

**LAWFOYER INTERNATIONAL**  
**JOURNAL OF DOCTRINAL LEGAL**  
**RESEARCH**  
**(ISSN: 2583-7753)**

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Volume 2 | Issue 1

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2024

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# PATENTING OF GENETICALLY MODIFIED CROPS: A GLOBAL EXPLORATION OF LEGAL AND ETHICAL PERSPECTIVES

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## I. ABSTRACT

Genetically modified crops have become a ground-breaking technique in the field of agricultural innovation, offering potential solutions to an array of problems concerning food security, sustainability, and increased agricultural output. Within this dynamic landscape, the patenting of genetically modified crops is a pivotal issue in the intersection of biotechnology, agriculture, and intellectual property, raising significant legal, ethical, and environmental questions. The research commences by exploring the historical development of patent laws, analysing how these laws have evolved to incorporate the complexities of genetically modified crops (GMCs). This research paper presents a comprehensive exploration of the legal and ethical perspectives surrounding the patenting of Genetically Modified Crops by conducting a comparative analysis across different nations, shedding light on the diverse global perspectives. The study delves deeply into the ethical ramifications of granting patent rights to GMO companies, investigating concerns related to market monopolies, seed accessibility, and the diminishing rights of farmers. It critically evaluates the equitable enforcement of these patents, particularly among small-scale and marginalized farmers, taking into account variables like traditional seed-saving practices, innovative approaches, and existing economic disparities. Through comprehensive case studies and rigorous legal analyses, the research elucidates the issues faced in India. This research is an effort to bring light into the discrepancies associated with patenting of biotech inventions.

## II. KEY WORDS:

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Gm Crops – Patenting –Legal And Ethical Issues –Farmers Right –Global Approach

### III. INTRODUCTION

The story of the patenting of genetically modified crops (GMCs) is a complicated web of promises, moral quandaries, and complexity that takes place in the wide field of agriculture, where innovation and soil meet. Imagine a sunny field where the unrelenting advance of biotechnology has collided with conventional farming methods. Here, the seeds not only have the capacity to produce food, but also the intellectual imprint of genetic alteration, a phenomenon that has completely transformed our food production systems.

Nina Fedoroff, An American Molecular Biologist said that, there's almost no food that isn't genetically modified. Genetic modification is the basis of all evolution. Things change because our planet is subjected to a lot of radiation, which causes DNA damage, which gets repaired, but results in mutations, which create a ready mixture of plants that people can choose from to improve agriculture.

This research paper on patenting genetically modified crops unfolds a wide area of agriculture where biotechnology contradicts with conventional farming. This paper commences by shedding light on the global market of GM crops. It examines India's existing regulatory framework. The paper takes examples of case studies to derive a judicial perspective on the issue. The paper examines the ethical and legal aspects and the transformative impact of utility patents. As we delve into this comprehensive exploration, we aim to dissect the challenges farmers face, the implications on the world food supply, and the delicate balance required to foster innovation while safeguarding ethical considerations.

### IV. GENETICALLY MODIFIED CROPS AND GLOBAL MARKET

Genetically Modified Organism (GMO) is an organism. It can be a plant, animal or microorganism whose genetic material has been altered by biotechnology. Usually, the transfer and mixing of genetic information happens through conventional breeding, but here, the DNA of such organisms are altered in some way through genetic engineering. The genetic material can also be manipulated in a plant by

manipulating its deoxyribonucleic acid. This process led to the formation of genetically modified crops. China became the first country to grow GM crops. They modified tobacco in such a form that it can resist tobacco mosaic virus.

The market for genetically modified crops is very diverse. The market size was around \$21.08 billion in 2022. This size increased at a compound annual growth rate (CAGR) of 5.8% to reach \$22.29 billion in 2023. The world economy was in a revival phase after the COVID-19 pandemic. The war between Russia and Ukraine disrupted the recovery rate, causing a surge in commodity prices, inflation, etc. The war even affected the growth of the market for genetically modified crops. The world nations are expecting stable growth till 2027 at a CAGR of 5.9%.<sup>3</sup>

The global genetically modified crops market is segmented on the basis of different features like traits, crops, techniques, and types of modification. The global genetically modified crops market is segmented on the basis of different features like traits, crops, techniques, types of modification and applications. The market for genetically modified crops is very large because of its increased benefits compared to other traditional crops. It helps the farmers to overcome many hurdles each season to bring their crops to harvest. It helps us address the issue of climate change; it protects plants from damaging insects, invasive weeds, and emerging diseases. It helps the farmers to use precious natural resources like land and water more efficiently.

