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Biological resources and rights of farmers

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Introduction:

In the intricate web of intellectual property (IP) law, biological resources and the rights of farmers are intertwined threads. Understanding how these resources, encompassing everything from plants and animals to microorganisms, are protected and utilized within the legal framework is crucial for ensuring both environmental sustainability and equitable benefits for farmers. This research paper delves into the diverse landscape of biological resources, analysing their classification and coverage under various IP regimes. By exploring the legalities surrounding access to and utilization of these resources, we aim to illuminate the potential benefits that accrue to farmers. Through concrete examples, the paper will showcase how the legal framework, when effectively implemented, can empower farmers to share in the economic gains generated from the use of their knowledge and resources. Ultimately, this research seeks to contribute to a legal landscape that fosters innovation in agriculture while safeguarding the rights and livelihoods of those who steward our biological heritage – the farmers.

Evolution of human civilization has been linked with development of agriculture. Therefore, agricultural practices predate the IPR regime. One such example can be seen in the agricultural practices of tribals in India in Arunachal Pradesh. The Apatani Tribes of Ziro is well known for the traditional paddy cum fishing cultivation for efficient use of resourcesⁱ. However, this situation has changed now. Technological breakthroughs in new plant varieties with increased yields, nutrition and resistance to pests and drought are desirable features. Without these technological developments, food security may not be ensured. Therefore, IPR protection in agriculture is very important and farmers are very important stakeholders in it.ⁱⁱ Studies from outside India has suggested that the majority of the innovative farmers lack the awareness of IPRs. It is also reported that “small-scale farmer-innovators prefer their innovations to be open access rather than protected by IPRs, and this is largely driven by altruistic motives. Some of the reasons cited by the farmers for preferring IPR protection

include obtaining financial benefits, recouping the money invested in developing the innovation, wanting to be recognized as the original innovator, and preventing piracy.”ⁱⁱⁱ

However, growth of IPR has also been associated with negative effects on biodiversity and interest of indigenous farmers.^{iv} Traditional farmers play an important role in “conserving, creating, and promoting genetic diversity in the food supply and in maintaining traditional agricultural practices.” One such example has been reported from Mexico where farmers from generations have cultivated and developed a unique variety of maize which can fertilize itself by converting atmospheric nitrogen into usable fertilizer.^v It has further been argued that national and international codification of IPR’s related to farmers rights will surely help in promoting farmers welfare. Furthermore, institutions and capacity building have been identified as a significant tool for enhancing farmer’s rights.^{vi} It has also been reported that despite the technological advances in biotechnology and subsequent food production in the world, hunger around the world is still prevalent especially in African countries and even in areas of developing countries which are frequently affected by natural disasters. Most of these victims belong to indigenous communities and farmers who practise traditional farming.^{vii}

Farmers from all agricultural regions of the world have contributed to creating the vast variety of crop genetic variation that is currently available throughout the last ten millennia. The huge variety of food crops that are currently accessible has resulted through careful seed and material selection, exchange over short and long distances, and close cooperation with nature. The notion that agro-biodiversity as a principle is part of humanity's common heritage and should be shared for the good of all as a part of the public domain is known as the **stewardship** approach. Thus, until the invention of intellectual property rights, the stewardship approach can be considered to have been the predominant justification throughout the history of agriculture. In the latter half of the 20th century, as interest in the commercial exploitation of genetic resources grew with the economic importance of biotechnologies, the **ownership** approach emerged. This was followed by calls for the protection and promotion of intellectual property rights for inventions.^{viii}

Farmers have been cultivating, conserving, protecting and developing plant genetic resources without claiming any rights over the crops since time immemorial. Novel crop varieties produced as a result of generations of inbreeding as well as techniques of agriculture employed by them have not been monopolised and have been seen as “common heritage of mankind”.^{ix} However, the extension of protection of intellectual property rights on plants and plant varieties has led to the emergence of new actors in the field of agriculture: big multinational corporations, plant breeders and technological firms, causing the traditional knowledge of farmers, local and indigenous communities to be monopolised. As a result, traditional knowledge (TK) of the indigenous peoples or indigenous knowledge especially that related to biological resources is threatened by IPRs. The need of sustainable development and its nexus with intellectual property rights is seen in the remarkable role played by the indigenous communities through the indigenous knowledge in sustainable utilisation of plant resources which in turn assist in environmental conservation.^x

