

GM FOOD: DO WE HAVE A CHOICE

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ABSTRACT

Genetically Modified Food has been an issue of controversy throughout the world since the production of the world's first scientifically genetically modified crop. This issue had knocked the doors of India in 2001 when the Indian government consented to the trials of genetically modified cotton. And since then the controversy is ongoing.

This article is an attempt to understand the controversy and see what stand the government authorities have taken on this. Through various examples the impact of GM crops is analysed and on the other hand, the article also takes cognizance of various scientific reports which remain unclear and conclude no such effect. In the debates on GM crops, it is the consumer who is being put on the back foot in spite of the fact that such debates are for the consumers themselves. For achieving the true objective of this article, three approaches will be used. Firstly, the consumer rights of general public will be evaluated with respect to the genetically modified food. Secondly, the consumer rights of a farmer and the right of compensation in case of failure shall be dealt with. Thirdly, the government's stand is taken into consideration and the rules and regulations which are there to regulate these are discussed. There are international organizations and national bodies like GEAC to check and regulate the flow, trials, cultivation, marketing of GM crops and food. The topic of labelling is also evaluated with its effect and regulations. This article envisages a theoretical approach and is built upon other reports and research papers.

INTRODUCTION

When the realm of science is expanding to almost every sphere, it was in the agriculture and food department where such increasing influence of science was both celebrated and criticized. The invention of genetically modified crops was seen as a revolution by many while, at the same time,

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others were sceptical of it. Genetically modified crops are the plants having some alteration, addition or deletion in their DNA structure. DNA is a sequence of genes. A particular sequence of genes encodes a code for a particular protein or enzyme. Hence, by changing the sequence of gene the properties of the organism also may change drastically. Scientists have used this phenomenon in the making of the genetically modified plants. They have adopted three approaches to create the GM plants. In the first approach, they alter the existing genome of the organism and no foreign gene is inserted and no gene is eliminated. Only the existing sequence is changed. In the second approach, a new gene is inserted into the genetic matter. This new gene could be from the same specie or, as noted in many examples, could be from different species like a fish gene added in plant, a microbe gene added in other organism, etc. And thirdly, where an existing gene is deleted from its gene. It may be to prevent the unwanted production of a protein or enzyme. In all these approaches the natural genetic makeup of an organism is changed due to human intervention.

The invention of GM crops have made the plants an instrument of humans. Scientists can now add a quality or delete an unwanted property from the plant. Adding a gene from the bacteria *Bacillus thurengiensis* to the genetic structure of brinjal makes it pest resistant. That gene triggers the production of a toxin which kills the pest which feeds on it by blocking the digestive system but that toxin does not affect the human beings. Similarly, the 'Round Up Ready plants' which are a product of Monsanto Company are those GM plants which can tolerate the herbicide 'Glyphosate' which is marketed by the same Company in the name of 'Round up'. The addition of such qualities are very rich. Scientists are even trying to add medicinal values to them.

But the controversy resides in the fact that not enough tests have been performed to prove that GM crops are not harmful to human beings if consumed. In fact, there are researches which show the opposite. The most cited report of Arpad Pusztai in *The Lancet* noting GM potatoes expressing a protein thickener from the snowdrop flower had negatively affected the rat

gastrointestinal tract. Just prior to publication in 1999, Dr. Pusztai appeared on a British TV show briefly describing the results and expressing concern that citizens are being used as guinea pigs. Dr. Putztai's experiment showed that genetically engineered modifications have the potential to be dangerous. His main concern, as stated in the 2008 interview with *The Guardian*, was primarily to push for more testing of genetically engineered food, not make a blanket statement about the hazards of GM foods. His issue was to elevate the science above the political and economic drivers.¹

