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KM Manojkumar
Advocate, Madurai Bar Association, Madurai District Court, Madurai, Tamil Nadu, India

Dr. E Murugaesan
Professor (SS), Government Law College, Madurai, Tamil Nadu, India

Corresponding Author:
KM Manojkumar
Advocate, Madurai Bar Association, Madurai District Court, Madurai, Tamil Nadu, India

The impact of IPR in agriculture with particular reference to protecting biodiversity: An analysis

KM Manojkumar and Dr. E Murugaesan

Abstract
Biological diversity is the hallmark of life on earth. It is very backbone of sustainable development. The current Intellectual Property Rights (IPR) regime is encouraging commercialization of seed development, monoculture, protection of new plant varieties, microorganisms, and genetically modified organisms. [1] As a consequence, our rich biogenetic diversity is being eroded irreversibly. We must find out a path to make an alternative approach that will bring a balance in between formal Intellectual Property (IP) system and sustainable aspects of biodiversity.

Keywords: IPR, agriculture, particular reference, protecting biodiversity

Introduction
Biodiversity is the basic of our sustainability. The developed countries are not rich in biogenetic resources but are better equipped in research and development. They use the biogenetic resources accessed from the developing countries. [2] As a result, there is a beginning in the unprotected flow of genetic information from the developing countries to the capital-rich west, and a protected flow in the reverse direction mainly through patents and Plant Breeders' Rights (PBR). It has both visible and invisible impacts. Genetic erosion is one of the most important invisible impacts that is in long run manifested visibly with the loss of biodiversity. [3]

Definitions
Biological Diversity Act, 2002 of India has defined various terms.
"Biological Diversity" means the variability among living organisms from all sources and the ecological complexes of which they are part and includes diversity within species or between species and of eco-systems [chapter I Clause 2b].
"Biological resources" means plants, animals and microorganisms or parts thereof, their genetic material and by - products with actual or potential use or value but does not include human genetic material [Chapter I Clause 2c]. Intellectual Property Rights (IPR), as the term suggests, are meant to be rights to ideas and information, which are used in new inventions or processes. These rights enable the holder to exclude imitators from marketing such inventions or processes for specified period of time; in exchange the holder is required to disclose the formula or idea behind the product/process. The effect of IPR is therefore monopoly over commercial exploitation of the idea/information, for a limited period of time. The stated purpose of IPRs is to stimulate innovation, by offering higher monetary returns than the market otherwise might provide. [4]

History of IPR and bio-diversity
The initial step towards making biodiversity a commodity evolved from the United Kingdom wanting to use high-quality seeds for agricultural production. This slowly led to the Companies selling registered seeds. Later the government rewarded individuals who improved seeds further. This led to the development of Breeders' Rights that become more commercialized and very soon restrictive. For over 60 years, different forms of protection of new plant varieties through system of PBR have in existence in industrialized countries. In 1961, a "Union Internationale Pour la Protection Des Obtentions Vegetales."

[1] See IP Laws. http://www.iplawsindia.com/bio-diversity
[2] See, Why biodiversity is essential for sustainable development, by Chandler Green On May 21, 2018, United Nations foundation.
[3] See Genetic erosion arise from habitat loss and fragmentation. https://www.fs.fed.us/wildflowers/Native_Plant_Materials/documents/genetics_Vol_11.pdf
[4] See https://indiacode.nic.in/bitstream/123456789/2046/1/200318.pdf

(UPOV-International Union for the Protection of New Varieties of Plants) was established in Geneva for coordinating the inter-country implementation of PBR. Although the Convention was signed in Paris in 1961, it came into force only in 1968. It was revised in Geneva in 1972,1978, and 1991. The 1978 Act came into effect in 1981. To be eligible for protection, varieties have to be:

- Distinct from the existing, commonly known varieties
- Sufficiently homogenous/uniform
- Stable and
- New in the sense that they must not have been commercialized prior to certain dates established by reference to the date of application for Protection. [5]

In addition, in many countries patents with full restrictions are also applicable for Genetically Modified Organisms (GMOs) and microorganisms. It was started in the USA in 1972 with the patenting of genetically engineered bacterial strain invented by famous microbiologist Dr. Anadamohan Chakrabarty.

Intellectual property rights in agriculture

Historically, systems for the protection of intellectual property were applied principally to mechanical inventions of one kind or another, or to artistic creations. The assignment of IPRs to living things is of relatively recent origin in developed countries. Vegetatively propagated plants were first made patentable in the US only in 1930. And the protection of plant varieties (or plant breeder's rights - PBRs), a new form of intellectual property, only became widespread in the second half of the 20th Century. Thus systems for the protection of plants derive from the economic structure and circumstances of agriculture that prevailed in developed countries in this period. That such systems came into being reflected the growing interest of private breeders in protecting their intellectual property. Farmers have traditionally replanted, exchanged or sold seed from the previous years' crop which means that breeders have difficulty in recouping the investments made in improved varieties through repeat sales. Patents or PBRs normally impose restrictions on farmers' ability to sell grown seed (and in some cases to reuse it) and thus enhance the market for the breeder's seed. Even in the developed countries, reuse of seeds remains quite common although for many crops annual purchase is now the rule. In developing countries the majority of farmers reuse, exchange or sell informally to neighbours, and annual purchase of new seed is relatively rare in most countries.

