

Transgenic and Traditional Farming: Finding a Mid-Way

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ABSTRACT:

To deal with the problem of shortage of food for the ever-rising population, the scientists manipulated the genes of plants, giving birth to the concept of genetically modified (GM) crops and seeds and the transgenic method of farming, which was seen as the saviour to meet the requirements of time. This technological advancement was soon encashed by the eagle-eyed MNCs, well anticipating the amount of profit the GM crops and seeds can earn them. Transgenic farming saw a full-fledged growth since 1982 with the production of antibiotic- resistant tobacco plant.

The issue of rising corpocracy in relation to GM crops has become debatable both at national and international fora. The ‘depicted charisma’ of transgenic farming by the MNCs has made competent authorities turn blind eye of its impact on environment.

This paper analyses the implications that flows from the rise of GM food. Taking a brief look into the history of GMOs in Chapter I, this paper proceeds to give a glimpse of a number of international rules/regulation/codex attempting to regulate the GMOs in the absence of a specific international instrument dedicated to GMOs under Chapter II, whereas Chapter III discusses how the Indian government has tried to tackle with the issue of GMOs by providing rules, further drawing the comparison of how much India has tried to incorporate the international standards with respect to the same. The role of MNCs and effect of GM seeds on farmers is dealt in Chapter IV. Discussing the environmental impacts of transgenic farming under Chapter V, the authors have summed up the paper while quickly looking into the comparison between transgenic and traditional methods of farming under Chapter VI which is Conclusion.

Keywords: Genetically Modified Crops, Environment, Farmers, Multinational Corporations, Transgenic seeds

I. INTRODUCTION

Since time immemorial humans have demonstrated their keenness to boost plant’s endurance and resistance from diseases. In pursuance thereto, selective cross-breeding was resorted to for better results as humans were completely unaware of genes manipulation then. Sweet potato, strawberries, wheat are apt illustration of traditional cross-breeding as they did not exist in the present form, back 1000 years ago.¹ George Mendel, known as Father of Modern Genetics, was the first one to introduce the ‘dominant’ and ‘recessive’ traits in plant in 1800s and facilitate alteration, popularly referred as ‘Hybridisation’.

“*Genetically modified*” or “*Genetic modification*” is a step ahead in the field of biotechnology. This process has enabled to improvise the traits in the plants by alteration of genes and has replaced the methods of

¹ Licia Bushak, *A brief history of Genetic Modified Organisms: From Pre-historic breeding to Modern biotechnology*, Medical Daily, Jul 22, 2015, available at: <https://www.medicaldaily.com/brief-history-genetically-modified-organisms-prehistoric-breeding-modern-344076>.

Traditional Farming by a large extent. Undoubtedly, such a gene is transmitted to a particular plant seed, thereby making it better suitable and resistant to any kind of disease thereby enhancing the food productivity. Resultantly, there has been a constant demand of Genetic Modified plants in the international trade markets since 1990s.

The primary objective of this paper is to present an overview of rules and regulations concerning Genetic modification in agriculture, at both national and international level; the blatant & indiscriminate foothold of MNCs over this biotechnology; and lastly the detrimental effects on environment.

II. INTERNATIONAL RESPONSE TO GM CROPS

International trade is blooming with the huge inflow and outflow of GM crops between nations. This along with the social and environmental implications of such crops, has made it all the more important to incorporate precautionary principle by regulation. Many instruments have been framed, some of them are:

1.	<p>WTO Rules –</p> <ul style="list-style-type: none"> a. WTO Agreement on Technical Barriers to Trade² (TBT) b. WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS)³ 	<p>As TBT covers ‘agricultural’ products, its importance vis-à-vis GM crops is accentuated. Members of this agreement are required to adhere to a “<i>Code of Good Practice for the Preparation, Adoption and Application of Standards</i>”⁴ concerning food labelling and conformity assessment to ensure safety of international food trade.</p> <p>Unlike TBT, SPS covers general rules and standards to protect humans from the intake of contaminated or disease-prone food which are produced via biotechnology or otherwise; also, to protect plant life from pests, etc. It also covers inspection of GM food products as well as sets a maximum permissible limit of pesticides residues, etc.⁵ However, it gives autonomy to Member nations to formulate their own</p>
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² WTO Agreement on Technical Barriers to Trade (TBT), 1868 U.N.T.S. 120.