GENERAL PUBLIC AS CONSUMERS

Genetically modified food, if introduced in the market as in the US, would put the public at stake as it would be difficult for the public to differentiate between a non-GM product and a GM product without adequate labelling. The fear of adverse effect on the body is the main reason for the rejection of GM crops. In addition to this, the lack of benefit that the first generation of GMOs provides to the consumer and the initial introduction of GMOs without the public's knowledge have added fuel to fire.² In one case, soya bean engineered with a gene from a brazil nut gave rise to allergic reactions in people sensitive to the nuts.³ Most genes being introduced into GM plants have never been part of the food supply so we can't know if they are likely to be allergenic and more so when they have been made a part of another genome. The controversy exists between the two sides on the impact of GM food on us. Gilles-Eric Seralini's famous two-year study on the effects of GM corn on rats allegedly demonstrated that consuming GM corn is likely to lead to cancer, tumors, and other serious health problems.⁴

1 Diehl, P. (2014). *What's the Big Concern with GM Food?*. [online] . Available at: <http://biotech.about.com/od/Genetically-Modified-Organisms/a/The-Controversy-Of-Genetically-Modified-Food.htm> [Accessed 23 Aug. 2014].

2 Charles Noussair, Stephane Robin & Bernard Ruffieux, *Do Consumers Really Refuse To Buy Genetically Modified Food?*, 114 *The Economic Journal* 102--120 (2004).

3 [Organicconsumers.org](http://www.organicconsumers.org), (2014). *New Book 'Genetically Modified (GM) Food: A Guide for the Confused'*. [online] Available at: http://www.organicconsumers.org/articles/article_1860.cfm [Accessed 23 Aug. 2014].

4 Wall St. Cheat Sheet, (2014). *10 Problems With Genetically Modified Foods*. [online] Available at: <http://wallstcheatsheet.com/life/10-problems-with-genetically-modified-foods.html/?a=viewall> [Accessed 23 Aug. 2014].

The report says that the effect of GM crops on rats have shown to be fatal for lungs and kidneys.⁵ Other studies often cited by anti-GM groups include Fared and Sayed's "*Fine Structural Changes in the Ileum of Mice Fed on δ -Endotoxin-Treated Potatoes and Transgenic Potatoes*", the article by Vecchio, et al., "*Ultrastructural Analysis of Testes from Mice Fed on Genetically Modified Soybean*", Aris and Leblanc's study, "*Maternal and Fetal Exposure to Pesticides Associated to Genetically Modified Foods in Eastern Townships of Quebec, Canada*," and a few others.⁶

Another point of contention is the ethical and religious rights of the consumer that would be put at stake which would lead to ethical and religious controversies. Many consumers believe that GE food crops are unethical and violate religious dietary laws, including kosher rules against hybridization. A coalition of groups including representatives of Jewish, Buddhist, Moselem and Christian denominations sued the US FDA for failing to label GE foods. Similarly, vegetarians are concerned about ingesting animal DNA by eating for example fish genes that have been inserted into tomatoes. A question here arises that whether eating a plant with human genome amounts to cannibalism. Whether it is ethical to use a gene from a microbe in food and so on...

Further, the bone of contention is what all should be considered as genetically modified and to what extent. If a cow feeds on GM fodder, should her milk also be considered as genetically modified although there has been no genetic changes done in the cow's genome. So, should milk of such cows also be banned or labelled accordingly? Here it must be differentiated from the food processed from GM crops. For example, the oil derived from GM mustard. The production of cornflakes from GM corn is indeed a direct product of GM crop. But what becomes the point of discussion is an area where no such processing is done rather the natural

5 Indiainfoline.com, (2014). *Research journal articles, qualitative research articles, recent research articles, research article, research articles at Indiainfoline.com*. [online] Available at: <http://www.indiainfoline.com/news-listing/research-articles> [Accessed 23 Aug. 2014].

6 *Supra* note 1.

process takes place. The eggs of hens which fed on GM corn, do we consider them too as genetically altered? Such issues are sensitive and can't be just proved or disproved by scientific studies.

