The Role of Intellectual Property Rights in Modern Agriculture

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Agriculture, the science and practice of cultivating crops and raising livestock for food, fibre and other essential products, has been the foundation of human civilization for thousands of years. India is a country that highly relies on agriculture. It provides livelihood to nearly 45–50% of India's workforce while contributing around 16–18% to the country's Gross Value Added (GVA), contributing the most to the country's GDP. However, as the most populous country in the world, it faces the rising demand for food while protecting the traditional practices and improving the economic well-being of the farmers. More innovative and modern technologies, scientific agricultural techniques, improved crop varieties and advanced agricultural implements are required to address these challenges. Together with production of new and improved varieties and tools there emerged a new field to ensure that such achievements are protected by law ie. Intellectual Property Rights (IPR). It helps secure the rights of scientist, researchers and farmers and motivates them for more developments and discoveries. Forms of IPR like patents, geographical indications, copyrights and trademarks not only allows for the creation of new plant varieties and tools but also are very crucial in protecting traditional agricultural practises and indigenous knowledge.

Intellectual Property Rights in Plant breeding

The Green Revolution is one of the turning points of Indian agriculture. Scientific achievements in plant breeding and genetics contributed abundantly to this revolution. The Green Revolution largely focused on the expansion of farming area, double cropping system and using seeds with improved genetics, turning India from a food deficient country to one of the leading agricultural producers. It was mainly introduced to provide high-yielding varieties of wheat and rice, boosting crop production, which helped the country feed its people. This success was made possible by plant breeders and scientists who developed new and improved crop varieties.

However, today's changing climatic conditions pose significant challenges for agriculture through irregular rainfall, changing temperature conditions, drought, floods and other environmental stresses. This demands for crops or varieties which are climate resilient, ensuring productivity and food security. Therefore, plant breeders adopt different breeding techniques from conventional selection methods to advanced biotechnological tools to create new and improved crop varieties. Conventional methods such as hybridisation, selection, back crossing and mutational breeding are still widely used, but modern techniques like in vivo culture, genetic modification (GMO), and CRISPR-based gene editing have made the breeder's work more efficient.

With the incorporation of traditional knowledge with the latest technologies, researchers intend to produce crops with the desired characteristics, such as increased potential yield, resistance to pests and diseases, tolerance to drought, temperature fluctuations with enhanced nutritional quality and taste. Such efforts have given us crops that grow better and healthier, benefiting both farmers and customers. These scientific achievements have to be protected with a legal framework with Intellectual property rights (IPR).

Understanding Intellectual Property Rights

Intellectual property rights are legal protection given to creators, inventors and owners of intellectual property. Such legal rights are granted for a certain period of time to prevent copying and unauthorised use. This enables them to reap commercial benefits from their creative efforts or reputation. Intellectual property includes inventions, artistic works, designs, symbols, names, varieties of plants, etc

Intellectual property rights (IPR) play a pivotal role in promoting sustainable developments in agriculture. It encourages innovation by protecting new inventions and making sure they are used in ways that help industries grow. There are different types of IPR pertaining to different kinds of intellectual property. This protection motivates people and companies to invest in the research leading to the development of cutting-edge technologies which can bring progress to the country in agriculture and other fields.

Global IPR and TRIPS Agreement

The modern intellectual property rights (IPR) system began with several early agreements that laid the foundation for today's global IPR. The first framework of intellectual property was in the Paris Convention (1883) followed by the Berne Convention (1886) extending it to literary and artistic works. Later, the Madrid Agreement (1891) simplified the process of international registration of trademarks, allowing brands to identify themselves across multiple countries. In 1961, the establishment of the International Union for the Protection of New Varieties of Plants (UPOV) was to ensure the protection of Plant breeders' rights, encouraging

researchers and farmers to develop new plant varieties through plant breeding.

In 1967, the World Intellectual Property Organization (WIPO) an intergovernmental organization was established to promote the protection of intellectual property of intellectual property worldwide. These progressive developments eventually paved the way to the establishment of the World Trade Organisation (WTO) and Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement in 1994 and came into effect on January 1, 1995 onwards. It set a minimum standard for all forms of intellectual property, aiming at harmonizing the intellectual property laws across the WTO member countries.

One of the most important clauses for agriculture is article 27(3)b, which requires all countries to protect plant varieties either by patents or a sui generis system or a combination of both. While developed countries supported the enforcement of this agreement, developing countries like India sought flexibility to protect their domestic interests, biodiversity and traditional farming systems. In compliance with the TRIPS Agreement, India enacted the Protection of Plant Varieties and Farmers Rights (PPV and FR) Act, 2001, a sui generis system to protect plant breeders' innovations while safeguarding farmers' rights and traditional knowledge.

