

Genetically Modified Seeds and Farmers' Rights: Threat or Opportunity?



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Abstract

The farming and agriculture industry has always supported technological progress, especially in the area of genetic enhancement of breeding and genetic crop improvement. For decades, the industry has naturally mixed the genetic characteristics of seeds in search of particularly robust varieties. Genetically Modified Seeds (GM seeds) represent a significant advance in the production of agricultural crops. GM seeds are seeds that have been modified with specific properties such as herbicide resistance. However, the modification method used for Genetically Modified Seeds differs significantly from the traditional method: the genes were not modified by generations of cross-pollination, but inserted directly into the seed DNA. Although this method is more effective, critics fear that the result - a "new combination of genes" - could have health or environmental effects that could not be adequately addressed. As a result, the technology is surrounded by considerable controversy. Farmers need to understand both the opportunities and threats of using Genetically Modified Seed. The benefits of the technology increase yields and reduce consumption of pesticides and herbicides and give more profit. Concerns that farmers should address before acquiring a technology, one must include private contractual relationships between farmers and seed companies, the environmental impact of the technology and the potential impact of consumers' concerns (national and international) on the gene market products. In this research paper, researcher would try to find out, whether technology patenting a good scope of invention which otherwise can be benefited to masses, Does farmers free trade affected by seed patenting? Does dependency of farmer on packed seeds increased by new upcoming terminator seeds? The focus of the paper shall be to examine the these questions and study the impact of seed patenting on farmers with reference to IPR related contemporary issues. The paper shall trace the development of local seed industry and patentability law from historical, legal and judicial perspective.

Keywords: Commercialization, Legislation, Modified Seeds, Patenting, Terminator Seed.

Introduction

With the era of globalization and the age of information technology, intellectual property rights are emerging globally. Patents are the new generation's protecting missile. More or less everyone agrees that patent have helped the developers to invent new technologies and enjoy monopoly for several years. Patent protections have encouraged the scientist and inventors to invent new technologies to recover the development money with the improved inventions on various sectors like pesticides, irrigation, fertilizers and even in seeds.

India primarily is an agriculturally dominant country. However, it is equally important to note that because of its land, skilled and unskilled laborers, the developed countries are eyeing towards it. Developed countries rule the world in agriculture technologies and they dominate the developing countries through them. Agriculture today has become more technological and scientific, thereby, giving platforms to the biotechnological invention in the field of agriculture. Transformation and the gene-transfer techniques have influenced the development of new technologies. Resultantly, we notice a shift in the way agriculture is done today. Of late, we find that gradually, India too is moving towards the branding of the agriculture as well.

Mainstream of the farmers still pursue the traditional old methods of farming, irrigation and all. Traditional knowledge has been serving the farmers since long for their seeds prerequisite for cultivation, but slowly

market is being flooded with varieties for seeds. Granting of patent will create dependencies of the farmers which will create certain issues like monopoly of seed Companies, and loss of our traditional knowledge of preserving the seed in coming years.

Review of Literature

(Elizabeth Verkey, 2016) has traced out the international efforts in protecting plant varieties by incorporating the UPOV Convention, TRIPS Agreement and the Convention on Biological diversity. The UPOV convention aims to ensure a harmonized international system for the protection of plant varieties and encourage the development of new varieties of plants. The convention also provides for an international legal framework for the granting of plant breeders' rights which is a key element in encouraging breeders. The author emphasised the need for a separate law to protect plant varieties in India.¹

(Gopalakrishnan, N.S., 2015) in his article titled 'Protection of Farmer's Rights in India: Need for Legislative Changes' has critically analysed the Farmers' Right in detail. He had indicated that it is now mandatory that members of the WTO must introduce legal measures either in the form of patent or an "effective" sui generis law or a combination of both to protect plant varieties. There was stiff resistance from many developing countries including India and farmer's groups against the introduction of such a provision in the TRIPS Agreement. The concern for providing food security to the people of the country forced many nations to keep plant varieties out of IPR protection. The diverse pattern of agriculture, the traditional methods of breeding and farming followed in the developing countries resulted in the generation of many customary rights to the farmers.²

(Vandana Shiva, 2014) has clearly emphasized the need for plant variety protection with special reference to Plant Varieties Protection and Farmers' Rights Act, 2001.³

Aim of the Study

Chief objective of this research is to conceptualize the underlying dimensions and issues of Genetically Modified Seeds and Farmers' Rights. Further, with the more emphasis on agricultural biotechnology with the use of intellectual property pose some research questions:

1. Is technology patenting a good scope of invention which otherwise can be benefited to masses?
2. Does farmers free trade affected by seed patenting?
3. Does dependency of farmer on packed seeds increased by new upcoming terminator seeds?

