

A DECADE OF BT COTTON IN TAMIL NADU¹

BACKGROUND

Bt cotton was officially approved for cultivation in Tamil Nadu in 2002, when the Genetic Engineering Approval Committee, the apex regulatory body pertaining to transgenics (renamed as Genetic Engineering Appraisal Committee in 2010) allowed three Bt cotton hybrids to be cultivated in the southern zone of cotton cultivation in India.

Interestingly enough, the very first year's monitoring report from the state government of Tamil Nadu says that there is no yield difference between Bt cotton and non-Bt cotton. It says, "it has been ascertained that pesticide spray has been reduced in Bt plots for Lepidoptera pests than in non Bt plots. Spraying continues for sucking pests and prodenia. It is also a fact that due to severe drought, pest incidence was low in 2002-03"². Therein lies a very pertinent question, to be asked about each year's performance: if the pest incidence itself is low, can yield increases in Bt cotton be attributed to the Bt technology or are there other factors which are to be studied? Very brief reports are presented from different districts in this monitoring report from Tamil Nadu, with a conclusion that says "there is no difference between Bt and non-Bt cotton this year. It may be observed for two more years before a judgment is pronounced". Thus began the story of Bt cotton in Tamil Nadu.

Ironically however, the hype around the "success of Bt cotton" emerged from Tamil Nadu too, along with other states throughout these ten years³. This report examines data available in official records with regard to cotton cultivation in Tamil Nadu to try and see what is the real situation as per these official records, the factors behind etc.

COTTON IN TAMIL NADU

Cotton, at present, is not a very important crop for Tamil Nadu in terms of production and is grown on a very small area, compared to the national cotton land acreage (TN hovers around 2% to 3% of India's cotton land and frequently, less than that too, as cotton land is expanding in other parts of the country). However, consumption of cotton is the highest by the Tamil Nadu cotton mills amongst all states.

Cotton in this state is cultivated in winter irrigated season (August-September), rainfed season (September-October), summer irrigated (February-March) and on rice fallows (January-February). Nearly 45% of the crop cultivated is under irrigated conditions, which is a higher proportion than several other states and the national proportion. For cotton grown in rainfed conditions, the quantum of South West monsoon rains has a significant influence.

¹ This is a note based mostly on data from official sources collected by Karthik Karthikeyan, compiled and written by Kavitha Kuruganti (kavitha.kuruganti@gmail.com), for Safe Food Alliance.

² "Performance of Bt Cotton cultivation in Tamil Nadu", Report of State Department of Agriculture, <http://moef.nic.in/divisions/csurv/geac/srtn.htm> accessed on Nov. 4, 2011

³ <http://biospectrumindia.ciol.com/content/CoverStory/20703072.asp> is an example.

The main districts that are into cotton cultivation are Coimbatore, Dharmapuri, Erode, Madurai, Namakkal, Perambalur, Salem, Theni, Trichy, Vellore, Villupuram, Virudhunagar etc. About two lakh farmers are estimated to be into cotton cultivation in Tamil Nadu, on average cotton farm holdings of 0.52 hectare each.

The following is the area, production and productivity-related data with regard to cotton in Tamil Nadu, from 1996-97 to 2010-11, from the Cotton Corporation of India's records. However, this data is not from in-the-season, farmer-field-based sources and is market-based. The Yield data in that sense is questionable.

Tamil Nadu Cotton Area, Production & Yield data			
Year	Area	Production	Yield
1996-97	2.60	5.50	3.60
1997-98	2.47	5.00	3.44
1998-99	2.43	5.50	3.85
1999-00	1.85	5.50	5.05
2000-01	1.93	5.50	4.84
2001-02	2.00	5.00	4.25
2002-03	0.85	3.00	6.00
2003-04	1.03	3.75	6.19
2004-05	1.29	5.50	7.25
2005-06	1.40	5.00	6.68
2006-07	1.00	5.00	8.50
2007-08	0.99	4.00	6.87
2008-09	1.09	5.00	7.80
2009-10	1.04	5.00	8.17
2010-11	1.30	5.00	6.54

Source: <http://cotcorp.gov.in/statistics.asp>

Another picture of Area (in thousands of hectares), Production (in thousands of bales, each bale being 170 kgs) and Yield (in kilos per hectare) is available from the Directorate of Economics and Statistics, through thousands of crop cutting experiments taken up by it. Irrigated cotton area ranged from 35% to 45% in different years.