Not much research has been done in this field and the existing ones contain flaws. Different opinions prevail on the effect of GM food on humans. In 1989 there was an outbreak of a new disease in the US, contracted by over 5,000 people traced back to a batch of food supplements produced with GM bacteria. 37 people died and 1,500 were left with permanent disabilities. Scientists at Showa Denko blame the GM process for producing traces of a potent new toxin. This new toxin had never been found in non-GM versions of the product.⁷ But the US government declared that it was not GM that was at fault but a failure in the purification process. The American Association for the Advancement of Science based on its studies stated "Foods containing ingredients from genetically modified (GM) crops pose no greater risk than the same foods made from crops modified by conventional plant breeding techniques."⁸ They claim GM foods currently available on the international market have passed risk assessments and are not likely to present risks for human health. In addition, no effects on human health have been shown as a result of the consumption of such foods by the general population in the countries where they have been approved. Continuous use of risk assessments based on the Codex principles including post market monitoring, should form the basis for evaluating the safety of GM food.

It is therefore a challenge for a consumer to choose a statement to rely on from the array of statements available. On one side, some studies offer fear but they are indeed criticized heavily and on the other side, studies not

7 Graviola (Soursop) Benefits Reviewed, (620).*Health and Wellness Archives - Graviola (Soursop) Benefits Reviewed*. [online] Available at: <http://buygraviolabenefits.com/category/health-and-wellness/> [Accessed 23 Aug. 2014].

8 Aaas.org, (2014). *AAAS Board of Directors: Legally Mandating GM Food Labels Could "Mislead and Falsely Alarm Consumers"* | *AAAS - The World's Largest General Scientific Society*. [online] Available at: <http://www.aaas.org/news/aaas-board-directors-legally-mandating-gm-food-labels-could-%E2%80%9Cmislead-and-falsely-alarm> [Accessed 29 Aug. 2014].

only negate any negative effects but glorify the GM food. But these studies had been done mainly either by the government or by big companies who need to promote their product.

FARMERS AS CONSUMERS

India's tryst with GMOs began way back in 2001, with the conditional clearance given to Monsanto and Mahyco for commercial planting of genetically engineering Bt cotton in the states of Andhra Pradesh, Maharashtra, Gujarat, Karnataka, Madhya Pradesh and Tamil Nadu.⁹

It is to be noted that the Maharashtra Hybrid Seeds Co. Ltd (Mahyco) is one of the largest seed companies in India and in 1998, after 8 years of negotiation, Monsanto became a 50% shareholder in the company.

This fact highlights the control of GM agriculture by MNCs in a country where 118.9 million stomachs are dependent upon agriculture. Farmers were made to buy the GM seeds making them believe that such seeds would yield more produce and require no use of pesticides. For the chairman of GEAC, the fact that BT Cotton would drastically reduce the pesticide use by 80% was the reason for approval.¹⁰ But the use of GM seeds showed no change. The agriculture ministers from Andhra Pradesh and Karnataka announced the failure of Bt cotton in both states. Studies conducted by Greenpeace India, in Karnataka showed that the average yield of BT cotton is lower than that of non BT cotton.¹¹ Failing their produce, farmers were left with nothing and the Company which claimed giant claims took their hands back and no compensation was paid to the aggrieved farmers.

In another case in Gujarat, India farmers were left helpless. A local company there sold GM seeds under the label 'Navbharat seeds' to the

9 Ikisan.com(2014), *BT Cotton* [online] Available at: <http://www.ikisan.com/BT%20Cotton/BT%20Cotton.htm> [Accessed 29 Aug. 2014].

10 Fbae.org(2014). [online] Available at: <http://fbae.org/2009/FBAE/website/images/PDF%20files/Biosafety%20in%20India.pdf> [Accessed 29 Aug. 2014].

11 The Hindu, *Bt cotton farmers suffered losses, says Greenpeace*, 2014, <http://www.thehindu.com/thehindu/2003/04/17/stories/2003041703430400.htm> (last visited Aug 22, 2014).

farmers without taking the approval of the authorities and the farmers unknown to that started cultivation. Around 3 months after sowing, when the crop was near to be harvested, the Union Environment Ministry stepped in and asked the Gujarat Government to "uproot and destroy" the crop. The development, however, raises several questions about the actual origin of the Bt cotton seeds.¹² This again is an example where the farmers were the sufferers. But it didn't stop here. The growers of illicit BT cotton were said to be liable under Rule 89 of the Environment Protection Act, 1986.¹³

