing trend during the current year more due to favorable international price than due to favorable climate.

Table 1: Area Production and Productivity of ELS Cotton in the World

	Area (l. ha)		Production (l. tonnes)		Productivity (kg/ha)	
	2005-06	2006-07	2005-06	2006-07	2005-06	2006-07
ELS Cotton in India	6.5	6.5	5.6	7.5	872	1153
World ELS Cotton	345	343	248	260	720	758
%	1.8	1.9	2.3	2.9	--	--

Origin of Egyptian Cotton

South America is believed to be the centre of origin of the species *Gossypium barbadense*, to which the Egyptian cotton belongs. However, these cottons were photoperiodic with medium staple and coarse fibre, typified by the current Tanguis cotton of Peru. The origin of the true Extra Long Staple cottons can be traced to the introduction of Sea Island cotton to the US in 1766 from Jamaica or Bahama Islands. The exact origin of the Sea Island Cotton is still not known. But the Geneticists suggest that the Sea Island Cotton acquired photosensitivity extra long staple and strong fibres by transgressive inheritance through the introgression of genes, probably from *G. hirsutum*. The crop continued till 1920, when a severe boll weevil infestation had made it impossible.



The USA Cottons belonging to *G. barbadense* species is known as Pima Cotton and traces its origin to the famous Sea Island Cotton. The Sea Island cotton was then crossed with Egyptian Cottons to produce the contemporary ELS Cottons. The USDA's Pima Improvement programme was responsible for the significant advances in Pima development. The first ELS Cotton released was 'Yuma' in 1908 which was a reselection from 'MitAfifi', an Egyptian cultivar developed in 1889 from a cross of 'Ashmouni' and 'Sea Island'. From 1908 to 1940 four additional varieties were developed from the Egyptian Germplasm base and released. They were 'Pima', 'SXP', 'Amsak' and 'Pima 32'. Further research work led to the release of five varieties viz., 'Pima S1' to 'Pima S 5'. Between 1975 and 2000, two varieties viz., Pima S6 and Pima S7 were released. Since early 1990s commercial seed companies like Delta and Pine Land companies have made further improvements by releasing new varieties like CH 253-6 and Conquistador with longer and stronger fibres.

The Evolution of ELS Cotton in Egypt began in 1825 when Sea Island Cotton was brought into Egypt and crossed with a tree cotton Jumel and the first *barbadense* variety 'Ashmouni' was developed in 1860. From Ashmouni, Mit Afifi was developed in 1889. This further led to the development of varieties like Sakel and Karnak. The evolution of *G. barbadense* varieties (later known as Giza varieties) in Egypt between 1910 and 1940 mostly took place by introgression and through crossing with Sea Island Cotton and no foreign Germplasm was involved.

The Egyptian Sakel was introduced during 1913 in Sudan from which Sudan Sakal was developed later. In spite of proximity to Egypt, with river Nile as the common source of irrigation, varietal specificity in Sudan is totally different. To combat Bacterial blight and leaf curl virus diseases, Sudan cotton has gone through remarkable change in respect of introgression of genes from the *G.hirsutum* and *G.herbaceum*. The current varieties are Shambat and Barakat 90.

At about the same time 'Yuma' cotton was being developed in US, Mid Afifi was introduced into Peru. At about the same time American Pima cotton was also introduced in Peru. According to Peruvian cotton information, Peruvian Pima originated from Yuma and was under cultivation in 1918. But, Feaster considers Peruvian Pima to be actually American Pima. By 1930, Mid Afifi went out of cultivation. The locally adapted variety Tanguis which is grown in the central valley is mostly consumed by the local industry. Peruvian Pima grown in the North is exported.

In India at the instance of British East India Company, *G. barbadense* was introduced during 1831. The initial attempts failed, mainly because of harsh climate under which it was tested. Later, reselection in the Egyptian variety Karnak resulted in the development and release of the first *G. barbadense* variety Sujata (1969). Sujata was crossed with a West Indies variety St. Vincent and Suvin was evolved (1975).



India is the only country, which have successfully utilized Inter specific hybridization involving the *G. hirsutum* and *G. brabadense* to evolve ELS cotton hybrids.