Year	Area	Production	Yield
1996-97	252.2	329.9	222
1997-98	227.8	358	267
1998-99	218.6	406.3	316
1999-00	178.3	339.5	324
2000-01	169.9	316.6	317
2001-02	187.8	326.1	295
2002-03	75.6	83.5	188
2003-04	97.8	122.7	213
2004-05	129.4	194.8	256
2005-06	140.5	213.3	258
2006-07	100.3	220.9	374
2007-08	99.3	200.7	344

Source: http://eands.dacnet.nic.in/StateData_12years.htm

The above table shows some dramatic declines in land area under cotton cultivation in Tamil Nadu starting from the mid-1990s. ***The annual average yield in the six years preceding the introduction of Bt cotton was 290.17 kilos per hectare, while in***

the six years after Bt cotton's advent it was 272.17 kilos per hectare. Further, the data here do not reflect the dramatically high yield figures like the Cotton Corporation's, probably because the CCI data relies on market sources for its information while the Directorate of Economics and Statistics relies on its own random crop cutting experiments.

Bt COTTON IN TAMIL NADU

Three Bt cotton hybrids with Monsanto's proprietary technology were first allowed to be cultivated in Tamil Nadu in 2002, when an approval was provided for cultivation in the south zone states. In 2004, a Bt cotton hybrid of Raasi seeds was allowed. By 2010 growing season, there were 444 Bt cotton hybrids/brands covering six genetic "events" from 35 companies that were on sale in South Zone including Tamil Nadu. However, it is worthwhile noting that in Tamil Nadu, like elsewhere in the country, Monsanto's proprietary technology related to Bt cotton has a monopolistic control over the seed market.

The adoption of Bt cotton began growing dramatically in Tamil Nadu from 2005 growing season onwards and is estimated to have reached more than 95% by 2009.

Area under Bt cotton hybrids in lakh hectares, over the years (the first year saw around 3000 hectares planted to Bt cotton, in 2002-03) is presented in the table below.

Bt Cotton expansion in Tamil Nadu (lakh hectares)

Year	Total Area	Bt Cotton	%age of total area
2003-04	0.977	0.027	2.8
2004-05	1.293	0.110	8.5
2005-06	1.097	0.178	16.2
2006-07	1.003	0.442	44.1
2007-08	0.990	0.460	46.5
2008-09	1.140	0.750	65.8
2009-10	1.370	0.800	58.4

Source: Report on Cotton Scenario and Implementation of Mini Mission II of Technology Mission on Cotton for the year 2009-2010, Department of Agriculture, Tamil Nadu

From the above table, **it is clear that Bt cotton has not seen a steady expansion in cotton area of Tamil Nadu but actually saw a decline in 2009-2010**, contrary to what industry data projects. Reasons for this are not apparent *prima facie*.

