GMO? omg! NO, NOT AGAIN!!

25 REASONS TO SAY NO TO DELHI UNIVERSITY'S GM MUSTARD

Do you remember how citizens collectively ensured that GMOs (Genetically Modified Organisms) like Bt brinjal, which are unneeded, unwanted and unsafe, do not enter our food plates or our farms back in 2010? That was when the Government of India placed an indefinite moratorium on the release of this Bt brinjal, a GM food crop, taking cognizance of the many reasons why it should not be allowed for commercial cultivation. Back then, the government said it was placing the GMO on an indefinite moratorium being "*responsive to society and responsible to science*". Further, 15 years of Bt cotton cultivation in India exposed the hype and lies around this GMO too – the insect for which Bt cotton has been created has developed resistance, and farmers are using more pesticides than ever before on cotton crop in the country. We have also seen how one Multi-National Corporation – Monsanto – has gained a monopolistic control over the cotton seed market in the country. And farmer suicides continue unabated in the country, most of which are by (Bt) cotton farmers.

Now, in 2016, there is another GM food crop which is being pushed for commercial cultivation approval. An application for the release of 3 GMOs, this time of Mustard - that ubiquitous crop that all of us are familiar with – is in an advanced stage of processing by the Indian regulators. The application, with a biosafety dossier that claims to have completed all required tests and studies to assess the impacts of this GMO as per the Indian regulatory guidelines, has been submitted to the apex regulatory body called Genetic Engineering Appraisal Committee (GEAC), constituted under the Environment Protection Act's 1989 Rules in the Ministry of Environment, Forests and Climate Change, Government of India. The application is from Delhi University's Centre for Genetic Manipulation of Crop Plants (CGMCP) for "environmental release" – which is a misnomer in the Indian regulatory parlance for commercial cultivation – of a hybrid GM mustard (namely, DMH-11 or Dhara Mustard Hybrid-11) and for its two parental lines (3 different GMOs in all).

The ostensible reason for creating this GMO and seeking its approval is yield increase. In reality, there are existing non-GM options for improving yields, including by creating hybrids based on non-GM "CMS technology". In many countries of the world, it is CMS hybrids which have been contributing to yield growth. The real reason is to make the job of seed manufacturers easy, combined with the use of herbicide technology. What is more unacceptable is that it is one set of scientists who are not part of the mainstream agricultural research systems, who want to use their own exclusive CMS lines, who are expressing their constraints with that CMS (ignoring other possibilities that exist for all public sector scientists) and opting for GM technology in developing these mustard GMOs.

The applicants show that through genetic engineering and insertion of bacterial genes into mustard plant, male sterility (*barnase* gene), can be introduced into selected varieties which will then prevent self-pollination. This then gives an opportunity to create hybrids by crossing this male sterile (female) line with selected (male) lines. The male line also has bacterial gene (*barstar*) introduced, to restore fertility in the offspring produced by crossing the male sterile lines with the male lines. Offspring between these two parents can bring "Hybrid vigour (heterosis)" into the progeny. Of serious concern is the fact that a herbicide tolerant gene called *bar* (which is also sourced from another bacteria) has also been tightly clubbed with both barnase and barstar genes in each parental line - which will then be inherited by the hybrid offspring - in this genetic engineering experiment. This opens up the possibility for herbicide use as the GM mustard would be herbicide tolerant (HT).

It is said that more than 100 crores of taxpayers' funds have been spent to develop and test these GMOs, with funding to CGMCP from National Dairy Development Board (NDDB) and Department of Biotechnology

(DBT) in the Ministry of Science & Technology. Ironically, the NDDB has wound up its edible oil business related to Dhara brand and has stopped its funding to the project now, while citizens have been kept in the dark about taxpayers' funds being used for thrusting a GM food crop onto them.

Here, we give you 25 reasons why you should say NO to Delhi University's GM mustard and to ensure that Indians are not made lab rats in an irresponsible and irreversible experiment unleashed on them.