With the adoption of the TRIPS Agreement, developing countries have been obliged to adopt protection of plant varieties, by patents or by other means, without any serious consideration being given to whether such protection would be beneficial, both to producers and consumers, or its possible impact on food security. As with medicines, a crucial issue is whether and how intellectual property protection can help promote research and innovation relevant to the needs of developing countries and poor people. And we also need to ask how IP protection affects the cost and access of farmers to the seeds and other inputs they need.

If the aim of plant variety protection is to provide incentives to breeders, one of the questions that arises is how the contribution of farmers to the conservation and development of plant genetic resources should be recognised and preserved. Until formal breeding programmes were introduced, varietal and cultural improvements depended on a process of selection and experimentation by farmers. Formal breeding programmes have since utilised those varieties and knowledge in order to develop improved varieties of higher productivity, or with other desirable characteristics. The question is whether this contribution of farmers to conservation and innovation should be either protected or rewarded. Building on the principles embodied in the Convention on Biological Diversity (CBD), which we discuss in the next chapter, the new International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), seeks to establish principles for facilitating access to plant genetic resources and establishing fair and equitable mechanisms of benefit sharing. [6]

Why is plant variety protection necessary?

Successful breeding requires great skill and knowledge. In addition, large-scale breeding calls for significant investment in land, specialized equipment (for example, greenhouses, growth chambers and laboratories), and skilled, scientific manpower.

- It takes a long time to develop a successful plant variety (10 to 15 years in the case of many plant species). Yet not all new plant varieties are successful and, even where the varieties show significant improvements, changes in market requirements may eliminate the possibility of a return on investment. This makes it necessary to balance the benefits with the return of the original high investment. Generally, however, plant breeding results in the availability of varieties with increased output and improved quality for the benefit of the society.
- Sustained and long-term breeding efforts are only worthwhile if there is a chance to be rewarded for the investment made. To recover the costs of this research and development, the breeder may seek protection to obtain exclusive rights for the new variety.
- At the same time, a new variety, once released, can often be easily reproduced by others. The original breeder is thus deprived of the fair opportunity to benefit from his or her investment. It is, therefore, critical to provide an effective system of plant variety protection, which encourages the development of new varieties of plants thereby benefiting the breeder and society at large. [7]

Value of bio-diversity

- Diversity is the most ecologically sustained form
- Diversified crops maintain soil fertility
- Diversity optimizes soil management in rain fed belts
- Diversity means insurance against crop failure.
- Diversity optimizes labour availability.
- Diversity ensures food security
- Diversity of range of foods ensures nutritional balance.
- Diversity provides a range of fodder to the cattle keeping them healthy and productive.
- Diversity helps women control their farm economics and seeds. [8]

[5] See, The Impact of IPR on Bio-diversity, Sabuj Kumar Chaudhuri. http://eprints.rclis.org/7905/1/Impact_of_IPR_on_Biodiversity.pdf

[6] See, Chapter 3, Agriculture and genetic resources, IPR in agriculture, http://www.iprcommission.org/papers/text/final_report/chapter3htmfinal.htm

[7] UPOV: The Impact of Plant Variety Protection, https://www.wipo.int/wipo_magazine/en/2006/04/article_0004.html#:~:text=An%20effective%20plant%20variety%20protection,a%20country%20without%20effective%20protection.

[8] See, Environmental Studies, Lesson 14: Bio-diversity and its conservation, value of biodiversity.

The advent of new biotechnologies and the capacity to identify and incorporate exotic genetic material into commercial products has forced the pace of change in industry and in Intellectual Property (IP) systems. Extensive commercial exploitation of genetic diversity catalysed by research and development for obtaining IPR will decide the future of our rich biodiversity. Biodiversity provides a variety of environmental services from its species and ecosystems that are essential at the global, regional and local levels.

Indian scenario

Biodiversity

India is classified among the 12 mega-diversity centres of the world. India's record in agro-biodiversity is equally impressive. There are 167 crop species and 320 species of wild crop relatives and several species of domesticated animals. India is considered to be the centre of origin of 50,000 varieties of rice, 1000 varieties of mango, 100 varieties of pepper, 27 breeds of cattle, 22 breeds of goat, 40 breeds of sheep, 18 breeds of poultry, 8 breeds of buffalo (The world's total biodiversity) and several other varieties of pigeon-pea, turmeric, ginger, sugarcane, gooseberries etc. and ranks seventh in terms of contribution to world agriculture. India has a rich and varied heritage of biodiversity. It has 850 species of bacteria, 6500 species of algae, 14500 species of fungi, 2000 species of lichen, 2850 species of bryophytes, 1100 species of pteridophytes, 64 species of gymnosperms and 17500 species of angiosperms. [9]

