

ANALYSING THE EXISTING REGULATORY MECHANISM FOR GM CROPS IN INDIA: THE NEEDED DISCUSSION ON THE JOURNEY OF GEAC FROM BT COTTON TO DMH-11 MUSTARD

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Abstract

The GM Rules, 1989, serving as the mother legislation for genetically engineered technology, laying down a regulatory structure with multiple authorities and overlapping functions, has been intervened with multiple times. Not being the first author to discuss the same therefore, it is ideal to dig further in the ‘un-amended’ Rules that has been providing direction to implementation of agricultural biotechnology since its inception. While Bt Cotton received its green signal from the Genetic Engineering Appraisal Committee (GEAC) in 2002, the road that GEAC, as the final decision-maker of genetically engineered organism in India, travelled, has not been majorly reflected across literatures. Failed attempts with Bt Brinjal and DMH-11 Mustard not only questions the efficiency and effectiveness of GEAC as the sole determining authority but also raises constructive doubts on the functioning of the regulatory framework under the surviving Rules to combat health and environmental risks that GM crops possess. The prima facie function of any cultivated crop is to make it available for consumption which is why the GM Rules, 1989 has to be intrinsically connected to the food laws in India, namely, the Food Safety and Standards Act, 2006 and the National Food Security Act, 2013. As GM Rules, 1989 continues to battle for its existence in today’s growing biotechnological applications towards agriculture, its co-existence with mentioned legislations must be looked with grave significance. Being an unpredictable living thing in an even more unpredictable natural world, the

question whether something that gets controlled and regulated in the hands of few, be able to suffice the larger crowd, sustains for GM crops.

Keywords

GM crops, Agricultural biotechnology, GEAC, Regulatory framework, Governance

1. Introduction

Regulation of any technology requires more than just vesting powers in the hand of statutory authorities to govern such technology thereby serving the purpose for its introduction. Genetic technology has received enormous legislations, rules, regulations, international conventions, circulars, codes alongside a complex set of advisory, professional and regulatory bodies, committees and industry associations.¹ The question therefore is how effective these existing mechanisms are to make regulation a facilitation. Coming back to the discussion of the present research, the scope remains grounded to the Indian context with primary focus on the GM Rules, 1989. The Rules came into existence by virtue of Sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (EPA, 1986) with a holistic perspective on safety against the risks posed by handling and production of any product of gene technology.

GM crops, being a product of gene technology, have received varied opinions from two extremes, namely, the proponents and the opponents. With each group having their established grounds with substantive evidence validating perspectives, integration of divergent views become necessary to channelize the course of actions that the technology should adopt. Regulations play a notable

¹ Food Safety and Standards Authority of India, 'Operationalizing the Regulation of Genetically Modified Foods in India' (FSSAI 2022) https://fssai.gov.in/upload/uploadfiles/files/fssa_interim_regulation_on_Operatonalising_GM_Food_regulation_in_India.pdf accessed 9 February 2026.

role in connecting stakeholders'² viewpoints along with societal necessities. This is why it becomes important to enquire into the existing regulatory mechanism governing GM crops in India. Consequences of commercial release of GM crops remain unknown even to biotechnologists carrying out such research, which is why, pre-release assessment in terms of increased regulatory filters, remains significant.³

While there has been an elaborated list of authorities that the GM Rules, 1989 is designed with, finding discussions in the later part of this article, the primary authority grabbing attention has remained to be the GEAC. The reason behind the same is this authority remains the final decision-maker as far as GMOs and its products are concerned. GEAC has been vested with wider scope in 2010⁴, as its name changed from approval to appraisal committee indicating the role of the authority being inclusive of risk assessment, handling and management and approval of GMOs. The provisions by virtue of which the 1989 Rules has been enacted deals with rule making power of the Central Government to maintain environmental welfare, for individuals, dealing with hazardous substances. The new name of the old authority makes it a better compliant of the EPA, 1986 therefore.

Interestingly enough, the three decades old statute and authorities functioning under it, primarily governing GMOs and its offspring, did not seem to require restructuring or re-assessment. This imbibed confidence is possible only when the said Rules functions without any hurdles, but, GM crops instances in India, repeated claims on regulatory failures, courts' effort in awakening existing

² Marion Desquilbet & Sylvaine Poret, 'How do GM/non GM coexistence regulations affect markets and welfare?' (2014) 37 Eur JL & Econ 51.

³Suman Sahai, 'GM Research and Its Impact on Indian Agriculture' in Tata Energy Research Institute (ed), *Relevance of Genetically Modified Plants to Indian Agriculture* (TERI 2003) 107.

⁴ Ministry of Environment and Forests, Notification (Change of Name of Genetic Engineering Approval Committee) 2010, GSR 613(E).

authorities, activists' collective efforts in raising awareness, suppressed farmers' voices, and hue and cry among general public, has a different story to offer. In order to determine the potential of this authority, a look into the journey it has decided for itself from the first commercial release of a cash crop, Bt Cotton to the first commercial release of a food crop, GM Mustard, definitely counts.

2. Reflecting on the GM Rules, 1989 from the lenses of GM crops cultivation in India

Notified under the EPA, 1986, the GM Rules, 1989 was introduced with the primary objective of putting in place a biosafety framework in India. Being a transformative technology in itself, gene technology comes with well-defined as well as unnamed threats towards human health, environment and nature. Such being the case, the Preamble of the 1989 Rules, expressly defines the legislative intent behind the introduction of the said Rules. Rule 2 of the said Rules, while having an inclusive approach towards defining the scope of the 1989 Rules, makes it mandatory for the Rules to apply in areas listed in Rule 2(2) and 2(3). GM crops remain a de jure component of the said Rule therefore, considering its literal interpretation.