These advantages made the world nations widely use the crop. North America is the largest market, followed by South America in second place as per the record for 2022. The countries covered under this market include Australia, Brazil, China, Germany, India, Indonesia, Japan, Russia, South Korea, the UK and the USA.<sup>4</sup>

## **V. TRACING THE HISTORY OF REGULATORY FRAME WORK IN INDIA**

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<sup>3</sup> Genetically Modified Crops Global Market Report 2023, Business Research Company, published on January 2024, (Accessed: 30 January 2024), Available at <https://www.bcresearch.com/partners/tbrc-market-briefs/genetically-modified-crops-global-market-report.html>

<sup>4</sup> Ibid 1

Genetically modified (GM) seeds in India are governed primarily by Section 3(j) of the Patents Act, 1970. This provision expressly excludes plants, seeds, plant varieties, and essentially biological processes for plant production and propagation from patentability, aligning with India's commitments under Article 27 of the TRIPS Agreement. Furthermore, India has extended these exclusions to cover "plants and animals in whole or any part thereof," explicitly incorporating seeds into the non-patentable category. Notably, this provision excludes natural and GM seeds from direct patent protection.

The Patents Act does not explicitly address their patentability in the context of genes and genomic sequences. However, Section 3(j) restrictions encompass natural genes, cells, tissues, and nucleic acids without any specified limitations. The Act acknowledges the patentability of recombinant genes, provided they demonstrate an inventive step and industrial application and involve substantial human intervention. This categorization is reinforced by the Mashelkar Committee Report, which classifies recombinant genes as "chemical compositions" eligible for patenting. Despite the direct inadmissibility of plant patents in India, a notable avenue emerges wherein recombinant genes indirectly pave the way for patent rights on resulting plants. A case in point is the instance of Bt Cotton, where a recombinant gene secured a patent in India, demonstrating the nuanced interplay between gene patents and plant patentability.

Examining the economic dimension, companies engaging in GM seed technology may leverage patents through licensing hybrid technology or directly selling seeds. However, technological barriers hinder seed propagation, particularly in GM seeds, compelling farmers to purchase new seeds each planting season. Consequently, patents play a limited role in scenarios where technological constraints impede seed viability and propagation.

In parallel, the Protection of Plant Variety and Farmer's Rights Act, 2001 (PPVFR Act) complements the Patents Act by defining varieties, including propagating material such as seeds, and encompassing transgenic varieties. The PPVFR Act introduces "researcher's rights," enabling breeders to license varieties without authorization for

developing new varieties. Moreover, the Act incorporates benefit-sharing provisions, ensuring that companies have a stake in the benefits derived from subsequent varieties.

The history heads from the setting up of National Biotechnology Board and issuance of the safety guidelines relating to biotechnology in 1983. This particular effort was taken by the nation to undertake and promote biotech researches in laboratories. The year 1986 is marked by the establishment of Department of Biotechnology replacing then existed National Biotechnology Board. The Ministry of Science and Technology was in charge of the board. It was bestowed with the function of developing the safety guidelines, monitoring their implementation and promoting biotechnology related activities within the national jurisdiction. Later the development of the biotech field and invention of genetically modified crops make it difficult for the ministry to deal with it. Later, the works related to genetically modified organism were reallocated to Ministry of Environment and Forest. The ministry will draft and notify the rules necessary for the use, export and import of microorganisms and genetically modified organisms or cell in 1989. These are the EPA rule 1989 under 'hazardous substances.

The rules to regulate the genetically modified crops will come under section 3(2)(iv) of the EPA Act 1986. These rules to regulate GMO and GM crops come into force on 13 September 1993. In conclusion, India boasts a well-balanced regulatory framework for intellectual property rights concerning GM seeds, with stringent provisions outlined in the Patents Act and additional coverage provided by the PPVFR Act. The potential patenting of plant varieties arising from patented genes remains a grey area, posing implications for farmers and local companies. While awaiting further clarification, the PPVFR Act serves as a safeguard by adequately addressing existing loopholes in the regulatory landscape.<sup>5</sup> To sum up, the Patents Act of 1970 and the Protection of Plant Variety and Farmer's Rights Act of 2001 merge in order to establish India's complex regulatory framework for genetically modified seeds. Even though there are problems with plant variety patenting, the PPVFR Act serves as a safeguard

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<sup>5</sup> Maurya, Arun Kumar, and Ashwini Siwal. "Current Legal Status of GM Crops in India with Special Reference to Intellectual Property Laws." *NUJS Journal of Regulatory Studies*, Vol. VI, Issue I, Hein Online pp. [2]-[9] (2018).

by filling in regulatory gaps and emphasising the constant need for clarity in this changing environment.