Classification of Intellectual Property Rights

Intellectual property rights (IPR) can be divided into two categories: Industrial property rights and Copyrights. The former includes patents, trademarks, industrial designs, technological processes, etc, while the latter covers artistic and literary works. All the IPR that do not come under either of them is kept under a sui generis system. Sui generis means, system of its own. This kind of IPR includes Plant breeders' rights and semiconductor chip protection systems and many more. Several forms of IPR directly or indirectly impact the agricultural sector, such as patents, Plant Breeders' rights, geographical indications, trademarks and trade secrets. Scientific publications that disseminate agricultural discoveries fall under copyright protection.

Different types of Intellectual Property Rights

Each Intellectual Property right is designed to protect the creativity and innovations of the inventors, artists, designers and researchers to get fair returns for their work, thereby encouraging them for their initiatives and investment. The major types of IPRs are Patents, Copyrights, Geographical Indications, Trademarks, Trade Secrets, Industrial Designs and Plant Breeders' rights.

Patents

It is the legal right granted to an invention or a process by the government in exchange for the public disclosure of the invention for a limited period of time. Patent gives the inventor exclusive right to make, use, sell or import an invention and prevent others from doing so without permission. In India, patent protection is governed by the Patents Act 1970. It grants protection for 20 years from filing of the application. This act was amended in 1999, 2002 and 2005 to meet with WTO's TRIPS agreement.

In agriculture, biotechnological inventions involving microorganisms, non-biological processes or bioproducts may qualify for patent protection if they are novel, involve an inventive step or industrial application. However, under section 3(j) of the Patents Act, plants, animals, seeds, varieties, species and natural biological processes are not patentable. Similarly, according to section 3(h), agricultural and horticulture practices are not patentable. There is a separate act to protect plant varieties and interests of farmers in India- the Plant Varieties Protection Act which was introduced in the year 2001. Examples:

Bacterial endophyte capsule for banana pest - Actively used in banana farming to fight the destructive pseudo stem weevil, Bamboo-Derived Biochar Nano-Fertilizers -A synthesis process creating carbon-nanofiber infused biochar out of sustainable bamboo biomass, Extraction Process for Tapioca Bio-Waste Biopesticides: The extracted molecules are formulated into commercial, eco-friendly biopesticides branded as *Nanma, Menma* and *Shreya* (Fig. 1, A), *e-Crop* (Electronic Crop Simulator) - An advanced real-time Internet of Things (iot) electronic simulation tool tailored for nutrient tracking in tuber crops (Fig. 1,B), Power-Operated Size-Based Chinese Potato Grader- A highly specific agricultural separation tool designed to resolve the labour-intensive sorting of Chinese Potato, which is highly prone to bruising, Low-Cost Biotechnique for Cassava Starch Extraction- An enzymatic processing technique used to naturally separate high-grade starch flours from the complex fibrous matrix of raw cassava roots.

Copyright

It protects literary works, musical and artistic works, which include books (Fig. 1, H), films, software, etc. This allows the creator to have exclusive rights to distribute, perform or display the work. The protection usually lasts for a creator's lifetime plus 60 years. In agriculture, copyrights can protect educational materials, software created for agricultural purposes, databases with agricultural information etc. Examples: *SPOTCOMS*: A sweet potato growth simulation model software developed to predict yield based on weather and soil data, *SIMCAS*: A specialized cassava growth simulation model, *EFYSIM*: An elephant foot yam growth modeling software, *TuberGuru*: An information app for tropical tuber crops, *Sree Poshini*: A site-specific

fertilizer recommendation system for tuber fields- are copyrighted

Geographical Indication (GI)

Geographical indication or GI is a tag given to products or goods that originate in a specific location and have distinct qualities linked to that place. Agricultural products, natural products, handicrafts can all receive GI protection. In India this is protected under the Geographical Indications of Goods (Registration and Protection) Act, 1999. This act ensures that only the authorised producers from the designated region can use the registered name preventing imitation a misuse. It also helps preserve the traditional farming methods protecting the livelihoods of local producers and promotes the unique identity of regional products. The well-known examples include Darjeeling tea, Basmati rice (Fig. 1, D), Marayoor jaggery (Fig. 1,E) and Malabar pepper etc. all of which owes its unique qualities to the place of origin. In case of ''Basmati'' the GI tag guarantees that only rice cultivated in specific regions of the Indo-Gangetic plains (across India and Pakistan) can be legally sold under this name.