It is interesting to note that the fulcrum of the 1989 Rules rest on the back of Rule 4 that lays down the existing regulatory framework for governance of Genetically Modified Organisms (GMO) in India. Spread over five clauses, mentioning five different authorities with each uniquely designed with a primary purpose and overlapping secondary functions, as provided hereunder, the GM Rules, 1989 definitely must have had a long-term goal in mind since its inception. The advisory committee working with the authorities mentioned below, namely the Recombinant DNA Advisory Committee (RDAC) is decorated with the function of reviewing biotechnological developments at domestic and international fronts along with recommendation of safety regulations in GMO associated research.

This authority, specifically speaking, aids the authorities listed under⁵ to make an attempt in fulfilling their functions and exercising required statutory powers.

Rule 4	Authority	Power and Function	Liability
Rule 4(2)	Review Committee on Genetic Manipulation (RCGM)	● Monitoring safety in ongoing research related to gene technology. ● Laying down procedures for regulatory processes involving GMO to minimize environmental risks. ● Restricting any activity with GMO that is statutorily prohibited.	The usage of the word 'shall' in the Rules make it mandatory for the concerned authority to abide by the same. But, consequences of such violation do not find any express mentioning under the said Rules.

⁵ The Table given is a representation of the authorities established under Rule of the GM Rules, 1989.

Rule 4(3)	Institutional Biosafety Committee (IBSC)	Preparing emergency plans according to the guidelines of RCGM to combat unprecedented challenges encountered in activities associated with GMO.	
Rule 4(3)(1)	Genetic Engineering Appraisal Committee (GEAC)	● Providing approval to all such activities that are carried out with GMO or in association with GMO. ● Approving proposals of genetically engineered organisms following quality assessment. Such approval is for the twin	

		purpose of experimental field trials as well as environmental release. ● Deliberate release of GMOs in special cases either for experimental field trials environmental release. ● Take punitive actions against unauthorized handling of GMO under the EPA, 1986.	
Rule 4(4)	State Biotechnology Co-Ordination Committee (SBCC)	● Inspect and investigate violation of EPA, 1986, if any, by	

		industries and institutions. ● Authorized to take punitive actions⁶ in cases involving violation of EPA Act, 1986. ● Periodical review of safety measures adopted by industries and institutions.	
Rule 4(5)	District Level Committee (DLC)	● Monitoring safety protocols involved in installing GMO and related applications, from an environmental perspective. ● Regularly submitting reports on its	

⁶ The Environment (Protection) Act 1986, ss 15–16.

		functioning either to the GEAC or the SBCC.	
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Drawing from Hohfeld's jural correlatives⁷, power walks with liability for otherwise the former witnesses an uncontrolled nature with inclination towards arbitrariness followed by minimized transparency and accountability. It therefore is noteworthy to mention that the GM Rules, 1989 has nowhere expressed its intention to make room for liability of the existing authorities. The source of the same is loosely attached to the mandatory tonality of Rule 4. Furthermore, while there remains a way to review the decisions of the GEAC and SBCC through appeal under Rule 19, such have to be made by any authority appointed by the Ministry of Environment, Forests and Climate Change (MoEFCC). This limits the scope of expecting liability enforcement for the authorities equipped to award deterrent under the EPA Act, 1986 by virtue of the 1989 Rules.

Different stakeholders ranging from biotechnology scientists, medical scientists, environmentalists to that of farmers, business groups and consumers have different opinions to be kept on plate which largely influence the Indian government in policymaking process.⁸ Agriculture being a subject-matter of State List⁹ will have the involvement of both Central and State government. As far as field trials for GM crops are concerned, no-objection certificate (NOC) has been

⁷ Walter Wheeler Cook, 'Hohfeld's Contributions to the Science of Law' (1919) 28 Yale Law Journal 721.

⁸ Asheesh Navneet, 'Policymaking in the Context of Contestations: GM Technology Debate in India' (2018) 6(1) Studies in Indian Politics 117.

⁹ Commission on Centre-State Relations, *Report: Summary of Recommendations* (Vol 7, 2010) ch 14.

received from four states only, namely, Punjab, Delhi, Andhra Pradesh and Maharashtra.¹⁰ Even then, India has witnessed ‘a not-so-transparent’ behaviour by the authorities under the 1989 Rules with respect to the approval and denial of GM crops introduced in India.

With GEAC being the final decision-maker,¹¹ the spotlight rests on the same, although its actions are inter-woven with the other four authorities designed under the 1989 Rules. By virtue of Rule 9(2) of the 1989 Rules, GEAC ‘may’ in ‘special cases’ proceed with ‘deliberative release’ of GMOs. While this discretionary power does not have clarity on cases where it is to be used, the additional note given under Rule 9(1) defines ‘deliberative release’ as intentional transfer of GMOs to the environment in whichever way possible. The consequences of the prevalent ambiguity in the said Rule remains grave, requiring immediate attention for the existing cases surrounding GM crops in India can be said to be a by-product of Rule 9(2)’s application.

As has been mentioned previously, both the GEAC and SBCC have the authorization to take punitive actions against violators. Firstly, GEAC’s actions are based out under the EPA, 1986¹² which does impose heavier deterrent on contravention of Rules, 1989 or any incidental directives. Whether such is the case for SBCC as well has not been expressly mentioned in the Rules as it says that SBCC imposing punishment is a possibility upon ‘violation of statutory provisions’. Although Rule 15 of the 1989 Rules categorises ‘penalties’ as a different sub-head, other than 15(2), the Rule has nothing beneficial to offer as far as its title is concerned. It is well understood that violation of any provision of Rules 1989 or the EPA, 1986 largely, will be leading to affecting human health

¹⁰ Kiran Pandey, ‘GE Cotton: Three States Refuse NOC for Field Trials’ (*Down To Earth*, 7 June 2023) <https://www.downtoearth.org.in/agriculture/ge-cotton-three-states-refuse-noc-for-field-trials-89855> accessed 10 February 2026.

