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# COTTON STATISTICS & NEWS

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## Agrarian Crisis – Why farmers commit suicide? Part-3

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Over the past 10 years, 'Bt-cotton' technology emerged as a major driver of change. Bollworms were effectively controlled, cotton yields were protected and insecticide usage against bollworms decreased. Though there was a very impressive decline in the insecticide usage initially during the first 5 years of Bt cotton until 2007, subsequently over the past 6-7 years, the usage of fertilizers and chemical pesticides increased continuously. Minor insects which were not controlled by Bt cotton became major pests and necessitated extensive insecticide usage. Hybrids are designed to respond to fertilizers. Higher yields are generally obtained with irrigation and optimum levels of fertilizer application. Hybrids are known for hybrid vigour in producing large amount of biomass, which eventually results in nutrient mining from the soil.

If the soil is not properly replenished with balanced macronutrients, secondary and micronutrients, the subsequent crop is likely to suffer higher levels of insect and disease infestation. It is widely acknowledged that higher levels of nitrogenous

fertilizers make the crop more vulnerable to insect pests, thus, warranting the need for repeated insecticide applications. Research results have shown that micronutrient deficiencies also render cotton crop more vulnerable to sap-sucking insects and diseases. The increase in usage of pesticides, fertilizers, high-priced GM seed and costly labour, has resulted in high cost of cultivation.

The following factors have contributed to the high cost of cultivation:

- 1. GM Hybrid seed:** Hybrid seeds are produced manually through a labour intensive process and thus are expensive to produce. The seeds are produced every year and farmers are required to buy fresh hybrid seeds every year. GM technology is royalty driven. The GM hybrid seed is at least 6-7 fold costlier than the conventional non-GM varieties. The DES data shows that in 2011, farmers spent Rs. 3595 per hectare on seeds, which is more than triple the cost of Rs. 1086 per hectare spent in 2003. This may have been due to the expensive Bt-cotton GM hybrid seeds. High seed cost plays a major role in causing distress especially in rain-fed regions which warrant re-sowing when germination is poor because of erratic onset of monsoon. This problem is more acute in the predominantly

**EXPERT'S  
Column**



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rain-fed states of Maharashtra, Telangana and Karnataka which spent more than Rs. 3700 per hectare in 2011. Maharashtra has 95% of its cotton area under rain-fed conditions, while Karnataka and Telangana have more than 86% of the cotton area dependent on rains alone for water requirement of the crop. Thus seed cost plays truant in rain-fed regions to create initial distress.

## 2. Nutrient mining by hybrid cotton, micronutrient deficiencies and increased biotic stress:

Continuous cultivation of hybrid cotton in the same field causes immense nutrient mining. If not replenished appropriately, nutrient deficiencies increase cumulatively and so does the need for increased application of fertilizers. Over the past few years, biotic stress factors such as leaf reddening and sap-sucking pest infestation increased significantly due to the deficiencies of a few micronutrients, nitrogen and phosphorus. Non-replenishment of Nitrogen + phosphorous + potash (NPK) in a balanced manner coupled with deficiencies of secondary and micronutrients such as magnesium, zinc and boron renders the crop susceptible to insect pests and diseases. Imbalanced fertilizer usage is partly because of the Government subsidized 'Statutory Price Control (SPC)' policy of only urea for Nitrogen (N) and not any other nutrients such as P, K or micronutrients. Over the past 5 years, the price of 'muriate of potash (K)' quadrupled; the price of phosphatic (P) fertilizers tripled, but urea cost increased only marginally. As a result farmers have been using urea in excessive quantities but

very less of P and K, thus leading to imbalanced fertilizer usage and increase in insect pests, especially sap-sucking pests and diseases.

## 3. Bt hybrids are susceptible to sap-sucking insect pests:

Bt-hybrids control only caterpillars and bollworms. 'Bt-technology' does not control sap-sucking insect pests such as thrips, jassids and whiteflies which cause extensive damage. Majority of commercial hybrids are highly susceptible to sap-sucking insect pests.

