

## Beyond the boom: 10 years of Bt cotton

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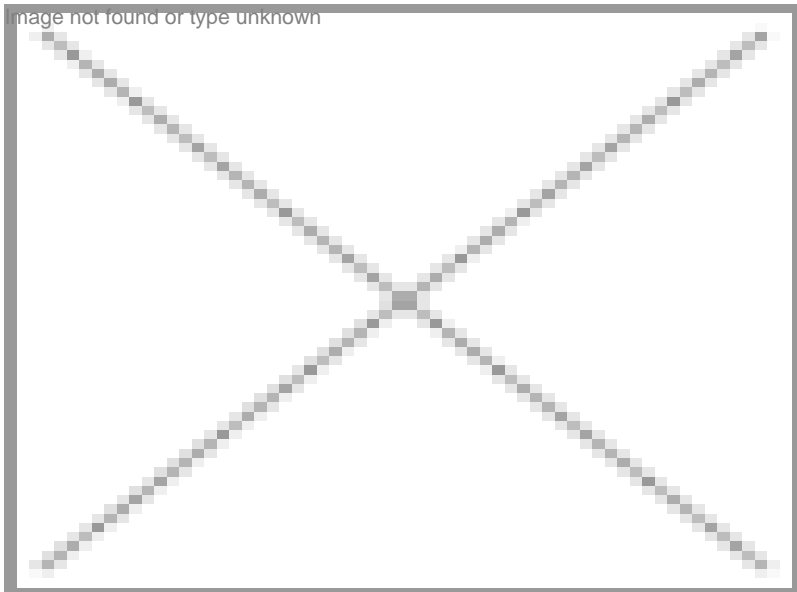


### What the government must do to push further growth?

BioSpectrum traces the journey of Bt cotton in India and the impact it has had on the Indian economic scene. And also explores if this boom in cotton cultivation will continue

Cotton farmers in India, who had once given up cotton cultivation due to unaffordable costs of production and expensive and ineffective pest control, have returned to the crop since 2002. According to statistics, India owes much of this success, which is often referred to as the White Gold Revolution, to Bt cotton.

In 2011-12, India planted 12.1 million hectares of cotton, the highest-ever land under cotton cultivation. This significant increase in hectareage of cotton has been attributed, by and large, to the Bt technology, which has substantially increased profitability of cotton production in the country. Today, about 90 percent of the total cotton cultivation is under Bt cotton, which has resulted in tremendous increase in farmers' income across the country. Also, since the introduction of Bt cotton in 2002, when land under Bt cotton was 7.7 million hectares, India's cotton yield per hectare has increased by 60 percent.



Union Agriculture Minister Mr Sharad Pawar has praised the introduction of Bt cotton seeds by saying that it was a great step towards decreasing insecticide usage in the country. "With the use of high quality hybrid cotton seeds, Indian farmers experienced the biggest gain in the form of reduced insecticide usage, from 46 percent in 2001 to less than 26 percent after 2006 and 21 percent in 2009 and 2010," said Mr

The number of cotton farmer cultivating cotton also increased significantly from five million in 2002-03 to eight million in 2011-12. Notably, the number of Bt cotton farmers increased from 50,000 in 2002-03 to seven million in 2011-12, representing approximately 88 percent of the eight million cotton farmers in 2011-12. Farm income too has enhanced with Bt cotton by 47,000 crore (\$9.4 billion) in the period between 2002

and 2010, and 12,500 crore (\$2.5 billion) in 2010 alone (Brookes and Barfoot report, 2012).

"Bt cotton has transformed cotton production in India by increasing the yield, decreasing insecticide applications, and contributed to the alleviation of poverty for over seven million small resource-poor farmers and their families in 2011 alone, and future prospects look encouraging," says Mr Bhagirath Choudhary, national coordinator, International Service for the Acquisition of Agri-biotech Applications.

Dr Arvind Kapoor, CEO, Vegetable division, Rasi Seeds, says due to higher prices of cotton lint and lower costs of cultivation, farmers are earning profits. "That is why cotton sowing has increased and farmers are queuing up for good hybrids," he adds. Expressing a similar opinion, Dr Seetharam Annadana, Traits Development & Vegetable R&D Management Lead, South Asia Syngenta, says, "The best agricultural economist of India is the humble but very intelligent Indian farmer. If he is growing it, he finds value for it and, secondly, there is no better alternative to cultivation of GM cotton at present."

