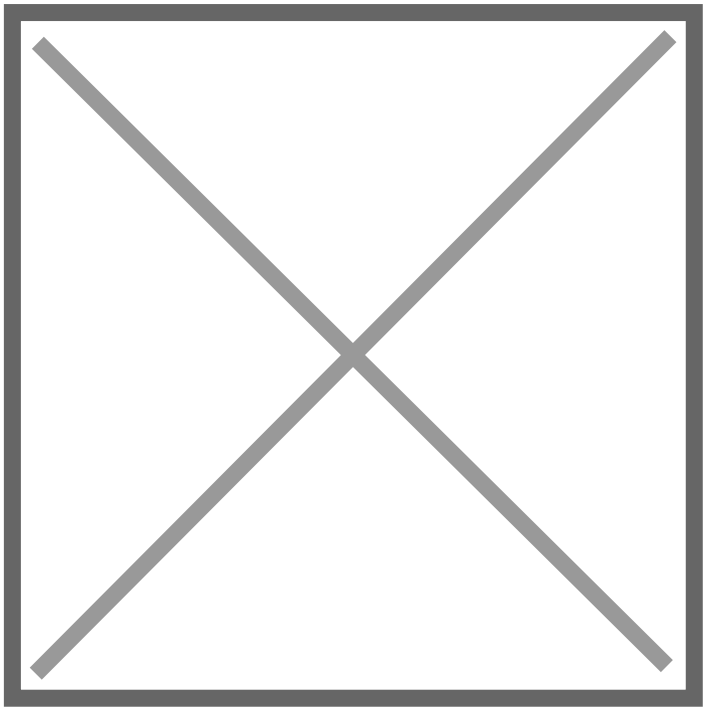
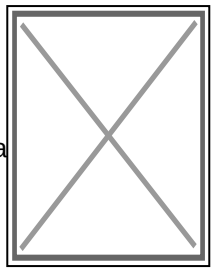
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Indian biotechnology needs truth, not hype

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Truth is the most powerful weapon in the world. This becomes particularly important in the emerging areas of technology such as biotechnology. Today informed public opinion around the world has become extremely wary of unethical and false claims about products that are marketed by high-pressure advertising and endorsements from familiar faces. As they have little or no technical knowledge of parameters that would define the quality of the product they are endorsing, leave aside the extent to which the quality criteria are really satisfied by the product.

People around the world and now even in our own country are becoming increasingly aware of the technological complexities of the new products (be they seeds or cars). It is a clichÃ?Â© that for new technology products to succeed, the confidence of people in the technology must be high. Therefore, for the success of biotech products, we need to present the truth, the whole truth and nothing but the truth about them to the people. Only recourse to this time-tested prescription will lead to public acceptance of biotechnology. Not only that, the larger number of mistakes we make in this regard now, the greater would be the effort required for acceptance of the truth later by the public. Once bitten, twice shy!

Today in UK as perhaps in the rest of Europe, four out of five people are totally opposed to GM food (food prepared from genetically manipulated organisms). This is the consequence of the greed of multinationals and their desire to control people around the world, which has led to an uncalled for and unproven hype about GMOs (Genetically Manipulated Organisms) released in the environment and suppression of vital information about them. For biotechnology to succeed, this greed must be replaced by true commitment to public good and truth.

Let me give a specific example of the so-called golden rice. I was concerned at the hype surrounding the initial announcements about this GM rice. The public was given the impression that this rice will take care of the entire requirement of vitamin A of an individual. Such a statement would be extremely important for India where vitamin A deficiency affects a large proportion of people and is one of the four major nutritional health problems of the country. However, when we got down to the brass tacks and did our arithmetic, it was found that only a miniscule fraction of the daily requirement of vitamin A will be taken care of by the amount of rice one normally consumes in our country in one day. When I pointed out this to the inventor of golden rice at a meeting in Chennai on 30th October 2002 organized by National Academy of Agriculture, I was told that the daily requirement of vitamin A prescribed by WHO was unrealisticÃ¢â?¬â??that is, far too high! Should WHO standards set up after stringent analysis cease to be a benchmark when they are inconvenient? Besides, for meeting even the prescribed WHO requirement of vitamin A, there are other cheaper and better sources already available. We have carrots available abundantly. A marine biotechnology company located at Tiruchendur is already producing beta-carotene using a marine alga and a low-cost production process that exploits sunshine and ambient temperature. Our problem with vitamin A deficiency is not the lack of sources of vitamin A but the lack of buying power. This is not to underrate the elegant work that

led to the production of golden rice, but only to emphasize that the hype generated by the Department of Biotechnology (DBT) regarding golden rice has done a disservice to the cause. This is surely not where our country should invest in biotechnology.