³ Agreement on the Application of Sanitary and Phytosanitary Measures (SPS), 1867 U.N.T.S. 493.

⁴ TBT, *supra* note 1, Art. 4 and Annex 3.

⁵ WTO, *Understanding the WTO Agreements on Sanitary and Phytosanitary Measures*, https://www.wto.org/english/tratop_e/spse_e/spsum_e.htm

		regulations provided the goals of SPS are preserved.
2.	The Cartagena Protocol on Bio safety, 2000 ⁶ to Convention on Biological Diversity, 1992 ⁷	It provides rules for trans-boundary handling, safe transfer and use of the Living modified organisms (LMOs), which are – intended for environment; direct usage as food; and for contained use. It is based on precautionary principle so as to deflect any harm that may come because of the use of the transgenic product.
3.	Codex Alimantarius	This non-binding code caters Guidelines for production, processing, labelling and marketing of foods derived from bio-technology.
4.	International Plant Protection Convention (IPPC)	Like Cartagena Protocol, it sets reasonable measures to highlight the risks to plant produced by modern biotechnology.

III. LEGAL MANDATE IN INDIA OF GM CROPS

As India headed towards the path of being one of the largest producers of GM crops, the need to regulate these transgenic organisms and products was recognized, which in turn was fulfilled by Biosafety Rules, 1989⁸ formulated with the aid of Sections 6, 8 and 25 of the “Environment (Protection) Act, 1986”. These rules cover all kinds of organizations (public or private) and organisms (micro-organisms, plants, insects, etc) in its ambit. It also spell out distinct regulating agencies, whose functions have been stated below:

1.	“Recombinant DNA Advisory Committee”(RDAC)	Scrutinizes the developments made at international and nation level in bio-technology and makes recommendations.
2.	“Review Committee on Genetic Manipulation” (RCGM)	Develops guidelines/manuals regarding the precautionary aspects of research, etc.

⁶Cartagena Protocol on Biosafety to the Convention on Biological Diversity, 29 Jan. 2000, 2226 U.N.T.S. 208.

⁷ The Convention on Biological Diversity, 5 June 1992, 1760 U.N.T.S. 69.

⁸Rules for the Manufacture, Use/Import/Export and Storage of Hazardous Microorganism/Genetically Engineered Organisms or Cells, 1989, G.S.R. 1037(E), Ministry of Environment & Forest, 5 December 1989 (Hereinafter called Biosafety Rules, 1989).

3.	“Institutional Biosafety Committee” (IBSC)	Ensures compliance with safety guidelines; adherence to protocols provided for experimentations and preparing on-site emergency plan.
4.	“Genetic Engineering Appraisal Committee” (GEAC)	Has been commissioned to provide requisite sanction to activities for large-scale commercial use and release of GE products. Additionally, it has the authority to forbid production, use, shipment of GMOs if seen a threat to environment and humans.

These Rules are backed by a series of guidelines.⁹ However, they do not govern the entirety of regulations related to GM food products and are facilitated by other statutes also, such as: “Biodiversity Act, 2002”, which monitors the use of genes used for improving crops; “Plant Quarantine (Regulation for import into India) Order, 2003” & “Food Safety and Standard Act, 2006” which provides for labeling of GM food products and rules concerning manufacture, storage, distribution, sale of the same; and others.

From time to time, various Ministries have also devised National Policies such as National Seeds Policy, 2002; Food Trade Policy (2006-09) and the latest National Biotechnology Development Strategy (2015-20)¹⁰ which focuses on realizing the full potential of biotechnology and to establish India as bio-manufacturing hub. Hence, India being a signatory to the Cartagena Protocol has tried its best to implement the same.