The fear of failure and no compensation is what prevails in the heart of a farmer. Confusion prevails over the benefit of Bt cotton. It also declared that the performance of the three Bt Cotton varieties did not surpass that of the best non-Bt varieties.¹⁴ In June 2002, about 55,000 cotton farmers grew BT cotton. In the fourth month, the cotton stopped growing and producing buds while the existing cotton bolls didn't get bigger. The crop wilted and dried up at the peak bolling accompanied by leaf – dropping and shielding. There was also bursting in immature bolls and heavy infestation of bollworm. The Bt cotton failure resulted in a total loss of Rs. 1128 million for the farming industry.¹⁵

While theoretical discussions have covered a broad range of aspects, the *three main issues debated* are tendencies to provoke allergic reaction (allergenicity), gene transfer and outcrossing.¹⁶ Gene transfer from the GM crops to other creatures feeding on them like butterflies, moth and even bacteria have raised the much heated controversy. It is claimed that it may lead to the pesticide resistant pest and superbugs. This would be particularly relevant if antibiotic resistance genes, used in creating GMOs, were to be

12 Genie out of the Bottle? Source: Economic and Political Weekly, Vol. 36, No. 45 (Nov. 10-16, 2001), p. 4237 Published by: Economic and Political Weekly Stable URL: <http://www.jstor.org/stable/4411340> Accessed: 22-08-2014 18:36 UTC

13 *Infra*.

14 Times of India, 'No Bt Cotton, No GM Mustard: GEAC', 2003.

15 Ndtvmi.com, (2014). [online] Available at: <http://www.ndtvmi.com/b4/dopesheets/rashi.pdf> [Accessed 29 Aug. 2014].

16 AraKirakosyan& Peter B Kaufman, Recent advances in plant biotechnology (1 ed. 2009), Springer Science+ Business Media, New York, pp 341 – 342.

transferred. The movement of genes from GM plants into conventional crops or related species in the wild (referred to as “outcrossing”), as well as the mixing of crops derived from conventional seeds with those grown using GM crops, may have an indirect effect on food safety and food security. Such a case of outcrossing was reported in USA. There were traces of GM genes reported in crops which were cultivated in a field adjacent to a field with GM crops.

There has also been an outcry regarding the use of GM crops. These groups fear that as a result of the interest of the chemical industry in seed markets, the range of varieties used by farmers may be reduced mainly to GM crops. The exclusive use of herbicide-tolerant GM crops would also make the farmer dependent on these chemicals. These groups fear a dominant position of the chemical industry in agricultural development, trend which they don't consider to be sustainable.¹⁷

RULES AND REGULATIONS

Lessons drawn from India's experience with its first commercially grown GM crop - Bt cotton - reveal several loopholes in the existing implementation of the national biosafety regulation. The blunder of Navbharat seeds in Gujarat¹⁸ and failure of Bt cotton crops in Andhra Pradesh and Karnataka¹⁹ shows the laxity of the regulatory authorities whose job it is to monitor compliance with rules, the impunity with which the company sold the seeds to the farmers and the implications for the future introduction of any biotechnological innovation in the country.²⁰ Hence the building of law and regulations should be able to build consumer confidence in the use of GM seeds and authorization of GM products. A set of rules and guidelines is

17 WHO International, (2014). *WHO | 20 questions on genetically modified foods*. [online] Available at: <http://www.who.int/foodsafety/publications/biotech/20questions/en/> [Accessed 23 Aug. 2014].

18 *Supra* note 13.

19 *Supra* note 12.

20 *Supra* note 19.

much required to check imports of GM food into the country and prevent India from becoming a dumping ground for GM food.²¹

The Union Health and Family Welfare Ministry has notified draft rules to amend the Prevention of Food Adulteration Rules, 1955 to regulate the sale and import of Genetically modified or engineered organisms obtained through modern biotechnology and to ensue mandatory labelling of all such products in order to provide correct information to consumers about the nature of food being purchased by them for consumption.²² The setting up of various organisations and committees by the government. Presently there are six Competent Authorities i.e. The Recombinant DNA Advisory Committee (RDAC), Institutional Biosafety Committee (IBSC), Review Committee on Genetic Manipulation (RCGM), Genetic Engineering Approval Committee (GEAC), State Biotechnology Coordination Committee (SBCC), District Level Committee (DLC).²³ The Genetic Engineering Approval Committee (GEAC) was reconstituted by the Ministry of Environment and Forests (MoEF) in 2006 whose objective is to permit and authorize large production and release of GMOs and approve the conduct of large scale field trials of transgenic crops.²⁴