The focus of this chapter is to examine the above questions and study the impact of seed patenting on farmers with reference to IPR related contemporary issues. The chapter traces the development of local seed industry and patentability law from historical, legal and judicial perspective.

Genetically Modified Organism in International Convention

The Convention on Biodiversity, Food and Agriculture Organisation and International Plant

Protection Convention have recognized a close joint relationship. These Conventions along with Cartagena Protocol and Nagoya Protocol touch upon the area of Genetically Modified Organisms (GMO). Principles urbanized under the IPPC are also suitable to input elements of the CBD, counting the obstruction and mitigation of impacts of alien invasive species, and the Cartagena Protocol.

International Plant Protection Convention Supervised By Food and Agriculture Organization (FAO)

The International Plant Protection Convention (IPPC) is a 1951 bilateral treaty supervised by the Food and Agriculture Organization (FAO) that intend to protected synchronized, effective action to avert and to organize the opening and spread of pests of plants and plant products. The Convention expands further than the protection of cultivated plants to the protection of natural flora and plant products. It in addition takes into deliberation both direct and indirect damage by pests, so it includes weeds

The purpose of the International Plant Protection Convention is to secure common and effective action to prevent the spread and introduction of pests of plants and plant products, and to promote measures for their control. Even though the IPPC create condition for trade in plants and plant products, it is not limited in this respect. Specifically, the scope of the IPPC extends to the protection of wild flora in addition to cultivated flora, and covers both direct and indirect damage from pests, including weeds. The IPPC plays an important role in the conservation of plant biodiversity and in the protection of natural resources.

The Convention on Biological Diversity

The Convention on Biological Diversity (CBD) describes biotechnology as: "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products for specific use". This definition includes medical and industrial applications as well as many of the gears and techniques that are commonplace in agriculture and food production.

Cartagena Protocol on Bio-safety

On 29 January 2000, the Conference of the Parties to the Convention on Biological Diversity adopted a supplementary agreement to the Convention known as the Cartagena Protocol on Bio-safety. The Protocol seeks to protect biological diversity from the potential risks posed by living modified organisms resulting from modern biotechnology.

Nagoya Protocol

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the Convention on Biological Diversity is a supplementary agreement to the Convention on Biological Diversity. It provides a transparent legal framework for the effective implementation of one of the three objectives of the CBD: the fair and equitable sharing of benefits arising out of the utilization of genetic resources.

The Nagoya Protocol on ABS was adopted on 29 October 2010 in Nagoya, Japan and entered into force on 12 October 2014. Its objective is the fair and equitable sharing of benefits arising from the utilization of genetic resources, thereby contributing to the conservation and sustainable use of biodiversity.

Development of Seed Law in India

The National Seed Corporation was established in 1963. The Government of India enacted the Seeds Act in 1966 to regulate the growing seed industry. The sixties were the most eventful times for Indian agriculture. This was the period, during which the private sector significantly stepped into the seed business. India's seed industry is presently regulated by the Seeds Act of 1966, its implementing rules 1968, the Seeds Control Order, 1983, and the Protection of Plant Varieties and Farmers' Rights Act, 2001 (PPVFR Act).

Seed Act, 1966

The Seeds Act stipulated that seeds should conform to a minimum stipulated level of physical and genetic purity and assured percentage germination either by compulsory labelling or voluntary certification. Further, the Act provided a system for seed quality control through independent State Seed Certification Agencies which were placed under the control of state departments of agriculture.⁴

Protection of Plant Varieties & Farmers Rights Act, 2001

This Act was enacted to provide for the establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders, and to encourage the development and cultivation of new varieties of plants;⁵ The object clause of the Act states To provide for the establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders and to encourage the development of new varieties of plants.⁶

Biological Diversity Act, 2002

The Biological Diversity Act, 2002 provides for preservation of biological diversity in India, and provides mechanism for equitable sharing of benefits arising out of the use of traditional biological resources and knowledge. The Act was enacted to meet the obligations under Convention on Biological Diversity (CBD), to which India is a party.