¹¹ Rules for the Manufacture, Use, Import, Export and Storage of Hazardous Micro-organisms/Genetically Engineered Organisms or Cells 1989, GSR 1037(E), r 7.

¹² *Supra* 4.

and environment but what happens when the authorities themselves infringes such safety? The question can only be answered if there were liabilities in place with a check and balance framework for regulating the regulatory bodies.

While domestically the scenario remains grey for India, internationally speaking, with the introduction of the Cartagena Protocol on Biosafety, a need for a biosafety framework was felt among several developing countries. By reading the Protocol with the Convention on Biological Diversity (CBD)¹³, the roadmap for handling, transporting and minimizing risk-based consequences associated with GMOs, can be discovered. While both the statutes promote precautionary approach¹⁴ towards GMO handling¹⁵, a similar trend is noticed in Indian legislations dedicated towards such governance. Interestingly enough, the application of such principle appears to remain eclipse by the whimsies of the existing authorities. A reflection has been discussed in the forthcoming headings. The present grey areas do invite ambiguity in terms of a future picture and calls for an in-depth research with respect to functions and powers adopted and implemented by the authorities under the GM Rules, 1989.

2.1. GEAC's role in promoting Bt Cotton cultivation in India: Could the functional transparency question be addressed?

Bt Cotton, released in 2002, amidst the absence of relevant information on GMOs in India among civil society, became the first and only commercial release of a GM crop in India.¹⁶ It was the introduction of Bt Cotton in India that led to

¹³ Convention on Biological Diversity (opened for signature 5 June 1992, entered into force 29 December 1993) 1760 UNTS 79 (CBD) art 11.

¹⁴ Cartagena Protocol on Biosafety to the Convention on Biological Diversity (adopted 29 January 2000, entered into force 11 September 2003) 2226 UNTS 208 (Cartagena Protocol) art 10.6.

¹⁵ Cartagena Protocol on Biosafety to the Convention on Biological Diversity (adopted 29 January 2000, entered into force 11 September 2003) 2226 UNTS 208 (Cartagena Protocol) art 18.

¹⁶ Pushpa M Bhargava, 'GM Mustard and India's Future' (2016) 51(49) Economic & Political Weekly 10.

different political discourse between its proponents and opponents. Among the proponents of the transgenic crop, the technology was conceived as a solution to a primary challenge of the cotton sector, bollworm infection, thereby reducing the dependency on pesticides, benefitting farmers, agricultural economy and the environment.¹⁷ Release of any other GM crop, commercially, with such affirmation, did not see the day light post 2002 owing to conflict of interest among authorities, as many cite.¹⁸ It is noteworthy to mention that while approving Bt Cotton for environmental release, the GEAC had no precedent to follow therefore co-ordination among different ministries, namely the Ministry of Agriculture, Health, Environment and Forest and Science and Technology, was the only way to make this initiative work.

Interestingly enough the 2006 Report¹⁹ released by a sub-committee formed under the MoEFCC exempted approved genes from extensive biosafety and agronomic testing, moving towards an 'event based approval system' instead of the 'case by case approval process'. An urgent need to strengthen enforcement mechanisms was duly felt by the committee alongside dissemination of information concerning field trials to the public. Weaknesses in the processes of the regulatory bodies giving approval to the field trials has been pointed out in the Technical Expert Committee Report²⁰ as well. Furthermore, the TEC opined for Post-Release Monitoring (PRM) as an important aspect to assess environment and health-safety issues. The committee was appointed following the order of the

¹⁷ Ian Scoones, 'Regulatory Manoeuvres: Understanding the Bt Cotton Controversy' in Ian Scoones (ed), *Science, Agriculture and the Politics of Policy: The Case of Biotechnology in India* (Orient Longman 2006) 242.

¹⁸ *Supra* 9.

¹⁹ Expert Committee on Application of Agricultural Biotechnology, 'Recommendations for Streamlining the Current Regulatory Framework for Transgenic Crops' (May 2012) http://www.geacindia.gov.in/resource-documents/sub-committee-reports/mayee_report.pdf accessed 9 February 2026.

²⁰ Technical Expert Committee, 'Final Report' (August 2013) <https://indiagminfo.org/wp-content/uploads/2013/08/TEC-Main-Report-2.pdf> accessed 9 February 2026.

Supreme Court in a writ petition filed by Aruna Rodrigues and others.²¹ Alongside this, the Parliamentary Standing Committee which assessed the prospects and effects of the cultivation of genetically modified food crops, observed that further research and development on transgenic crops should be done only in strict containment and field trials should not be undertaken till the government puts in place required regulatory, monitoring, oversight, surveillance and other structures.

The notable difference in the government's success slogans on Bt Cotton and the committee reports does reveal politics behind GM technology which is necessary to be considered before introducing a GM Policy in India. If Bt Cotton is taken as an example of a successful transgenic crop adaptation in India, it shows rapid technological acceptance amidst rigorous opposition.²² But, parallel to such success lies stories of farmers' suicide,²³ limited accessibility to usage of technology in agriculture among farmers, cultivation without field trials, etc.