## VI. JUDICIAL APPROACH IN INDIA

Granting patents to GM crops and related issues is complex. The Supreme Court has yet to pronounce any direct decision on its own. The first PIL was filed in 2005, challenging the grant of GM crops. Subsequently, the Supreme Court (SC) established a panel to propose a moratorium on genetically modified (GM) field trials. In an initial report, the panel advocated an extended suspension of GM crop field trials for the upcoming decade and a comprehensive prohibition on the commercial introduction of GM crops. The final report was submitted only in July 2013. There was only one dissenting opinion which supported the release of GM crops.<sup>6</sup>

In case of *Diamond v. Chakraborty*<sup>7</sup>, first time a successful effort was made to patent a live artificial microorganism. Chakraborty developed a new species of bacterium called *Pseudomonas putida*, capable of metabolizing hydrocarbons that constitute crude oil. He applied for a patent. The patent office denied the application because microorganisms are products of nature and, therefore, unpatentable. It was held that man-made microbes are not naturally occurring and therefore patentable.<sup>8</sup> Given that patent laws explicitly encompass materials similar to those under consideration. No particular statute excludes them; the most suitable conclusion is that microorganisms produced through recombinant DNA technology are eligible for patent protection – US Supreme Court.<sup>9</sup> This judgement settled the conflict what is patentable and what is not.

The Monsanto had a series of cases with different farmers across different countries.

- **Monsanto Canada Inc. vs Schmeiser**<sup>10</sup>

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<sup>6</sup> Kumar, S., Bhatnagar R. K., Kranthi, K. R., & Datta S. K, The legal battle over field trials of crops to the Supreme Court in October 2012.<http://www.natureasia.com/en/nindia/article/10.1038/nindia.2014.14>, Accessed on 12<sup>th</sup> December 2024

<sup>7</sup> 447 U.S. 303, 100 S. Ct. 2204, 65 L. Ed. 2d 144, 206 U.S.P.Q. (BNA) 193 (U.S. June 16, 1980)

<sup>8</sup> *Diamond v. Chakraborty*, 447 U.S. 303 (1980)

Available at: <http://supreme.justia.com/cases/federal/us/447/303/case.html>

<sup>10</sup> [2004] 1 S.C.R. 902, 2004 SCC 34

A Canadian farmer named Percy Schmeiser was charged with violating Monsanto's patent on Roundup Ready Canola, a genetically modified (GM) variety that is resistant to the company's herbicide, in the *Monsanto Canada Inc. v. Schmeiser* case. The Canadian Supreme Court determined that Schmeiser had infringed upon Monsanto's patent, highlighting that this was solely a case of patent infringement and ignoring any issues pertaining to farmers' rights or biosafety. The court ruled that, even though Schmeiser had not profited financially, he had 'used' the patented gene or cell since Monsanto's patent on genetically modified organisms covered the entire plant, casting doubt on the distinction between patenting genes and plants. Nonetheless, the court determined that Schmeiser owed Monsanto nothing because his "use" of the invention had not resulted in any financial gain.<sup>11</sup>

- **Bowman v. Monsanto Co**<sup>12</sup>

The United States Supreme Court, in the case of *Bowman v. Monsanto Co.*, unanimously maintained Monsanto's patent rights over Roundup Ready soybeans, a genetically engineered variety that is resistant to the herbicide glyphosate. In the case, farmer Vernon Bowman bought Roundup Ready soybean seeds under a limited licence that permitted planting for one season for his first crop. Bowman purchased less expensive 'bin-run soybeans' from a grain elevator, which might have included Roundup Ready traits, for later, riskier plantings. These soybeans were planted and harvested by Bowman, who preserved the desired trait's seeds for future plantings. Bowman's defence of patent exhaustion was rejected by the Court, which emphasised that the doctrine does not allow buyers to create new copies of the patented product. The decision aimed to protect patent holders' rights and maintain incentives for innovation. The Supreme Court explained in upholding the ruling that although patent exhaustion permits the resale or use of the acquired patented article, it does not

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<sup>11</sup> Philippe Cullet, *Lessons from Canada*, International Environment Law Research Centre, accessed on 10<sup>th</sup> February 2024, <https://www.ielrc.org/content/n0407.htm>