The contemporary scholarship has identified three main threats to peasant seed systems – from seed and intellectual property laws to bio piracy, corporate concentration and new genome editing technologies.^{xi} Further, use of technology has not always resulted beneficially to farmers.^{xii xiii}

IPRs have become increasingly important in agriculture, particularly with the development of genetically modified organisms (GMOs). The ownership and control of GMOs have raised significant concerns about the rights of farmers. In many countries, laws have been enacted to protect the rights of plant breeders and provide them with exclusive rights to use and

distribute their plant varieties. However, these laws have also restricted the rights of farmers to save and use seeds from their own crops.

II. Overview of Biological Resources

Biological resources encompass the vast tapestry of living organisms found on Earth, playing a critical role in agriculture, food security, and the overall health of our planet. Understanding this diverse realm is essential for appreciating the legal frameworks governing their access and utilization^{xiv}. This section delves into the classification of biological resources, highlighting their significance within the agricultural and food security landscape.

a. Classification of Biological Resources:

Genetic Resources: These are the hereditary materials (DNA) within plants, animals, and microorganisms that determine their traits and characteristics. Plant genetic resources encompass diverse species with unique properties, such as drought resistance or improved yields. Animal genetic resources include breeds of livestock with desirable traits for meat, milk, or fibre production. Microorganisms serve as vital tools for bio fertilizers, pest control, and bioremediation.

Species and Varieties: This category focuses on the entire organism, encompassing cultivated and wild species of plants and animals. Cultivated varieties, developed through breeding programs or traditional techniques, play a crucial role in modern agriculture. Wild species serve as reservoirs of genetic diversity, holding potential for future crop improvement.

Ecosystems and Associated Microbiomes: Biological resources extend beyond individual organisms to encompass the complex ecological communities they inhabit. This includes natural ecosystems like forests, grasslands, and wetlands, which harbor a wealth of biodiversity. The associated microbiomes – the intricate communities of microorganisms within these ecosystems – play a vital role in nutrient cycling, soil health, and overall ecosystem function.

This classification system provides a framework for understanding the immense diversity of biological resources. Recognizing their significance in agriculture and food security underscores the need for legal frameworks that promote sustainable utilization, equitable access, and benefit-sharing with the stewards of this vital heritage – the farmers.

b. Significance of Biological Resources in Agriculture and Food Security

Biological resources serve as the foundation for a thriving agricultural sector and a secure food supply. Their importance can be explored through several key aspects:

1. Ensuring Food Security:

Genetic Diversity: A diverse range of biological resources provides the genetic building blocks for breeding programs that develop new crop varieties with improved yields, disease resistance, and adaptability to changing environmental conditions.^{xv} This diversity helps to ensure food security by fostering crop resilience in the face of climate change, pests, and diseases^{xvi}.

Natural Pollinators: Many biological resources, particularly insects and birds, play a vital role in plant pollination, ensuring successful fruit and seed production. Protecting these pollinators is critical for maintaining agricultural productivity and a stable food supply.

Soil Microbiomes: The complex communities of microorganisms within the soil contribute significantly to plant growth and health. They facilitate nutrient cycling, decompose organic matter, and promote soil fertility, all of which are essential for sustainable food production.^{xvii}

2. Enhancing Agricultural Productivity:

Livestock Breeds: Diverse breeds of animals provide farmers with options tailored to specific environmental and production conditions. Animals with improved feed conversion efficiency or resistance to local diseases can contribute significantly to increased productivity and economic returns for farmers.^{xviii}

Biofertilizers and Biocontrol Agents: Microorganisms can be harnessed as biofertilizers, reducing dependence on synthetic fertilizers and promoting sustainable agricultural practices. Additionally, certain microorganisms act as natural biocontrol agents, helping to control pests and diseases without resorting to harmful chemicals.