2.2. The 'bringing in' and 'taking out' tale on Bt Brinjal: What went wrong on the regulators part?

It was the success of Bt Cotton that led to the introduction of Bt Brinjal in India. As far as brinjal production in India is concerned, mishap created by fruit and shoot borer alongside chemical pesticides became responsible for the advent of Bt Brinjal.²⁴ It was the RCGM that concluded Bt Brinjal to be environmentally sound and effective in carrying out its purpose and objective. Furthermore, declaring food safety assessment of Bt Brinjal to be in compliance with the

²¹ *Aruna Rodrigues & Ors vs Union of India & Ors* 2012 AIR SCW 3340

²² Debanshu Khettry and Sreenivasulu NS, 'Regulation of Agricultural Biotechnology in India: Environmental Law and Other Policy Considerations' (2016–17) 5 *Environmental Law & Practice Review* 122.

²³ *ibid.*

²⁴ Genetic Engineering Appraisal Committee, 'Minutes of the 97th Meeting of the Genetic Engineering Appraisal Committee' (16 September 2009) <http://www.geacindia.gov.in/Uploads/MoMPublished/2009-geac-97.pdf> accessed 9 February 2026.

‘Guidelines for the safety assessment of foods derived from GE plant, 2008’²⁵, the crop was said to be neither toxic nor allergenic to humans and animals. As discussed previously, GEAC goes by RCGM’s recommendation and the present case was nothing different.

The trials on Bt Brinjal that was carried out by Mahyco, with an intention to commercialize it, along with GEAC’s field trials and research data was always kept in abeyance of the public. With Supreme Court’s intervention in the Bt Brinjal debate,²⁶ GEAC was mandated to release the reports submitted by Mahyco thereby helping the debate reach a conclusion from the civil society’s end that the trials conducted were deficient. Although clearance from GEAC’s end in 2009²⁷ led to release of Bt Brinjal in the environment, the interesting factor here is that Mahyco, the company who came with this transgenic crop, and as had claimed, followed GEAC’s directives before leading to Bt Brinjal’s release. But, the repercussions of such release owing to negligent assessments that have been carried out does not make Mahyco responsible, for it did what the apex regulator of GM crops in India has guided it to do.

Interestingly, within a year, the decision of imposing a moratorium on commercial release of Bt Brinjal until independent scientific studies reached their satisfaction of clearing the transgenic crop amidst environmental and health tensions was made by the MoEF on 9th February, 2010.²⁸ It was the lack of proper bio-safety regulations for the environmental release of transgenic crops in India that made the Biotechnology Regulatory Authority of India Bill, 2013 (BRAI

²⁵ Department of Biotechnology and Ministry of Environment and Forests, *Guidelines for the Safety Assessment of Foods Derived from Genetically Engineered Plants* (2008) 12.

²⁶ VS Viswambharan, ‘Eat, Pray, Law: Implications of the Absence of a Coherent Regulatory Regime and the Problem of Genetically Modified Food in India’ (2013) 2(1) Nirma University Law Journal 9.

²⁷ *Supra* 16.

²⁸ Jairam Ramesh, ‘Moratorium on Bt Brinjal’ (*Centre for Science and Environment*, 9 August 2010) <https://www.cseindia.org/moratorium-on-bt-brinjal-jairam-ramesh--1051> accessed 10 February 2026.

Bill, 2013)²⁹ feel its importance. BRAI Bill, 2013 which came with major flaws, one of them being exclusion of GM crops and foods from the purview of Food Safety and Standards Act, 2006, failed to achieve anything significant.³⁰

2.3. Approval of DMH-11 Mustard for cultivation: Repetition of past mistakes?

GM Mustard, considered to be the first indigenously developed crop in India, was recommended for environmental release on October 18, 2002 through the 147th Meeting of GEAC.³¹ Although introduced as an answer to edible oil shortage, GM Mustard, failed to achieve its purpose as opponents' defence citing failed technology application in previous cases of Bt Cotton and Bt Brinjal weighed more.³²

While procedure laid down in GM Rules, 1989 gets followed before approval of any transgenic crop and further release in the environment, the interesting factor is the way each meeting conducted by GEAC is presented before the public. It appears that while GEAC had already made up its mind to proceed with GM Mustard without adequate risk assessment and biosafety protocols, delaying the same through meetings appeared to be a deliberate attempt in covering up its failed efforts. The discussed transgenic crop was the first food crop to be approved by GEAC³³ with no involvement of Food Safety and Standard Authority

²⁹ PRS Legislative Research, 'The Biotechnology Regulatory Authority of India Bill, 2013' (*PRS India*) <https://prsindia.org/billtrack/the-biotechnology-regulatory-authority-of-india-bill-2013> accessed 11 February 2026.

³⁰ Coalition for a GM-Free India, 'What's Wrong with the BRAI Bill 2013? Read On to Find Out' (*India GM Info*) <https://indiagminfo.org/whats-wrong-with-the-brai-bill-2013-read-on-to-find-out/> accessed 9 February 2026.

³¹ Press Information Bureau, 'GEAC Recommends Approval for Genetically Modified Mustard' (21 July 2023) <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1897008> accessed 10 February 2026.

³² Vandana Shiva, 'GMO Mustard: An Unnecessary, Toxic, and Failed Technology' (*Navdanya International*, 2022) <https://navdanyainternational.org/gmo-mustard-an-unnecessary-toxic-and-failed-technology/> accessed 14 February 2026.