<sup>12</sup> 569 U.S. 278 (2013)



confer the authority to make new copies of the patented item without the patent holder's consent.<sup>13</sup>

- **Nuziveedu Seeds Ltd v. Monsanto Technology LLC.**

Monsanto developed a transgenic cotton variety called Bt II cotton seed by manipulating the cotton genome by introducing a foreign gene, Cry2 Ab. They secured a process patent for the same. Later on, Monsanto licensed seeds to Nuziveedu. The company transferred the genetic trait into indigenous plants to cultivate hybrid cotton varieties. They paid royalties to Monsanto. Later, the agreement was cancelled due to some issues with royalty payments. Monsanto files patent infringement against Nuziveedu. The primary issue was whether the process patent granted came under the exclusion of section 3 (j) of the patent act. The court held that it is excluded from protection and can be protected under the PPVFR Act. They directed Monsanto to continue the supply of GM hybrid seed according to the already issued license. The case went to the Supreme Court, which upheld the High Court's decision. The court gave months to take protection under the Protection of Plant Variety and Farmers Act,2001.<sup>14</sup>

The European Enlarged Board of Appeals broadened the definition of "essentially biological processes" for plant production under Article 53(b) of the European Patent Convention (EPC) in the case of *Plant Bioscience Limited v. Syngenta Participations AG Groupe Lima grain Holding*.<sup>15</sup> The ruling established the general exclusion from patentability of non-microbiological processes, such as sexual crossing and plant genome selection. The important difference, though, is that these processes are not excluded from patentability because they involve an extra technical step that introduces or modifies a trait independently of gene mixing through sexual crossing. Using this interpretation, it was argued that the exclusionary provisions of Article

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<sup>13</sup> Theresa Bevilacqua and Kristin Stastny, *In the Courts: Monsanto v. Bowman: Supreme Court upholds patent holders' rights*, WIPO Magazine, accessed on 10<sup>th</sup> February 2024 at 5.00AM available at [https://www.wipo.int/wipo\\_magazine/en/2013/03/article\\_0007.html](https://www.wipo.int/wipo_magazine/en/2013/03/article_0007.html)

<sup>14</sup> Viral Maru, *Nuziveedu Seeds Ltd. vs. Monsanto Technology LLC (3 SCC 381): A Case Analysis*, International Journal of Legal Science and Innovation volume 6

<sup>15</sup> *Plant Bioscience Limited v. Syngenta Participations AG Groupe Lima grain Holding*, G2/07 dated 9 December 2010, page 71

53(b) EPC should not apply to transformation processes, which entail the introduction of recombinant DNA constructs and significant human intervention.<sup>16</sup>

The importance of human intervention in the transformation process was highlighted by the European Enlarged Board of Appeals in the parallel case of *Plant Genetic Systems v. Greenpeace*. It emphasised that human interference was necessary for the insertion of a relevant DNA sequence into a plant's genome, and that this was a critical technical step for patent eligibility. It was determined that the first plant to be obtained through this kind of transformation was a result of a microbiological process. Based on these ideas, the argument argues that the recombinant synthetic DNA construct and related transformation technique in Indian Patent No. 214436 should not be classified as "essentially biological" under Section 3(j) of the Patents Act since they involve significant human intervention. It does this by drawing a distinction between transformation and conventional breeding.<sup>17</sup>

Analysing these case studies helps us infer the patentability of genetically modified crops in different countries. This allows us to understand the approach of developed nations like Canada and the US and developing nations like India. This enables to have a comparative analysis in judicial perspectives globally. Even though there is no interdependence or binding of decisions. There is a substantial amount of influence in policy making.

## VII. GM CROPS-ETHICAL AND LEGAL ISSUES

Genetically Modified Crops have come into prominence during the recent decades. Plant breeders apply GM technology to various crops for better harvests. This particular area has many complexities. This includes both ethical and legal. The legal complications revolve around the patenting of Genetically Modified Crops, while the ethical aspects concern the creation of monopolies over matters like health and food, which are nothing but essential needs of humans. Biological materials are treated as

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<sup>16</sup> Aliko Nichogiannopoulou. "Examination in the Field of Biotechnology at the EPO - Part II: Plants/ Animals & Medical Methods." WIPO National Workshop on Search & Examination of Inventions Related to Genetic Resources, Volume 2

<sup>17</sup> Mike Adcock (2004) The Relationship between IP and Biotechnology, *Global Bioethics*, 17:1, 25-29  
DOI: 10.1080/11287462.2004.10800839

discoveries as they exist in nature. The emergence of the World Trade Organisation and its agreement on trade-related aspects of intellectual property turned the scenario upside down. The change from discovery to invention has changed with hybridisation and biotechnology.