Genetically engineered *G. brabadense* cotton is also under commercial cultivation. In the USA, Roundup Ready *G. brabadense* (Pima Varieties) derived from conventional breeding with Roundup Ready *G. hirsutum* has been commercially released. Giza varieties with Bt gene(Bollgard II) are under advanced testing in Egypt. GM insect resistant (Bollgard II) and/or herbicide tolerant (Roundup Ready) *Gossypium brabadense* cotton are under limited trials in the Farmers' field in Australia.

World ELS cotton supply and use

Egypt and United States of America continue to be the Major ELS cotton producing and exporting countries and account for nearly 59 per cent of the world production. China, India and Sudan are the other countries with substantial ELS cotton production. They together account for 28 per cent of the world production. Of this only Sudan exports a sizable quantity. Other countries like Australia, Israel, Peru, Tadzhikistan, Turkmenistan and Uzbekistan account for the rest 13 percent production (Table 2).

Table 2: Market share of ELS cotton in the world

Country	Average production (Mean of 2001-2006)		Per cent
	Tonnes	Lakh Bales	
Egypt	2,57,800	15.16	38
U.S.A.	1,38,600	8.15	21
China	89,600	5.27	13
India	66,400	3.91	9
Sudan	38,600	2.27	6
others	82,200	4.84	13
Total	6,73,200	39.60	

Major ELS Cotton producing countries

Egypt

G. brabadense was planted in 2.3 lakh hectares with a total production of 12.3 lakh bales (2.12 lakh tonnes) during 2005-06 (Table 3). Egypt cultivates both LS and ELS cottons. During 2005-06 season, the ELS cotton accounted for 54,000 tonnes as against 1,58,000 tonnes of LS cotton. The average productivity was 900 kg/ha lint.

Table 3: Cotton area and Production in Egypt

Year	Area (ha)	Production (Tonnes)	Productivity (kg/ha)
2005-06	2,75,000	2,01,900	735
2006-07	2,31,000	2,12,000	900



The ELS varieties are cultivated in the Delta Region. The most popular ELS Varieties are Giza 45, 70, 87 and 88. The long staple varieties grown in Delta Region are Giza 85, 86 and 89. The long staple varieties are also cultivated in upper Egypt. The popular varieties in Upper Egypt are Giza 80, 83,90 and 91. Of this, Giza 86 (40 Per cent of the total area) and Giza 88(20 per cent of the total area) are the most popular varieties. Fibre properties of important Egyptian varieties are furnished in Table 4.

Table 4 : Fibre quality Attributes

Attribute	Giza 70	Giza 88	G.86	G.89	G.90	G.91
Upper Half Mean Length (mm)	35.1	35.4	32.4	31.4	28.7	28.5
Micronaire	4.2	4.1	4.4	4.3	4.0	4.1
Strength (g/tex)	44.1	45.1	43.9	39.1	34.0	37.6

United States of America

The ELS cotton of the USA is known as Pima cotton. ELS cotton was cultivated in an area of 1.31 lakh hectares with a total ELS cotton production of 1.67 lakh tones (Table 5).

Table 5 : Cotton area and Production in U.S.A.

Year	Area (ha)	Production (Tonnes)	Productivity (kg/ha)
2005-06	1,08,700	1,37,000	1003
2006-07	1,30,900	1,67,000	1013

Ninety percent of the Pima area is in California. Texas, Arizona and New Mexico are the other states which cultivate Pima cotton in a limited way. Till 1990 USDA developed Pima varieties were popular. The popular varieties in this region are PhytoGen 800, Pima Deltapine 340 Pima and Deltapine 744 Pima.. Fibre properties of important Egyptian varieties are furnished in Table 6.

Sudan

Cotton is cultivated in the Gezira Scheme area comprising the vast fertile arable land between the Blue and White Nile. Shambat and Barakat 90 were the major ELS varieties grown till 1997. However, currently Barakat 90 alone is cultivated in an area of about 86,000 hectares with an annual production of 31,000 tons (Table 7).

