

Editorial

The Indian research agenda on genetic engineering in agriculture is ad hoc and arbitrary. Research has been funded on all kinds of crops with little attention to their relevance to India's agricultural needs or the problems faced by farmers. The availability of (proprietary) genes seems to be the dominant criterion for funding research so it is not surprising that there is an unacceptable reliance on the Bt gene. According to data given by Dr Manju Sharma, former Secretary, Department of Biotechnology (DBT) in a Current Science paper, over 42 percent of the research projects in biotechnology research, use the Bt gene. Ranging from cotton to potato, rice, brinjal, tomato, cauliflower, cabbage, even tobacco, to maize, the Bt gene is everywhere.

Assuming that the crops that are being researched are targeted to reach the fields one day, we are facing a situation when a wide range of crops growing in both the Rabi and Kharif season will contain the Bt gene. So throughout the year, there will be standing crops containing Bt endotoxin. Not just that, in the same season, there will be various Bt crops juxtaposed with each other in small fields when farmers grow a variety of different crops, for example vegetables. When the bollworm is exposed to the endotoxin, constantly, season in and season out, because there is some kind of Bt crop in the field all the time, resistance build up will happen very fast. As it is, resistance-delaying strategies like keeping a 20 percent non-Bt crop belt is not followed by cotton farmers and resistant pests are already appearing, as the laws of biology dictate they would.

So, what would be a more rational approach to Bt mediated disease resistance? And, is the Bt approach workable in a developing country situation? Recent studies on Bt cotton in China have reported that the development of Bt toxin resistant pests has assumed such large proportions that the technology is failing and there is already a decline in cotton production.

If the Bt strategy were indeed to be selected as a viable path of disease resistance, surely it cannot be used in all crops. Since cotton uses more pesticides than any other crop, perhaps the use of the Bt technology should be reserved solely for the cotton crop, to be managed with extensive farmer education and monitoring of insect refuges. If the Indian Bt cotton technology were viable, which it currently does not appear to be, very careful field management may result in pest control up to a point but eventually it is Integrated Pest Management (IPM) strategies that will prove effective in the long term.

The really unnerving aspect of using the Bt gene however, is when it is incorporated into food crops. Permission has been given for large-scale field trials of both Bt brinjal and Bt okra or bhindi. Let us remember that the Bt gene is meant to produce a toxin inside the plant, the strategy being that in doing so, the crop produces its own pesticide, thus reducing the need for external applications of poisonous chemicals. The Bt gene put into a food crop is supposed to do what it does in cotton, produce toxins to kill pests. Is that such a good idea?

Granted we are much bigger than the bollworm and a dose of toxin that will kill the bollworm will not kill us humans, but surely it cannot be good for us to be eating toxins.

What will be the cumulative effect of eating toxin-containing brinjals and bhindi and cabbage and cauliflowers all through the year? How will children react to this consistent accumulation of toxins in their bodies? Given the enormous chemical overload in our environment already, surely the last thing we need is to wilfully put poisons in our food!

— **Suman Sahai**