Since plants and seeds are products of nature and did not fall under the purview of the patent system at the time, they were regarded as patentable material. Property rights for purposefully developed varieties were granted by the US Plant Patent Act in 1930. Patents could only be granted for living things that were both valuable and unique. Originally limited to asexual seed reproduction, this was expanded to include sexual seed production in the 1950s. Plant seed germination was also protected by the Plant Variety Protection Act of 1970, but it was only applicable to farmer-performed research and seed saving. The legalisation of germplasm for commercial purposes did not occur until 1980. Although the interpretation of the law was wide, it was deliberate, and human made.<sup>18</sup>

GM crops issues are very complex. We focus on its positive side most of the time. The best argument in its favour is that genetically engineered crops are the best method to feed the world. We need to remember the other side. GM crops are about patented ownership of food supply.

The agribusinesses and top biotech companies patent the seeds from GM crops. This forces poor farmers to buy those seeds every year at the exorbitant price fixed by the companies. This will affect the farmer's independence in choosing seed varieties. Countries like Brazil, the US, and Argentina reduced farmers' independence in choosing seeds. The GM businesses have brought out the seed companies, thus controlling seed availability. The slogan GM crops for hunger has yet to be proven through any research. Research conducted by over 400 scientists funded by the World Bank did not endorse GM crops as a solution to world hunger.

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<sup>18</sup> GMO Literacy Project "Biotechnology intellectual property law", available at: <https://sites.psu.edu/gmoliteracyproject/current-legislation/biotechnology-intellectual-property-law/> Accessed on 25 December 2023

The main issue related to GM crops is the associated safety issues. This has been under much debate. As more crops are produced for field testing and commercialization, there is concern regarding the potential risks that may arise for humans and the environment. Biosafety is a principle and policy to ensure the environment and personal safety. 167 countries have adopted the Cartagena Protocol on Biosafety. The agreement came into force in September 2003. This agreement set forward protocols for the safe transborder movement of living organisms and focused on harmonizing methodology for risk assessment. This agreement made it mandatory to seek the approval of regulatory authorities before conducting any research in genetically modified organisms or crops. Some common fear exists of the creation of new allergens or toxins. The development and spread of modified genes into other relative crops and the development of antibiotic-resistant bacteria form significant concerns of safety issues.

The biggest threat of GM food is the harmful effect on the human body. The long-term effects on the human body cannot be adequately analysed. The health effects are unknown, making people hesitate to use GM crops. GM crops are considered an unnatural way of producing food by many religious and cultural communities. Transferring animal genes into plants makes the situation uncomfortable for a specific population. The predominance of developed countries over developing and underdeveloped countries is a result of GM crops.

Some argue that the manipulation of genetic material for commercial purposes is unethical. It questions the concept of ownership of life. Some other sectors strongly support manipulation to improve people's quality and standard of living. Ethical issues regarding the environment are the other concern. GMOs negatively impact the equilibrium that exists in the ecosystem. The crossbreeding of modified genes may lead to the creation of unwanted species in the eco system.<sup>19</sup>

The research conducted by Nuffield Centre on Bioethics has put forward various issues. The main suggestion from the part of researchers is the bio safety regulations.

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<sup>19</sup> Haon Chen, Yongjun Lin, Promise and issues of genetically modified crops, *Current Opinion in Plant Biology*, Volume 16 issue 2, pgs. 255to 260

The advent of genetically modified (GM) crops and other advances in modern biotechnology have led to the introduction of biosafety regulations in many countries including India. Notwithstanding the fact that these policies aim to balance environmental preservation with technological advancement. The ethical considerations are frequently ignored, especially when it comes to the rights of Indian farmers to a livelihood and contractual justice. It is still difficult to apply descriptive ethical principles in real-world situations. To ensure that the fundamental rights of Indian farmers are protected in addressing this disparity, a thorough evaluation of the ethical implications of genetically modified crops technology must be carried out.

