

The Role of Intellectual Property Rights in Conservation, Utilization and Benefit Sharing of Plant Genetic Resources

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

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ABSTRACT

India is one of the twelve mega biodiversity countries in the world with two hotspots at Himalayan Region and Western Ghat. Besides, north-eastern hilly region; Andaman and Nicobar Islands are also carrying huge diversity for biological resources. Phytobiodiversity and species richness have been observed with the longitudinal decrease or increase in these regions. Urbanisation, industrial growth and deforestation are threatening the plant genetic resources (PGR) that led to many plant species to be extinct or endangered. Thus, protection of PGR, their sustainable utilisation is crucial in the context of mitigating climatic changes and their access and benefit sharing. Protection of plant biodiversity particularly varieties were first time considered with the establishment of Union for Protection of Plant Varieties in the year 1961. Later on, in 1992 the 'Earth Summit' protection of PGR and benefit sharing was considered with the establishment of Convention of Biological Diversity (CBD). Plant varieties and their parts are not patentable subject matter, but it was directed as per article 27.3(b) of World Trade Organization (WTO) that member countries have to protect the plant varieties through Patent or any other *sui generis* system. Establishment of Protection of Plant Varieties and Farmer's Rights act (PPVFRA) in the year 2001 was *sui generis* system adopted in India. Presently, 150 crop species include food crops, horticultural crops, trees and forest crop species are accessible for registration under this act for a period of maximum 15 or 18 years. Till now, 3439 plant varieties of different crops were registered under the PPVFR Act. Among which

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maximum varieties of 1796 were of rice from different states of India. However, most of the genetic resources available in the public domain are untouched that needs intensive work plan to provide protection to that valuable germplasm.

Keywords: Plant genetic resources; ABS; PPV&FR act; germplasm conservation.

1. INTRODUCTION

Intellectual property rights (IPR), an exclusive right given to the owner of an invention so that the inventor may exclude others from unauthorised use of his or her creation. The patent is the oldest form of intellectual property right exists. In the year 1447, the first patent statute was established in Venice. The word patent originates from the Latin word *Patere* means "to lay open". Currently, there are several forms of intellectual property rights exist that protects a different kind of properties created by the human being. However, if we look at the major step back for the establishment of various IP regulations, the Paris convention in the year 1883 has led to the industrial property rights (priority rights and Unfair competition) that followed by 1886 Berne convention that took care of literary and artistic rights. Gradually, several IP laws were established for the protection of almost all kind of invention.

India is one of the rich nations for plant genetic resources. It carries 7.6% of all mammalian, 12.6% of all avian, 6.2% of all reptilian, 4.4% of all amphibian, 11.7% of all fish, and 6.0% of all flowering plant species in the world [1]. India carries a distinct identity for its pattern and distribution of biodiversity region. It contains a great diversity of its natural ecosystem from the evergreen tropical rainforest of Western Ghat; North Eastern region; Andaman and Nicobar island to dry alpine scrub high in the Himalayan region. The greater amount of species diversity has been observed over the longitudinal decrease or increase in these regions. Nearly 21.05% areas of total geographical land of India under forest cover. Deforestation has led to the greater loss of forest biodiversity. According to the World Resources Institute around 450 million hectares, forest areas declined in the last 30 years. Worldwide, nearly 15 million hectares tropical forest degrades that also creates 4.6 gigatons of carbon dioxide. Increase the rate of urbanisation and industrialisation is a threat to the climate. Presently, climate change is a major concern

both for developed and developing nations. Conservation and sustainable use of plant genetic resources could be a boon for handling climate change and also to minimise the deforestation issue. In the present article, we will discuss different IP regulations related to conservation, sustainable use and benefit sharing of plant genetic resources (PGR) and their traditional knowledge.