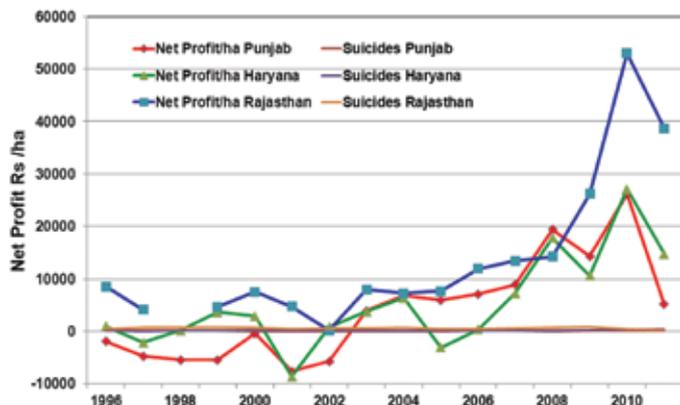
## 4. Insecticide resistant sucking insect pests:

Sap-sucking pests have developed resistance to almost all the recommended insecticides, thereby prompting repeated insecticide applications.

## 5. Labour shortages and high wages:

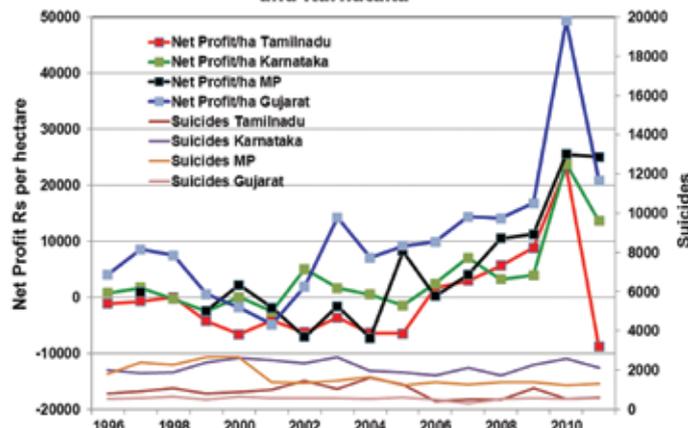
Though extremely valuable in providing employment in rural areas, there are reports that the MNREGA (Mahatma Gandhi National Rural Employment Guarantee) scheme is actually causing labour shortages for crucial agriculture operations thus leading to increased demand for wages and high cost of labour. The DES data (table 4) shows that as compared to the base year of 2003, labour wages in 2011-12 had increased exorbitantly by at least 7 fold in Karnataka, erstwhile AP, Maharashtra and Gujarat. The labour wages in AP increased to Rs 19,351 from Rs 6,343 per hectare. Similarly the wages in Maharashtra increased from Rs 4,702 to Rs 20,127 and the wages in Gujarat increased from Rs 7510 in 2003 to Rs 20,013 per hectare in 2011.

Graph 6. Suicide Cases & Net Profitability in North India



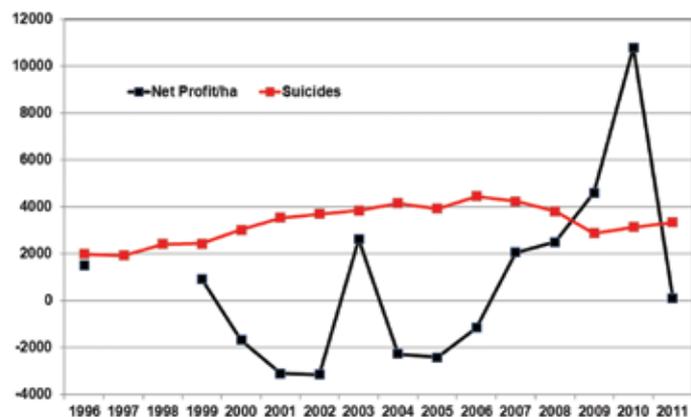
Suicide data sourced from NCRB, GOI. Net Profit calculated from <http://eands.dacnet.nic.in/>