Adoption of optimal procedures, policy guidelines, and a legislative framework is necessary to assist policymakers in assessing the bioethical concerns Education on legal responsibilities is crucial. Balancing biosafety regulatory measures is essential, striking a middle ground between relaxed and rigid laws. Ethical intervention in the current GM crop technology system is necessary to protect farmers' rights and ensure a harmonious coexistence between GM crop development and ethical considerations.<sup>20</sup>

### **VIII. PATENTING OF GMO'S AND ITS EFFECT ON FARMERS**

Genetically modified crops and transgenic crops completely changed the world market. The revolution began in North America and then it spread to other parts of the world. These crops have advantages like high yield, herbicide tolerance and higher productivity for farmers.<sup>21</sup>The Multi-National Companies are keen on dominating the seed market. They started buying up seed companies and biotech companies to satisfy their goal. The monopoly or domination of these companies resulted in domination of 30-40% of world seed market by 10 top transnational companies. The multinational companies not only patent the manipulated genetic strains and but also the processes

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<sup>20</sup> Prof Ian Kennedy, Genetically Modified crops: the ethical and social issues, Nuffield Council ON Bioethics available at <https://www.nuffieldbioethics.org/assets/pdfs/GM-crops-full-report.pdf> accessed on 11th February 2024 9.00 AM

<sup>21</sup> Samantha M. Ohlgart, The Terminator Gene: Intellectual Property Rights vs. the Farmers' Common Law Right to Save Seed, 7 DRAKE J. AGRIC. L. 473 (2002).

of creation.<sup>22</sup>This particular nature of the transnational companies is having different effect on developed and developing nation.

Farmers face difficulties with seed patents because they limit what they can grow and result in higher royalties than are currently paid for plant breeders' rights. They also obstruct the UN Declaration of Peasant Rights and People Living in Rural Areas' recognition of the right to preserve, use, exchange, and sell farm-saved seed or propagating material. The farming lobby group Copa-Cogeca, which formally opposes crop patents, acknowledges this threat to farmers. Farmers may also run the risk of being sued for patent infringement. This is demonstrated by the US, where between 1997 and 2010, Monsanto - which has since merged with Bayer – filed 144 lawsuits alleging that farmers had failed to pay royalties on patented genetically modified seeds.<sup>23</sup>

To shed more light upon the issue we need to refer an application submitted by agricultural activist Kavitha Kuruganti, the Protection of Plant Varieties & Farmers' Rights Authority issued a historic order in December 2021 rescinding Pepsico's exclusive rights to the potato variety 'FL 2027.' The multinational company registered 'FL 2027' in 2016, which is an essential part of its well-known Lays chips. In 2018 and 2019, the company filed civil lawsuits against Gujarati farmers, claiming they should have been compensated for growing 'FL 2027' without belonging to exclusive 'collaborative farming' clusters.

The subject of the dispute was Pepsico's legal action and claim of exclusive rights against farmers, who customarily saved and shared seeds. In its order, the Protection of Plant Varieties & Farmers' Rights Authority acknowledged Pepsico's procedural errors but placed a strong emphasis on the public interest and the harassment that farmers endure. Notably, the order recognised the legal validity of Kavitha Kuruganti's application, citing concerns raised by the public. With the revocation of

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<sup>22</sup> Peter Straub, *Farmers in IP wrench*, *Hastings International and Comparative Law Review*, Volume 29,

<sup>23</sup>Corporate Europe Observatory. Available at: [https://corporateeurope.org/sites/default/files/2022-10/G2\\_BIOTECH\\_GIANTS\\_EXPOSED\\_MEDIA\\_BRIEFING.pdf](https://corporateeurope.org/sites/default/files/2022-10/G2_BIOTECH_GIANTS_EXPOSED_MEDIA_BRIEFING.pdf) (Accessed: 17 January 2024).

Pepsico's exclusive rights over "FL 2027," the resolution saw a resounding victory for the farmers. This ruling recognised the wider significance of farmers' rights and the public interest in the context of intellectual property disputes in addition to being based on procedural irregularities. One of the farmers from Sabar kantha in north Gujarat, Bipin Patel, who was sued by Pepsico, came to represent the farmers' victory in this case.<sup>24</sup>

On analysing the above case study, we can understand the issues faced by ordinary farmers in the hands of giant companies. The story of Bipin Patel is a representative one. There are many others in the list. Bipin was lucky enough to get the support of activists and the concerned authorities. Else, he would have lost his livelihood in the struggle.