The Seed Bill, 2004

1. The Seeds Bill, 2004 aims to regulate the quality of seeds sold, and replaces the Seeds Act, 1966. All varieties of seeds for sale have to be registered. The seeds are required to meet certain prescribed minimum standards. Transgenic varieties of seeds can be registered only after the applicant has obtained clearance under the Environment (Protection) Act, 1986. In addition, the label of a seed container has to indicate specified information.⁷
2. The Bill exempts farmers from the requirement of compulsory registration. Farmers are allowed to sow, exchange or sell their farm seeds and planting material without having to conform to the prescribed minimum limits of germination, physical purity and genetic purity (as required by

registered seeds). However, farmers cannot sell any seed under a brand name.⁸

3. If a registered variety of seed fails to perform to expected standards, the farmer can claim compensation from the producer or dealer. The Bill provides for setting up a compensation committee that shall hear and decide these cases. It also provides for an appellate mechanism to be set up by notification.⁹

The Seed Bill, 2014

The Seeds Bill, 2014 that seeks to regulate seeds and plant material to ensure quality, increase private participation in production and distribution, liberalize imports while incorporating measures to protect rights of farmers.

The Bill, revived by this government after 10 years in November 2014, was put on hold in 2015 after the backlash against an enabling provision for genetically modified (GM) crops.¹⁰ The proposed Bill is expected to give a major boost to agricultural growth. Under the Bill, all varieties of seeds for sale have to be registered. If a registered variety of seed fails to perform up to expected standards, the farmer can claim compensation from the producer or dealer.

A compensation committee shall hear and decide these cases. The Bill also provides for an appellate mechanism to be set up by notification. Besides, the Bill also exempts farmers from the requirement of compulsory registration while prescribing huge penalty for contravening any provision of the Act for those selling misbranded or substandard seeds.

Genetically Modified Seeds

Genetically modified (GM) seeds are a significant step forward in the production of agricultural crops. GM seeds are seeds that have been modified to contain specific characteristics such as resistance to herbicides or resistance to pests (in the case of Bt corn). But the method of modification used with GM seeds varies from the traditional method in an important respect: the genes have not been modified over generations of cross-fertilization, but rather inserted directly into the DNA of the seed.

Genetically Modified Seed: Meaning and Definition

Genetic modification, also known as genetic engineering or recombinant-DNA technology, was first applied in the 1970s. This technique allows selected individual genes to be transferred from one organism into another and also between non-related species. It is one of the methods used to introduce novel traits or characteristics into micro-organisms, plants and animals. The products obtained from this technology are commonly called genetically modified organisms (GMOs). GMOs are officially defined in the EU legislation as "organisms in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating and/or recombination." Genetic alteration of plants or crops is based on a natural ability of the bacterium, *agro bacterium tumefactions* (an omnipresent soil borne pathogen higher species of plant).¹¹ Genetic modification can be used to promote a desirable crop character or to suppress an undesirable trait. The technology is also sometimes called as gene technology, recombinant DNA

technology or genetic engineering. Thus, genetically modified crops are produced by genetic engineering. In these plants a foreign gene is introduced, that is, a gene alien to the plant species. This creates plants that never be created naturally. For example, fish genes can be introduced into tomato or pig genes can be inserted into rice.

GMOs: Issues and Concerns

Farmers should understand both the benefits and concerns that are raised by the use of GM seeds. Benefits of the technology include increased crop yields, diminished use of pesticides and herbicides, and increased profits. Concerns that farmers should address before adopting the technology include the private contractual relations between farmers and seed companies, the environmental impacts of the technology, and the potential impacts of consumer concerns (both domestic and international) on the market for GM products.

Benefits of GM Seed

Increased Crop Yields

There is an expectation widely held by those in agriculture that GM seeds will increase the yields of farmers that adopt the technology. Although there is not yet a large volume of research regarding the impact of biotechnology on crop yields and returns, the research that is available supports this expectation.

In a study using 1997 data, the Economic Research Service (ERS) found a statistically significant relationship between increased crop yields and increased adoption of herbicide- and pesticide-tolerant crop seeds.¹² The ERS study found that crop yields "significantly increased" when farmers adopted herbicide-tolerant cotton and Bt cotton. The use of herbicide-tolerant soybeans resulted in a "small increase" in crop yields.

Fewer Applications of Pesticides and Herbicides

Similarly, farmers expect that, as adoption of GM seeds increases, the use of chemical pesticides and herbicides (and the costs associated with their application) will decrease. Again, the research that is available generally supports this expectation. The study by ERS found a decrease of pesticide and herbicide use when farmers adopted GM seeds. The decrease in pesticide use was significant.¹³

Increased Profits

In general, studies indicate that farmers' profits increase as they adopt GM seeds. The ERS study found that in most cases there is a statistically significant relationship between an increase in the use of GM seeds and an increase in net returns from farming operations. The service also found a "significant increase" in net returns for herbicide-tolerant cotton crops and Bt cotton crops.