2. INTELLECTUAL PROPERTY RIGHTS FOR THE PROTECTION OF PLANT GENETIC RESOURCES

The movement of germplasm is important to the establishment and maintenance of biodiversity in many countries, especially the countries that generate a huge amount of funds from exotic plant species. Administrators and researchers have been recognised that the movement of plant species should be through the legal process. Indeed, the progress of genetic improvement is closely related to the available genetic diversity of the species in a particular locality [2]. For most of the cases in the 20th century, the international movement of tree seed was subject to minimal legal impediments and regulations, other than those related to quarantine. Today, there is increasing public and political pressures to regulate the movement of all kinds of germplasm. These may stem from the need to protect national assets and promote conservation, or from concerns about profiteering by unscrupulous bio-prospecting.

Harmonizing the patent laws was first attempted in the Paris convention (1886) that covers industrial property including patent and trademark. However, copyright issue was not discussed in the Paris convention which was later on covered in the Berne convention (1886). With the establishment of World Intellectual Property Rights (WIPO) in the year 1976, the international IPRs regime has strengthened up and well coordinated among the countries. One of the strongest multilateral instruments for IPRs established as TRIPS (Trade-Related Aspects for Intellectual Property Rights) agreement

among the member state of WTO (World Trade Organization). PGR is considered the product of nature and excluded from patentability. Earlier plant genetic resources were shared freely among the researcher over the region and continents. Presently, it is considered as the property of the territory where it evolved and adapted over the time. The IP rights existing for the protection of plant genetic resources in the national and international agreement is discussed briefly.

3. INTERNATIONAL CONVENTION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS (UPOV)

Establishment of UPOV (International Convention for the Protection of New Varieties of Plants) in the year 1961 was the first of such kind where plant varieties and seed materials were considered for protection with the aim of promoting breeders for development of new plant varieties. Breeder's right and farmer's right were also considered later in the different amendment of UPOV (1978 & 1991).

4. CONVENTION OF BIOLOGICAL RESOURCES (CBD)

Conservation of forest genetic resources their utilisation benefit sharing was given more concern with the establishment of the convention of biological diversity (CBD) in the year 1992. The excess rate of diminishing biodiversity is alarming food security of the present and future generation. Identification of biodiversity-rich sites and their protection was the focus of the CBD. Besides, sustainable use of genetic resources was one of the main agenda of the convention. The convention tried to make a common understanding among the countries for the exchange of genetic resources. However, one concern is the genetic resources exchanged between the countries before the convention came into force. Identification of those territories and the genetic resources exchanged need to be found out. The convention reaffirmed the sovereign rights of countries over their natural resources, access to genetic resources with national governments and is subject to national laws.

Table 1. Establishment of international agreements and major IP regulations

| Year | Agreement | Major decision was taken |
|------|--------------------------------|--|
| 1883 | Paris Convention | Industrial property rights: Priority Rights and Unfair competition |
| 1886 | Berne Convention | Literary and Artistic Rights |
| 1891 | Madrid Agreement | International Registration of Mark |
| 1958 | Lisbon Agreement | Appellation of Origin |
| 1994 | World Trade Organization (WTO) | TRIPS agreement, PVP, Integrated circuits, Trade secrets |

Table 2. IP regulations related germplasm management and their utilisation

| Year | IP regulations established |
|------------------|--|
| 1930 | 1 st attempt to recognise IPR by the enactment of Plant Patent Act by the USA |
| 1961, 1978, 1991 | UPOV Convention on Plant Variety Protection, Breeder's Rights |
| 1983-1993 | FAO International Undertaking on PGR (IUPGR)- Breeder's Rights, Farmer's Rights |
| 1986-1994 | Uruguay Round of Negotiations on GATT/attention on agriculture; long-term reform of agricultural trade and domestic policies aimed at increased market orientation |
| 1992 | Rio Conventions on Biological Diversity (CBD) |
| 1993 | Revision of IUPGR set in – to harmonise with CBD |
| 1995 | WTO came into existence/Agreement on TRIPs requiring protection of plant variety by countries either by patents or effective <i>sui generis</i> system or a suitable combination thereof |
| 2001 | An international treaty on PGR for Food and Agriculture Multilateral System for access and benefit sharing, PPV&FR Act, 2001 in India |
| 2010 | <i>Nagoya Protocol of CBD on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization</i> |