1. **Transgenic technology is unsafe**: Genetic Engineering is an unnatural and imprecise breeding technology with living organisms, and there is enough evidence that it is an unstable, unpredictable, irreversible and uncontrollable technology being deployed in our food and farming systems. This then has implications for our health and environment. Further, increased riskiness in agriculture, lack of choices for farmers and consumers, market rejection are all consequences of the environmental release of GMOs. More on the adverse impacts of GM crops/foods is available as a compilation of scientific papers at: http://indiagminfo.org/?p=657

2. **GM HT crops cause numerous adverse impacts, for farmers, agri-workers and consumers**: Herbicide Tolerant GM crops like the current GM mustard result in numerous adverse impacts. These include health impacts including from the use of chemical herbicides. For instance, glyphosate, a widely used herbicide whose use has increased manifold after glyphosate-tolerant GM crops have been introduced on a large scale in countries like US, Canada, Brazil etc., was classified as a **probable human carcinogen** by WHO in early 2015, after decades of claims by promoters that it is a safe product. Rapid emergence of **"Super-Weeds"** (weeds that cannot be killed by herbicides anymore) has been well documented. **Impacts on non-target organisms** and also on **soil health** are well-documented. It is also important to note that in countries like India where the largest number of female workers in the economy earn their livelihood mainly by manual de-weeding of "weeds", use of herbicides and **HT crops will displace women from their existing livelihood opportunities** without alternatives being available. Weeds are also not always plants to be destroyed, but are food and fodder as well as medicines in many cases. Bringing in herbicide-based GM crops will also **discourage the use of mixed-cropping** as non-GM HT crops will be destroyed by the herbicide sprays on the main crop. Mixed cropping and agro-diversity are particularly valuable in sustaining our natural resources in the age of climate change. It is also important to note that one of the leading causes for litigation between farmers in countries like the US is supposed to be damage caused to neighboring crops due to herbicide drift. Given our smallholdings in India, such **damage to neighboring crops** is a distinct possibility here too. HT crops also mean **greater chemical residues** in consumer food.

3. **GM mustard is a back door entry for HT crops:** All these 3 GMOs that Delhi University scientists have applied for, are herbicide-tolerant. Shockingly, other than reveal that the *bar* gene has been put into all 3 GMOsh as a herbicide-resistant marker gene, the GMO application does not declare the crops as being herbicide-tolerant. Nor has the risk assessment been taken up as in the case of risk assessment that should be done for HT crops which recognizes risks from the genetic engineering process as well as from the increased use of herbicides, and any "combination" effects as well! The intentions of the DU scientists to introduce HT crops are evident from their published papers and to present this crop only as a high-yielding transgenic crop and not a HT crop is intentionally misleading. We are aware that many HT crops including of many MNCs are waiting to get a green signal and GM mustard is a ploy to make their entry easier. It is appropriate to mention that many GM patents are held by world's largest pesticide companies, and promoting herbicides is certainly intrinsic to their profitability. It therefore does not matter whether the seed is developed by a public sector institution or a private company, as it will inevitably increase herbicide use.

4. **GM mustard yield increase claims are wrong & unverified**: There is ample evidence already put out in the public domain that the testing of GM mustard was **deliberately designed to create favorable results for DMH-11**, to the point of violating decisions taken by regulators in their meetings, and **violating conditions** imposed in the permission letter for trials. Convenient protocols were adopted by the applicants to compare GM mustard with very old low yielding varieties, instead of comparing it with other hybrids. They could consequently show that GM mustard yields upto 28% higher than what it has been compared with. It is now well established that **wrong "Checks"** were used to make GM mustard look good. **Its yield increase claims can thuse be described as rigged and wrong.** If such yield increases are only against parental lines, it can only prove a point around "hybrid vigour" or "heterosis" and nothing more. There is nothing additional here for farmers or consumers. There are several non-GM hybrids and well-performing latest release varieties already available in the market for farmers. DU's GM mustard is unverified against these hybrids/varieties for its yield claims.