The same has been true of Bt cotton. To cite just one example, no protagonist of Bt cotton has spoken about the official governmental report (2002) of the Nanjing Institute of Environmental Sciences of the State Environmental Protection Administration of China on the impact of Bt cotton on non-target organisms and the development of resistance of cotton bollworm to Bt cotton there. On the other hand, the public has been always led to believe what a tremendous success Monsanto's Bt cotton has been in China.

Let us now look at what is stated in the above report. The following quotes from the report (annotations that are not in quotes are mine) should give the reader a flavor of this report.

- "Domestically developed Bt cotton accounts for one third of Bt cotton seed market and this percentage should increase over the next few years." The percentage of acreage under Monsanto's Bt cotton has progressively declined from 1998 onwards. The question one may ask in the Indian context is-Why did we not make our own Bt cotton as China did, when one of the purposes of setting up the DBT in 1986 was to do precisely this kind of work?

- "The populations of parasitic natural enemies in Bt cotton fields are significantly reduced."

- "Bt cotton is not effective in controlling many secondary pests, especially sucking pests. Field experiments showed that the population of secondary pests, such as cotton aphids, cotton spider mites, thrips, lygus bugs, cotton white fly, cotton leaf hopper and beat armyworm increased in Bt cotton fields after the target pestÃ¢â?¬â??bollworm had been controlled. Some pests replaced bollworm as primary pests and damaged cotton growth". Shouldn't we have had similar data for our country by now in respect of Bt cotton?

- "A higher insect dominance in Bt cotton than in the non-Bt control suggests an increased potential for pest outbreaks for certain pest species in Bt cotton fields".

- "Both laboratory tests and field monitoring have verified that cotton bollworm can develop resistance to Bt cotton". "The resistance of Bt cotton to bollworm decreases

- over time, and control is not complete in the third and the fourth generations. In fact, farmers must use chemicals two to three times to control bollworm".

- "There are not yet effective measures to postpone resistance development or to resolve the resistance problem. A high-dose of the Bt toxin protein is considered difficult to obtain, and the refuge mechanism is not easily implemented. In addition, the high dose assumption and refuge design have theoretical shortcomings". In fact, Science (2003, vol. 299, p. 1013) has recently reported that in China, Bt cotton is not recommended for small farms. In our country, we have only small farms.

If those who are advocating the use of Bt cotton in our country, including the DBT have any commitment to truth shouldn't they take the above into account when "selling" Bt cotton to ignorant and trusting farmers?

The latest addition to the hype is the GM potato also sponsored and publicized by the DBT. First, it is no big deal to make a GMO todayÃ¢â?¬â??even a GMO with a better or higher protein content as is claimed for DBT's GM potato. Secondly, GM potato does not make any sense from the point of view of nutrition as has been well argued by Ramesh Bhat and S Vasanthi of the National Institute of Nutrition at Hyderabad, in The Hindu of 24th July 2003. It is claimed that the GM potato contains 45 percent more protein than traditional potatoes. The protein content of the ordinary potato is 1.6 grams per 100 grams. Ramesh Bhat and Vasanthi state, "According to the National Nutrition Monitoring Bureau, the intake of potato by school children is about 30 grams per day". The protein intake from GM potato would thus be 0.7 grams per day which would meet the Recommended Daily Allowance (RDA) of protein only to about 2 percent in school children. Simple arithmetic would tell the reader that to meet the RDA for protein from GM potatoes alone, the children would need to consume 1.5 kg of potatoes per day!

The DBT also claims that "transgenic potato leads to a high increase in all essential amino acids with corresponding increase in total protein content". These claims, as Bhat and Vasanthi also say, are not substantiated by the available data. There is also another important point that worries me. Our dietary guidelines state, "A nutritionally adequate diet should be taken through a wide choice from a variety of foods." As Bhat and Vasanthi say in the above mentioned article, "The over-enthusiasm of promoting GM technology by claiming miraculous solutions to solve malnutrition problems in India would harm the credibility and interest of the transgenic technology." Well said, but who is listening?

PM Bhargava

Pushpa M Bhargava is one of India's most brilliant scientists. He founded and directed the Centre for Cellular and Molecular Biology (CCMB), Hyderabad.His scientific contributions include the preparation, characterization and use of primary liver cell suspensions, and characterization of new proteins, such as seminalplasmin, from the seminal plasma. His over 70 major honours and awards include the Padma Bhushan, the Legion d'Honneur, and the National Citizens Award.