

GM Mustard: A Contrary View

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Mr. Bharat Dogra's article "Now, a threat from GM mustard" (The Statesman, 28 May) presents only one side of the argument and quotes facts only in support of that argument. But there is another side of the argument and the issue remains far from settled. While the fear of corporatization of agriculture, or health and safety concerns highlighted by him may be true, despite the fact that WHO has certified the GM crops as perfectly safe, the Government's think tank, the Niti Aayog has strongly advocated the use of GM seeds. "Elsewhere in the world, most notably the United States, GM seeds have been in use for over two decades with no adverse effect on either crops or those consuming the product of those seeds", it said.

More than half the 28 countries in the European Union, including Germany, France, Italy, Austria, Greece, Hungary, Latvia, Lithuania and Poland have decided to ban their farmers from growing genetically modified crops, while allowing import of GM fodder mainly from South and North America, where 90 per cent of the soya bean crop is GM, as their farmers depend on these imports for feeding livestock. Only one GM crop has been approved in Europe, a type of maize with in-built resistance to a weevil called European corn borer, grown primarily in Spain where the weevils are a serious problem.

Currently, Bt-Cotton introduced in 2002 remains the only commercially cultivated GM crop in the country. In fact, India has the 5th largest area (with 10.8 million hectares) planted under GM crops, after USA, Brazil, Argentina and Canada. Bt has a built-in organic pesticide which has by and large reduced the use of insecticide spraying on many crops across the world, but the technology remains to be perfected and probably needs more research. As Bt-cotton, supposed to be immune to pests, has shown, it can also attract new pests as it did in 2015 in Punjab, attracting white-fly that affected over 95% of Bt-cotton crops. Farmers had to suffer huge losses in 2015, leading to over a dozen farmer suicides. But save such stray incidents, Bt-cotton has been cited as a success story in India. As per the International Food Policy Research Institute data, between 2002 and 2013, area under cultivation of Bt-cotton in India had increased by 53%, yield by 75% and production by 272%. While exports increased from zero to 10 million bales, import remained constant at 2 million bales. Activists' argument that farmers' wealth are being transferred abroad through GM seeds is only partially true, because farmers won't buy these seeds if they were not profitable.

According to a detailed report released by the US National Academy of Sciences in May 2016, GM crops are as safe to eat as their non-GE counterparts, they have no adverse environmental impacts, and they also reduce the use of pesticides. However, it found no significant evidence of increase in the crops' potential yields just on account of use of GM seeds. The report acknowledges that beyond safety, other issues need to be addressed, including earning public trust. It recommends a more transparent and inclusive conversation with the public about GM crops, which has altogether been missing.

But the larger issue is that we live in an age driven by technology whose benefits can be denied only with the abandonment of reason. Technology alone can solve our problems of hunger by increasing

productivity and yield. There cannot be any dispute that Indian agriculture needs a tremendous boost in yield which cannot come without biotechnology.

All crops including vegetables and herbs have evolved over millennia of nature's experimentation. No vegetable or herb has evolved purely for altruistic purposes for consumption by animals or humans or to serve as a link in the food chain. Every living species has developed some defence mechanism against predation; for the plants this mechanism translates into some form of toxicity that deter their most natural eaters and pests. As the Harvard scientist Pinker says in his book "The Blank Slate: The Modern Denial of Human Nature", "Plants are Darwinian creatures with no particular desire to be eaten, so that they did not go out of their way to be tasty, healthy, or easy for us to grow and harvest. On the contrary they *did* go out of their way to deter us from eating them, by evolving irritants, toxins and bitter tasting compounds."

Genetically modified foods cannot be more dangerous than natural foods, because they are not fundamentally different. Mutation is a fact of all life, and virtually every vegetable or animal has been genetically modified through millennia of evolution, and through selective breeding and hybridization ever since we have learnt agriculture some 12000 years ago. There are many examples of this in nature.

The wild ancestor of carrots was a thin, bitter white root, not the sweet, long, orange-coloured vegetable we eat today. The ancestor of corn had an inch long cob with a few small, rock hard kernels, barely edible. The ancient ancestor of the modern bananas was the *Musa acuminata*, a plant that had small okra like pods, not the nutrient-rich bright yellow fruits we love. A 17th-century painting by Giovanni Stanchi shows a watermelon we would not recognize today, having swirly shapes at the centre and divided into six separate sections - very unlike the red, fleshy centre of modern watermelons. Early ancestor of eggplant was orange-like in shape with spines. But selective breeding has gotten rid of the spines and given us the larger, oblong, purple vegetable of today. There are hundreds of such examples. These are all genetically modified vegetables, much richer in taste and nutrition than their 'natural' ancestors.

Since ages, farmers have been practicing selective breeding by deliberate crossbreeding among closely related varieties of plants to produce new varieties with desirable properties, in the process transporting genes from one variety into another, by choosing the properties we want in plants. In GM crops, the DNAs are artificially altered by introducing genes from a completely different species, unlike from closely related species as in selective breeding, in order to boost the plant's resistance to pests or herbicides or for higher yield. Even selective breeding is not without hazards. Every plant produces toxins as its natural defence, and farmers will naturally prefer those with greater disease - or pest-resistance and crossbreed them. This selective breeding will only increase the concentration of the plant's own poisons and will ultimately result in dangerously hazardous foods. The effect of elevation of toxins in them may not even be noticed till people actually start getting ill from their consumption. A variety of potato thus developed called Lenape potato had to be withdrawn from the market because of its toxicity. Similarly natural flavours, indistinguishable from their artificial counterparts, may often be more harmful than the latter. When natural almond flavour benzaldehyde is derived from peach pits, it has traces of cyanides; when synthesised in the laboratory, it has none.

Fear against GM food arises partly out of ignorance and partly out of unfounded fear against traditional beliefs, what Pinker calls "intuitive essentialism". Traditional faith believes that every living thing has a pure essence, and natural foods carry that pure essence to rejuvenate us and protect us against sickness.

Anything engineered by humans will destroy that essence. Going by that argument, every civilizational process can be seen as destroying the essence of nature.

Mr Dogra has quoted a few instances of unsuccessful application of genetic engineering. Apart from conception, success of any technological experiment depends on the choice of techniques, their correct application and proper control of the experiment. Failure in either of this may lead to a failed experiment, but that does not necessarily prove incorrectness of the conception or the underlying idea.

With increasing populations and decreasing areas of cultivable land, increasing yield and productivity is essential for solving the problem of food, and biotech seeds can help address these problems in sustainable manner, boosting rural incomes and quality of life for farmers. By opposing GM technology, the activists may actually be harming the interests of the very people they seek to represent. We should not mix science with politics, but insist instead on stringent regulations like those in US or Brazil, side by side with greater transparency, evidence and investments in R&D.