Regardless of this, controversy surrounding GM seeds and crops have acquired a new dimension recently when in the Supreme Court, “Food Safety and Standard Authority of India” (FSSAI) stated that “*GM crops are not allowed in the country*”¹¹ thus raising existential crisis of GM seeds and crops flooded Indian markets.

IV. CORPORACY

The five agrochemical groups- Mansanto, Syngenta, DuPont, Bayer, Dow and BASF are known as “The Big Six” owing to their sales, of pesticides and seeds both.¹² All the multinational corporations (MNCs) have bio-patented GM seeds while the 80% of GM food market is owned by 13 commercial corporations own.¹³

⁹ Guidelines for Safety Assessment of Food Derived from Genetically Engineered (GE) Plants, 2008; Guidelines & Handbook for Institutional Biosafety Committees (IBSCs), 2011; Guidelines on similar Biologics: Requirement for Marketing Authorization in India, 2012; Guidelines for Environmental Risk Assessment of Genetically Engineered Plants, 2016; Risk Analysis Framework, 2016.

¹⁰“National Biotechnology Development Strategy” (2015-20), “Department of Biotechnology, Ministry of Science and Technology, Govt. of India.”

¹¹DTE Staff, “*India is consuming banned GM food owing to lack of regulations*”, DOWN TO EARTH (September 19, 2018), <https://www.downtoearth.org.in/news/food/india-is-consuming-banned-gm-food-owing-to-lack-of-regulations-59931>”

Owing to this, the farmers are ending up losing their autonomy; they had in Traditional Farming methods, of: a) saving and re-using of seeds, b) applying indigenous knowledge and skills c) participating in decision making, d) compensation for crop failures and other rights that they enjoyed in the pre-corpocracy era.

A drastic economic loss for farmers is sparked, due to contamination of GM seeds in non-GM crops, when export markets that ban GMO reject the products of these farmers.¹⁴ Due to such contamination, organic farmers tend to lose their organic certification.

Looking from the Indian perspective, there is a specific kind of cropping pattern that needs to be followed in GM crops, to which the Indian farmers are very new. Taking the case of Bt cotton, farmers have to follow the “refuge strategy,”¹⁵ which requires a lot of land, knowledge and understanding, all of which is difficult for the poor farmers.

Nearly 90% of the cotton is GM in India. The GM crops are expensive, failing to control pests as well as failing to yield; still the farmers are left with little or no option of growing non-GM crops owing to the monopoly in seed market of the “agritech giants”.¹⁶ This is shoving the farmers of India into the “cycle of debt”. Farmers growing cotton crops in India are committing suicide in large numbers. The Indian Ministry of Agriculture has accepted that it is to be “directly linked to Monsanto’s Bt cotton varieties”.¹⁷

This concentration of power and resources in the agricultural sector is allowing MNCs to increase their profit margins by feeding upon the poor farmers.

V. ENVIRONMENTAL IMPACT

GM crops have enhanced the agricultural productivity, so lesser area of land produces more crop.¹⁸ GM crops can also reduce soil erosion and increase organic matter of soil.¹⁹ The need of pesticides is reduced by GM crops, reduces soil erosion and the loss of groundwater.²⁰

¹² Sylvie Bonny, *Corporate Concentration and Technological Change in the Global Seed Industry*, 9 Sustainability, 21, 21-22, (2017).

¹³“Yamuna Ghale and Bishnu Raj Upreti, *Concentration and monopolisation of seed market: Impact on food security and farmer’s rights in mountains*, ICIMOD (Oct. 17, 2018, 11:40 a.m.)<http://lib.icimod.org/record/13338/files/2056.pdf>”

¹⁴ Case of Starlink corn (2000); US rice supply(2006); roundup ready wheat variety (2013).

¹⁵“Ashok Kumbamu, ‘Ecological Modernization and the “Gene Revolution”: The Case Study of Bt Cotton in India’, 17 CAPITALISM NATURE SOCIALISM 7, 27 (2006).”

