The Road Blocks to Genetically Modified Crops in India

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The views expressed in this column are his own and not that of Cotton Association of India)

EXPERT's Column

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In October 2012, several newspaper headlines read 'Supreme Court panel calls for 10-year ban on trials of genetically modified crops'. Bt cotton is the only genetically modified crop approved for commercial cultivation in India thus far. There were several reactions to the Supreme Court panel report since many other advanced GM Cotton varieties are in the pipeline and panel report could have serious implications. Ten months later, the Technical Expert Committee (TEC) submitted their final report to the Supreme Court. The report was scathing and there was a direct threat to any possible field trials being conducted sooner or later, if the report was accepted by the court.

The TEC made the following recommendations:

1. A scientific secretariat for the GEAC.
2. The applicant must not choose the trial site.
3. The regulator-designated trial site should fulfill conditions of suitable isolation, walled area, etc., under the control of a regulatory authority.
4. Field trials to be discontinued until the required conditions are met.
5. Assessment of need for the transgenic trait/ crop, socio-economic assessment and stringent post-monitoring.
6. Long term feeding and inter-generational studies for assessment of chronic toxicity in small animals.
7. Genome-wide expression analysis in the toxicity studies to screen for possible unintended effects on host physiology, especially in RNA interference.
8. Moratorium on field trials of herbicide tolerant HT crops until the issue had been examined by an independent committee.
9. Transgenic crops of Indian origin or diversity should not be allowed for field trials.

The TEC recommendations seem to have been inspired by the report "cultivation of genetically modified food crops prospects and effects" of the Parliament Standing Committee on Agriculture submitted on August 9, 2012. The 31-member committee took two years to make a critical assessment of GM crops. The report highlighted the need for pro-poor technologies, anti-monopoly, empowering local societies, sustaining biodiversity, ensuring food security, development of GM crops without antibiotic markers, strengthening bio safety and regulatory system and the need for GM labeling. The Committee unanimously recommended that till all the concerns voiced in the report were fully addressed and decisive action taken by the Government with utmost promptitude, to put in place all regulatory, monitoring, oversight, surveillance and other structures, further research and development on transgenics in agricultural crops should only be done in strict containment and field trials under any garb should be discontinued forthwith.

The committees also pointed out that the composition and operational mechanism of the regulatory agencies should be revamped. This was included in the 'National Biotechnology Regulatory Authority' NBRA proposal to be tabled in the parliament this year. The need for independent testing laboratories and independent secretariat, have been emphasised for a long time and these are included in the NBRA.

Though the TEC report did not quite say so, but, it gave an incorrect impression that India does not have the scientific competence for good

bio safety assessment and evaluation. Similarly, the arguments put forth for herbicide tolerant (HT) crops on weed resistance development, also did not really support their contention that India should not move forward with HT crops. But, thankfully the TEC only recommended that the HT field trials may be put on hold until the issue had been examined by an independent committee. HT crops, especially the glyphosate resistant crops can play an important role in weed management. Herbicide usage on cotton has increased from Rs. 50 lakhs in 2002 to Rs.8690 lakhs in 2010. This has been happening due to labour shortages and also because of a narrow window period of rain-free dry weather available for the weeding operation that enables labourers to walk through fields. Weeding is most critical during the first 10-60 days of the crop. There are separate herbicides for grasses and broad leaved weeds and mixtures are being used now, which makes it expensive. Glyphosate is relative much better in terms of cost (less than half of the other herbicides) and environmental persistence (gets rapidly degraded). There may be problems with POE-15 (polyethoxylated tallowamine), but formulations can be changed. The consequences of herbicide resistance to herbicides are that farmers may go back to manual weeding or move on to other herbicides and nothing more. The impact of reduction in biodiversity of weeds as mentioned by the TEC, also happens due to manual weeding in much the same way as it happens with chemical herbicides.

Another aspect relates to GM crops and biodiversity. The TEC panel report says that thus far there are no examples of GM crops approved for commercial cultivation in their centres of origin. This is incorrect. Northern and Central America and Mexico are centres of origin for American cotton species Gossypium hirsutum, but genetically modified Bt and HT G. hirsutum cotton varieties are being commercially grown there for more than a decade. Similarly Mexico has been conducting open field trials of corn for more than three years now. China conducted open field trials on GM rice for several years. China was recently declared to be the center of origin of rice. India is thought to share the center of origin of rice. Further, there is no scientifically justified apprehension on the opposition to GM crops in the country of centre of origin or diversity. It is possible that GM crops may cause contraction in crop varietal diversity. But this also happens with non-GM varieties/hybrids that compete and replace other varieties.hybrids. All new varieties including GM varieties have the potential to cause a contraction in the diversity of competing varieties, as correctly pointed out by the Parliament Committee Report. How differently would GM crops affect genetic diversity or biodiversity is the question that needs to be scientifically assessed, depending on the specific traits. But, it is hybrid seeds that do not contribute to diversity. Seeds of varieties which farmers can reuse, can actually contribute to the growth in biodiversity. Therefore what is needed is a policy to use straight varieties of GM instead of GM hybrids for crops with centre of origin or centre of diversity in India.

