

The Hazards of Cross-breeding Pigs with Rice



Last Tuesday, Dr Suman Sahai spoke on 'Genetically Engineered Crops and Foods' at our Club. Introducing her, PP Kalpana Munshi pointed out that Dr Sahai had a PhD in genetics from the Indian Agricultural Research Institute, and was honoured with the 2004 Borlaug Award for her outstanding contribution to agriculture and the environment.

After serving as a faculty member at Universities in Canada, USA and Germany, she returned to India in 1989 and organized Gene Campaign, an NGO devoted to safeguarding farmers' rights, livelihood and food security.

"I am a scientist and am trained to think objectively," she said at the outset, seeking to dispell the notion that she was either pro- or anti-genetic engineering. "I would like to take you through the paces of a technology that has arrived prematurely in the market, but has potential if handled in the correct way. What is genetic engineering? It is sometimes called a technology which produces unnatural foods — because genetic engineering does what nature cannot do — crossbreeding pigs with rice plants, for instance.

"Also, you cannot exclusively introduce the gene for herbicide tolerance or drug resistance. To do so, you need to transfer a whole cassette of genes, on which you have no control. So when you put in a genetic trait into a new species of plant or crop, you actually put in a whole lot more as well.

"This technology is applied in many areas such as producing monoclonal antibodies, diagnostic kits etc. However, it has not invited as sharp a comment as in the area of food and agriculture, because food is entirely personal — socially, culturally and religiously defined — and evokes greater interest.

"There is little material available for genetic engineering across the world. The dominant trait the genetic engineering offers is *Bacillus thuringiensis* (Bt). You have heard of Bt cotton which we grow in India for its herbicide tolerance and virus resistance. It is very controversial. Other than Bt, there is very little actually available right now in the field of genetic engineering for R&D efforts in the field of agriculture.

"Indian research needs to focus on the needs of small farmers and to the needs of food security — to banish hunger and poverty. Indian research on genetic engineering is almost entirely based on genes that belong to someone else. The Bt gene used in 40% of research belongs to Monsanto. There is little innovation in this field.

"There is also some carelessness about granting permission to research projects in India. The banned Cry9C gene, which is associated with a strong allergic response and has been banned in all countries of the world, is still being used in India. Also, edible vaccines have been developed, by putting vaccines into fruit. Mixing such fruits and vegetables with the rest of the food chain can have unpredictable results. The needs of India's agriculture are oilseeds, fodder grasses, and the nutritional quality of certain kinds of crops. Regrettably, no research is being done on these, although India is among the world's largest human and livestock habitats.

The Agrarian Crisis

The gene revolution and green revolution are spoken of in the same breath. The promoters of genetic engineering indirectly suggest that this is a technology that could achieve at least as much, if not visibly more, than the green revolution. But we really need to examine what are the causes of our hunger, what genetic engineering can contribute, and genetic engineering provides answers to those problems.

“We know that our country is going through an agrarian crisis — the biggest crisis since independence. Many farmers are committing suicide because agriculture has become economically a very adverse activity, as input costs are high.

“The biggest cause of this crisis is non-availability of water. There is a depletion of groundwater, which we are extracting at an unprecedented rate, and not adequately recharging through rainwater harvesting.

“Other causes of the crisis lie in soil degradation, loss of soil nutrients, diminishing agricultural diversity and disharmony in agricultural practices. Whereas India traditionally grew 50,000 to 60,000 varieties of rice a few decades ago, today only about 10,000 varieties are grown. So there is a tremendous shrinking of the genetic base on which we had built our food and agricultural security.

“Meanwhile, the costs of fertilizers and pesticides are going up substantially without a commensurate price increase for the produce and the market part of that is related to the WTO. There is also the problem of a lack of agricultural credit and insurance.

“So, will genetically engineered crops solve these problems? Maybe, it can provide a tool to address one or the other problem, but that it cannot provide an answer to the problem of hunger as a whole. The myth that it can needs to be debunked, so that we can evaluate this technology more rationally and soberly. If we don't do that we won't identify the real causes of hunger, and real ways of addressing those issues.

“There is always a comparison between the ‘green’ and the ‘gene’ revolutions, and there is an adherence to the idea that one did so much and the other one will do more. Let's not forget that the green revolution was a publicly owned technology. There was nothing like an intellectual property right (IPR). It was a technology that created public goods and was easily accessed by the public.

“On the other hand, the so-called gene revolution is a private technology. Anyone entering that technology can now do so only through licensing unless there is innovation at home — and even that innovation is going to come at a very high cost, because licensing fee for processes and methodologies are very high. This is a technology which is almost exclusively controlled by multinationals, who have invested very heavily in it, and therefore lateral entry is practically impossible.