³³ Genetic Engineering Appraisal Committee, 'Minutes of the 136th Meeting of the Genetic Engineering Appraisal Committee' (12 October 2018)

of India (FSSAI) in the meeting granting such approval. It was the Indian Council for Agricultural Research (ICAR) and Indian Council for Medical Research (ICMR) involved at biosafety research level to take care of environment and food safety concerns.³⁴ Considering the easier road travelled by the GEAC and the associated authorities in this case, consciously ignoring the previous encounters it had with its unfavourable decisions on transgenic crops, heavier consequences were knocking its doors. It was a series of connected petitions that the division bench of the Supreme Court heard in a significant case of *Gene Campaign v. Union of India*³⁵ involving the GM Mustard dispute. Although resulting in split verdict, the observations made by the bench, individually, pointed out grave reluctance on the part of GEAC carried out uniformly since its induction.

Interestingly, one of the fundamental issues addressed by the Apex Court was whether GEAC's decision in approving the environmental release of GM Mustard was according to the law. Such questions are raised to set the narrative in order to discuss what the regulatory framework fails to. While the Court began with how GEAC violated its order³⁶ by not putting up the biosafety dossier for public comments even after dual inspection by sub-committees formed, it focused on GEAC's independent decision of deferring field trials after unsatisfactory *consensus ad idem*. But it was the letter from the Centre for Genetic Manipulation of Crop Plant (CGMCP) to the MoEFCC that made GEAC a dictation taking body merely. GEAC's brain child, the Expert Committee newly constituted, suggested risk assessment of transgenic GM specifically on honeybees as pollinators 'post-

<http://www.geacindia.gov.in/Uploads/MoMPublished/MoMPublishedOn20181012223929.pdf> accessed 11 February 2026.

³⁴Genetic Engineering Appraisal Committee, 'Minutes of the 147th Meeting of the Genetic Engineering Appraisal Committee' (20 September 2022) <http://www.geacindia.gov.in/Uploads/MoMPublished/MoMPublishedOn20220909190233.pdf> accessed 11 February 2026.

³⁵ *Gene Campaign vs Union of India* 2024 INSC 545.

³⁶ *Supra* 14.

environmental release'.³⁷ Going by the settled principles of administrative law,³⁸ authoritative decision-making is to be backed by reasons alongside adoption of principles of fairness, equity and good conscience. Furthermore, such authority established by a statute is bound by it and has to deliver functions in accordance to it. Therefore, neglecting mandates and functions required to be performed as provided in the law makes the decision of GEAC legally unsound and unstainable.³⁹ The notable judgment, although not to be presumed as authoritative precedent, for two contrasting opinions on the plate, provided a definite observation by extending the scope of judicial review to GEAC's decision.

Mustard, which has not been limited to being an oilseed only, extends to Indian cuisine as far as its leaves are concerned as well. It is this wholesome purpose that calls for a "holistically aware" approach that not only popularizes GM mustard seeds but preserves naturally occurring seeds as well.⁴⁰ It was therefore by virtue of this judgment that GM Mustard was withdrawn indefinitely from the activities it was proposed with unless an appropriate bench be appointed by the Hon'ble Chief Justice of India.

3. Co-existence of GM Rules, 1989 and Food laws in India: Tracing the provisional compatibility

Carrying forward a rather uncomfortable discussion, taking into consideration the three fundamental cases of GM crops in India, the missing link that seems to exist is provisional compatibility between the biosafety framework and the food laws

³⁷ DTE Staff, 'GEAC Approves Field Studies of GM Mustard on Honey Bee' (Down To Earth, 26 October 2018) <https://www.downtoearth.org.in/agriculture/geac-approves-field-studies-of-gm-mustard-on-honey-bee-61947> accessed 14 January 2026.

³⁸ SR Rao and KV Prabhu, 'Genetically Modified Crops in India: Testing the Waters' (2001) 6(2) Science, Technology & Society 251.

³⁹ *Supra* 48.

⁴⁰ Krishnadas Rajagopal, 'Indigenous GM Mustard Meant to Make Edible Oil Cheaper, Reduce Import, Centre Tells Supreme Court' *The Hindu* (New Delhi, 18 January 2024) <https://www.thehindu.com/news/national/indigenous-gm-mustard-meant-to-make-edible-oil-cheaper-reduce-import-centre-to-supreme-court/article67751742.ece> accessed 13 January 2026.

of India. The supporters of GM crops have indeed recognised the role of modern biotechnology as a catalyst to attain food security.⁴¹ It is the advantages of biotechnology that vests equal importance on the right of everyone to enjoy scientific benefit and the right to food.⁴² For these rights to be enforceable, tracing their statutory existence is a necessity which is why the present research dedicates itself in unfolding the fraternity between 1989 Rules and the two relevant food legislations in India.

As far as GM crops that will serve consumption purposes are concerned, GEAC's reasoned decision should be a reflection of FSSAI's consultation.⁴³ This is because food security comes with food safety. The burden of ensuring the same although rests entirely on FSSAI, owing to the nature of the crops being transgenic, GEAC must walk along. It was the recent encounter of the Apex Court with the efficiency of the existing GMOs governing authorities that worried the former about the absence of FSSAI's regulation as far as GM processed food and food crops are concerned, since the very beginning.⁴⁴ The reading together of the GM Rules, 1989 alongside food legislations is indicative of an efficient approach towards managing larger risks of toxicity, allergenicity, nutritional analysis, etc. While the Food Safety and Standards Act, 2006 focuses on 'safe wholesome food for human consumption'⁴⁵ by laying down required standards, the National Food Security Act, 2013 promotes 'increased access of adequate quantity of quality food' for human consumption. Both legislations have definite inclination towards safe and quality food indicating the legislative intent behind their drafting.

⁴¹ Stéphanie Barral, 'The Bt Cotton Controversy in India: What is at Stake for Indian Farmers?' (2014) 49(14) Economic and Political Weekly 41.