Trademarks

Trademarks play an important role in protecting the identity of a brand or product. They help farmers and agribusinesses to secure their rights over their names (brand names), logos, packaging designs, slogans, colours, sounds etc. In India, trademarks are protected under the Trademarks Act, 1999. Class 31 under the Act deals with raw agricultural produce, horticultural products and forest produce such as grains, seeds, fruits, vegetables and live plants. Class 30 deals with prepared or processed food items like organic tea, cocoa, spices and bakery products. Class 29 deals with processed agricultural products like dairy, packaged foods and preserved fruits and vegetables. Marks like AGMARK, FSSAI Certification etc. certify quality and authenticity. Once registered, a trademark remains valid for 10 years and can be renewed indefinitely. This helps companies and farmers build consumer trust, enhance market value and grow their business into new markets. Examples: ITC Farmland, Amul (Fig 1, C)

Trade secrets

All the important and confidential information that gives companies, researchers or farmers an advantage over others can be classified as trade secrets. Even though India does not have a particular or special law for trade secrets, researchers and businesses can protect such information through contracts, agreements and other laws. Unlike patents, trade secrets do not require registration or public disclosure. In agriculture, trade secrets can include hybrid seed formulas, parental lines of crops, fertilizers or pesticide mixtures, and seed processing methods and marketing plans.

Industrial Designs

Industrial designs protect the aesthetic aspects of a product or a tool, such as its shape, pattern, or colour. This type of IPR ensures that the visual design of a product is not copied without permission. Industrial design protection lasts for 10 years, with the possibility of a 5-year extension. In agriculture, industrial designs can protect the appearance of agricultural machinery, packaging, and even the layout of the equipment. Examples: Solar Powered Water Hyacinth Harvester, Chinese potato grader (Fig 1, I), Coca-Cola Contour Bottle, Bend straw, Vegetable Slicer and grater (Fig 1, J) etc.

Fig. 1: A- Bioformulations as biopesticides & B- e-Crop ICAR-CTCRI (Patents), C- Amul (Trademark); D- Basmati Rice & E- Marayoor Jaggery (GI); F- Rice variety long-grain Pusa Basmati 1121(cooked rice in inset) (*http://en.wikipedia.org)* & G – Farmer developed cassava variety, Manna (Plant Breeders rights); H-Copyright; I-Chinese potato grader ICAR-CTCRI, J - vegetable Slicer/grater (Industrial designs)

Plant Breeders' Rights

The Protection of Plant varieties and Farmers' Rights Act (PPV&FRA),2001 is enacted by the government of to protect the rights of plant breeders and farmers. This Acts allows them to have exclusive rights to produce, sell, market, distribute, import and export the plant varieties they have developed,thus encouraging research and development of better crops while protecting the breeder's innovation from misuse. This follows a sui generis system that suits the

nation's agricultural needs and in line with the UPOV (1978) and TRIPS agreement. To receive the protection under this Act, the variety has to meet the NDUS criteria: -

Novelty: A variety should be new and should not have been commercially sold or commercially used in India for more than a year before the application is filled. Outside India the limit is four years for most crops or six years for trees and vines.

Distinctness: The variety must be clearly different from another variety in one or more essential characteristics.

Uniformity: The variety should be uniform, i.e., plants of the same variety should only have small differences in their important traits

Stability: A variety is considered stable if its essential characteristics remain unchanged after repeated propagation.

Once a variety satisfies the NDUS criteria, the breeder or farmer can apply for registration under the PPV&FR Act. Registered varieties are protected for 15 years in most crops and 18 years for trees and vines. The PPV&FR Authority maintains the National Register of Plant Varieties and preserves the original seed samples in the National Gene Bank ensuring that the registered varieties are properly documented and conserved for the future. Example: Pusa Basmati 1121 (*Oryza sativa* L.) from IARI, New Delhi (Fig.1, F) . 'Manna' is a farmer –developed cassava variety by a farmer Mr Johnson Mathew, Kozhikode, Kerala which was officially registered under PPV and FRA with the facilitation from ICAR-Central Tuber Crops Research Institute, Thiruvananthapuram (Fig 1, G).

Conclusion

Innovation and creativity are the driving forces in modern agriculture and these valuable contributions can be protected through the use of Intellectual Property Rights (IPR). By understanding IPRs, scientists, plant breeders, and farmers can safeguard their discoveries, gain recognition from their work and derive proper benefit from them.

IPR play a vital role bridging the gap between traditional knowledge and modern technologies. It also encourages innovations and promotes responsible sharing of knowledge and supports development of improved crop varieties. With greater awareness, IPR can help strengthen agriculture, boost productivity and contribute to long-term food and nutritional security.

References

Shendekar, S., Ambhore, A., Kute, N., Meshramand, M., and Totre, A. (2023). Intellectual Property Rights in Agriculture: An Overview. In: (Eds.) Jayakumar, R., Reddy, R.D., Kumar, A., and Laddunuri, M.M. Research Trends in Multidisciplinary Research, 49: 93-108. AkiNik Publications, New Delhi. *https://doi.org/10.22271/ed.book.2509*

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