3. Nutritional Security:

Biodiversity in Food Systems: A diverse range of cultivated plants and animal species contributes to a wider variety of nutritious foods available for human consumption. This diversity is fundamental for ensuring a balanced diet and promoting nutritional security.

Wild Species as Food Sources: Many wild plant and animal species contribute directly to food security, particularly for local communities. Sustainable harvesting of wild resources can provide vital dietary supplements, especially in regions facing food insecurity.

4. Innovation and Future Food Systems:

Genetic Resources for Research and Development: The vast genetic diversity of biological resources serves as a treasure trove for scientific research and development. These resources offer immense potential for developing new crop varieties with improved nutritional content, increased stress tolerance, and enhanced environmental sustainability.

Novel Applications of Microorganisms: Microorganisms hold promise for developing innovative solutions in agriculture, such as creating new biofertilizers, improving soil health, and developing novel food products.^{xix}

In conclusion, understanding the significance of biological resources in agriculture and food security is crucial for developing sound legal frameworks. These frameworks should promote the sustainable use and equitable access to these resources, ensuring long-term food security for a growing global population.

III. Legal Provisions

In India, there are several legal provisions that specifically deal with Intellectual Property Rights (IPR) protection related to farmers. Some of these are:

Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act, 2001:^{xx}

This act provides for the protection of plant varieties and farmers' rights. It recognizes and protects the rights of farmers in plant genetic resources and encourages the development of new plant varieties. Following are the important provisions of this act which are important with respect to interests of farmers:

1. **Recognition and Protection of Farmers' Rights:** Section 2(k) of the Act defines a "farmer" as any person who cultivates crops, including the person who cultivates land as a tenant or sharecropper.^{xxi} Section 2(l) of the Act provides for the registration of farmers' varieties, which are defined as varieties that have been traditionally cultivated by farmers.^{xxii} Chapter 3 of the act provides for registration of plant varieties and essentially derived variety. Section 39 of the Act provides for the protection of the traditional knowledge of farmers.^{xxiii} Indigenous communities and local farmers have developed traditional knowledge and practices related to agriculture over generations. This knowledge can be protected under the Intellectual Property (IP) system, including patents, trademarks, and geographical indications. However, there is ongoing debate over the appropriate legal framework for protecting traditional knowledge and ensuring that indigenous communities receive fair compensation for its use.
2. **Benefit Sharing:** Section 26 of the Act provides for the sharing of benefits arising from the commercialization of registered plant varieties with farmers and local communities. It requires the payment of a share of the royalties or other compensation to the farmers or their associations.
3. **Exemption for Farmers:** Section 39(1)(iv) of the Act provides an exemption for farmers from infringement of plant breeders' rights for the use of protected plant

varieties on their own farms. It allows farmers to use protected varieties for the purposes of breeding, selection, and other agricultural practices.

Plant Breeders' Rights: Plant Breeders' Rights (PBR) are similar to PVPs and provide exclusive rights to plant breeders for a certain period of time. However, PBRs may also be granted for genetically modified plants and provide more flexible protection than PVPs. PBRs can incentivize private investment in plant breeding and enable farmers to access new plant varieties.