Concerns

Contractual Issues

The contracts that seed companies require that buyers of their GM seeds sign when obtaining those seeds may disadvantage farmers. Seed companies have invested significant funds in the research and development of GM seeds, and they protect this investment through their contracts with agricultural growers. These contracts aggressively

protect the biotechnology company's rights to the seeds, frame the context within which disputes may be settled, and limit the liability of the company.¹⁴

Limited Rights to Retain and Reuse Seed:

Under a private contract between a grower and a biotech company, the grower's rights to the purchased seed are significantly limited. Such contracts generally contain a "no saved seed" provision. This provision prohibits growers from saving seed and/or reusing seed from GM crops. In effect, the provision requires growers of GM crops to make an annual purchase of GM seeds.

Environmental Concerns

Development of Resistant Weeds and Insects

Farmers may worry that their use of GM seeds will create "superweeds" or "superbugs" that, over time, become resistant to GM seeds and crops and to other herbicides and pesticides. There is some research that suggests that weeds and bugs could possibly evolve into resistant organisms. Gene movement from crop to weed through pollen transfer has been demonstrated for GM crops when the crop is grown near a closely related weed species.¹⁵ Similarly, insects have, in the past, developed a resistance to pesticides. One particular strategy that has been developed to prevent the growth of pests resistant to GM seeds is "refuge areas."

Harm to Other Organisms

Another concern centering on impacts of biotechnology is possible harm of GM seeds and crops to other, beneficial organisms. Very little research exists to support this concern. A study performed at Cornell University received indicated that a gene contained within Bt corn can be harmful to the larvae of a monarch butterfly when windblown onto milkweed leaves. But subsequent research has indicated that the actual level of Bt on milkweed plants in a real-life scenario do not reach the levels that produce a toxic results in the larvae.¹⁶

Uncertainties Concerning Human Health Risks

Critics say that the effects of GM products on human health are not yet fully known. The largest threat to health is the presence of unknown allergens in the GM food supply. There is some evidence that humans who respond to allergens will respond similarly to that allergen when it is transferred to another organism. For example, a recent study found that people allergic to nuts reacted to GM soybeans into which a protein from a Brazil nut had been inserted.¹⁷

It is not clear whether the Bill bans certain genetic engineering technologies such as "genetic use restriction technology" and "terminator technology." These technologies preserve intellectual property rights by either requiring specific additives, or by making the next generation seeds sterile.

India and Patentability of Seeds

Patent Act of 1970 is one of the important milestones in the history of patents in India. The major change in intellectual property protection has been the change in patent laws. The Trade Related Aspects of Intellectual Property Rights (TRIPs) Agreement came into force in WTO member countries in 1995. This requires member countries to comply with fixed

minimum standards for intellectual property rights protection. As a result, India has amended its Patent Act in 1999, 2002 and 2005. While the main changes brought through the amendments do not substantially affect traditional knowledge, farmers' rights and biodiversity, there are a few provisions, which attempted to reduce biopiracy. For instance, the scope of an 'invention' has been broadened to cover all aspects of new scientific creations. However, new uses of known substances, including the duplication of traditional knowledge have been specifically excluded from patentability. In addition, the non-disclosure of the source of geographical origin of a traditionally known material has been made a basis for the challenge of a patent. The food sector in India will also have to face new challenges in the new patent regime. Different processes and products will become patentable. The TRIPs agreement addresses the question of life patenting in article 27(3) (b) that life patents such as patents on micro-organisms and non-biological and micro-biological process for the production of the plants and animals must be introduced. As a whole, Article 27 of the TRIPs Agreement defines which inventions governments are obliged to make eligible for patenting and what they can exclude from patenting. Inventions that can be patented include both products and processes, and should generally cover all fields of technology.

Broadly speaking, part (b) of paragraph 3 (i.e. **Article 27.3(b)**) allows governments to exclude some kinds of inventions from patenting, i.e. plants, animals and "essentially" biological processes (but micro-organisms, and non-biological and microbiological processes have to be eligible for patents). However, plant **varieties** have to be eligible for protection either through patent protection or a system created specifically for the purpose ("sui generis"), or a combination of the two. The emphasis on registration in the new seeds policy ties in with the demands of the Plant Variety Protection and Farmer's Rights Act passed in 2001. This Act provides for plant breeder's rights, which requires extant and new plant varieties to be registered on the basis of characteristics relating to novelty, distinctiveness, uniformity and stability.