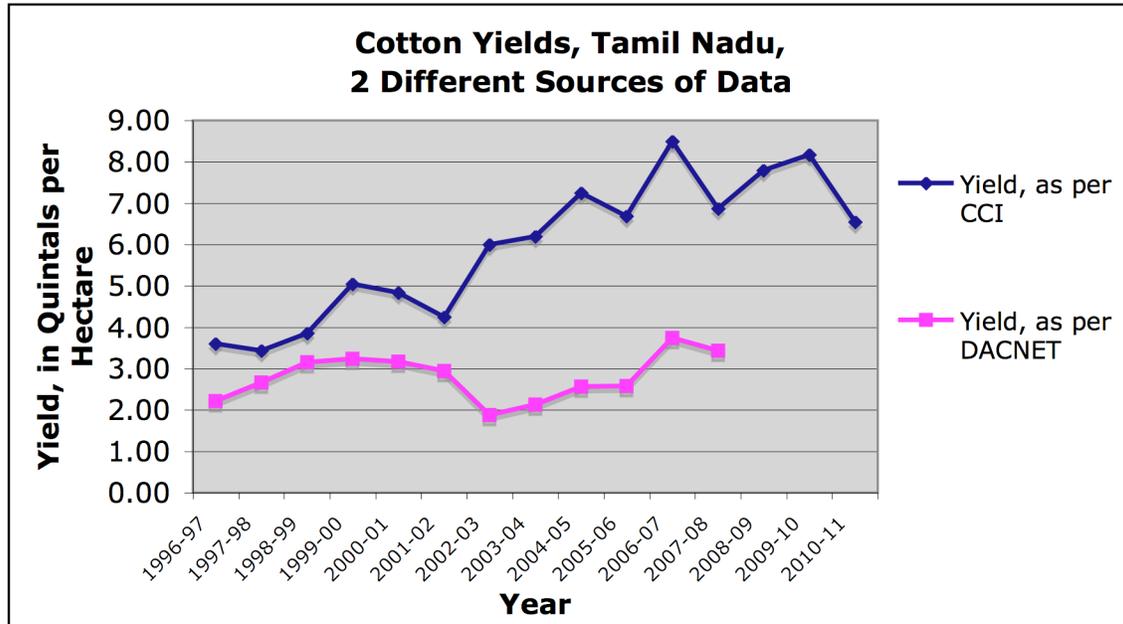
SITUATION AFTER THE ADVENT OF BT COTTON

The usual claims around Bt cotton are:

- that yields will increase, due to reduction in losses from pest attack mainly from bollworm complex (this pre-supposes pest incidence since there is no intrinsic yield increase potential from the Bt technology);
- that pesticide use and costs will come down;
- that costs of cultivation will reduce for farmers, improving their overall economic condition with such reduced costs and increased yields.

Yields

It is also apparent that yields have been fluctuating in the state over the years, with or without Bt cotton, whether one looks at the Cotton Corporation of India data or the Directorate of Economics & Statistics' data. The graph below shows that clearly.



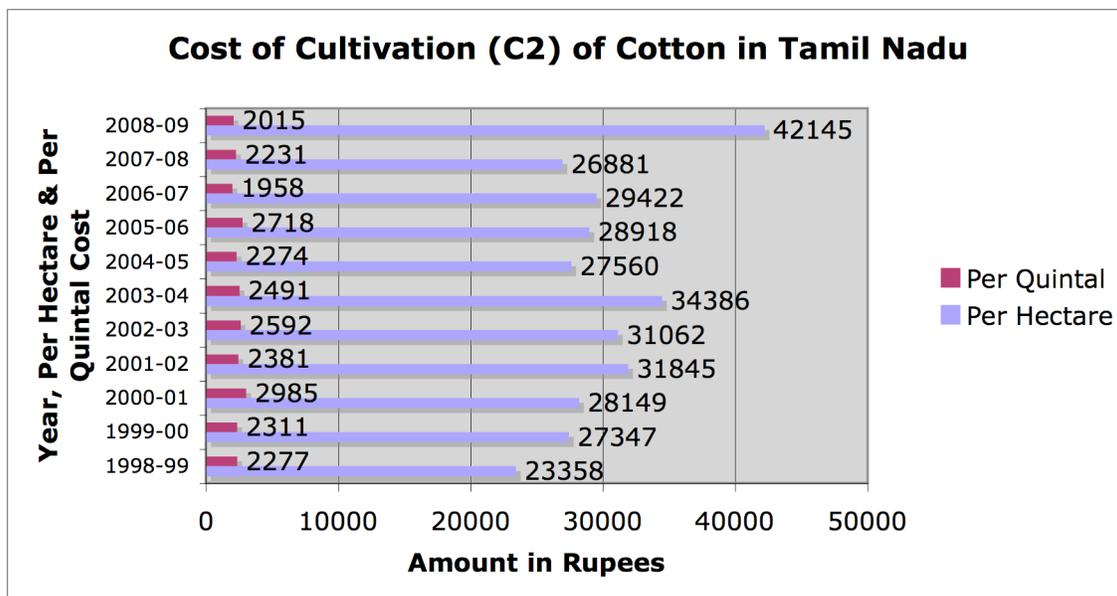
Source: Compiled from CCI and DACNET data

In fact, any yield increases until 2005-06 cannot be attributed to Bt cotton given that these seeds occupied a negligible portion of total cotton area in the state.