Private companies have recently been driving to intellectual property (IP) protection, especially through patents, as a result of the increasing privatisation of agricultural research. They claim that such measures are necessary to protect their large research investments. There are concerns regarding possible access restrictions, especially for resource-poor farmers in developing nations, as a result of the push for strict intellectual property rights on genetically modified (GM) crops. The relationship between genetically modified crops and intellectual property rights has become a contentious social issue in India. The relationship between genetically modified crops and intellectual property rights has become an important topic of conversation in India. A coalition of global non-governmental organisations (NGOs), Indian civil society action groups, and farmers' organisations is strongly against genetically modified (GM) crops and the related intellectual property protection, arguing that these advancements are potentially harmful to farmers. Notably, scholars like Herring cast doubt on the success of this civil society campaign, arguing that the widespread

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16 Kavitha Iyer, *India's Potato-Chip Tussle: How Gujarat Farmers Won A Battle – But Not The War – Against Pepsico*, Article 14, published on 3<sup>rd</sup> January 2022, available at <https://article-14.com/post/india-s-potato-chip-tussle-how-gujarat-farmers-won-a-battle-but-not-the-war-against-pepsico-61d26768dd419>, accessed on 12th February 2023, 4.00 pm

acceptance of genetically modified Bt cotton is proof that the campaign failed to address the real issues and concerns of farmers.<sup>25</sup>

Patents on genetically modified (GM) crops have a big influence on farming practices in both developed and developing nations. All plants and plant material, including seeds with altered genetic features, are patentable in developed nations like the US and Canada. Generating, utilising, or commercialising the seeds or other plant parts without getting a licence from the patent holder is prohibited by these patents. Farmers who are not aware that some of the plants in their fields have manipulated DNA run the risk of facing legal repercussions as a result. The production of food in developing nations is largely dependent on small-scale subsistence farmers. But now, multinational seed companies are going after the seed markets in these nations. According to them, GM crops have the potential to significantly contribute to the fight against hunger and malnutrition by increasing small farmers' productivity and creating crops that specifically cater to the needs of the undernourished.

Furthermore, under the new intellectual property (IP) regimes, farmers will be required to sign licence agreements that will force them to purchase new seeds every season. Simultaneously, transnational corporations use their political clout to secure patent protection to open up developing nations to their genetically modified products and ensure that they receive an equivalent level of intellectual property protection as those in the US and other developed nations. It is expected that manipulated DNA from GM varieties will contaminate other crop varieties, especially "landraces," in developing nations where crop plants' wild ancestors are still present.

## **IX. EMERGENCE OF UTILITY PATENTS - US APPROACH**

When plant varieties and biological inventions became a part of IP Regime of US, the private companies started investing in plant breeding. In US, these have strong legal backup provided by Plant Patent Act of 1930 and the Plant Variety Protection Act of

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<sup>25</sup> Lodewijk Van Dycke and Prof. Geertrui Van Overwalle, Indian Patents on Bt cotton in view of the socio political Background, Journal of Intellectual property ,Information Technology and Ecommerce Law, available at <https://www.jipitec.eu/issues/jipitec-8-2-2017/4564> accessed on 12th February 2023 at 8.30 pm



1970. The landmark judgement of *Diamond V. Chakraborty* authorised use of patents by biological inventions.

To understand the importance of Utility Patents, a comparative analysis of TRIPS Agreement US Utility Patents, EPC and UPOV Convention 1991. All the four shares common granting criteria emphasizing novelty, inventive step and industrial applicability. The UPOV Convention of 1991 requires the plant variety to satisfy the condition of industrial application. TRIPS, US Utility Patents and EPC mandate the utility as a condition for patenting. The protection under EPC extends to biological material, genes, and plant groupings. The UPOV grants the right to prevent sale and stocking of specific plant varieties. In US utility patents the protection is granted for all biological materials, genes and genotype. Compulsory licences are not permitted in US utility patents, are not explicitly mentioned in the EPC, and may be restricted for public interest reasons under the 1991 UPOV Convention. However, they are permitted under certain conditions in TRIPs. The patent length under the 1991 UPOV Convention is 25 years for other varieties, 30 years for trees and vines, and 20 years for TRIPs, US Utility Patents, and EPC. The legal frameworks governing intellectual property rights are nuanced, reflecting a balance between promoting innovation and protecting the public interest.