Intellectual Property Rights vis –a- vis Farmers rights

Farmer's Rights

The PPV&FR Act, 2001 was enacted to grant intellectual property rights to plant breeders, researchers and farmers who have developed any new or extant plant varieties. The Intellectual Property Right granted under PPV&FR Act, 2001 is a dual right – one is for the variety and the other is for the denomination assigned to it by the breeder. The rights granted under this Act are heritable and assignable and only registration of a plant variety confers the right. Essentially Derived Varieties (EDV) can also be registered under this Act and it may be new or extant. Farmers are entitled to save, use, sow, re-sow, exchange or sell their farm produce including seed of a registered variety in an unbranded manner. Farmers' varieties are eligible for registration and farmers are totally exempted from payment of any fee

in any proceedings under this Act. The period of protection for field crops is 15 years and for trees and vines is 18 years and for notified varieties it is 15 years from the date of notification under section 5 of Seeds Act, 1966. Annual fee has to be paid every year for maintaining the registration and renewal fee has to be paid for the extended period of registration. Farmers can claim for compensation if the registered variety fails to provide expected performance under given conditions. The rights granted under this Act are exclusive right to produce, sell, market, distribute, import and export the variety. Civil and criminal remedies are provided for enforcement of breeders' rights and provisions relating to benefit sharing and compulsory licence in case registered variety is not made available to the public at reasonable price are provided. The procedural details and modes of implementing this Act are provided in PPV&FR Rules, 2003. The TRIPs Agreement requires a review of Article 27.3(b) which deals with patentability or non-patentability of plant and animal inventions, and the protection of plant varieties

IPRs and Monocultures

Identifies a strong connection between IPRs and a bias towards centralized research, and believes that this has an impact on agro-biodiversity. The prevailing policy framework for the use of genetic resources for food and agriculture favours "centralized crop breeding and the creation of uniform environmental conditions, and discourages agro-ecological research or local breeding tailored to local conditions".

However, the IPR link appears stronger in the case of genetically modified crops. In recent years, life-science corporations (often originally chemical companies that have bought seed companies) have increasingly been creating transgenic plants with built-in resistance either to herbicides marketed by the same company¹⁸ or to insect pests. Environmentalists and some scientists counter that genetically-engineered herbicide resistance has negative environmental effects. Among the claims commonly made are that use of herbicide-resistant transgenic plants may: the rights of the farmers to save their seeds and breed their own crops

Economic Impact

Views on the economic impact of IPRs in agriculture are often quite polarized. Proponents of PBRs argue that their introduction provides the incentives needed by breeders to develop better planting material, which, in turn, benefits the agricultural sector by increasing productivity. They also argue that the productivity grows through the use of improved varieties of seeds which market by charging higher prices. The increase is sufficiently high for farmers even in industrialised countries to resort to using farm saved seeds. The expansion of the IPRs regime in agriculture tends to create a market for seeds and other planting material that is dominated by a few large companies. Such a "monopoly rights system encourages and seeks to solidify an agricultural system that is environmentally damaging and incompatible with the concepts of sustainable development.

Private Monopolies Will Restrict Use of Biological Resources

It is feared that private (especially corporate) monopolies over resources will prevent the legitimate use of those resources by others, for example by restricting farmers from setting harvested seed of an IPRs protected plant variety or stifling scientific research by placing restrictions on the use of PR-protected gene sequences. Depending on how they are used, IPRs can have the effect of restricting the free flow of information and resources on which livelihoods, food security and biological diversity depend. For example, evidence from a major study conducted for the above reasons.

Conclusion

In a country like India where the farming community provides more than 80% of the country's annual requirements of seed, it is fundamentally important for the farmer to sell seed. If a farmer does not have the right to sell seed, it implies that each time the farmer wishes to grow a new crop, he or she has to turn to the market to procure seeds. Such dependence on the market for seeds is not economically feasible for farmers in India and hence will have hindrance in livelihood. Further, if farmers do not have the right to sell seeds, it will weaken the overall seed market in India because there will be less competition for the private seed companies. Food security can be ensured only if there is a control over seeds by the farmers.

GM seeds is neither full-scale adoption nor full-scale rejection is a viable option. The technology may be more appropriate for farmers that have difficulty spraying pesticides and herbicides. GM seeds may work well for farm areas that are inaccessible to tractors or close to water bodies, or in places where winds are high. Conversely, GM seeds may be least appropriate for farmers who are particularly reliant on a stable market. The uncertainty surrounding consumer acceptance of GM products, particularly in foreign markets, is a risk that may simply be unacceptable to some farmers.

Certainly, GM seeds are a revolutionary technology in the agricultural industry. Certainly, too, the potential benefits of these seeds promise to be considerable. But an uneducated acceptance of this technology by farmers is not the proper response. The technology of GM seeds and the attendant legal issues raise concerns that may work against an individual farmer. The best response of every farmer is to educate him about this technology and to carefully read all legal documents before deciding to plant GM seeds.

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