

Making Biological Time-Bombs

Rashme Sehgal

Thirty-two genetically engineered crops are presently being researched across 111 government and 50 private institutes, and already 14 have entered the trial stage. Leading Scientist Dr P M Bhargava says India may be flooded with GM foods with unknown health risks unless the government ensures otherwise.

Dr Bhargava is a scientist, writer, thinker and institution-builder. He is the founder-director of the Centre for Cellular and Molecular Biology (CCMB), Hyderabad, and former vice-chairman of the National Knowledge Commission. He is currently a member of the National Security Advisory Board, and has chaired several NGOs, professional organisations and pharmaceutical companies.

Widely regarded as the architect of modern biology and biotechnology in India, he has authored over 125 major scientific publications and over 400 other articles on a variety of subjects in some of the best-known publications around the world. He has written four books, including a 500-page monograph on 'Proteins of Seminal Plasma' published by John Wiley, New York, a national integrated science textbook for 11-12-year-olds; and the highly acclaimed 'The Saga of Indian Science Since Independence: In a Nutshell' (Universities Press, 2003). He has won several awards including the Padma Bhushan.

He has consistently warned about scientific norms being flouted in order to push GM foods into the market. A very dangerous precedent has been set in the country whereby GM foods like Doritos corn chips are being sold off the shelf against the law, and Bt cotton is being cultivated without a comprehensive risk assessment having been conducted on its effects—for example on the soil and the surrounding fauna. The most disturbing aspect of this trend is that the tests being done on toxicity are being conducted by the applicant company itself or on samples supplied by it. Will any applicant for permission to release a genetically modified organism (GMO) say its GMO is not safe? Monsanto is the world's largest seed supplier, and has a vested interest. Why is this being done?

For profit and, nothing else. Western multinational companies (MNCs) want to make as much money as they can by exploiting people's ignorance. The fact of the matter is that Indians do not need Bt cotton or GM food. Globally, no major advantage is being conferred by these foods and the damage and harm they may cause has still to be properly assessed. In the US, GM food does not require to be labelled, so it is being mixed with other foods. One of the reasons for the rising health bill in the US could well be GM foods.

MNCs are continuing with their monopolistic hegemony by selling GM seeds in third world countries.

A good part of the first world, including almost all the European countries, has imposed a ban on them. Switzerland, to cite an example, has put a moratorium on release of GMOs till 2012. Most countries across the world have banned GMOs.

The problem is that no one knows what effect these foods will have on people. In animals, there is a good idea about their possible ill-effects. All available

scientific predictions so far are not in favour of GM foods unless they are tested extensively and exhaustively, which they are not today. Experts are crying themselves hoarse; it is for the Indian government to listen.

If politicians and scientists were committed to their country, not a single GM product would have been permitted in India as of today.

The government and scientific bodies have ignored several reports on the failure of Bt cotton in terms of yield, and how it has adversely impacted lakhs of farmers, for example in Vidarbha, who are now shifting from cotton to soyabean.

Bt cotton seeds were supposed to increase yields. This has happened in some cases, but not in many others where yields have decreased and the cost of production gone up. The Bt seeds are also more expensive than normal seeds. The cost of Bt seed started with Rs 1,650 (per standard packet) as opposed to the cost of normal seed which is Rs 450.

The government needs to pay much more attention to the death of over 1,000 cattle that foraged on remnants of Bt cotton plants in some districts of Andhra Pradesh over the last few years.

Monsanto-Mahyco's new studies have highlighted a gene flow of up to 15-20 metres (that is, the Bt gene can affect non-Bt plants that are 10-20 metres away) in the case of Bt brinjal, and 10 metres for Bt cotton. For the majority of India's farmers, with holdings of less than two hectares of land, a 10-metre gene flow would render a third of their holdings unviable. That is a huge loss.

The supervisory agencies have turned a blind eye to what is going on. In West Bengal, trials of Bt okra, which started in mid-August 2007, were done on the basis of approval by the panchayat. What knowledge do panchayats have about genetically modified organisms and GM foods, especially since they are susceptible to all kinds of pressures? The State Biotechnology Coordination Committee and the District Level Committee have not approved these trials. West Bengal's agriculture university monitoring the trials has also given a damning report about the trials. Strangely, the left government is all in favour of Bt cotton cultivation.