The importance and relevance of utility patents incentivize innovation and technological development. US Utility patents are essential for inventors and businesses, granting exclusive rights for 20 years. This exclusive right allows the inventors to invest in research and development, fostering economic growth and development. In short, utility patents play a pivotal role in encouraging innovation by providing inventors with temporary monopolies and, at the same time, finding an equilibrium between safeguarding intellectual assets while promoting knowledge protection for the public good.<sup>26</sup>

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<sup>26</sup> Sachin Chaturvedi, *Agriculture Biotechnology and new trends in IP regime*, Economic and Political Weekly, Volume 37, No.13 pgs 1212-1222 available at <https://www.jstor.org/stable/4411924>

Renowned civil society activist Vandana Shiva, who is connected to Navdanya, voiced her vehement opposition to Monsanto-Mahyco and other genetically modified multinational corporations introducing Bt cotton in 2006. Shiva maintained that the introduction of Bt cotton had negative effects on Indian farmers, driving them into ever-greater debt and impoverishment. She said that thousands of farmers were forced into a debt trap as a result of the high cultivation costs and poor returns associated with Bt cotton, and that this situation left them with no choice but to commit suicide.<sup>27</sup> Beyond its focus on agronomic effects, Shiva's critique explicitly challenges the socioeconomic effects of Bt cotton, highlighting farmers' reliance on large seed companies and the high costs associated with cultivation. This viewpoint is consistent with that of the Deccan Development Society, an Andhra Pradesh-based grassroots group that draws a direct connection between intellectual property (IP) and the purportedly detrimental effects of biotechnology, specifically Bt cotton. They contend that despite biotechnology's heralded status as a lifesaver for the impoverished globally, its advancement is primarily driven by corporations who invest billions of dollars in proprietary technologies and use intellectual property rights (IPRs) to exploit farmers.

## **X. CONCLUSION AND SUGGESTION**

Renowned civil society activist Vandana Shiva, who is connected to Navdanya, voiced her vehement opposition to Monsanto-Mahyco and other genetically modified multinational corporations introducing Bt cotton in 2006. Shiva maintained that the introduction of Bt cotton had negative effects on Indian farmers, driving them into ever-greater debt and impoverishment. She said that thousands of farmers were forced into a debt trap as a result of the high cultivation costs and poor returns associated with Bt cotton, and that this situation left them with no choice but to commit suicide<sup>28</sup> Beyond its focus on agronomic effects, Shiva's critique explicitly challenges the socioeconomic effects of Bt cotton, highlighting farmers' reliance on

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<sup>27</sup> Shiva, 'Resources, Rights and Regulatory Reform' (2006) 3 Context pp. 85-91.

<sup>28</sup> Ibid 25

large seed companies and the high costs associated with cultivation. This viewpoint is consistent with that of the Deccan Development Society, an Andhra Pradesh-based grassroots group that draws a direct connection between intellectual property (IP) and the purportedly detrimental effects of biotechnology, specifically Bt cotton. They contend that despite biotechnology's heralded status as a lifesaver for the impoverished globally, its advancement is primarily driven by corporations who invest billions of dollars in proprietary technologies and use intellectual property rights (IPRs) to exploit farmers. The various aspects discussed by the paper also brought in a similar conclusion.

- Recommendation and suggestions form a crucial role in present scenario.
- We have to strengthen and enforce regulations so that patent rights do not lead to market controls and do not restrict access to seeds, especially for small and marginal farmers.
- Direct access to genetically modified crop technologies and equitable enforcement of patent rights must be balanced properly.
- Foster an international debate, discussions and surveys on the ethical implications of granting patents to transgenic companies, taking into account the possible impacts on food safety, the environment and farmers right. It provides comprehensive procedures for resolving ethical issues related to the patenting of genetically modified crops.
- The laws should be strengthened in such a way, that it mandates the GM companies to adopt ethical licensing practices focused on the needs of farmers and consumers, especially in developing countries.
- Encourage independent research into the risks and benefits of genetically modified crop. This can take into account ethical considerations and protect the interests of farmers and consumers.
- In particular in nations that are developing, we should promote public discussion and involvement on the moral implications of genetically modified products. This will ensure that ethical concerns are properly taken into account when dealing with the interests of farmers and consumers.

- Guarantee fair access to crop technologies that have undergone genetic modification, so as to prevent patent rights from impeding market regulations and limiting the availability of seeds.
- The focus of this improvement strategy is on small and marginal farmers in developing nations. This could involve taking steps to raise public awareness of the ethical concerns surrounding the patenting of genetically modified products as well as providing direct access to the technology, private research, procedural licencing, and public participation.
- Establishment of ethical boards as in many European country can help to tackle the issue. Proper regulatory bodies and organisations should be there to help the farmers in IP wrench.

In conclusion, patenting genetically modified crops presents a challenging intersection of ethical, legal, and environmental issues. It demands a fair and impartial strategy that protects farmer's, consumers, and the world food supply's interests while encouraging innovation and sustainability.