4. Section 30 of the PPV&FR Act talks about **Researcher's rights**. It allows farmers to use a registered variety for conducting experiment or research and use it as an initial source of variety for the purpose of creating other varieties.
5. **Compulsory Licensing:** Chapter VII and specifically Section 47 of the Act^{xxiv} provides for the grant of compulsory licenses for the production and sale of a protected variety under certain circumstances. These circumstances include when the variety is not being made available to the public on reasonable terms or when the holder of the breeder's rights is engaging in anti-competitive practices.
6. **Seed Sovereignty:** While there is no specific provision in the Act related to seed sovereignty, some farmers' groups have argued that the Act does not go far enough to protect the rights of farmers to save, exchange, and sell seeds. They have called for stronger measures to promote seed sovereignty and to ensure that farmers have access to diverse and locally adapted seed varieties.^{xxv, xxvi}
7. **Protection of Traditional Knowledge:** Section 39(1)(iv) of the Act provides for the protection of traditional knowledge related to plant genetic resources. This provision aims to prevent the misappropriation of traditional knowledge by commercial entities. **Plant Genetic Resources for Food and Agriculture (PGRFA)** are the genetic material of plants used for food and agriculture, including crops, trees, and livestock. These resources can be protected under various legal instruments, such as the International Treaty on Plant Genetic Resources for Food and Agriculture^{xxvii}. The Treaty establishes a multilateral system for sharing PGRFA and ensures that farmers have access to the genetic resources they need to develop new plant varieties.
8. **Grievance Redressal Mechanism:** Section 3 of the Act provides for the establishment of a "Protection of Plant Varieties and Farmers' Rights Authority" to implement the provisions of the Act, which includes the redressal of grievances related to the registration of plant varieties and other matters under the Act. The Authority can set up an "Appellate Tribunal" to hear appeals from its decisions. Additionally, the Act provides for the establishment of a "Registrar of Plant Varieties" to maintain a register of plant varieties and grant registration certificates to the breeder of a new variety. On the other hand, advocates for seed sovereignty argue that the Act does not go far enough to protect the rights of farmers to save, exchange, and sell seeds, and that stronger measures are needed to promote seed diversity and local adaptation.
9. **Plant Varieties Protection Appellate Tribunal (PVPAT)^{xxviii}:** Earlier, Section 54 of the Act used to establish the PVPAT, which was an appellate body for decisions made by the Registrar of Plant Varieties and other authorities under the Act. The PVPAT heard appeals against decisions related to the registration of plant varieties, the grant of breeder's rights, and the infringement of breeder's rights. Now, this provision has been deleted from the Act and shifted to the Tribunals Reforms Act, 2021.
10. The **DUS (Distinctiveness, Uniformity, and Stability)** criteria is a set of standards used for the registration of farmers' varieties under the Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act, 2001 in India. The DUS criteria are used to

determine whether a variety is distinct, uniform, and stable and thus eligible for registration under the Act.

The **Distinctiveness** criteria are used to evaluate whether the variety is different from existing varieties in the same species or group of species. The variety must have unique characteristics such as plant morphology, seed characteristics, and other traits that differentiate it from other varieties. The **Uniformity** criteria are used to evaluate whether the variety is uniform in its characteristics and performance across different environments and conditions. The variety should display consistent characteristics across different samples and environments. The **Stability** criteria are used to evaluate whether the variety is genetically stable and maintains its unique characteristics over time. The variety should not show any significant changes in its characteristics over successive generations.

To register a farmers' variety, the applicant must provide information and evidence that the variety meets the DUS criteria. The registration of farmers' varieties is an essential component of the PPV&FR Act, which aims to protect the rights of farmers and encourage the development of new plant varieties. By registering farmers' varieties, farmers can secure their rights over their traditional knowledge and ensure fair compensation for their contributions to agricultural biodiversity. The DUS criteria for registration of farmers' varieties promotes farmers' welfare by protecting their rights, preserving traditional farming practices, providing access to new markets, and promoting the development of new crop varieties that benefit farmers and their communities.

The recognition of farmers' rights and the sharing of benefits arising from the commercialization of plant varieties have been important developments in the protection of farmers' rights in India. However, there have been some controversies related to the implementation of these provisions. For example, some stakeholders have raised concerns that the benefit-sharing provisions are not being implemented effectively and that farmers are not receiving a fair share of the benefits arising from the commercialization of plant varieties. Similarly, there have been debates over the extent to which farmers are able to exercise their rights to register their traditional varieties and claim intellectual property rights over them.

The Geographical Indications of Goods (Registration and Protection) Act, 1999^{xxix}:

This act provides for the registration and protection of geographical indications of goods. It recognizes the unique qualities and characteristics of agricultural products and ensures their protection against misuse. It also relates to farmers' rights by providing them with legal protection for their traditional knowledge and cultural heritage associated with a particular geographical region. This Act grants exclusive rights to the registered proprietor of a geographical indication to use the indication on the goods and to obtain relief in case of infringement of the same.