Quoting the report, State of Indian Agriculture 2011-2012, Dr Annadana says, "Bt crop technology has more than doubled India's cotton production. By 2011-12, almost 90 percent of cotton area is covered under Bt cotton. More such revolutions to accelerate agricultural growth are needed."

### Demand to go up

Out of an estimated 8,000 crore seed industry, Bt cotton seed market is pegged at 3,000 crore. As per Cotton Association of India (CAI), the total cotton supply is estimated at 42.55 million bales, while the domestic consumption is estimated at 26.8 million bales, thus leaving 15.75 million bales as opening stock for 2012-13. While India produced 32.5 million bales (170 kg each) with 27.52 million acreage during the season ended September 2011, the next season's (October 2011- September 2012) output is projected to be 35.5 million bales from an acreage of 9.9 million acres (12.1 million hectares). The speedy migration of farmers to cotton from less profitable crops, such as oilseeds and pulses, has added to the forecast.

Dr Arvind Kapoor of Rasi Seeds ruled out any scarcity of Bt cotton seed currently, but is skeptical about the future. "In future there is a possibility of scarcity due to higher costs of production and price control by government on cotton sale," he says.

According to sources, the demand for Bt cotton seeds for the 2012 kharif season is estimated to be 4.5-to-five crore packets, while the estimated stock with the seed companies is four crore packets. Earlier, the demand-supply gap led to black marketing of Bt cotton seeds in many states. Seeds and fertilizers were distributed under police protection in 2008 and 2009 in Maharashtra after riots over seed purchase. It was alleged that a few seed brands popular with farmers created an artificial shortage leading to strict vigil by the Maharashtra government last year.

### Variable seed prices

As compared to other countries planting Bt cotton, India's Bt cottons are unique in the sense that they are hybrids and not varieties. The total value of cotton seed market is said to be around 3,500 crore. The cotton seed prices are fixed in each state depending on whether it is Bt Bollgard-I or Bollgard-II. The price varies in the range of 750 per packet for Bollgard-I to 900 per packet for Bollgard-II. In Punjab, Haryana and Rajasthan, the prices of Bt cotton seeds containing BG-I and BG-II traits are 750 per packet and 920 per packet, respectively. In other states, the prices of BG-I and BG-II cotton are 650 per

packet and ₹750 per packet, respectively. The seed industry associations have requested the government to increase it to ₹850 and ₹1,050 per packet each.

Giving a different take on the issue, Dr Gyanendra Shukla, director, Mahyco Monsanto Biotech (MMB), says, “The cost of cultivation itself constitutes up to 60 percent of investment and seed price is only seven-to-eight percent of the total cost. Therefore, the seed price is a miniscule issue as the farmers may pay for a good seed that can give better yield.” On the current requirements, he adds, “On the contrary, there is a requirement of new technology for further improvements of seed hybrids and the industry must be duly incentivized to bring down the cost of cultivation.”

Due to shortage of Bt cotton seeds in the previous years, the state governments have been asking for written commitments from the seed companies about their supply plans. Owing to factors such as rainfall and seasonal variations in Bt cotton arrivals, the prices of cotton get affected. Although a seed shortage is expected, seed prices may not go up because Gujarat, Maharashtra and Andhra Pradesh governments have fixed the prices through legislation. In other states, there is an indirect price control because state governments ask for undertakings from seed companies that they will not sell seeds above the maximum agreed price.