Legislation

In order to comply with the TRIPs (Trade Related Intellectual Property Rights) and CBD (convention on Biological Diversity) India has passed Indian Patent (Second Amendment) Act, 2002 and the Biological Diversity Bill, 2002 respectively. [10] According to this Amendment Act, 2002 the duration of the term of patent has been extended to 20 years for all product and process (under the existing Act of section 53 as well as those included in the present bill) patents. Now microorganisms will be patentable subject in India. In addition, new plant varieties will get PBR certification in India as India has joined recently in UPOV (1978 Act). Earlier India has also passed Plant Protection Bill to develop a sui generis system (a system of its own). The deposit of biological materials has also been included in compliance with the Budapest Treaty. [11]

Impacts of IPR

It is simply a tough task to offer an estimate of impacts of IPR on biodiversity. The benefits of genetic diversity are long term and rarely predictable. Humanity shares a common bowl containing only 20 cultivated crops that sustain 90% of our calorie requirements (FAO 1991). All 20 crops originate in developing countries. [12] All are alarmingly vulnerable to pests and diseases and depend on genetic diversity for their continued survival. During this century, most authorities believe that an alarming proportion of the genetic variability of our major food plants-as it is available in the field-has become extinct. The conservation and development of the remaining crop diversity is a matter vital global concern.

When farmers look to increase their sale they often sow different and more commercially viable seeds. Sometimes various government schemes force them to adapt specific seeds or new plant varieties. Thus commercial agriculture tends to increase genetic uniformity and this, in turn leads to genetic erosion. IP system encourages commercial agriculture that accelerates genetic erosion. Biotechnology research focuses on commercial agriculture and leads to demand for IP protection with the same potentially negative consequences for genetic diversity. The criteria for awarding PVP (Plant Variety Protection) certificate involve lower thresholds than the standards required for patents. There are requirements for novelty and distinctness, but there is no equivalent of non-obviousness (inventive step) or industrial application or utility. Thus PVP laws allows breeders to protect the varieties with very similar characteristics, which means the system tends to be driven by commercial considerations of product differentiation and planned obsolescence, rather than genuine improvements in agronomic traits. [13]

Similarly, the requirements for uniformity (and stability) in UPOV type systems exclude the local varieties developed by farmers that are more heterogeneous genetically, and less stable. But these characteristics are those that make them more adaptable and suited to the agro-ecological environments in which the majority of poor farmers live. Another concern is the criteria for uniformity.[14] While proponents argue that PVP, by stimulating the production of new varieties, actually increases biodiversity but in reality requirement for uniformity, and the certification of essentially similar varieties of crops, will add to uniformity of crops and loss of biodiversity. Moreover similar concerns have arisen in respect of greater uniformity arising from the success of Green Revolution Varieties, leading to greater susceptibility to disease and loss of on field biodiversity. [15]

In addition, the privatization of genetic resources that have been engineered and patented accelerates the trend toward mono-cultural cropping. Furthermore an engineered organism may produce unanticipated harmful impacts on other species in its new environment that may cause further erosion and ecological degradation. Improved seeds require more fertilizer and pesticide consumption, which has tremendous contribution towards biodiversity loss, and have direct impact on floral, faunal and microbial population. Moreover substantial royalties payment to the developed countries and multinational seed companies will greatly increase the debt burden that could further intensify the environmental and social disruption if we consider the debt repayment such as the export of natural products. [16]

Conclusion

The successful development of biological diversity will depend upon creative relationship that can be nurtured between two opposite poles-formal innovative and community systems. For this to work, policymakers must implement technology transfer with a strong inclination towards active participatory approaches to research and

[9] See, IP Laws, Bio-diversity, http://www.iplawsindia.com/bio-diversity
[10] Regulatory Framework at National, Regional and International Level, Biodiversity, http://www.legalservicesindia.com
[11] Biodiversity Act, 2002, No.93 of 2002 (Ministry of Environment and Forests, Government of India, New Delhi) 2002.
[12] See, Biodiversity and intellectual property. https://iprlawindia.org/wp-content/uploads/2021/03/Rasamsetty-Sai-Sree-Keerthika.pdf
[13] Genetic Erosion of Agro-biodiversity in India and Intellectual Property Rights: Interplay and some Key Issues, Sabuj Kumar Chaudhuri
[14] See, UPOV, for farmers. https://www.upov.int/about/en/faq.html
[15] See Chapter 3, Agriculture and genetic resources, overview, iprcommission.org
[16] See Biological Diversity in IPR. https://advocatespedia.com/Biological_Diversity_in_IPR

extension. Active participation means exercising practical power and command over genetic resources by farmers and rural people that would be reciprocated by the formal system with their analysis, experimentation, professional, institutional and policy changes from time to time in order to discharge our international obligations and at the same time keeping in view of sustainability of biodiversity. Ultimately, the reason to conserve our genetic diversity and to encourage innovation out of these biogenetic resources is to improve the quality of human life and this should be kept in mind always before any invention or policy changes, otherwise our very existence will be at stake.

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