Some of the relevant sections of the Act that relate to farmers' rights are:

1. **Protection of Traditional Practices:** Section 2(e) of the Act defines "geographical indication" as any indication that identifies goods as originating from a particular territory, region, or locality, where a given quality, reputation, or other characteristic of the goods is essentially attributable to their geographical origin. By registering geographical indications, the Act provides legal protection to traditional practices and knowledge systems associated with a particular geographical region.
2. **Promotion of Rural Economy:** Section 17 of the Act provides for the establishment of a Geographical Indications Registry and applications, which maintains a register of geographical indications. The registration of geographical indications can contribute to the economic development of rural areas by promoting traditional products and

increasing the demand for these products, which can provide a better price for the farmers and local communities involved in their production.

3. **Participation of Farmers and Local Communities:** Section 11 of the Act provides that any association of persons or producers seeking to register a geographical indication must prove that they have a special interest in the geographical indication. This provision ensures that farmers and local communities have a say in the registration process and can benefit from the protection provided by the Act.
4. **Access to Markets:** Section 22 of the Act provides that the registration of a geographical indication confers on the authorized user the exclusive right to use the geographical indication in relation to the goods in respect of which it is registered. This provision can provide farmers and local communities with access to markets that value traditional products, which can help in promoting the production and marketing of traditional products and increasing the income of farmers and local communities
5. Section 11 provides for the **registration** of geographical indications, and it requires that any association of persons or producers seeking to register a geographical indication must prove that they have a special interest in the geographical indication.
6. Section 17 gives the registered proprietor of a geographical indication the exclusive right to use the indication in relation to the goods in respect of which it is registered.
7. Chapter 6 provides for **rectification** and correction of the register and provides for the cancellation of a geographical indication registration if it is found that the geographical indication is no longer associated with the origin or quality of the goods.

One example of a geographical indication registered under this Act is Darjeeling tea, which is grown in the Darjeeling district of West Bengal. Another example is the Alphonso mango, which is grown in Maharashtra and is known for its unique taste and aroma.

One controversy related to this Act is the issue of ownership and control of geographical indications. There have been cases where registered proprietors have been accused of exploiting farmers and denying them a fair share of the profits generated by the use of the geographical indication. The Act does not provide clear guidelines on how the benefits of the registration should be shared with farmers.

One notable case related to this Act is the **Basmati rice case**, where the Indian government successfully prevented a US company from trademarking the term "Basmati" for its rice products. The government argued that Basmati was a geographical indication and a traditional product of India, and therefore, the US company could not claim exclusive rights over it. The case highlighted the importance of protecting traditional knowledge and cultural heritage associated with a particular geographical region.^{xxx}

Another example of a controversy related to this Act is the case of the Neem tree. In 1995, the European Patent Office granted a patent to the US Department of Agriculture for a process for controlling fungal diseases using an extract of Neem leaves. This patenting of a traditional knowledge system was seen as an attempt to privatise and monopolise the use of the Neem tree and its products, which have been used for centuries by Indian farmers for various purposes such as pest control, medicinal properties, and others. The Indian government challenged the patent in the European Patent Office, arguing that the use of Neem was traditional knowledge and not an invention. After a long legal battle, the patent was revoked in 2005.^{xxx, xxxii}

In another instance, PepsiCo India sued a group of farmers for allegedly growing a variety of potato that was registered and patented by the company. PepsiCo India claimed that the farmers had infringed on their intellectual property rights by growing the registered potato variety without permission. The farmers denied the allegations and argued that they were not aware that the variety was patented by PepsiCo. They also argued that they had been growing the same variety of potato for many years and that it was not exclusive to PepsiCo. The case

attracted widespread attention and sparked a debate about intellectual property rights and the rights of farmers. Eventually, PepsiCo India decided to withdraw the case after facing intense public pressure and criticism from various quarters.^{xxxiii}

The Geographical Indications of Goods (Registration and Protection) Act, 1999, also includes provisions for the protection of traditional knowledge associated with geographical indications. Section 6 of the Act provides for the establishment of a **National Register of Geographical Indications**, which will contain details of all registered geographical indications along with any traditional knowledge associated with them. This register can be used to prevent the misappropriation of traditional knowledge and to protect the rights of traditional knowledge holders.

