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Twists and Turns in the Indian Cotton Scenario

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GUEST COLUMN

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The history and evolution of the Indian civilization is closely linked to the domestication, cultivation and use of cotton across its diverse agro-ecological regions. Today, cotton is the most important cash crop as it sustains the rural economy, besides being a major export earner. Cotton is still the most pristine fibre and is best suited to clothe the human body in tropical climate. Cotton contributes to 50% of the clothing needs of India. About 4 million farm households cultivate cotton. The cotton industry employs around 40 million through different activities along the cotton value chain.

The quantitative and qualitative changes in the cotton production scenario of the country can best describe the story of Indian cotton. For centuries, India cultivated desi cotton (*Gossypium arboreum* and *Gossypium herbaceum*) that were short to medium staple, but our dexterous spinners and weavers could produce the finest cloth with this cotton. India ruled the world of textiles between 1200 and 1800 AD in cotton production, clothing manufacture and trade. Cotton was abundantly available and our craftsmen had adequate knowledge of processing and weaving. Despite several attempts to introduce the new world cottons, *G. Hirsutum* (American) and *G. Barbardense* (Egyptian) cotton during the colonial regime and intensive R&D efforts to acclimatise them, less than 3.0% of the total cotton area was under these cottons at the dawn of Independence.

Drivers for Cotton Growth in the Post-Independent Era:

Post-Independence, India witnessed several technology driven changes in the type and quality of cotton available and the way cotton is produced. The area trebled from 4.24 million

ha in 1947-48 to 12.85 million ha in 2014-15, and productivity rose over five fold from 99 kg/ha in 1950-51 to 566 kg/ha in 2013-14. Together they contributed to a 12 fold increase in cotton production from 3.34 million bales (of 170 kg each) in 1947-48 to 39.8 million bales in 2013-14. While enabling policy measures, effective price support and increased off-take by domestic textile industry led to expansion of cotton area, the productivity improvement was largely due to technological breakthroughs. Development of high yielding varieties and agro chemical based production/protection technologies in the 1960s, hybrid cotton revolution in the 1970s, spread of drought tolerant, semi compact American and desi cotton varieties and pyrethroids for pest management in the 1980s, Integrated Pest Management (IPM)/ Insecticide Resistance Management (IRM) in the 1990s and introduction of transgenic Bt cotton hybrids in the first decade of this country were major breakthroughs that revolutionised cotton production. Government supported programmes like Grow More Cotton, Integrated Cotton Development Programme, Technology Mission on Cotton, Integrated Pest Management and Insecticide Resistance Management projects were also responsible for transforming the Indian cotton scenario.

Area, Production and Productivity of Cotton in India

Year	Area (m ha)	Production (m bales of 170 kg)	Productivity (kg/ha)
1947-48	4.24	3.34	132
1950-51	5.88	3.43	99
1960-61	7.61	5.60	125
1970-71	7.61	4.76	106
1980-81	7.82	7.01	152
1990-91	7.44	9.84	225
2000-01	8.58	14.00	278
2002-03	7.67	13.60	302
2010-11	11.14	32.50	496
2013-14	11.96	39.80	566
2014-15	12.85	38.60	511
2015-16	11.88	33.80	484

Source: Cotton Advisory Board

The introduction of Bt cotton in the year 2002 was a game changer. It changed the composition and character of India's cotton landscape in favour of the long-stapled hybrids and resulted in significant yield gains. The spread of cotton increased from 7.6 m ha in 2003-04 to 12.8 m ha in 2014-15, albeit at the expense of pulses, oilseeds and coarse cereals that are vital for our food security. Today, BG II hybrids occupy 90-95% of the cotton area. It has transformed India to becoming the world's largest cotton producer and a stable exporter. The export of raw cotton steadily increased and reached 12.96 million bales in 2011-12. The mean export of raw cotton during 2011-12 to 2015-16 was 9.5 million bales. The production of cotton seed oil increased from 0.46 million tonnes in 2002 to 1.5 million tonnes in 2013.

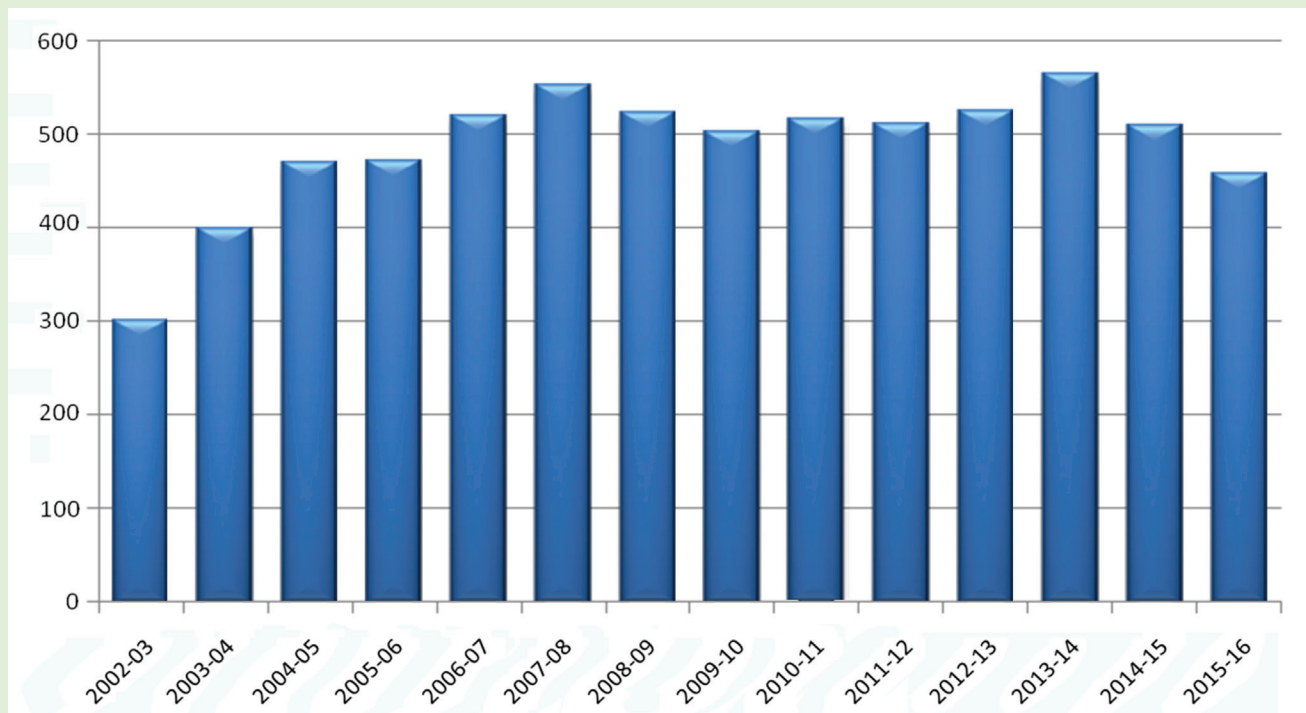
Qualitative Changes in Indian Cotton:

Along with the vertical and horizontal expansion in cotton production, the qualitative changes in Indian cotton was equally impressive. These changes were made to cater to the dynamic demands of the Indian textile mills. After independence, deliberate attempts were made to replace short staple desi cotton with medium and long stapled hirsutum cotton (including hybrids). The area under G. Hirsutum cotton increased from 3% in 1947-48 to 41% by 1965, further to 75% by the year 2000 and to 95% at present. The change in species composition caused significant changes in fibre quality profile. The release of *Gossypium barbadense* variety Suvin that can be spun to 120s, in 1974, revolutionised the production of extra-long staple (ELS) cotton in India. During 1947-48, 67% of our cotton was of medium staple category and the rest was short stapled. Efforts were intensified to produce long staple cottons that suited the mills. After 50 years, in 1998-99 around 69, 25 and 6% were under long, medium and short staple category respectively. The production of short staple cotton further reduced from 9-10 lakh bales in 2000 to 6 lakh bales in 2006-07 and to 4.0 lakh bales 2011-12. The large-scale adoption of Bt hybrids in the last decade caused a glut of long staple cotton and shortage of short, medium and long staple cotton.

Have Indian Cotton Yields Plateaued?

Biotech cotton, increased area under irrigation, new selective herbicides and

Productivity Trend (kg lint/ha) of Cotton in India



insecticides, mechanisation and new varieties brought in major changes in production technologies in the last decade and a half. But have the yields plateaued? There are more than 30 countries whose productivity has consistently been above 600 kg/ha while the mean lint yield in India during the last five years is only 530 kg lint/ha while the cost of cultivating the crop continues to spiral upwards. While the last decade (2000-01 to 2009-10) witnessed a 6.8% Compounded Annual Growth Rate (CAGR) in productivity, during the first half of this decade (2010-11 to 2015-16) the CAGR in productivity declined to -0.74%.

Have the Current Cotton Production Systems Become Unsustainable?

In the last 10 years, the cost of cotton cultivation increased three-fold, fertilizer consumption increased by 250% and the insecticide usage doubled. About 20,000 litres of water is consumed to produce one kilogram of cotton lint, which is one of the highest in the world. Production systems based on increased use of external inputs and inefficient use of water are seldom sustainable. Today the Indian cotton is at cross roads. The pink bollworm has developed resistance to Boll Gard II at a number of locations in Central and South India, yet again forcing farmers onto the pesticide treadmill. The

cotton leaf curl virus disease and whitefly took a heavy toll of cotton in the North India a couple of years back. Labour to cultivate cotton crop has become scarce and expensive forcing some farmers to grow Round up Ready (herbicide tolerant) cotton even without the clearance from the Government. It is imperative to shift towards more 'input use efficient' and 'sustainable yield enhancement techniques' in order to lower production costs and improve profits.

Ushering a New Cotton Revolution:

The time is ripe for ushering another technological revolution in Indian cotton. Appropriate technologies and strategies are needed either to increase yields or reduce production costs. Ideally, these technologies must be sustainable, in harmony with nature and in consonance with local production systems. Some exciting technologies that can usher a new trend in Indian cotton are high density planting system with short duration, compact Bt cotton varieties, early maturing, long-linted desi (*Gossypium arboreum*) cotton specially suited for rainfed and dryland areas of Central India, using efficient legume based cropping systems with cotton, partial mechanisation of sowing and harvesting cotton, convergence of INM, IWM, IPM, IRM strategies into an ecology based production system to reduce input costs and greater use of

ICT based technologies to enable farmers make informed choices. Logically, large scale adoption of synchronous early maturing cultivars under HDPS would facilitate mechanical cotton picking. To remain competitive in the global market, we need to take care of contamination and mixtures. Massive efforts are needed to create awareness among the cotton farmers and to motivate them to follow the 'Best Cotton Management Practices' for improving quality and reducing the level

of contamination. To reduce imports there is a need to revive of ELS cotton production. All these can happen only with good science backed up by enabling polices and stringent regulatory regimes.

(The views expressed in this column are of the author and not that of Cotton Association of India)