5. **Release of high yielders non-significant in their contribution to increase production of oilseeds and reduce oil import**: The applicants of this GM mustard claim that approval for their transgenics will lead to increase in India's yields and production of rapeseed mustard and will thereby bring down the country's edible oil import bill. However, official records show that release of hybrids into the market has not resulted in either production increases or in import bill declines. The simplistic and exaggerated benefit claims lie hollow in the face of such evidence.

6. **DU's GM Mustard must be rejected as the grounds for rejecting Bayer's GM mustard by Indian regulators in 2002 remain valid here and now too:** In 2002, a similar GM Mustard, with bar, barnase and barstar genes, was rejected by Indian regulators when Bayer's subsidiary ProAgro sought a commercial cultivation approval for the same on several grounds: the ICAR (Indian Council of Agricultural Research) declared that it was not satisfied with the testing that the GMO underwent and the results. It was also noted there was no safety testing on mustard as a vegetable (it is not just an oilseed – seeds and leaves are directly consumed in our food). Regulators also could not answer questions around how to regulate the spread of GM mustard to regions where it is not needed. Most importantly, it was acknowledged that ProAgro's mustard was a herbicide tolerant mustard. Though the crop developer kept saying that herbicide tolerance was only used as a marker technology and that was not the primary reason for commercialization of the GM mustard, the regulators rightly recognized that it would still be a problem since end-use regulation of illegal herbicide use on this GMO would be impossible. All these reasons apply equally with DU's GM mustard!

7. **This GM mustard is a Trojan Horse for other GMOs**: This GM mustard is being pushed by GM lobbyists as a public sector GMO to create an aura of acceptability. It is as though when it comes to biosafety, public sector GMOs will automatically become safer than private sector GMOs! Public sector GMOs are in fact as unsafe as private sector GMOs. Moreover, the developers can eventually assign the patents to anyone, including profiteering MNCs. Given huge public opposition to GMOs in our food and farming, it is apparent that corporations like Monsanto which were far ahead in the regulatory pipeline with their products like GM maize have withheld their applications to allow this GM mustard to be approved first on this "public sector" sentiment, so that there is easier entry for all other GMOs in the pipeline. We must recognize DU's GM mustard for what it is: a Trojan horse!

8. **This GM mustard will only benefit agri-business profiteering**: Currently, patents claiming the *bar* gene are mostly in the hands of Bayer Crop Science, the German MNC (which is reportedly trying to buy up Monsanto to become the world's largest agri-inputs corporation). It is also interesting to note that *Glufosinate ammonium*, which is the herbicide to which GM mustard has been made tolerant to, is mainly sold by Bayer in India. It is clear that this so-called public sector GMO is hiding the fact that it is

herbicide tolerant and is thereby meant for benefiting corporations manufacturing/selling herbicides. It is also apparent that even the technology is for facilitating ease of seed manufacturing and not to benefit farmers or consumers. Farmers already have non-GM mustard hybrids to choose from, for heterotic (yield) advantage.

9. **State Governments, including leading mustard-growing states, do not want even field trials; Farmers Unions, Scientists and others have objected strongly against GM mustard**: Major mustard growing states in India like Rajasthan, Madhya Pradesh and Haryana did not want even field trials of this GM mustard to take place in their states. Other states like Gujarat, Bihar, Odisha, West Bengal etc., have taken a policy stand not to allow GM food crop cultivation in their states (not even field trials). In India, agriculture being a State Government subject as per the Constitution, this is an important factor to consider when discussing approvals related to GMOs. It was one of the main factors behind the Bt brinjal moratorium too. It is clear that the Central government has no mechanism by which it can prevent the entry of transgenic seeds into states which have a policy against them. How can the federal spirit be upheld then, and wouldn't a decision by the Centre become unconstitutional if they insist on approving GM mustard?

   More than 55 large and active farmer unions of the country have already put out statements against GM mustard approval. Scores of scientists have written to the government against permitting any release of GM mustard. Ordinary citizens have been writing in the thousands to the government resisting the approval of GM mustard. This itself should be a strong reason for rejecting GM mustard.