5. NAGOYA PROTOCOL

The agreement was undertaken in the year 2010 in Nagoya, Japan that deals with access of genetic resources and benefit sharing out of their utilization. This protocol fulfils one of the objectives of CBD through providing a transparent legal framework. Genetic resources by the researchers or for commercial purpose must be lawfully acquired. Besides, it also covers the traditional knowledge associated with it. Benefits generate through commercialization of genetic resources or its traditional knowledge must be equally shared among the conservators or the inventors. Many indigenous tree species of India and Southeast Asia are of high value crop. Teak, Neem and Sandalwood trees are indigenous to India and high value crop. Nagoya protocol as n undertaking of CBD is providing a legal instrument to regulate the exchange of such high value crops.

6. PROTECTION OF PLANT VARIETIES AND FARMERS RIGHT ACT

The act was enacted in the year 2001 by the Government of India as resultant of TRIPS agreement under the WTO. Article 27.3 (b) of the agreement mentioned that all the member countries have to protect their plant genetic resources by the patent law or any *sui generis* system. As discussed earlier the PPV&FR act is a kind of *sui generis* process to protect the plant genetic resources up to 15 years in case of food and horticultural crops and 18 years in the case

of trees and vines species. Breeder's rights, researcher's rights and farmer's rights are also the provision in the act (Pratibha et al. 2004). This is one of the unique act enacted keeping in the mind of different provisions under UPOV, CBD and TRIPS agreement. Currently, 150 plant species including seven species of forest trees are accepted for registration. Till now 15647 applications were submitted of different crop species of which 3441 applications were granted for registration plant varieties. A maximum number of 1796 germplasm were registered in rice (1796) crop followed by maize (238), sugarcane (228) etc. 1531 varieties were registered as farmer's varieties under this act. The contribution of cereals, pulses crop are more for registration of crop varieties. More than 4.33 lakhs germplasm of different crop species were collected by exploration programme of National Bureau Plant Genetic Resources, New Delhi. It can be assumed that more than 90% of the crop varieties and their wild relatives are available in the country that can be protected under this act. It is the need of the day to protect the crop species of our countries under this act as earliest. Intellectual property rights cell of BAU, Sabour is conducting awareness programme in collaboration with PPV&FR Authority, New Delhi to make aware the farmers of Bihar and facilitate the farmers and scientists to protect their varieties. Till now 25 awareness-generation programme was organized at different places of Bihar as a result 520 applications form of around 60 crops species has been submitted for registration (Fig. 1). Bihar Agricultural University

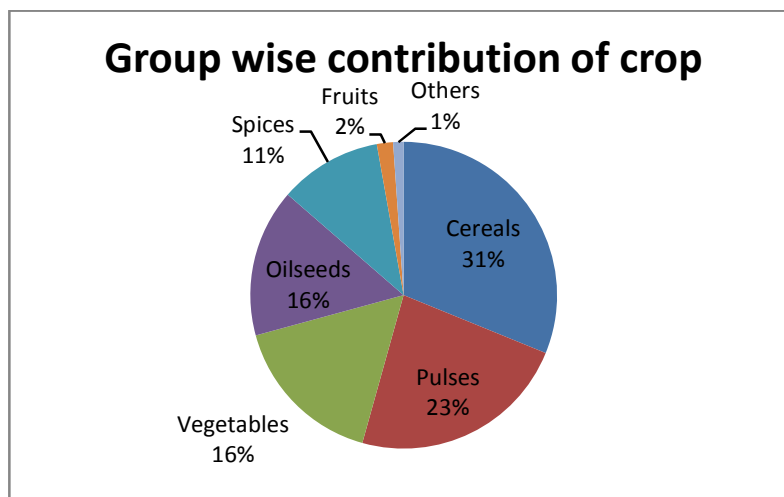


Fig. 1. Group wise contribution of crops submitted for registration to PPVFRA Authority

has registered one variety of cauliflower *Sabour Agrim* and facilitate two farmers to get registered their own varieties in Rice var. *Kanak Jeera* and Wheat var. *Tipoya*.