Cost of cultivation, per hectare and per quintal

Data on costs of cultivation is collected and put out by Directorate of Economics and Statistics, Ministry of Agriculture, Government of India. This is available at http://eands.dacnet.nic.in/Cost_of_Cultivation.htm for different crops, across states over the years.

The following data culled out from this source pertains to Cost of Cultivation (C2, revised) per hectare and per quintal for Cotton in Tamil Nadu. The chart below also has the absolute cost mentioned in rupees each year.



Source: Compiled from [http://eands.dacnet.nic.in/Cost of Cultivation.htm](http://eands.dacnet.nic.in/Cost_of_Cultivation.htm)

It is apparent from this data pertaining to Tamil Nadu that neither the per-hectare cost of cultivation nor the per-quintal cost of cultivation have steadily come down as Bt cotton area expanded, as promised and claimed. While presenting this data, it is assumed that this data would have evolved from Bt cotton farmers too, given that sampling for this happens in a random manner and given that Bt cotton expansion is reported to be high in the recent years within the cotton area of the state.

Volume of Chemical Pesticides' Usage in Cotton in Tamil Nadu

The NALMOT report on Cotton Scenario for 2007-08 has some data on major chemical pesticides used in cotton by volume and categories, as presented below.

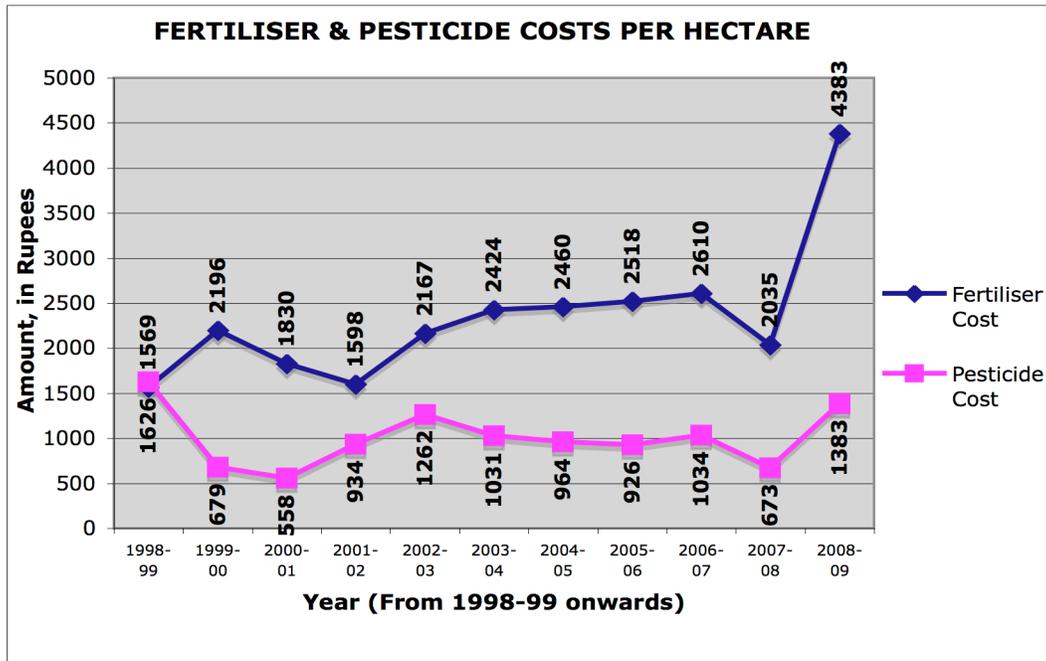
Major Chemical Pesticides Used in Cotton, in Metric Tonnes (Technical Grade)

Category	2003-04	2004-05	2005-06	2006-07	2007-08
Insecticides	14.18	15.3	14.16	15.12	14.0
Fungicides	7.04	4.50	3.75	3.75	3.00
Others	4.25	3.88	3.81	3.50	3.00

Source: NALMOT visit report on Cotton Scenario and Implementation of Mini Mission II of Technology Mission on Cotton for the year 2008-2009, Dept of Agriculture, Tamil Nadu

It is important to note that insecticides usage, which is supposed to come down with the use of Bt cotton has not shown any significant difference even as Bt cotton expanded to larger areas over the years.