10. **Male Sterility Trait could impact farm livelihoods**: It is seen that the *barnase* gene introduced through genetic engineering to induce male sterility and the subsequent transmission of such sterility into GM mustard hybrid will not be limited only to these lines. The male sterility trait will also get expressed in the contaminated crop of neighboring non-GM mustard crop when the non-GM farmer saves seed from her/his crop that has outcrossing from the barnase-bar parent or barnase-barstar-bar hybrid. It is only natural to expect that the GM mustard hybrid adopting farmer will go in for such a GM hybrid season after season, impacting the farm saved seed of the neighboring non-GM farmer on a continuous basis. The yields of the non-GM farmer could be affected to an extent because of this contamination by the male sterility trait and sooner or later, this farmer will be forced to turn to the market for external seed. This is quite apart from such a need arising due to any herbicide drift related damages of the neighbor's non-GM crop. This then is a scenario where more and more non-GM farmers will be compelled to adopt externally sourced seed, affecting their seed sovereignty as well as diversity.

11. **India is a Centre of Diversity for Mustard**: As was seen in the case of Brinjal, India happens to be a Centre of Diversity for Mustard. There are scientists who argue that India is the Centre of Origin too. Starting from the 2004 report of an Agriculture Ministry's Task Force led by Dr Swaminathan, to the 2013 report of a Supreme Court Technical Expert Committee, there are clear recommendations against genetically modifying those crops for which we are the Centre of Origin/Diversity. This was one of the main reasons for the government's moratorium on Bt brinjal. GM contamination can destroy the rich genetic heritage of India's mustard diversity and bring in disastrous monocultures.

12. **Containment of GM mustard impossible – Contamination inevitable**: Numerous instances from all over the world, as well as the statements of the GM mustard crop developer himself, are evidence that containment of this GM mustard will be impossible, and contamination inevitable. Biological as well as physical contamination will be the consequence from allowing this GM mustard into our farms. This then has serious implications for organic farmers and their organic status, amongst other issues like persistence, weediness, superweeds emerging etc. As much as 12 to 19% of the neighboring non-GM/organic crop could be contaminated depending upon the level of outcrossing. It is worth noting that

the Supreme Court of India in its 2007 Orders in a Public Interest Litigation (WP 260/2005) related to GMOs has instructed the government to prevent contamination, including from field trials.

13. **Organic Farming will be directly impacted**: Contamination will mean that certified organic farmers will immediately lose their organic status. In fact, even mustard oilcake for soil amendments will be affected, once GM mustard is approved, which will also jeopardise the organic certification of a farmer.

14. **Governments should not force their citizens to eat GM food**: By both contamination (through pollen flow as well as physical admixtures), and by deliberate marketing practices, GM seeds will spread rapidly till virtually no non-GM variety of the crop is available. Given that there will be no segregation system which can keep GM mustard separate and contained, away from other mustard, approval of GM mustard or any such GMO will mean that consumers' right to know what is in their food, right to informed choices and right to safe food will be violated. They will be left with no choices about whether they want to consume GM mustard or not. There will also be no labeling possible and consumers will not be able to distinguish which mustard is GM or non-GM, to exercise their choices. Similarly, contamination will mean that farmers will be left with no choices either.

15. **Genes used in GM Mustard make it a GURT (Genetic Use Restriction Technology)**: Through the use of GE, a barnase gene to confer male sterility has been inserted in one of the parental lines of the GM mustard hybrid. India's Protection of Plant Varieties & Farmers' Rights Act describes GURT as a technology that is injurious to the life or health of human beings, animals or plants and the Act does not register any such varieties. Meanwhile, the complete picture of IPRs on various genetic materials and processes used in creating these 3 GMOs remains unclear. The terms and conditions of any Material Transfer Agreements entered into, for the R&D of GM mustard are not in the public domain.