In recent years, there has been increased interest in registering traditional knowledge associated with geographical indications. For example, the Kandhamal Haldi (turmeric) from Odisha and the Mizo Chilli from Mizoram have been recently registered as geographical indications under this Act. These registrations help in promoting the local economy by increasing the demand for traditional products and ensuring a fair share of benefits for the farmers and local communities involved in their production.

The Geographical Indications of Goods (Registration and Protection) Act, 1999, provides legal protection to farmers for their traditional knowledge and cultural heritage associated with a particular geographical region. The Act has been used to protect traditional products such as Darjeeling tea, Basmati rice, and others. However, there have been controversies related to the ownership and control of geographical indications and the patenting of traditional knowledge. The Act also includes provisions for the protection of traditional knowledge associated with geographical indications and the establishment of a National Register of Geographical Indications.

However, the growth of GI registration in India has not been very good in recent years.^{xxxiv, xxxv}

Geographical Indications					
	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21 (Till October 31, 2020)
Filed	32	38	32	42	27
Examined	28	18	43	51	0
Registered	33	26	23	22	5

For boosting registration of GI's in India, several measures to reduce the processing time. The whole procedure has reduced the total time frame of registration from 12 months to 8 or 9 months. This report also highlighted the institutions created for IPR regime in agriculture and farmers welfare.^{xxxvi}

Patents Act, 1970:

This act provides for the grant of patents for inventions. It protects new and useful inventions, including those related to agriculture, and provides a framework for their protection. The Patents Act, 1970 provides for the grant of patents for inventions, including new processes and products. While the Act does not have specific provisions that relate directly to farmers' rights, certain sections of the Act have been interpreted in a way that impacts farmers' access to seeds and plant varieties.

Section 3(j) of the Act specifies that plants and animals in whole or any part thereof are not patentable, except for microorganisms. This provision was introduced to ensure that traditional knowledge and genetic resources used in agriculture are not monopolized by corporations through patents. However, the interpretation of this section has been a subject of

debate and litigation, with some arguing that it allows for the patenting of genetically modified organisms and transgenic crops. This can have implications for farmers' access to seeds and genetic resources.

Another section of the Act that has been contentious with regard to farmers' rights is Section 48, which allows for the grant of exclusive rights to a patent holder for a period of 20 years. This can create a monopoly over a particular technology or product, making it difficult for farmers to access and use that technology or product without paying exorbitant licensing fees. Another section of the Patents Act, 1970 that has implications for farmers' rights is Section 84, which allows for the grant of **compulsory licenses**. Compulsory licenses are licenses granted by the government to third parties to produce and sell a patented product or use a patented process without the permission of the patent holder. This provision is intended to balance the need for innovation with the public interest by allowing for the production and sale of patented products at a reasonable cost, especially in cases where the product is not available in the market or is available at an exorbitant price. In the context of farmers' rights, compulsory licenses can be used to ensure that farmers have access to affordable seed varieties. For instance, in the case of the Bt cotton seed technology, which was patented by Monsanto, the government of India granted a compulsory license to an Indian seed company, allowing it to produce and sell the Bt cotton seeds at a reasonable price. This helped to increase access to the technology and reduce the cost of seeds for farmers.

One case where the Patents Act and its relation to farmers' rights was discussed is the *Monsanto vs. Nuziveedu* case^{xxxvii}. In this case, Monsanto had patented a genetically modified seed technology that was used in India for producing cotton. Nuziveedu, a seed company, was a licensee of Monsanto's technology but stopped paying royalties on the grounds that the technology did not meet the necessary regulatory requirements. The case went to court, and the Delhi High Court ruled in favor of Monsanto, stating that the patent was valid and enforceable. However, the Supreme Court of India later ruled that Monsanto's patent was not valid and that Indian farmers had the right to access and use the technology without paying royalties to Monsanto.