⁴² Arjunan Subramanian and Matin Qaim, 'Impact of Bt Cotton on Farmers' Health: A Case Study from India' (2009) 6(2) EcoHealth 263.

⁴³ *Supra* 52.

⁴⁴ *ibid.*

⁴⁵ Food Safety and Standards Act 2006, Preamble.

Prior to the introduction of the 2006 legislation, GEAC remained the de jure authority to decide upon release of GM foods for human consumption. Such being inclusive of GM food crops as well. But by virtue of the FSSAI in place following 2006, the scenario changed significantly. Section 22 of the said legislation expressly confers competence to regulate GM foods through the inclusion of ‘genetically modified or engineered food or food containing such ingredients’ within the definition of food. There exists no harm in expanding the interpretation of the provision to extend to any GM crops that will ultimately be consumed by the masses. Keeping this in mind, it becomes ideal for GEAC to mandatorily include FSSAI in the former’s decision-making as far as the related subject-matter is concerned.⁴⁶ An absence of the same in both Bt Brinjal⁴⁷ and GM Mustard cases⁴⁸ has been alarming therefore.

Back in 2008, GEAC had adopted “Guidelines for Safety Assessment of Foods derived from GE Plant”⁴⁹. Such was in consonance with the guidelines issued by Codex Alimentarius Commission (CAC). In both the discussed cases of Bt Brinjal and GM Mustard, whether such guidelines were followed by GEAC before final approval, how were such guidelines followed, who checked on such following, remains unattained. The best evidence for that remains the consequences discussed previously in this article. Furthermore, India being an

⁴⁶ Food Safety and Standards Act 2006, s 22.

⁴⁷ Genetic Engineering Appraisal Committee, ‘Decisions Taken in the 107th Meeting of the Genetic Engineering Appraisal Committee’ (9 February 2011) <http://www.geacindia.gov.in/Uploads/MoMPublished/2011-geac-107.pdf> accessed 10 February 2026.

⁴⁸ SpicyIP, ‘The End of the Regulatory Lacunae? Analyzing the Rajasthan High Court’s Definitive Mandate on GM Food Safety’ (*SpicyIP*, 11 November 2025) <https://spicyip.com/2025/11/the-end-of-the-regulatory-lacunae-analyzing-the-rajasthan-high-courts-definitive-mandate-on-gm-food-safety.html> accessed 10 February 2026.

⁴⁹ Department of Biotechnology, *Guidelines for the Safety Assessment of Foods Derived from Genetically Engineered Plants* (2008) https://dbtindia.gov.in/sites/default/files/GE_Plant_2008.pdf accessed 14 January 2026.

elected member⁵⁰ in the Executive Committee of CAC, has been getting definite opportunities to substantially contribute to setting up international standards for food thereby deciding its ideal future.⁵¹ Such being the case, it becomes even more relevant for India to have an effective domestic biosafety framework in place to embrace challenges and not suffer because of them. It is ideal for the framework to be composed of authorities specially made to regulate GMOs and its products and regulators assigned for ensuring healthy and safe food for human consumption. It is for this reason compatibility between provisions of GM Rules, 1989 and the food laws in India remains the need of the time.⁵²

3.1. The Food Safety and Standards Act, 2006: An underrated regulation governing consumable GM crops

The definition of 'food' by virtue of Section 3(k) of the Act extends to GM food as well thereby setting the tone for the discussion as to whether FSSAI has to have a substantial involvement in regulation of the same.⁵³ Section 16 of the legislation carries forward this conversation by vesting FSSAI with the function of enforcing quality control in relation to any article of food alongside maintaining transparency among enforcement authorities by communicating the method of sampling and analysis for such food products. Such authority as far as GM crops that are produced for human consumption are concerned includes those established under the GM Rules, 1989.⁵⁴ FSSAI has also been responsible for providing technical aids and scientific advice to the Central Government for the

⁵⁰ Press Information Bureau, 'Union Environment Minister Reviews Status of GM Mustard' (18 July 2024) <https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=1981926> accessed 9 February 2026.

⁵¹ Ministry of Environment, Forest and Climate Change and Biotech Consortium India Limited, *Genetically Modified Crops and Regulations in India: Myths vs Facts* (2019) <https://www.biotech.co.in/sites/default/files/2020-01/2019%20Genetically%20Modified%20Crops%20and%20Regulations%20in%20India%20%E2%80%93%20Myths%20vs%20Facts%20C%202019.pdf> accessed 10 January 2026.

⁵² 'Social Security in India (continued)' (1953) 16 Soc Sec Bull 22.

⁵³ Klaus M Leisinger, 'Biotechnology and Food Security' (1999) 76 Current Science 488.

⁵⁴ *Supra* 48.

purpose of policy framing in relation to food safety and nutrition.⁵⁵ It goes without saying that such advice has not been required even when the matters surrounding GM crops remain vibrant and juvenile. The absence of FSSAI's representative while GEAC took the final call to allow commercial cultivation of the first GM food cash crop,⁵⁶ supports the above contention.

By virtue of Section 18 of the Food Safety and Standards Act 2006, the general principles governing food safety have been established, ipso facto applying to GM crops made available for consumption.⁵⁷ The FSSAI has been cited under Clause 1(b) of the provided provision to be responsible for carrying out risk management following risk assessment for all food released in the market. It becomes the inherent liability of RCGM under the GM Rules, 1989 therefore to give effect to its approved duty of monitoring safety of ongoing projects involving GMO, in an efficient manner.⁵⁸ On the basis of such assessment will the IBSC come up with its emergency plan as a precautionary measure. Scientific uncertainty welcomes risk, the consequences of which on human health remains unfound. While the FSSAI takes into account the same under Section 18(1)(c), the RCGM's attention has to be drawn to work with the former thereby reflecting on health safety alongside previously assigned environmental safety.