16. **Mustard is used in Ayurveda and GM mustard's impacts on Indian Systems of Medicine is unassessed**: Mustard is used both as food and medicine in Ayurveda. Mustard seeds and oil are used singly as well as in various formulations for a variety of treatments. The impact of GM mustard on such uses is unstudied and unclear.

17. **GM mustard will impact honey bees and industry adversely**: Bees and other beneficial insects are major pollinators and any adverse impact on them will eventually result in reduced yields – of not just mustard but other crops too. This GM mustard has potential adverse impacts on honey bees. Studies (sponsored by GM seed industry at that!) from elsewhere indicate this. This will impact crop production in general and also honey production. It is seen that honey industry is a sunrise industry in India, and mustard is one of the major sources for Indian bee keepers. Bee keeping with mustard creates a win-win situation by increasing yields of mustard by about 20-25%, even as it supports honey production and additional income for the beekeeper. However, GM mustard could result in adverse impacts on honeybees, lower honey production, contaminated honey and export rejections too. The impacts will be from transgenic pollen contamination as well as herbicide residues in honey.

18. **Opting for healthy oil consumption or catering to increasing oil consumption**?: The per capita oil consumption in India has already crossed the per capita recommended oil intake. While it may be true that a large proportion of poor population in the country are not able to meet the per capita recommended dosage, the solution does not lie in attempting to increase supplies to meet exponentially-growing demand, but supplying healthy edible oil to poor households through the Public Distribution System and discouraging the unhealthy overconsumption by other sections.

19. **GM mustard data shrouded in secrecy**: The so-called regulation of this transgenic mustard so far has been highly secretive and opaque. It is unclear what the regulators are trying to hide, and to protect

whom. Test results have not been shared in public despite Supreme Court and Central Information Commission Orders that require the regulators to put out data for public scrutiny.

20. **Testing of GM mustard deliberately misleading, unscientific, inadequate and unreliable**: It is seen that several tests that are required to assess risks and impacts have not been performed for this GM mustard. Further, in a narrow set of tests that were taken up, study protocols and tools lack rigour. It is also seen that test results indicate something and conclusions claim something else. In some cases, data presented is unbelievable from an ecological viewpoint. Data analysis is poor. The little analysis that was possible by independent experts, based on limited access to information, already shows clearly that testing of GM mustard has been deliberately misleading, unscientific, inadequate and unreliable.

21. **Conflict of Interest reigns supreme**: It is seen that the regulatory decision-making body has not yet cleaned itself of elements of conflict of interest with one member from the GM applicant team also serving as a regulator in GEAC! It is also clear from information gathered, including through RTI, that test protocols were prescribed by the crop developers themselves. While crop developers claim that their tests were undertaken and supervised by ICAR's Directorate of Rapeseed Mustard Research (DRMR), DRMR in an RTI reply disowned the same. In a secretive regulatory regime, with rampant conflict of interest, with tests and test results apparently misleading and unreliable, citizens cannot trust the regulators' and applicants' benefit claims or safety certificates.

22. **Supreme Court Technical Expert Committee says NO**: The matter of GM crops' risk assessment regime and environmental release is sub-judice in India. The Supreme Court is yet to pronounce its views and orders on the recommendations given by the Technical Expert Committee that it had set up in a Public Interest Litigation on the subject. A majority report (5:1) of the independent experts of the TEC (the dissenting note is from a scientist whose organization is financially supported by the GM industry) has explicitly asked for a ban on Herbicide Tolerant Crops in India, citing several reasons. This is not the first committee to have said so. A Task Force set up by the Ministry of Agriculture had earlier recommended the same. Further, the TEC report said NO to transgenics in crops for which we are the Centre of Origin/Diversity.

23. **No liability regime in place**: This application and other applications related to GMOs are being allowed to progress by Indian regulators even in the absence of any liability regime, which will take care of penalties, compensation and redressal for affected parties and remediation where required. Since citizens and their environment will bear the brunt of the adverse impacts of GMOs, it is essential to clearly establish before any clearances are given, who will be responsible for the environmental release of such GMOs. The regulators? The crop developers? The government? Through what mechanisms and procedures, and under what clauses of which statute?