Graph 7. Suicide Cases & Net Profitability in Gujarat, MP, TN and Karnataka



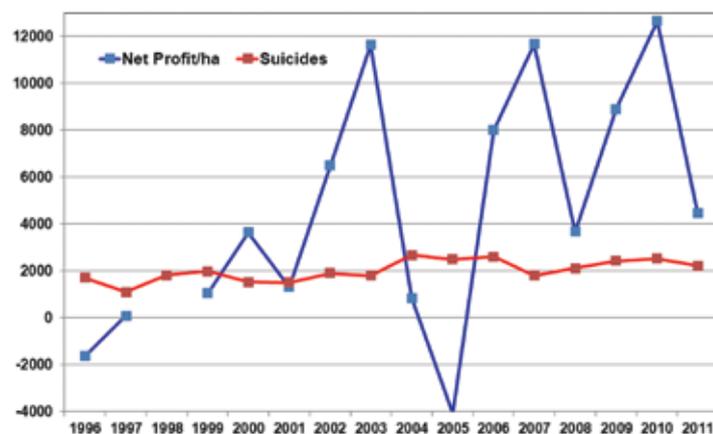
Suicide data sourced from NCRB, GOI. Net Profit calculated from <http://eands.dacnet.nic.in/>

Graph 8. Suicide Cases &amp; Net Profitability in Maharashtra



Suicide data sourced from NCRB, GOI. Net Profit calculated from <http://eands.dacnet.nic.in/>

Graph 9. Suicide Cases &amp; Net Profitability in AP



Suicide data sourced from NCRB, GOI. Net Profit calculated from <http://eands.dacnet.nic.in/>

### What is causing the stress?

Is cotton responsible for the stress? Logical reasoning suggests that this may not be the case. Firstly, if cotton was the cause of crisis, farmers would have shifted to other crops especially in Maharashtra and Telangana wherein agrarian crisis is intense. Instead, the area under cotton increased by 1.0 million hectares in each of the two states over the past 10 years right in the face of agrarian crisis. Further, if cotton was the cause, then, the agrarian stress would have been equally perceptible in the other major cotton growing states such as Gujarat, Punjab, Haryana and Rajasthan. But this has not been the case at any point of time in the past. For example, suicides are also high in states such as Madhya Pradesh and Karnataka where the area under cotton cultivation is less than 4.0% is not a major crop and conversely suicides are negligible in Gujarat and Haryana where cotton area is 25% and 16.8% of the area under agriculture in the two states respectively. Therefore relating cotton cultivation with suicides could be spurious. Moreover, as stated in the CACP Annual Report 2014, "The net rate of gross return, i.e., profitability over C2 (cost of production) is also maximum for cotton at 32 percent among kharif crops considered in the analysis (page 36, Price policy for Kharif crops 2014, Commission for agricultural costs and prices CACP, Government of India). Therefore it would be grossly erroneous to conclude that cotton cultivation could be the cause of agrarian crisis.

It would only be correct to state that like many crops, cotton is also facing a crisis of high input costs and stagnant yields, but in rain-fed regions

where hybrid cultivation is not very profitable. The entire analysis points out to the fact that high cost of cultivation and low net returns cause great stress (graphs 6 to 9). Unfortunately, consistently pathetic and low net returns coupled with high cost of cultivation in Maharashtra and high investment beset with constant risks in Andhra Pradesh pose great concerns to cotton farming. Cotton cultivation in the other cotton growing states was found to be reasonably risk-free. Analysis (graph 6) shows that in Punjab and Haryana, the annual net profits on investment of Rs. 100 were Rs. 26 to 27 for the 6 year period after 2005. The net profits during this period were highest at Rs. 71.33 in Rajasthan. However during the 10 year period prior to 2005, the annual average net returns on Rs. 100 invested on cotton cultivation were negative at Rs. -10.44 per year in Punjab and Rs. -0.02 per year in Haryana but positive in Rajasthan at Rs. 39 per year. Cotton was found to be profitable in Gujarat with Rs. 15.39 per year for every Rs. 100 invested during the 7 year period prior to 2002 and Rs. 44.77 per year for the 9 year period after 2003. Cotton in Madhya Pradesh and Karnataka provided net annual average profits of more than Rs. 20 per Rs. 100 invested over the 9 year period subsequent to 2003. Though the net returns were low in Tamilnadu, farmers are relatively less affected because of the assured irrigation in at least 40% of the 1.0 lakh hectares in the state.