While the Patents Act, 1970 does not have specific provisions related to farmers' rights, its interpretation and implementation have implications for farmers' access to seeds and plant varieties. The Act's provisions on compulsory licenses and the PPV&FR Act provide some safeguards for farmers' rights, but there is a need for greater clarity and implementation of these provisions to ensure that farmers have access to affordable and diverse seed varieties.

Rajya Sabha committee^{xxxviii} on review of IPRs regime in India has recommended the following regarding Patents Act:

“(iii) As per Section 3(j), the patenting of plant, seeds, varieties, species and essentially biological processes for production or propagation of plants is barred. The Committee was informed that patenting of plants and seeds in India should be allowed wherein the Government of India should become a stakeholder in the patent with private players as co-owners. The said patent should then be made available at subsidized rates to farmers in need. This would allow the farmers of the country to enjoy subsidies while private players can be charged market value for use of patent. The Committee recommends that a thorough analysis should be conducted by the Department on approving the patents on plants and seeds favourable to agriculture sector of the country with a pre-condition of making Government of India as a participant in the patent. It recommends the Department to hold proper discussions and wide consultations with farmers groups/associations and necessary stakeholders to examine the plausibility of allowing the patents on plants and seeds that yields benefits to the farmers of the country.”

Trademarks Act, 1999:

This act provides for the registration and protection of trademarks. It protects the unique names and symbols used to identify agricultural products and ensures their protection against misuse. Another example is the protection of traditional knowledge under the Act. Section 9(2)(b) of the Act provides that a trademark shall not be registered if it contains any matter likely to hurt the religious susceptibilities of any class or section of citizens of India. This provision has been used to prevent the registration of trademarks that make unauthorized use of traditional knowledge, cultural expressions, and symbols of indigenous communities.

For instance, the Khadi and Village Industries Commission (KVIC) of India filed a case in 2014 against the German company, Khadi Naturprodukte, for using the term "khadi" on their products without permission.^{xxxix} BNP sells Indian origin products under the brand name Khadi Naturprodukte in Europe. KVIC claimed that the Khadi mark had been selling in the European market for a significant time, and there were consumers associated with it. However, the Cancellation Division concluded that KVIC was not able to substantiate its argument with relevant documents, and the appeal for invalidity of the trademark was dismissed. The Cancellation Division of the EUIPO upheld this decision in 2017, and the German General Court confirmed the order in 2018. KVIC has filed applications for registration in WIPO and EUIPO to establish an Indian brand internationally and prevent bio-piracy.

The Trademark Act, 1999 does not specifically mention farmers' rights. However, farmers' rights may be affected in various ways by trademark laws. Below are some examples of how trademark laws and farmers' rights may be related:

Protection against Misuse of Trademarks: The Trademark Act, 1999 provides for the protection of registered trademarks against infringement, passing off, and false advertising. Farmers may be affected by the misuse of trademarks if their products are falsely labeled or advertised as being produced by a particular farmer or region. The protection against the misuse of trademarks helps safeguard the reputation and goodwill of farmers and producers.

1. **Certification Marks:** The Trademark Act, 1999 provides for the registration of certification marks. A certification mark is a mark used to indicate that goods or services have been certified by a particular organization or authority as meeting certain standards. In the case of farmers, certification marks can be used to certify that their products meet certain quality, safety, or environmental standards. For example, "Organic India" is a certification mark used to certify that products meet organic standards.
2. **Protection against Unfair Competition:** The Trademark Act, 1999 provides for the protection of businesses against unfair competition, which includes actions such as passing off, misrepresentation, and false advertising. Farmers may be affected by unfair competition if their products are falsely labeled or advertised as being produced by another farmer or region. The protection against unfair competition helps ensure that farmers and producers are not disadvantaged by the actions of others.
3. **Protection of Collective Marks:** The Trademark Act, 1999 provides for the registration of collective marks. A collective mark is a mark used by a group of producers or businesses to indicate the origin of their goods or services. In the case of farmers, collective marks can be used to indicate that the products are produced by a group of farmers or under a particular cooperative.