7. GEOGRAPHICAL INDICATION ACT

Genetic resources having relation with the particular geographic location or place of its adaptation or climatic factors related to its reputed are internationally recognised asset. As per the article 22.1 of the TRIPS agreement the goods or resources having a relationship with a geographical location must be protected as a Geographical Indication (GI) of goods. According to TRIPS agreement- "Geographical indications are, for this Agreement, indications which identify a good originating in the territory of a Member, or a region or locality in that territory, where a given quality, reputation or another characteristic of the goods is essentially attributable to its geographic origin".

In India, the GI act was passed in the year 1999 and Darjeeling tea is the first GI goods registered under GI act in the year 2004. As of now, 577 products have been registered as GI goods. Out of which 89 products belong to Agricultural goods. Darjeeling tea was the first product that was registered as GI goods in India from West Bengal. Intellectual Property Rights Cell, BAU, Sabour has facilitated three farming communities to registered products of Bihar as *Mahgahi Pan* of Betel Vine; *Jardalu Mango* of Mango and *Katarni Dhan* of rice popularly grown in the state. A maximum number of products was registered from the state of Maharashtra. GI act provides strong support to the rural and tribal communities for strengthening the economic status through identification of important biological resources available in a particular geographical location and promotion of the quality food products and generating income.

8. INTERNATIONAL TREATY ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE (ITPGRFA)

Food and Agricultural Organization adopted International Treaty on Plant Genetic Resources for Food and Agriculture in the year 2001. The main aim of the treaty is to conserve all kinds of plant genetic resources, their sustainable use and legal exchange of genetic resources. Presently, growing demand in the timber

industries, the volume of income through good quality wood has increased largely. ITPGRFA provides a multilateral system for free access to genetic resources. The treaty also recognises the contribution of a farmer in the creation, protection of PGR and also the traditional knowledge associated with them. It keeps the interest of the farmers in participating in the national decision-making process and ensure their share from the benefit arising from their contribution.

9. BIOLOGICAL DIVERSITY ACT

The biological diversity act was enacted in the year 2002 by the Government of India with the aim of preservation of biological resources of the country. India as a geographically diverse country carries huge genetic diversity for all the species. The act covers protection, use of biological resources and traditional knowledge for commercial or research purposes or for bio-survey and bio-utilisation. It facilitates the access to genetic resources and sharing the benefits arising out of such access and use. The act also includes in its ambit the transfer of research results and application for intellectual property rights (IPRs) relating to Indian biological resources.

Protecting the traditional knowledge as a trade secret is another way of un-disclosing the valuable information. India is rich in traditional knowledge particularly in the field of medicine and agriculture. Protecting traditional knowledge associated with a particular community as trade secret would keep the knowledge intact. Indian government after the "neem" patent controversy has developed a traditional knowledge digital libraries (TKDL) with Council of Scientific and Industrial Research (CSIR) and AYUSH (Ministry of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy). TKDL documents the traditional knowledge associated with medicine and agriculture including forestry and listed out all such documents. This effort protects the information from bio-piracy and helps the patent office before granting any patent.

10. CONCLUSION

India as a rich biodiversity country provides shelters for many potential plant genetic resources. Conservation and sustainable use of important genetic resources are essential in the sense to protect the climate and also for the use of future generation. Looking at the global competitive market protecting intellectual

properties of any nations has become mandatory by the suitable national laws. Several agreements have been adopted by the nations worldwide to harmonise the IP laws. One such effort is being made by the TRIPS agreement under WTO that has come up with one of the strongest IP instrument among the nations. As a result, India has adopted PPV&FR act 2001, Geographical Indication act 1999, Bio-diversity act 2002 for protecting the biological resources of the country in different forms. One of such effort being made by joint work of CSIR and AYUSH by creating TKDL that identify, document and helps in protecting the traditional knowledge associated with medicine and agriculture. However, effective IP laws, easy process of filling for application and awareness generation are required for protecting the genetic resources and prevent the bio-piracy.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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