It is a pity that farmers of Maharashtra and Andhra Pradesh have to invest more than Rs. 61,000 per hectare every year after 2011, to cultivate cotton under predominantly rain-fed conditions

subjecting themselves to high risks. Beyond doubt, the entire analysis points towards high level of stress in Maharashtra and erstwhile Andhra Pradesh. In Andhra Pradesh, the returns are low at Rs. 14.9 per year per Rs. 100 investment, but are better than Maharashtra. Nevertheless, the most important factor that causes immense stress in Telangana and AP is the high level of fluctuation in net profits per year. Please see graph 9 to get an idea of the year to year fluctuations that indicate enormous risks with cotton cultivation in the two states.

The net annual average returns in Maharashtra for an investment of Rs. 100 were negative at Rs. -5.26 for a period of 7 years prior to 2002 and a meagre Rs. 3.82 per year for Rs 100 invested during 9 years after 2003. Indeed such low net returns can certainly cause agony to the 40 lakh farming families whose sole livelihood depends on cotton cultivation under rain-fed conditions. In light of the negligible annual profits, the high investment of more than 61,000 per year will have to be essentially drawn from money lenders or banks. Needless to mention, the extremely poor returns and high seasonal risks have been the hallmark of low productive cotton cultivation systems in Maharashtra for the past two decades. Clearly these conditions are only likely to get worse in the near immediate future with the ever increasing cost of inputs and labour.

### Are there any solutions?

Suicides reflect agrarian crisis and agrarian stress is primarily related to declining profitability especially in small scale farms in rain-fed tracts. As has been pointed by many researchers, suicides in rural India could be part of a very complex phenomenon which in many cases is intricately woven into socio-economic aspects of agrarian societies. This article examines the economic crisis only from the perspective of cotton cultivation and does not take a look either at the relative socio-economic dynamics or economic stress that may have been caused either due to other crops or the aberrant weather or any other system changes in the agrarian sector. Based on the analysis, it should be possible to find appropriate long term sustainable solutions at least for cotton which is a major crop in Maharashtra and Telangana states where agrarian stress can be very acute because of the high risk involved with predominantly rain-fed farming in the two states.

A few of the possible tangible solutions are:

1. A provision for special state specific minimum support price (MSP) of cotton at 50% above

the production cost (C2) in Maharashtra and Telangana which have more than 90% of cotton area under rain-fed tracts. The special MSP can be operated in the two states by the Cotton Corporation of India.

2. Reduction in cost of production by lowering down input costs using varieties (variety seeds can be re-sown, whereas hybrid seeds cannot be re-sown) coupled with legume based cotton cropping systems that can effectively help in natural cotton pest management, strengthen soil nutrient management through nitrogen fixation thereby reducing chemical inputs, enhancing yields and overall profitability.
3. Approval of Bt-varieties in addition to the existing By-hybrids. The seeds of Bt varieties can be reused and cost of inputs could be reduced to at least half of the current costs incurred with Bt-hybrids.
4. Enhancing irrigation and infrastructure facilities in Maharashtra and Telangana
5. Part-time disabling of MNREGA (Mahatma Gandhi National Rural Employment Guarantee) scheme during kharif season to ensure labour availability in the cotton growing states.

This study shows that of all the cotton growing states, net returns were the lowest in Maharashtra. Is it possible to increase the net profits from cotton cultivation in Maharashtra? For profits to increase, the cost of production must decrease substantially and the yields coupled with cotton market prices should increase significantly. Unfortunately, the cost of seeds, chemical fertilizers, pesticides, labour wages and transport are increasing every year, while the cotton yields and market price are either stagnating or decreasing over the recent immediate past. Thankfully, there is immense scope for Government policies especially to support critical inputs, labour availability, mechanisation, export-imports and pricing to ensure that cotton farming becomes more profitable in rain-fed farms. Farmers need inexpensive seeds, good quality bio-pesticides, bio-fertilizers and machinery to reduce dependence on labour. Timely availability of inputs and labour can help immensely in reducing the stress and enhancing yields. But on topmost priority, there is a need to support research that can lower down the cost of cotton production and enhance ecological and economic sustainability of cotton production systems.