Section 18(2)(d) of the 2006 Act voices transparency and welcomes participation from the grass-root level in the process of preparation, evaluation and revision of a regulation passed by the FSSAI.⁵⁹ Interestingly enough, GM Rules 1989 mentions DLC as one of the five authorities under it, working in districts, whose

⁵⁵ Food Safety and Standards Act 2006, s 16(3).

⁵⁶ *Supra* 69.

⁵⁷ RT Gahukar, 'Status of Genetically Modified Food Crops in India' (2002) 31(1) Outlook on Agriculture 43.

⁵⁸ Rules for the Manufacture, Use/Import/Export and Storage of Hazardous Micro Organisms/Genetically Engineered Organisms or Cells 1989, r 4(2).

⁵⁹ Albert C Lin, 'Biotechnology: Emerging Technology Past and Present' in *Prometheus Reimagined: Technology, Environment, and Law in the Twenty-first Century* (University of Michigan Press 2013).

mandatory responsibility is to regularly submit its safety monitoring of GMO-related activities report to either the SBCC or GEAC.⁶⁰ Additionally, Section 30 of the Act mandates the appointment of the Commissioner of Food Safety by the State Government to holistically address public health effects, handling, production and sale of food products for consumption, raising needed awareness among the general public in subjects of food safety and standards as adopted and effectively implementing decided standards of food safety.⁶¹

Furthermore, Section 30 read with Section 39 of the 2006 Act makes the Commissioner liable for exceeding vested power by levying a penalty of up to one lakh rupees on it. It is because of such existing liability that the Commissioner is made to carry out its activities according to the law. Additionally, a self-regulatory mechanism has been incorporated by Section 28 of the Act using which a food business operator can withdraw the food, all by themselves, which appears to not be in compliance with the 2006 Act or any incidental rules. Such remains the protective shield to safeguard 'misinformed' consumers the whereabouts of their consumption.⁶² A contrary situation is noticed in case of the GEAC and authorities under Rules, 1989 as the scope of liability is absent making no room for cross-checking their activities that have been time and again appeared to be in contravention of the existing regulations. Reading the Rules with the Act is therefore indispensable for better governance of GM crops produced for ultimate consumption or GM foods, whatever the case may be.⁶³ The work which remains therefore is not structural outlining but implementation

⁶⁰ Rules for the Manufacture, Use/Import/Export and Storage of Hazardous Micro Organisms/Genetically Engineered Organisms or Cells 1989, r 4(5).

⁶¹ Colin A. Carter & Guillaume P. Gruere, 'New and Existing GM Crops: In Search of Effective Stewardship and Coexistence' (2012) 4 *Ne U LJ* 169.

⁶² Sanyukta Biswas and Vasu Jain, 'GM Food: Do We Have a Choice' (2014) 2 *International Journal on Consumer Law and Practice* 74.

⁶³ H Charles J Godfray and others, 'Food Security: The Challenge of Feeding 9 Billion People' (2010) 327 *Science* 812.

of the existing system in a harmonious manner for both GEAC and FSSAI in order to contribute towards effective capacity building.

3.2. The National Food Security Act, 2013: The Tomorrow's Move

Although food security remains an independent variable to GM crops and discussions related to it, the relationship cannot be avoided. The objective of genetic engineering in the context of food security is to not remain inventing freakish hybrids but to sustain yields of cultivated plants.⁶⁴ The need for better governance and an appropriate long-term structural planning by the stakeholders to gene technology is therefore felt.⁶⁵ It is in this context the social-welfare based legislation, the Act of 2013, finds its position. Food security through GM crops is not expressly discussed in this legislation but it prima facie appears that the legislators while drafting the Act did not completely ignore the potentials of transgenic crops in mitigating food insecurity in India. Such is evident by virtue of Section 31 read with the Third Schedule of the Act.

The provision uses the phrase 'advancing food and nutritional security' thereby indicating that transgenic crops are to be used to do more than what organic cultivation is successfully doing and not merely replace the latter by the former.⁶⁶ While doing so, the Central Government along with the state governments and local authorities, in order to revitalise agriculture, need to multiply investments in agriculture in terms of research and development, promoting increased productivity and production in it. Increasing yield has remained the fundamental reasons for introduction of transgenic crops in India⁶⁷, as has been the common

⁶⁴ *Supra* 68.

⁶⁵ World Health Organization, 'GM Food and Food Security' in *Modern Food Biotechnology, Human Health and Development: An Evidence-Based Study* (World Health Organization 2005), <https://www.jstor.org/stable/resrep35658.9>, accessed 12 February 2026.

⁶⁶ Colin A. Carter & Guillaume P. Gruere, 'New and Existing GM Crops: In Search of Effective Stewardship and Coexistence' (2012) 4 *Ne ULJ* 169

⁶⁷ S Jhansi Rani and R Usha, 'Transgenic Plants: Types, Benefits, Public Concerns and Future' (2013) 6 *Journal of Pharmaceutical Research* 879.

justification in the previously discussed cases, communicated both by MoEFCC and GMOs governing authorities. But whether such could bring in agricultural overhaul that helps the farmers, breeders, producers and consumers, the pillars upholding agricultural practice in India, remains a question.⁶⁸ Moreover, India being a federal democracy, effective capacity building signifies involvement of three-tier level of governments, a structure existing in both GM Rules, 1989 and FSSAI, 2006 and also established by Sections 38 and 39 of the 2013 Act.