Fertiliser & Pesticide costs in Cotton Cultivation in Tamil Nadu



Source: Directorate of Economics & Statistics, MoA, GoI

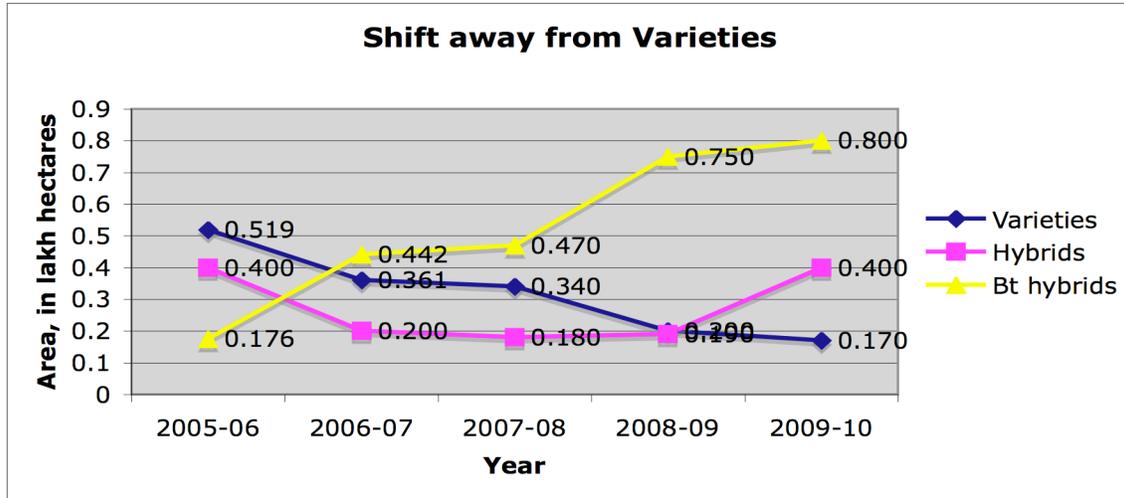
From the graph above, it appears that per hectare costs on pesticides were not always very high, as rationalized during the approval given to Bt cotton. In 2000-01, for instance, two years before Bt cotton was approved, it was just Rs. 558/- per hectare in Tamil Nadu and even after the advent of Bt cotton, this low amount was not regained when it came to farmers' spending on pesticides. Compared to Rs. 1034/- per hectare on pesticides when Bt cotton was 44% of the cotton, the spending went up to Rs. 1383/- per hectare when it reached 66% adoption as per official records (more than 70% by industry figures).

In recent years, spending on chemical fertilizers for cotton cultivation appears to be going up, with the exception of 2007-08, in the state.

Shift from cotton varieties to cotton hybrids over the years

There has been a dramatic shift away from cotton varieties like MCU5 VT, LRA5166, Surabhi, SVPR3, K11, MCU7 to Bt cotton hybrids in the state as depicted in the graph below. This data is obtained from the NALMOT report of 2009-2010. It is very apparent that such a shift is not discussed while talking about yield increases, if any. It can be seen from the data and the graph that cotton varieties, which occupied nearly half of the sown cotton area in 2005-06, came down by 67% by 2009-2010. Varieties occupied only 12% of the cotton area in 2009-2010. In 2008-09, varieties were only 17% of the cotton area. This shift has implications potentially in terms of yield increases but also in terms of more investments required of farmers, increasing their seed dependency on external sources and therefore, creating a new cause for crisis related to seed choices, seed prices and seed sovereignty. For instance, "seed shortages" have been reported from different states of India earlier in 2011, bringing farmers onto the streets agitating

for timely supply of seed and black marketing of seeds was reported widely. It has to be remembered however that such 'shortages' disappeared dramatically once the sowing season began, reflecting how the seed industry is not averse to playing with the lives of farmers for their own profiteering!