More importantly, cotton price needs to be protected. Government support can be helpful in this endeavour. The National Commission on Farmers chaired by Prof. Swaminathan recommended setting up of minimum support price at 50% above the production cost. It is reported that over the past 7-8 years in China, farmers were being paid about 50% higher price than 'Cotlook-A' through Government schemes. However, there is a need to conduct an in-depth analysis to understand the implications of enhanced MSP on the overall cotton economics that can enable the development of appropriate strategies to benefit farmers, traders, value chain industry and the consumer.

Cotton cultivation is highly labour intensive with a need for 110 to 120 man-days per hectare. In a decentralised farming set up such as the one in India where millions of farmers manage their own small farms, small scale machinery would be useful to circumvent labour shortages. But such machinery can also displace labour to create a new crisis in the rural sector.

Another important issue relates to varietal seeds. It would be immensely helpful if the Government can intervene to ensure that the option of 'GM variety seeds' should also be available to farmers in India, as is the case with all other cotton growing countries across the globe. GM variety seeds can cost less than one-third of the GM hybrid seeds. This can make a huge difference in rain-fed regions, because early sowing of early maturing compact Bt-cotton varieties in high density planting can reduce the cost of cultivation in rain-fed regions by half and enhance the yields significantly.

Increase in the domestic consumption of raw cotton by the textile industry coupled with exports can immensely help stabilising local prices. Governments can play a significant role by enhancing infrastructure facilities related to cotton cultivation and trade especially in Maharashtra, Telangana, Karnataka and Andhra Pradesh.

Water management can play a significant role in rain-fed regions. Construction of check-dams, farm ponds and micro-irrigation can help enhancing cotton yields. Additionally, simple technologies such as rain water harvesting, soil moisture conservation through bio-mulching, reduced tillage and crop residue recycling especially in rain-fed farms have good potential to increase yields.

To ensure sustainable farming, it is extremely important to enhance the soil organic reserves through cropping system techniques. Crop residue incorporation, vermin-composting, bio-fertilizers, reduced tillage, organic manures etc., assist in increasing soil organic content and thereby enhance the crop response to fertilizers. In addition to these there is a need to explore sustainable crop production options. It may sound over-simplistic, but legume crops in cropping systems with cotton may actually provide long-term sustainable solutions. Legume crops such as beans, peas, gram, soybean, lucerne, berseem etc., fix large quantities of atmospheric nitrogen when the seeds are treated with nitrogen fixing bacterium species called 'Rhizobium'. When cultivated as intercrop or in crop rotation, soybean and other legume crops act as hosts for naturally occurring insect predators and parasitoids thus reducing the need for chemical pesticides. Integrated nutrient management actually helps the crop to fight back insect pests and diseases thereby reducing the need for pesticides. These cropping systems provide good economic returns apart from greatly reducing the need for chemical fertilizers. Thus legume based cotton cropping systems can effectively help in cotton pest management, soil nutrient management and enhance profitability.

## Conclusion

In conclusion, cotton is a profitable crop in general and is therefore preferred by farmers over many other kharif crops. The net returns could be less in rain-fed farms, though. Like any crop in rain-fed agriculture, cotton could cause distress in rain-fed farms where the cost of cultivation is high, yields are risk prone and net profits are very low especially when monsoon behaves erratically over the season. Clearly, agrarian stress is related to the declining net returns in agriculture and cannot be related to cotton cultivation alone. But, there are long term sustainable solutions that can lower down the cost of production and increase yields. Thus, there is no room for despair. Indian farmers are resilient and can usher in a second farm revolution in India, if supported with proper technologies and policies. It needs a collective efforts from all stakeholders to ensure that the farmer confidence in rain-fed cotton farms is restored as we progress towards eco-friendly, sustainable and profitable farming systems.

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