Safety concerns

“The States of Andhra Pradesh, and perhaps Karnataka and Tamil Nadu, have filed cases against Monsanto's monopoly and excessive pricing. The cost of Bt cotton seeds provided by the MNCs have gone up to Rs 1850 per bag, which is five to six times the cost of very effective locally-produced hybrids.

"The technology per se is young, and has not matured enough. If this technology came out of universities, it would not be on the market yet, but still at the testing stage. But because it comes from the private sector, and there is a lot of private investment riding on it, safety testing might have been given a short-shrift, and the technology is on the market when it should still be incubating and going through trials.

"It worries me as a scientist, on the point of safety testing, that there are so many knowledge gaps in genetics. There are a lot happening at cell level, at the level of genetics, that we haven't yet begun to understand. It is important to realize the impact of the forceful insertion of foreign genes into life forms like plants, or animals that have been stabilized during thousands of years of evolution.

"An indication of gaps in knowledge was when the mad cow disease and other brain disorders were identified, and it was found that the transmission of mad cow was through prions, and not through genetic material. So clearly there are other elements that control the flow of characteristics. That is why one of the most important concerns about genetic engineering is its impact on health where food products are concerned. There is anecdotal evidence that cattle and sheep grazing on Bt cotton wastes have either died or suffered due to damage to vital organs. A lot rat feeding studies and mice feeding studies show frequent damage to organs and the neural system.

"Only last week, the US Federal Courts ordered the US department of agriculture that all the field trials must stop until a review of the safety test procedures are done. Mexico, the birthplace of corn, has banned GM corn because of the danger of mixing up genetically engineered corn with native corn. Similarly, China has banned genetic engineering in soybean, and Peru has banned genetically engineered potatoes. But strangely, in India, the birthplace of rice, rampant genetic engineering research is happening on rice! It is very careless to do so.

"Consumer surveys in the US, UK, Europe and Australia, show that consumers experience no visible advantages in terms of a better taste, better look, lower price, or greater nutrition. But you do have major question marks on risks. Consumers feel that as GM foods do not offer any advantage, why take risks?"

"We need to develop a national policy and a relevant research programme after assessment of our needs. We need to clearly define what we should be doing and what we should not be doing.

"We need to invest in stringent testing procedures, and in innovations. There is no point in chasing Monsanto's Bt genes; we have to do some novel gene discovery that requires innovation. And we need to be very careful about evaluating the technology before we put it into the field," Dr Sahai concluded.

Q&A

Rtn Dilnavaz Variava: I have met many successful farmers who have understood the basic issues involving advantages and disadvantages of agrarian practices such as organic farming, chemical and natural pesticides, use of hybrid seeds and Bt cotton etc. I have learnt that Andhra farmers were disillusioned by the fact that despite prolonged use of Bt cotton seeds, secondary pests have multiplied and cost of pesticide use continued to be high.

Dr Sahai: I agree with all that you said. The global market for organic farm produces is rising exponentially. Today it is around \$50 billion and the figure is slated to double in the next five years. The global market for genetically engineered products is diminishing very rapidly. Considering these facts, where your trade tells you to go? Where as an exporting nation we want to be?

Rtn Mudit Jain: You said that genetic engineering is expensive and cannot solve the problems of poverty and hunger. So why should we go in for it at all?

Dr Sahai: It is a private technology, which is being pushed by many private corporations having deep pockets and influence in the corridors of power. There is an element of blandishment and inducement. And the political class sees the green revolution as very powerful technology which delivered the country from PL-480 and dependence on the US. I think the spinmasters of the gene revolution are cleverly taking advantage of the semantic similarity between the green and gene revolutions.

Rtn Shailesh Haribhakti: I have seen the Bt cotton crop raised from Monsanto seeds, and apparently they were far superior to traditional cotton. I don't see the logic behind opposition to Monsanto technology, just because it was not invented in India.

Dr Sahai: The opposition is not because Bt cotton was invented in some other country, but because it is owned through a series of patents by corporations who will only license it. The Bt cotton is five or six times more expensive than comparable indigenous hybrid cotton varieties because of the heavy licensing fees. Of the Rs 1850 per bag of Bt seeds, Rs 1450 goes towards licensing fees to Monsanto.

And let me correct the record for you. Monsanto's Bt cotton has failed to deliver on its promises, and that is why their permission has not been renewed. The Bt cotton that has succeeded in India is in fact is the Bt cotton Navbharat, the Navbharat 151 and the Desai cotton from Gujarat. Bt cotton has a very limited strategy. Already it has begun to fail in China and in Arkansas, a major cotton belt in the US.