24. **This GM mustard is unneeded**: This risky new technology is being sought to be thrust on farmers and consumers in the name of improving yields. However, just as there is evidence that yield increases have actually not been established with this GMO, and that release of even non-GM mustard hybrids has not changed the production scenario in any appreciable way, there is also evidence that simple agronomic changes that adopt the principles of System of Root Intensification (SRI) or System of Crop Intensification (SCI) – being called as System of Mustard Intensification (SMI) by some – can lead to significant yield improvements and alternatives such as these need to be invested upon. Wasting 100 crore rupees of taxpayers' funds on hazardous unwanted technologies is unwarranted when effective and safer technologies already exist.

25. **India's oilseeds production can indeed be improved significantly, without transgenics**: Oilseeds production improvements require political commitment to begin with, not a hazardous techno-

fix. On the technical front, large scale promotion, support and adoption of SMI as well as relay sowing in rice fallows of India, can increase mustard production. Similarly, provision of emergency/protective irrigation systems coupled with participatory water management at the community level will improve and stabilize production of oilseed crops like groundnut and soybean. On the policy front, export-import policies related to oilseeds and edible oil should favour Indian producers for higher production to accrue, not price them out; further, land use policies should incentivize cultivation of oilseeds on larger areas; there is also a need to revise the price support and procurement policies related to all oilseeds, to encourage farmers to grow more. On the institutional front, plugging the last mile extension gaps with the existing technologies should lead to significant production improvements. If the Indian government is indeed keen on improving oilseeds production, all these options should be explored seriously for sustainable results.

Conclusion: The above are some important reasons why we need to resist the possibility of GM mustard being approved in India, in whatever direct or indirect manner. It is being said that the parental "events" will be approved while the hybrid GM mustard application will be rejected. This is a spurious approach given that any approval to the parents will only generate HT offspring, with all other reasons above still remaining valid and unaddressed.

The opposition to GMOS in our food and farming systems today stands vindicated with Bt cotton and Bt brinjal experience in India. The lies and the hype of Bt cotton stand exposed today, 15 short years after commercial cultivation was permitted after the spread of illegal cultivation that the regulators could not control. Cotton yields have stagnated, after growing in the most impressive fashion in years when Bt cotton was not widespread in its cultivation. Secondary pests have proliferated while bollworm has developed resistance. Pesticide use has increased. India stands 31 out of 72 countries when it comes to cotton yield, and 23 countries are ahead of us **without** the use of GM cotton. On Bt brinjal, the fresh analysis taken up by the Supreme Court's TEC shows us that the Government of India's decision to place the GMO on an indefinite moratorium was absolutely scientific and correct. Concerned citizens are by now tired of this constant unscientific push for GMOs, including by governments which have promised something else in their Party Manifestos before elections!

While GM canola area is declining globally in the recent past, Indian government is contemplating this GMO's commercialization! There is now conclusive evidence on the impact of herbicides on our health and environment. Much more evidence has emerged in the recent past, after the Bt brinjal moratorium in India, on the various adverse impacts of GMOs on our food and environment. Meanwhile, no biosafety information on this particular GM mustard has been put out in the public domain, despite express Supreme Court and CIC orders to the regulators. In the past, our regulators have compromised on testing related to public sector GMOs, and there is nothing since then to instill greater confidence about the regulatory regime and the regulators. It is for each of us to act to keep our health and environment protected from unsafe, unwanted, unneeded and risky technologies.

Say NO to this GM Mustard. Say NO to GMOs in our food, farming and environment by giving a missed call at 044 3312 4242.

Let us ensure that only farmer-controlled, safe, affordable and sustainable technologies are promoted as real solutions in Indian agriculture.

WRITE TO THE ENVIRONMENT MINISTER (moefcc@nic.in) COMMUNICATING YOUR REJECTION OF GMOs, AND GM MUSTARD IN PARTICULAR AT https://www.change.org/p/indian-govt-say-no-to-gm-mustard

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