Also, several of the tests that are claimed to have been conducted may never have been done. This is because Monsanto-Mahyco itself is conducting the tests for its own products that it wants approved. The result may have been very different if an independent professional organisation had conducted the tests—for example, the toxicity tests.

The study on the heat stability of the highly toxic protein in Bt brinjal which is genetically engineered to contain this insecticidal protein to help the brinjal plant escape attack by certain pests is open to question. The conclusion of this study is supposed to be that while uncooked Bt brinjal scores *positive* for the Bt protein, cooked Bt brinjal scores *negative*. This statement has no meaning as no values are given and no indication is given of the sensitivity of the method used. Thus, if the sensitivity was low, then it is possible that, on cooking, as much as say 25% of the active protein may have been left, which could be toxic.

Many tests on GM foods and crops in India today are taking place in non-accredited laboratories that may not have the proven expertise and facilities in the area to test these food and other GM items.

To recap some of the issues, the West has done a lot of studies on gene flow. On May 16, 2008, a 147-nation conference in Bonn concluded that GMOs were responsible for damage to other plants. Understandably, the US was not a party to this conclusion.

The recent IAASD (International Assessment of Agricultural Science and Technology for Development) report makes the point that GM foods are not the solution to the looming agricultural crisis. A review of this report in the journal *Science* emphasises that a redirection of science and technology is needed to move away from processes that have profited primarily large-scale enterprises, to processes that address the most basic needs of the world's 900 million small farmers. This was partly a reference to GM crops.

Reported cases of Bt allergy in north India have not been investigated. Also it has not been investigated in sufficient detail the impact of GM crops on soil ecology.

There have been recent studies that show that dietary DNA can find its way into blood. This opens up the possibility that GMO DNA could change the characteristics of cells of the body. Such a transformation could have a major deleterious effect on the host. A recent UN study also states, that "India faces a high safety risk because safety norms on genetically modified crops are not being enforced".

As of today there is no reasonably conclusive evidence that GM foods are safe. It is better to exercise the precautionary principle and ban their use unless incontrovertible evidence regarding their long-term safety is obtained, which would take 10 to 25 years. It is a pity that alternatives to GM crops such as integrated pest management and the use of bio-pesticides, which are cheaper and better, and organic agriculture, are being ignored by Indian government in spite of the enormous evidence in their favour.

Two other examples of Bt technology which has proved harmful to insects and animals may be highlighted. *Transgenic Research Magazine* (December 2007, Vol 76, p 795 onwards) reports that Bt Cry 3A protein has a deleterious effect on beneficial, non-target beetles. An example of a dramatic metabolic change following genetic engineering would be the recently reported incidence of extraneous melanoma (a cancer) in genetically modified animals (Pigment Cell Research, December 2007, Vol 20(6), p 485 onwards).

The Genetic Engineering Approval Committee (GEAC) should seriously consider calling a meeting to objectively review all the existing experiences with Bt cotton and information that has been obtained over the years on GM crops, including Bt cotton. This review should involve technical members of the GEAC and RCGM (Review Committee on Genetic Manipulation), a small number of carefully selected experts whose knowledge and objectivity have never been in doubt and who have no vested interests, a small number of reliable and responsible NGOs, and a few representatives from industry. It is to the credit of GEAC that it has agreed to organise such a meeting.

One reason government has not taken note of all that has been said about GM crops probably lies in the fact that (a) India appears nearly at the bottom in the list of corrupt countries. For one thing Monsanto produced Agent Orange in the US-Vietnam war (which the US lost) to defoliate thousands of square kilometres

of Vietnam. GM crops could be very profitable for people in the government and Monsanto, but a disaster for the billion people of India, 78% of whom live on less than Rs 20 per day and are virtually voiceless. Some NGOs and concerned individuals have rightly taken the matter to court. Genetic engineering is a marvellous technology. But it may be used to make biological time-bombs. □□□