Bt cotton is a good example of how GM cotton can benefit farmers. Did Bt cotton help Indian farmers? Bt cotton was expected to protect cotton crop from bollworm damage. It was expected to reduce insecticide usage and enhance yields due to effective protection. The technology was highly successful in controlling bollworms and reducing pesticide usage. Yields doubled all over the country including all the eight districts of Vidarbha. But, the most significant contribution of Bt cotton is the reduction in insecticide usage. CICR conducted all-India surveys, including Vidarbha to study the impact. Results clearly showed that insecticide usage has come down and can further be reduced by streamlining the approval of hybrids based on their resistance to sap-sucking insects. Insecticide usage reduced by at least 50.0%. Prior to the year 2004, the area under Bt cotton was less than 5.0% and the average usage of insecticide for 10 preceding years was 1.22 kg per hectare. The average insecticide usage during the last six years, 2005 to 2011 was only 0.6 kg per hectare. Interestingly, the cost of cotton cultivation being Rs. 48000 to 54000 per acre in Vidarbha as mentioned in the Parliament committee report page No. 224, cannot be correct. The normal estimate of cotton cultivation is Rs. 8000 to 15000 per acre in Vidarbha and rarely more than this. It is beyond doubt that Bt cotton helped in enhancing the yields, reducing pesticide usage, safe-guarding fibre quality and reduction of bad-kapas. All these factors contributed to high levels of acceptance by importers.

The very fact that about 60 lakh farmers have taken up to Bt cotton cultivation in more than 90.0% of India's cotton area, stands testimony of necessity of the technology for Indian conditions. Activists have been saying that farmers are cultivating Bt cotton because there is no cotton seed of non-GM available in the market. Interestingly, every packet of GM seed is provided with 450 grams Bt and 120

grams of non-Bt seeds. Ironically the 120 gram seed packets are thrown away by farmers, and do not have any takers. I have always maintained that there is a need for straight varieties with Bt especially for marginal conditions. We are working towards developing profitable systems with straight varieties in the tough terrain of rain-fed farms, where Bt-hybrids may not be the best option.

Bt cotton helped India earn through exports. Recently, India has been importing agricultural commodities such as edible oil, pigeon pea, chick pea, lentils, fruit and nuts worth Rs. 55,000 crores annually. Edible oil constitutes 50 to 60% of the value of imported commodities. Last year raw cotton worth Rs 22,000 crores was exported. This was clearly an extended benefit of cultivating genetically modified Bt cotton in India. Moving away from advanced technologies such as GM crops will certainly push India into a food crisis very soon. In the near future, the country may have to import food grains, and if anything we may be forced to import only GM food grains if non-GM grains are unavailable in the exporting countries.

India must explore every possible technology in a scientific manner to move forward to feed the burgeoning population of 1.2 billion that is expected to reach 1.5 billion by 2025, from the shrinking land, soil and water resources. In fact there are no easy answers to some problems in agriculture. This is where the GM approach provides options. Virus diseases do not have remedial measures. Insect pests that feed internally on fruiting parts of crops are not easily controlled by insecticides. Three crops, paddy, cotton and pigeon pea are major consumers of insecticides in India. Insecticides worth Rs. 4215 crores were used for insect pest management in agriculture in India in 2010, out of which Rs. 1250 crores (30% of the total) were used on paddy, Rs. 880 crores (21%) were used on cotton and Rs. 332 crores (8%) were used on pigeon pea. Despite the use of insecticides, crop losses due to insect pests were estimated at 30 to 50% in these crops because of cryptic pests such as bollworms, pod borers, stem borers and fruit and shoot borers that are well protected from external pesticide application and require highly hazardous systemic insecticides that are absorbed by plant tissues. GM technology is immensely useful in such cases for effective control of the pest coupled with reduced need for harmful pesticides.

It is common knowledge that India is at least 10 to 15 years behind in biotech research, far behind China, US, Australia and many other countries. The moratorium, if implemented, would have pushed back Indian agri-biotech research by at least a few decades. Even without a moratorium, the question is: Will India ever be able to catch up with rest of the world? Just at a time when India's biotechnologists are poised to make an entry into the GM arena from the public sector, the recommendation caused concerns.

Moratorium on field trials, essentially means a ban on field experiments and a full-stop to any further releases of GM crops. While this move will invigorate the pesticide multinational companies, and kill any possible competition to the multinational products from the public sector institutions. Any moratorium on field trials will bring all the biotech GM science in India to a grinding halt.

It must be reiterated again that the public sector biotechnology research was struggling because of the meagre infrastructure, manpower and financial resources. Compared to any multinational company, the public-sector investment in India on biotechnology is a pittance and may be less than a meagre fraction of what was invested by multinational companies. Despite all odds, there are GM products that are developed by public sector institutions that are being tested. In these challenging times, there is an imminent necessity to strengthen the public sector scientific institutions, and boost their morale, not badger them and put their efforts down. Seed prices of GM crops can be brought down only if the public sector biotech research on GM crops is effectively strengthened.

It is time to wake up to the realities of impending challenges of food security for the burgeoning population which can be effectively tackled with a combination of conventional tools and biotechnology in consonance with the environment. Indian scientists cannot afford to give up on any options that science provides and neither should activists work against it. Good reason must prevail and India can certainly rise to establish the best possible bio-safety regulatory procedures and operational systems and prioritise investment on selected crops to ensure that the public sector GM varieties will enhance profitability for the farmers and ensure food security for India.