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GM MUSTARD- IT'S CONTROVERSIAL

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Introduction: While world is following the organic and indigenous food, now India is ready to start controversial GM crop to eat. It will be first of its kind of food item to be cultivated commercially after cleared *Bt* government authority *i.e.* Genetic Engineering Appraisal Committee. It was developed by Delhi- university based center- Genetic Manipulation of Crop Plant (CGMCP). This is second attempt to push for commercial cultivation in India. In 2002 Bayer which is German multinational company developed GM mustard variety called ProAgro, which was rejected by Indian government. Talking about the improvement in yield the highest yield in mustard are from the five countries which do not grow GM mustard - U.K., France, Poland, Germany, Czech Republic and not from GM mustard growing Sand Canada. There is no denying that science and technology will lead world into next generation but still question is why to use controversial technology when we had sufficient.

Authority had claimed that GM mustard yield 30 % higher yield and can be Indians best bet to reduce 76,000 crore edible oil import oil bill but reality is that DMH-11 which is GM mustard variety that has approved is not high yielding variety. its productivity is less than other non-GM varieties that exist. DMH-4 and two varieties of Pioneer and Advanta which gives equal amount of yield. So, GM technology is seen to be for seed manufacturer than for Indian oil import cutting. Another important fact about GM mustard is ice of Barnase gene which develops male sterility means this trait related to the Genetic Use Restriction Technology (GURT). the protection of Plant Variety and Farmers Rights Act (PPVFRA) of 2001 under section 29 (3) classifies GURT and Terminator technology as a technology that is injurious to the life or health of human beings, animals or plants and lays down that no variety of any genus or species which involves GURT will be registered.

What is GM Mustard

Hybrid variety of a crop is obtained by crossing of two genetically diverse plants of same species and it can give higher yields than their parents. But mustard cannot be naturally hybridised because it is a self-pollinating plant having both male and female reproductive parts in a single flower. But researchers have created hybridised mustard using GM technology. The GM hybridised mustard, as it is claimed, gives up to 30% more yield than the present best varieties.

Researchers have used “barnase / barstar” technology for genetic modification. A barnase gene is isolated from a soil bacterium called *Bacillus amyloliquefaciens*. The gene can code for a protein that impairs the pollen production in a plant making it male-sterile. This male-sterile variety is crossed with a parent variety having a gene called ‘barstar’ to block the action of barnase gene. The resulting variety, having both foreign genes, is a fertile plant and it can increase yield of the crop.

Scientists at the Centre for Genetic Manipulation of Crop Plants (CGMCP) in Delhi University, however, showed that this problem could be addressed by crossing Indian mustard cultivars with *juncea* lines of East European origin like 'Early Heera' and 'Donskaja'. The combination of the 2 divergent gene pools enhanced the crossing options; the resultant F1 progeny were found to exhibit significant heterosis.

Controversy about GM Mustard

- Many scientist claims that at a time when sustainable farming and low-input agriculture are becoming the buzzwords, it is surprising that agricultural scientists continue to recommend crop varieties that will end up doing more harm to the environment and crop fields. GM mustard will require almost double the quantity of fertilizer and water.
- Other Health concerns of GM Hybrid Maize include: allergenicity; gene transfer, especially of antibiotic-resistant genes, from GM foods to cells or bacteria in the gastrointestinal tract; and 'out crossing', or the movement of genes from GM plants to conventional crops, posing indirect threats to food safety and security.
- GM mustard can affect honeybees directly and indirectly through effecting flowering and pollen production. Protease inhibitors have proved detrimental to the longevity and behaviour of bees.
- Regulatory weakness-The Genetic Engineering Approval Committee, which is responsible for approving large-scale releases and commercialisation of GMOs, functions under the Ministry of Environment and Forests and is not entirely independent.
- The case of the Review Committee on Genetic Manipulation that supervises and clears research activities and also small-scale field trials is even starker. It is part of the Department of Biotechnology, whose primary task is to promote biotechnology. DBT therefore is the promoter as well as the regulator. On several occasions, developers of transgenic crops have also been members of regulatory committees

Should India Ban GM Crops

- GM technology has already been commercialized in India through Bt cotton, which is also based on incorporation of foreign genes derived from a soil bacterium, *Bacillus thuringiensis*. Country's cotton production has gone up more than 2½ times since Bt hybrids were first planted in 2002. Nor has any evidence emerged really of Bt cotton causing any adverse human or animal health effects.
- While the likes of Pakistan, Bangladesh, Myanmar, Philippines and Vietnam are adopting GM technology to improve crop yields and reduce input costs, we are still questioning its potential not on the basis of scientific evidence, but using emotional arguments.
- Bangladesh was the 1st country to approve the commercial planting of Bt brinjal in late-2013, after being disallowed by India. Bt brinjal has been harvested over 2 seasons, with farmers deriving better marketable yields and incomes from its successful commercialization.

Conclusion

In a current environment where climatic change would have negative effects on yield of many major crops which could seriously undermine food security, GM crops are the way forward. However at the same time to convince the opponents of GM crops to allow commercialization of GM crops we need a strong regulatory framework. What is therefore needed is an independent biotechnology regulatory authority, a single organization that will

replace the multiple committees - at least six - that are part of the current regulatory structure. This authority would deal with the use of all GMOs in agriculture, pharmaceutical and biodiversity sector.

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