Major failures of crop in recent years

In November 2005, following reports of seed germination failure from Salem and Namakkal districts, a civil society fact finding team called the "Monitoring and Evaluation Committee" went into the field to investigate and found after interacting with seed dealers, officials and farmers, confirmed that there has been a germination failure of upto 75% in at least 35% of the area sown in Salem and Namakkal districts⁴. The fact finding report pointed out that while the failure of germination is being attributed to excessive rainfall, such a failure was not found in the non-Bt cotton fields of the same farmers. It was seen that seeds of Raasi and to an extent, Mahyco, had failed to germinate. Due to repeated sowings, farmers ended up shelling out nearly Rs. 3500/acre on seeds alone that season. It is unclear if any compensation has been paid to the affected farmers to this day; the regulators and the state government discounted seed failure in this case.

In January 2007, there were reports again of cotton crop failure in Tamil Nadu⁵. This time, it was the turn of farmers in Dharmapuri who suffered with Mahyco's Bt cotton seed. In this case, after scientists and agriculture department officials investigated the failure reports, this was confirmed by the Tamil Nadu Agriculture Minister at that time as a problem caused by improper seeds. It was reported that the Minister had ordered that the said company should not sell any type of seeds in Tamil Nadu and had asked for the affected farmers to be compensated.

⁴ Gargi Parsai, "Bt cotton seeds fail to germinate", The Hindu, November 10th, 2005. <http://www.hindu.com/2005/11/10/stories/2005111007110500.htm>

⁵ "Bt cotton crop fails in Tamil Nadu", January 5th, 2007.

<http://www.financialexpress.com/news/story/188798/>

"Tamil Nadu blacklists Mahyco's Bt cotton seeds after crop failure", Down To Earth, 15/2/2007. <http://www.downtoearth.org.in/node/5514>

In January 2009, another instance of failure of Bt cotton emerged – from Erode district now⁶. The reddening of the leaves and lodging of plants in this case of failure was blamed on magnesium deficiency by investigating scientists even though no samples were taken for testing. Farmers harvested very low yields and incurred economic losses. It is known informally that some compensation has been paid to some of the affected farmers while details are unclear on this front; however, it is clear that there are no liability mechanisms in place for redressal and accountability.

In a Round Table organized in Bengaluru on March 26th and 27th 2011 by SAGE (Southern Action on Genetic Engineering), two farmers from Tamil Nadu presented their bitter experiences with Bt cotton in front of a panel of 4 senior High Court Judges.

Mrs Sappani Ponnuthayee

Aattuvazhi, Vasudevanallur Panchayat,
Sivagiri Taluk, Tirunelveli district, Tamil Nadu.



Who is Mrs Sappani Ponnuthayee

Ponnuthayee is a farmer from Aattuvazhi, Vasudevanallur panchayat, Sivagiri Taluk of Tirunelveli district in Tamil Nadu.

Bt Cotton and Ponnuthayee

In 2005, we came to know that a new variety of cotton seeds were available in the market and hence we approached the seed sellers in our area and enquired the salient features of the new variety of cotton. At that time, we were told that this variety will help cotton farmers in 3 areas. That is,

- * Requires less seed quantity (per acre ¼ Kg)
- * Gives more yield (12 quintals per acres)
- * The pest attack will be very less and thereby use of pesticide will come down.

Against this promise we have found that we need to weed more and application of pesticides is more than the normal times. After the boll formation we expected good yield. Unfortunately, the bolls formed in the plants remained as bolls only and did not burst and release the cotton. That time, we cultivated cotton in 3½ acres with the new variety and spent more than Rs.35,000/-. Finally, we were able to get just 4 Quintals of cotton from the 3½ acres. It was a heavy loss for us.

Source: Extracted from "What are the South Indian Farmers saying about their Bt Cotton experience?", SAGE, April 2011. PP 12

⁶ Kannaiyan, "Failure of Monsanto's Bt cotton", May 12th 2009.
<http://kannaiyan.blogspot.com/2009/05/normal-0-false-false-false-en-in-x-none.html>
<http://www.thehindu.com/2009/01/31/stories/2009013156960600.htm>,
<http://www.hindu.com/2009/02/03/stories/2009020352740300.htm>,
<http://www.hindu.com/2009/02/04/stories/2009020451260300.htm>,
<http://www.hindu.com/2009/03/17/stories/2009031754890500.htm>

Mr Mathiyalagan

Poompatti Village, Aroor block
Dharmapuri District, Tamil Nadu



Who is Mr Mathiyalagan

Mr Mathiyalagan is a cotton farmer for more than 10 years. He is from a village called Poompatti situated in Aroor block of Dharmapuri district, Tamil Nadu.

