BT Cotton in India - Problems and Solutions

This editorial is based on two articles “White gold: How a revolution was reversed” which appeared in Indian Express on 21st march, 2019 and “Spinning the right yarn” which appeared in Indian Express on 9th April, 2019. In this article we will see what are the results from the use of BT cotton in the Indian cotton sector.

In 2003-04, India was the world’s third largest cotton producer and seventh biggest exporter of cotton in the world. Overall, India was a net importer of cotton. With the introduction of BT-cotton, India in a decade rose to become not only biggest producer of cotton bales but also the 2nd biggest exporter.

Can this transformation in cotton industry be solely attributed to the introduction of BT-Cotton? Before answering one must have to look what led to the introduction of Bt-cotton in India.

A brief history of cotton production in India:

- Before the advent of British in India, different varieties of cotton, indigenously developed over a long period of time, were grown in different parts of the country, each being suited to the local soil, water and climate.
- However, labelling this variety of cotton as inferior, the British introduced Bourbon cotton in 1797, just to suit the needs of Lancashire mills. It resulted in neglect of the varieties of the cotton that were pest resistant, and resistant to the vagaries of weather, resulting in loss of traditional seed selection, manuring and cultivation practices of Indian cotton farming.
- The new varieties of cotton, though profitable, were not able to resist the vagaries of weather, pest resistance. This continued even after Independence. To overcome the problem of pests such as ballworm, a lot of pesticide and insecticide were being used and to control this problem, Govt introduced BT-cotton in 2002.

A brief introduction of BT-COTTON

- Bt cotton is an insect-resistant transgenic crop designed to combat the bollworm.
- Bt cotton was created by genetically altering the cotton genome to express a microbial protein from the bacterium *Bacillus thuringiensis*.
- In short, the transgene inserted into the plant's genome produces toxin crystals that the plant would not normally produce which, when ingested by a certain population of organisms, dissolves the gut lining, leading to the organism's death.

How Bt-cotton changed Indian cotton industry:

- A study conducted on 533 farm households between 2002 and 2008, who switched to BT-cotton has following findings:
    - Yield of plots planted with Bt cotton increased by 24% compared with conventional cotton plots. This translated to a 50% increase in profits.
    - During 2006–08, families who adopted Bt cotton spent 18% more money than conventional farming households, suggesting an increase in living standards. The benefits were due solely to reduced pest damage.
    - There was an initial reduction in insecticide use with Bt technology.
- The introduction of Bt cotton led to a dramatic increase in production across the cotton producing states and soon Bt cotton took over most of the acreage under cotton cultivation. Cotton production rose from 14 million bales in the pre-Bt year of 2001-'02 to 39 million bales in 2014-'15, a rise of almost 180%. India’s cotton imports fell, export grew and in 2015-16 have overtaken China as the biggest cotton producer in the world.
- There was an expansion in crop area from 7.67 million hectares to 11.96 million hectares during this period.

Change at what cost?

What should be noted is farmers and food activists have been protesting for the past decade on various ground, some of which are as follows:

- The seeds are more expensive than local, non-genetically modified varieties.
- Seeds cannot be reused and farmers need to buy new stock for every growing season. This, along with licensing agreements with local seed companies, has given Monsanto a near monopoly on cotton seeds in India that has been the biggest worry for activists.
- Diffusion of illegal Bt hybrids that hadn't been cleared for bio safety standards, leading to fears of environmental toxicity.

An analysis of other cost involved:

- The introduction of hybrid Bt-cotton led to an initial reduction in insecticide use, but by 2012, insecticide use was at pre-2002 levels, and now targeted still newer induced secondary pests.
- Resistance to insecticides and to Bt toxins was developing in pink bollworm and American bollworm: two pest which were running havoc on Indian cotton industry. This resulted in double jeopardy of insecticide and biotechnology to Indian farmers.

Has Indian farmer benefitted at all ?

- Opinions are divided on this. Definitely big farmers and corporate sector have benefited from the introduction of Bt-cotton. But it is the middle and small farmers who have suffered a lot with Bt-cotton.
    - According to Rajya Sabha 301st committee report, the use of insecticides increased steeply both in value and quantity.
    - Farmers were forced to pay almost triple the price of regular seeds for Bt cotton seeds, increasing indebtedness and reliance on high yield.
    - This increase in indebtedness led to an increase in farmer suicides, in light of failure of crop yield.
- Causes of indebtedness include:
    - Changes in cropping patterns caused due to development of plant resistance to pesticides and hence increased spending on pesticides.
    - A shift in the agrarian economy from low-cost food crops to high-cost cash crops along with a lack of access to institutional credit facilities.

Why Bt-cotton is facing failure only in India?

- Even though Bollgard 2, or BG-2, Monsanto's second generation insecticidal technology for cotton, was supposed to protect crops against the pink bollworm, the pest has grown resistant to the toxins produced by this trait only in India.
- The following reasons can be attributed for this:
    - It is often argued by scientists that Bt-cotton seeds are not suitable under Monsoon conditions.
    - Unlike other Cotton-growing countries where open-pollinated cotton varieties are grown, Indian cotton farmers only opt for hybrid varieties.

Way forward

- The solution is planting rainfed short season high density (SS-HD) cotton as developed at CICR, Nagpur, and other institutions — cotton that could double yields, avoid pink bollworm infestations and hence reduce insecticide use and obviate the need for Bt

technology.

- Further, in the era of globalization where indigenous varieties has become a tradition, witnessed in the ever increasing demand of muslin cloth, indigenous varieties should be promoted. Also, infrastructure should also be promoted for local weaving and spinning, along with creating demand through e-commerce.

Conclusion

Without doubt Bt-cotton in India provided a lot of impetus to the Indian textile sector thus creating a lot of employment around, but the gains made were short term in nature, manifested in the recent upheaval in our agriculture sector. Now, it's time to move over to a better and equitable upgrade to Bt-cotton and perhaps resort back to indigenously grown cotton which would create equity for farmers and sustainability to environment.