¹⁶“Dr. Mae-Wan Ho, *Farmer suicides and Bt cotton nightmare unfolding in India*, SCIENCE IN SOCIETY (Oct. 20, 2018, 01: 30 p.m.) <http://www.i-sis.org.uk/farmersSuicidesBtCottonIndia.php>”

¹⁷ Zia Haq, “Ministry blames Bt cotton for farmer suicides”, H.T., March 26, 2012, at Pg.1.

¹⁸“Luis R. Herrera-Estrella, *Genetically Modified Crops and Developing Countries*, 124 AMERICAN SOCIETY OF PLANT BIOLOGIST, 923, 925(2000).”

¹⁹Graham Brookes and Peter Barfoot, “Global Impact of Biotech Crops: Environmental Effects”, 1996-2008, 13(1) AGBIOFORUM, 76, 80 (2010).

²⁰ Nigel G. Halford & Peter R. Shewry, “Genetically Modified Crops: Methodology, Benefits, Regulation and Public Concerns”, 56 BRIT.MED. BULL. 62, 66 (2000).

However, negative impact of GM crops on environment cannot be overlooked.

Firstly, the claim of lesser use of pesticides than in Traditional methods of farming, practically, fails. Like in the case of Bt cotton the crop is protected only against one pest, while the cotton crop is likely to be attacked by “165 pests”, having high probability of resurgence of secondary pests and to combat this same amount of pesticides are sprayed. An example of this is the “emergence of the mealy bug” as a “Bt cotton pest” in Punjab which has got uncontrollable by any amount and type of pesticide.²¹ Even otherwise, the farmers end up spraying the same amount of pesticides in the fear of pest attacks.

Secondly, there has been an increase in the use of glyphosate, which is extremely harmful for the environment and human and plant health, 15-folds since the introduction of “glyphosate-resistant genetically modified crops” in 1996.²² Such use of herbicides can also alters the ability of the plant to absorb nutrients and reduce soil health by killing microbes, thereby, increasing plant diseases.²³

Coming to fauna, “The British Trust for Ornithology” has shown that there has been a dip in the numbers of birds owing to the “modern agriculture”. The loss of “crop rotations”, changes in “arable farming” and grass have led to a reduction in “breeding habitats and sources of winter food”. Many birds require different habitats at different stages in their lifecycle, hence, diversity is essential, which is being lost due to GM crops everywhere.²⁴

VI. CONCLUSION & SUGGESTIONS

The advent of Genetic modification in the field of agriculture was promoted with the ‘pro-farmer’ intention and as ‘an answer to food crisis’ flagship. GM crops are being governed, at both international and Indian level, through plentiful scattered provisions under different rules and regulations. However, there is no specific enactment governing the same. Hence, with the passage of time, MNCs were successful in capturing the market and technology which resulted in unpropitious consequences for the farmers. It has also brought on table the debate regarding the adverse effects that GM seeds pose to the environment.

The wider connotation of “GMOs” is over-shadowing the problems of GM crops thus, facilitating its unregulated use. Therefore, there is an urgent need to address the lacunae present in the legal system. It is time for legislature to come up with a law which touches upon the arena of both Modern Farming and Traditional

²¹ B. Goswami, “*India: Bt Cotton Devastated By Secondary Pests*”, GRAIN (2007).

²² C.M. Benbrook, “*Trends in glyphosate herbicide use in the United States and globally,*” 28 ENVIRONMENTAL SCIENCES EUROPE, 1, 5(2016).

²³ FRED GOULDEt.Al., “*GENETICALLY ENGINEERED CROPS: EXPERIENCES AND PROSPECTS*, 136 (Norman Grossblat, The National Academies Press, 2016)”.

²⁴ “GM crops, Modern agriculture and the Environment” Report of a “Royal Society Discussion Meeting” held on 11 February 2003. Available at:

“https://royalsociety.org/~media/royal_society_content/policy/publications/2003/9835.pdf”.

Farming and not act as a care-taker of MNCs but rather balance the demand of Traditional Farming, GM crops and environment, without being prejudicial to the need of farmers.