Bt Cotton enters Mathiyalagan's farm

About four years back, Bt cotton was introduced in our area. I also started to cultivate Bt cotton because of the following promises made by the seed company.

- * No need for any pesticide application in Cotton
- * The yield will increase.
- * Reduction of input cost.

At that time our normal cotton yield per acre was between 6-8 quintals. The yield promise made to me was between 12- 15 quintals. At the very beginning, I noticed the difference in seed cost. A packet of 450grams cotton along with 50grams of refugia seed was sold to us for Rs. 750 which was three times higher than our normal cotton seed cost.

The actual problem started with abnormal changes in soil. I am able to notice it. In the normal practice of cotton I apply basal fertilizer for one time and top dressing for 2 times. With Bt cotton after the application of 1 top dressing the plant responded very well. But it was only for 10 days. After 10 days, the cotton plant started to appear very weak and asked me to give another dose of fertilizer. Then I gave fertilizer for 2nd time. This time also I noticed the same response from my cotton plant. This is how I started to give fertilizer at least for once in 5 days and it increased my input cost very much. Similarly, my pesticide application also increased day by day and I had to apply pesticide for every 15 days. Totally I spend Rs.13,000 to Rs. 15000 for one acre of Bt Cotton while I normally spend around Rs.6000 to Rs. 8,000 with the normal cotton. I also noticed the disappearance of spider webs, dragon flies, and butterflies and wash which are normally found abundant in my field.

It was a total crop failure. Many farmers in our area experienced the same. We raised the issue at the Farmer's Grievance day and brought to the notice of District collector, agriculture department. A section of farmers got compensation of Rs. 2500-3500 per acre and another section of farmers were unable to get the compensation. We demanded the availability of non-Bt cotton seeds to our farmers.



Source: Extracted from "What are the South Indian Farmers saying about their Bt Cotton experience?", SAGE, April 2011. PP 13

In this Round Table, the eminent panel of Judges made a number of observations based on the experiences of farmers from different states, concerning the false claims and promises held out, exorbitant seed costs, large scale losses of crop, adverse effects on the cultivation of traditional cotton, adverse health impacts, impacts on cattle, human food chain contamination with cotton seed oil, adverse effects on soil, increase in pest incidence, non-availability of traditional cotton seeds and so on.

TO SUM UP

- Bt cotton expansion in Tamil Nadu did not increase in steady yield increases as claimed and hyped up. Tamil Nadu had high yields in cotton even in the years when it predominantly grew non-Bt varieties (not even hybrids).
- Bt cotton cultivation in larger areas did not bring down the per-hectare or per quintal cost of cultivation as projected. The trends on this front have always been fluctuating and this continues.
- Bt cotton cultivation and expansion to larger areas did not bring down the insecticide usage in cotton crop in Tamil Nadu. Further, Tamil Nadu had low average cost incurred on pesticides (indicative of lower use in volume too) even prior to Bt cotton introduction and the rationale for its approval is not clear in such a context. Spending on chemical fertilizers appears to be on an upward trend in cotton cultivation now.
- There has been a large scale shift away from cotton varieties to sowing of Bt cotton hybrids raising many serious concerns around seed choices, seed prices and seed sovereignty, in addition to increasing chemicalisation of agriculture. This also raises valid questions on why Bt technology is seen as the cause for cotton yield increases, even by scientific institutions like the Tamil Nadu Agricultural University; this is all the more perplexing in a context when pest incidence itself is reported low!
- There have been major failures of Bt cotton crop over the years and the unpredictability of performance is apparent from this. However, farmers have not always obtained a redressal from such failures. There are serious questions around the lack of a liability regime which covers both penalties as well as compensation in addition to remediation where necessary.