But there is no permanent secretariat to monitor the trials of GMOs. Instead the regulations are implemented by various statutory ad hoc committees.²⁵ The GEAC is supposed to be assisted by the State Committees (SBCC) and district level committees (DLC). However, none of the states have established SBCC and DLC committees, not even in areas where field trials are already taking place. It is all the more interesting to note

21 *Supra* note 15.

22 Pib.nic.in, (2014). *Press Information Bureau English Releases*. [online] Available at: <http://pib.nic.in/newsite/erelease.aspx?relid=17941> [Accessed 23 Aug. 2014].

23 Moef.nic.in, (2014). *Genetic Engineering Approval Committee (GEAC) | Ministry of Environment & Forests, Government of India*. [online] Available at: <http://www.moef.nic.in/division/genetic-engineering-approval-committee-geac> [Accessed 29 Aug. 2014].

24 Dbtbiosafety.nic.in, (2014). *Committees*. [online] Available at: <http://dbtbiosafety.nic.in/committee/geac.htm> [Accessed 29 Aug. 2014].

25 SachinChaturvedi, *GEAC and Biotech Policy: Which Way and What For?*, 38 Economic and Political Weekly 1459-1460 (2003), <http://www.jstor.org/stable/4413426> (last visited Aug 22, 2014).

that GEAC is imposing rules which do not apply to domestic producers. India does not have a system of labelling of domestically produced GM crops. Cotton which was cleared earlier and the mustard, the clearance for which was withdrawn in a hasty manner, were at no stage asked to be labelled once in the market.²⁶ Activists allege that GEAC has shown a bias towards companies like the Monsanto.²⁷ The Task Force on Application of Agricultural Biotechnology formed by the Indian government recommended the restructuring of the regulatory system, including that of the GEAC, and the formation of a biotechnology regulatory authority (whether India requires another agency is still a matter of debate). The Biotechnology Regulatory Authority of India (BRAI) is a proposed regulatory body in India for uses of biotechnology products including genetically modified organisms (GMOs) under the Biotechnology Regulatory Authority of India (BRAI) draft bill.²⁸

The Supreme Court of India had given some directives to regulate the cultivation of GM crops. Supreme Court, vide its order dated 8th May, 2007, lifted the moratorium on open field trials, subject to the conditions stated in that order, including a directive in regard to the maintenance of 200 metres isolation distance while performing field tests of GMOs. A further clarification was introduced vide order of this Court dated 8th April, 2008, whereby all concerned were directed to comply with the specific protocol of Level of Detection of 0.01 per cent.²⁹

The TEC Final Report (FR) of Supreme Court exposes the lack of integrity, independence and scientific expertise in assessing GMO risk. It is the third official report barring GM crops or their field trials singularly or collectively. This consensus is remarkable, given the regulatory oversight and fraud that otherwise dog our agri-institutions. The pervasive conflict

26 *Infra*.

27 Eng.agriinfomedia.com, (2014). *Agricultural Information*. [online] Available at: <http://www.eng.agriinfomedia.com/2010/01/all-you-wanted-to-know-about-bt-brinjal.html> [Accessed 23 Aug. 2014].

28 *Supra* note. 23.

29 Aruna Rodrigues and Ors. v. Union of India (UOI) and Ors.,(2012)5 SCC 331.

of interest embedded in those bodies makes sound and rigorous regulation of GMOs all but impossible. The *four reports are*: The ‘Jairam Ramesh Report’ of February 2010; the Sopory Committee Report (August 2012); the Parliamentary Standing Committee (PSC) Report on GM crops (August 2012) and now the TEC Final Report (June-July 2013). The TEC recommends that in general, there should be an indefinite stoppage of all open field trials (environmental release) of GM crops, conditional on systemic corrections, including comprehensive and rigorous risk assessment protocols.³⁰ "Whether there should or should not be any ban, partial or otherwise, upon conducting of open field tests of the GMOs? In the event open field trials are permitted, what protocol should be followed and conditions, if any, that may be imposed by the Court for implementation of open field trials."³¹ These are the questions which are still unanswered and require a legislation.