The National Food Security Act, 2013 has been rarely discussed in the existing literature with respect to GM crop cultivation and food to be produced from it for consumption purpose. The reason, although unknown, may be the unidirectional interpretation of the 2013 legislation to implement the right to food as a fundamental right under Article 21 of the Indian Constitution. A small yet powerful hidden phrase in the Preamble of the Act that is 'quality food', and the relevant phrase 'advancing food security' provided in Section 31, has been completely forgotten to be a part of this legislation.⁶⁹ The latter incorporates the principles of sustainable development⁷⁰ as food security being a social problem that needs to be mitigated for the present generation without neglecting the scope of such a challenge for the generations to come.⁷¹ It is for these reasons; the 2013 Act has to be included whenever food security is discussed in the context of GM crops and its governance in India.

4. Conclusion and Recommendations

The 'much celebrated' US-India Trade Deal received global attention owing to India's consistent negotiation to un-accept GM crops that witnessed a significant

⁶⁸ Vandana Shiva and others, *The Future of Food: Farming with Nature, Cultivating the Future* (Navdanya International 2019).

⁶⁹ National Food Security Act 2013, s 31.

⁷⁰ Richard Bownas, 'Lost in Transnationalism? GMOs in India and the Eclipse of Equitable Development Discourse' (2016) 11(1) *Journal of South Asian Development* 67.

⁷¹ Emily Webster & Peer Zumbansen, 'Transnational Food (In)Security' (2018) 9 *Transnat'l Legal Theory* 175.

push from the West.⁷² Portraying its socialist spirits, India, while expressing reluctance towards modern biotechnological products, intended to hide its underlying fear. One of the fundamental reason behind opposing GM crops, that goes untraced has remained the fragile state of the domestic legislation that the country is home to. Irrespective of whatever stand India took to protect its subjects, ignorance is not bliss in this context.

Applications surrounding plant biotechnology often become prey to misrepresentation when in contact with the masses and is cited to be prejudicial to the public because of the consequences it offers and the risks they are designed with. From approving a GM crop for field trials following providing green signal to its environmental release and furthering commercial cultivation making it ultimately fit for human consumption, the final call has always been of the GEAC. When authorities themselves are well versed with the unforeseen health and environment hazards that GM crops possess together with being metabolically dangerous for consumption, it would not be wrong to presume that the burden of remedying grave outcomes vests on the authorities entirely. The article locates the ideal loopholes in the working of the GEAC under the GM Rules, 1989 thereby tracing its functions reflective in the three primary cases of transgenic crops that India witnessed.

The Hindu reported⁷³ approval of confined field trials of GM Maize by the GEAC and scheduled to be carried by Punjab University although such activities are to be limited to research purposes only for the timing with commercialization at hold. While oppositions have not ignored this new entrant, the absence of

⁷² Abhijay A, 'Seed of Resistance: How India's Farmers are Blocking a GMO-powered Trade Deal?' *Down to Earth* (18 July 2025) <https://www.downtoearth.org.in/agriculture/seed-of-resistance-how-indias-farmers-are-blocking-a-gmo-powered-trade-deal> accessed 12 February 2026.

⁷³ Confined Field Trials on GM Maize to Begin Soon at Punjab Agricultural University' *The Hindu* (15 July 2025) <https://www.thehindu.com/news/national/punjab/confined-field-trials-on-gm-maize-to-begin-soon-at-punjab-agricultural-university/article69814457.ece> accessed 11th January 2026.

competent authority in places supports opponents' concern. In addition to this, USA's push for GM crops⁷⁴ has been worrisome thereby keeping the US-India trade deal in an unfinished position as farmers cultivating such crops already are likely to be the prey to such acceptance by India. Even though by citing farmers' distress, diplomats have been shifting their attention from the depressing domestic legislations governing GM crops with some not fit enough to be used and others being kept underused, reality does not change. With these troubles entering as unwelcome guests in India, she became the first country to develop genome-edited rice varieties⁷⁵ intending to revitalize agricultural scenes but interestingly not involving the GEAC in the decision-making. Citing absence of foreign gene insertion, GEAC's approval has not been considered in the same. There arise two possible questions in this context, one being, whether diplomats wish to do something indirectly, what cannot be done directly and if at all GEAC has a defined scope when it comes to exercising its regulatory powers. While the first question can be answered in affirmative, the following question supports the first answer as GM Rules, 1989 is ideally supposed to govern everything coming from genetic engineering usage, be it insertion or absence of foreign gene.

With ambiguity hovering around legislature and the executive, the judiciary, although in a split verdict⁷⁶, have exercised reasonableness while indicating the need for a GM Policy in India with increased transparency and accountability as far as the GEAC's working is concerned. It not only needs work within the GM Rules, 1989 by amending the age-old legislation with provisions of liability for

⁷⁴ U.S. Trade Deal: India Targeting July 8 Deadline but Can Extend to Aug. 1 if Deal Specifics Don't Suit' *The Hindu* (8 July 2025) <https://www.thehindu.com/business/Industry/us-trade-deal-india-targetting-july-8-deadline-but-can-extend-to-aug-1-if-deal-specifics-dont-suit/article69786855.ece> accessed 12 February 2026.

⁷⁵ Press Information Bureau, 'Union Agriculture Minister Shri Shivraj Singh Chouhan Announces Two Genome-Edited Rice Varieties Developed in India' (4 May 2025) <https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2126802> accessed 13th January 2026.

⁷⁶ *Supra* 64.

the authorities and streamlined process of approving a GM crop but also a collective reading with the food laws in India to adopt and add necessary things highlighted in this article. It is only through effective authorities in place can the fate of GM crops in India be decided.