The general yield levels are low in Sudan, mostly due to inadequate plant protection practices. Fibre properties of important Sudan varieties are furnished in Table 8



Table 6: Fibre quality Attributes

Attribute	Pima S6	Pima S7	Phy 800 Pima	DP 340 Pima	DP 744 Pima
Yield (Q/ha)	30.78	34.77	30.49	35.56	33.29
Boll Wt. (g)	3.2	3.2	-	-	-
Ginning %	31.5	30.9	30.2	30.9	31.3
2.5% span length (mm)	34.0	34.5	36.8	35.8	36.3
Micronaire	3.9	3.9	3.8	4.1	4.2
Strength (g/tex)	42.9	44.9	43.7	41.2	42.9

Table 7 : Cotton area and Production in Sudan

Year	Area (ha)	Production (Tonnes)	Productivity (kg/ha)
2005-06	80,500	36,900	450
2006-07	86,000	31,000	360

Table 8 : Fibre quality Attributes

Variety	2.5% span length (mm)	Micronaire	Strength (g/tex)
Barakat 90	35.0	3.6	34
Shambat	31.5	3.7	28

India

The annual production of ELS cotton in India is around 2.65 lakh bales. Suvin is the only *G. barbadense* variety currently under cultivation in a very limited way. Fibre properties of important Indian varieties are furnished in Table 9:

Table 9: Fibre quality Attributes

Attributes	Sujata	Suvin
2.5% span length(mm)	32.3	40.6
Micronaire	4.0	3.4
Fibre Strength (g/tex)	31.6	32.3
CSP 100s count (Combed)	2421	2830

However, most of the ELS cotton production in India comes from inter specific hybrids. Even though as many as 10 inter specific hybrids are officially released for commercial cultivation, only two hybrids are currently grown. Hybrid DCH 32 is under commercial cultivation in parts of Karnataka, Tamil Nadu and Madhya Pradesh. Hybrid TCHB 213 is grown in Tamil Nadu alone. Since 2006, inter specific Bt cotton (Bollgard I) hybrids viz., MRC 6918, RCHB 708, Kasinath, NCHB 990, NCHB 992 and KDCHB 407 have been released for commercial cultivation. The fibre quality of the important hybrids are furnished in Table 10.



Table 10 : Fibre quality Attributes

Attributes	DCH 32	TCHB 213	MRC 6918	RCHB 708	Kasinath
2.5% span length(mm)	33.9	34.8	35.2	35.0	33.3
Micronaire	3.0	3.3	3.6	3.7	2.9
Fibre Strength (g/tex)	23.9	24.3	26.5	25.7	23.1

ELS cotton Production and consumption in India

Table 11 : ELS Cotton Production and consumption in India

	2005-06		2006-07	
	Metric Tonnes	L. bales	Metric Tonnes	L. bales
Opening stock	14,464	0.85	7,864	0.45
Production	30,600	1.80	34,000	2.00
Import	51,000	3.00	54,400	3.20
Total supply	96,624	5.65	96,624	5.65
Consumption	88,400	5.20	93,500	5.50
Ending Stock	7,864	0.45	2,764	0.15

As may be seen from the above table India still depends on imports to meet its Domestic demands. The current estimates of National Demand and supply projections for the next ten years are furnished below:

Table 12 : ELS cotton may be summarized as follows.

Year	Estimated Local Production (lakh bales)	Requirement (lakh bales)
2006-07	2.6	9.0
2010	?	15.0
2015	?	25.0

The textile mills are therefore compelled to import ELS cotton from countries like USA, Egypt, Sudan or CIS countries. As per the 2005-06 estimate, it costs around Rs 1300 crores to import 5.0 lakh bales of ELS cotton. It is imperative that domestic production of ELS cotton has to be increased to meet the growing demand of the consumer industry. The following strategies are suggested to increase production.

- Organized seed production of existing ELS hybrids like DCH 32 and TCHB 213.
- Extension of contract farming and integrated cultivation practices to increase the cultivation area of Suvin.
- Increasing the coverage of ELS Bt cotton hybrids.
- Targeted breeding programmes to develop new ELS varieties with reduced duration higher yield and higher ginning out turn.
- Improvement of Micronaire and fibre strength in inter specific hybrids to meet the international quality norms.