There had been International conventions to regulate the flow of GM crops. The Cartagena Protocol on Biosafety (CPB) is an environmental treaty legally binding for its Parties which regulates trans boundary movements of living modified organisms (LMOs). The cornerstone of the CPB is a requirement that exporters seek consent from importers before the first shipment of LMOs intended for release into the environment. The Codex Alimentarius Commission provides guidelines and standards for GM foods internationally. Codex has developed standards and a code of practice to effectively apply the irradiation technology to improve food safety, together with guidance on the labelling of irradiated foods.³²

30 Rodrigues, A. (2013). *Nip this in the bud*. [online] The Hindu. Available at: <http://www.thehindu.com/todays-paper/tp-opinion/nip-this-in-the-bud/article5013917.ece> [Accessed 23 Aug. 2014].

31 Aruna Rodrigues and Ors. v. Union of India (UOI) and Ors., (2012) 5 SCC 331.

32 Codexalimentarius.org, (2014). *CODEX Alimentarius: Questions about specific Codex work*. [online] Available at: <http://www.codexalimentarius.org/faqs/specific-codex-work/en/> [Accessed 29 Aug. 2014].

LABELLING

One of the most pressed demand put forth by GM protestors is of labelling. They claim it should be the choice of consumers to eat or not to eat the genetically modified food. Labelling has been approved in the Cartagena Protocol and European Union has incorporated that into its legislation. Labelling is a sign of consumer empowerment where the consumers are given the sovereign powers to choose. Someone who, for whatever reason, wants to know whether GMO ingredients are in their food, should be able to expect a clear label that indicated whether their food has been genetically altered.’ Many surveys have been done to know the public’s opinion on labelling of GM crops and results were in favor of labelling. But Julian Edwards, the Director of Consumers International, maintains the view that the surveys present not a true picture. She says when a person respond to a survey, he do so as a citizen and not as a consumer. His behavior changes when the same situation will be there in a shopping center picking up different products. Another contention against labelling is that it will put GM food on back foot. The argument by a member of editorial board of World Food Regulation touches on the ‘guilt by association’ “Such a label statement, particularly in the current climate, falsely implies the food is less safe than conventional foods. Conversely, a label claim of ‘GMO-free’ falsely implies such a food is safer and better than GMO-containing foods”.³³

CONCLUSION

All these contentions are sufficient to say that the research in this field is somewhere lacking and it is mainly the possibilities which are inciting the fear in the minds of people and farmers. This fear of GM food is really a fear of the unknown, and that can only be addressed by more familiarity. The scarcity of evidence of specific health problems related to

33 John S. Eldred, ‘Labelling of GMO-Derived Food Ingerdiets: A Recipe for Misinformation’, paper presented to 27th Session of Food Labelling (Ottawa Canada, 27-30 April 1999).

GM-food, which has been around sold for almost *15 years*, increases this familiarity and is gradually undermining the source of the concern. The recent productive dialog between scientists and anti-GM protesters over field trials of genetically modified potatoes in England suggests that some fear concerning GM foods is being replaced by more practical discussion of the risks and benefits of this technology.³⁴ There is a lot to be done. Apart from just scientific researches, the legal framework is to be developed. It would not be wrong to say that the lawmakers are very much behind with respect to the rapid developments taking in the society. Though an international convention is there but seriousness from the part of government is lacking. Also, the influence of political and business lobbies cannot be undermined while evaluating the rules governing the trade and labelling of GMOs. Though the issue is scientific but the public at large is at stake and the role of lawmakers is much more. The coming of new laws is invited but care must be taken because scientific advancement could not just be rejected while it could not be invited when it affect the health and sentiments of the public.

34 *Supra* note 1.