### Commercially released varieties of Bt cotton approved by GEAC till 2010

Serial No	Name of Company	Number of approved hybrids	Location
1	Ajeeth Seeds	20	Aurangabad, Maharashtra
2	Amar Biotech	55	Hyderabad, Andhra Pradesh
3	Ankur Seeds	38	Nagpur, Maharashtra
4	Bayer Biosciences	30	Hyderabad, Andhra Pradesh
5	Bioseed Research India	35	Hyderabad, Andhra Pradesh
6	CICR	1	Maharashtra
7	Emergent Genetics (now part of Monsanto)	1	
8	Ganga Kaveri Seeds	19	Hyderabad, Andhra Pradesh
9	Green Gold	4	Aurangabad, Maharashtra
10	Global Transgene	5	Aurangabad, Maharashtra
11	JK Agri Genetics	38	Hyderabad, Andhra Pradesh
12	Kaveri Seeds	18	Hyderabad, Andhra Pradesh
13	Kohinoor Seed Fields India	3	New Delhi
14	Krishidhan Seeds	20	Pune, Maharashtra
15	MAHYCO (Maharashtra Hybrid Seeds Company)	33	Jalna, Maharashtra
16	Monsanto Holdings	11	Mumbai, Maharashtra
17	Metahelix Life Sciences	2	Bengaluru, Karnataka
18	Namdhari Seeds	15	Bengaluru, Karnataka
19	Nandi Seeds	22	Ahmedabad, Gujarat
20	Nath Seeds	12	Aurangabad, Maharashtra
21	Navkar Hybrid Seeds	11	Ahmedabad, Gujarat
12	Nuziveedu Seeds	84	Hyderabad, Andhra Pradesh
23	Palamoor Seeds	6	Hyderabad, Andhra Pradesh
24	Prabhat Agri Biotech	51	Hyderabad, Andhra Pradesh
25	Pravardhan Seeds	19	Hyderabad, Andhra Pradesh
26	ProAgro	2	New Delhi
27	Rasi Seeds	42	Attur, Tamilnadu
28	RJ Biotech	3	Aurangabad, Maharashtra

29	Safal Seeds and Biotech	9	Aurangabad, Maharashtra
30	Seed Works India	37	Hyderabad, Andhra Pradesh
31	Solar Agrotech	16	Rajkot, Gujarat
32	Super Seeds	8	Hisar, Haryana
33	Tulasi Seeds	35	Hyderabad, Andhra Pradesh
34	Uniphos Enterprises	22	Hyderabad, Andhra Pradesh
35	Vibha Agrotech	38	Hyderabad, Andhra Pradesh
36	Vikki Agrotech	1	Hyderabad, Andhra Pradesh
37	Vikram Seeds	20	Ahmedabad, Gujarat
38	Xylem Seeds	3	Hyderabad, Andhra Pradesh
39	Yashoda Hybrid Seeds	11	Wardha, Maharashtra
40	Zuari Seeds	4	Hyderabad, Andhra Pradesh

*Source: Indian GMO Research Information System*

### Events approved in India for commercialization

S No.	Developed by	Bt genes	Events	Year of approval
1	Mahyco	cry1Ac	MON-531 (Bollgard), licensed from Monsanto, US	2002
2	Mahyco	cry1Ac and cry2Ab2, Stacked	MON-15985 (Bollgrad II), licensed from Monsanto, US	2006
3	JK Agri Genetics	cry1Ac	Event-I, sourced from IIT, Kharagpur (India)	2006
4	Nath Seeds	cry1Ab and cry1Ac, fused	Even-GFM sourced from China	2006
5	Central Institute of Cotton Research, Nagpur and University of Agricultural Sciences, Dharwad	cry1Ac	Event BNLA-601	2008
6	Metahelix Life Sciences	cry1C	Event MLS-9124	2009

*Source: ABLE AG*

### Cotton cultivation in the last seven decades

Cotton cultivation in the last seven decades Year	Area in lakh hectares	Production in lakh bales of 170 kgs	Yield (kgs per hectare)
1950-51	58.82	34.3	99
1960-61	76.1	60.12	134
1970-71	76.05	56.64	127
1980-81	78.23	78	169
1990-91	74.39	117	267
2000-01	85.76	140	278
2001-02	87.3	158	308
2002-03	76.67	136	302
2003-04	76.3	179	399

2004-05	87.86	243	470
2005-06	86.77	241	472
2006-07	91.44	280	521
2007-08	94.14	307	554
2008-09	94.06	290	524
2009-10	103.1	305	503
2010-11	111.42	339	517
2011-12	121.91	345	481

*Source: Cotton Advisory Board*

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