Although the Trademark Act, 1999 does not specifically mention farmers' rights, it can be used to protect the rights of farmers in various ways. The protection of geographical indications, traditional knowledge, certification marks, collective marks, and the protection against unfair competition can help safeguard the reputation, goodwill, and interests of farmers and producers.

Biodiversity Act, 2002:

This act provides for the conservation, sustainable use, and equitable sharing of benefits from biodiversity. It recognizes the contribution of farmers in conserving and maintaining biodiversity and provides for their protection. The Biodiversity Act in India was passed in 2002 to regulate access to biological resources and associated traditional knowledge. The Act recognizes the contributions of farmers in conserving and developing biodiversity and provides for the protection of their rights over traditional knowledge and biological resources. Here are a few examples of how the Biodiversity Act relates to farmers' rights:

1. **Access and Benefit Sharing (ABS):** One of the key provisions of the Act is the requirement for ABS, which is a mechanism to ensure that the benefits arising from the commercial use of biological resources are shared equitably with those who conserve and sustainably use them. Farmers are recognized as custodians of agro-biodiversity and are entitled to a share of the benefits arising from the commercial use of plant genetic resources that they have conserved and developed.
2. **Protection of traditional knowledge:** The Act provides for the protection of traditional knowledge associated with biodiversity. Farmers are often the custodians of traditional knowledge related to the use of plant and animal resources, and the Act recognizes their rights over such knowledge. Any commercial use of such knowledge requires prior informed consent and benefit-sharing with the community.
3. **Community Biodiversity Registers (CBRs):** The Act provides for the establishment of CBRs, which are registers that document the biodiversity resources and associated traditional knowledge of local communities. Farmers and other community members are involved in the preparation and maintenance of the CBRs, which can be used to assert their rights over biodiversity resources and traditional knowledge.

Some of the sections of the Biodiversity Act, 2002 that relate to farmers' rights are:

1. Section 3: This section recognizes the sovereign rights of the state over its biodiversity and provides for the regulation of access to biological resources by requiring prior approval from the National Biodiversity Authority (NBA). The NBA is also responsible for ensuring that the benefits arising out of the utilization of biological resources are shared fairly and equitably with the local communities including farmers.
2. Section 4: This section provides for the establishment of State Biodiversity Boards to facilitate the implementation of the provisions of the Act at the state level. The State Biodiversity Boards are also responsible for the identification, documentation, and preservation of biodiversity in their respective states, including traditional knowledge related to biological resources.
3. Section 6: This section provides for the registration of local people, including farmers, who have been conserving and promoting sustainable use of biological resources. Such registration confers certain rights on the registered persons, including the right to receive a share of the benefits arising out of the utilization of biological resources.
4. Section 7: This section provides for the establishment of Biodiversity Management Committees (BMCs) at the local level to ensure the conservation of biodiversity and sustainable use of biological resources. The BMCs are also responsible for promoting equitable sharing of benefits arising out of the utilization of biological resources.
5. Section 8: This section requires prior approval from the State Biodiversity Board for the commercial utilization of any biological resource within the territory of the state. The Board is also responsible for ensuring that the benefits arising out of the utilization of biological resources are shared fairly and equitably with the local communities including farmers.

6. Section 19: This section provides for the recognition and protection of the rights of farmers, breeders, and traditional communities to conserve, cultivate, use, and exchange genetic resources. The section also recognizes the importance of traditional knowledge associated with genetic resources.

Some examples of case laws related to farmers' rights and the Biodiversity Act include:

In the N.D. Jayal case^{xi} the petitioners challenged the constitutional validity of certain provisions of the Biodiversity Act, 2002, including those related to access and benefit sharing of biological resources. The Supreme Court, in its decision in 2005, upheld the constitutional validity of the Act and held that it was necessary to protect India's biodiversity and traditional knowledge.

The P.S. Vetrivelvam case^{xii} dealt with illegal sand mining in the Kaveri river basin in Tamil Nadu, causing damage to the ecosystem and local communities. The NGT ordered the formation of a committee to study the impact of sand mining on the river bed and the livelihoods of local communities. The NGT also directed the Tamil Nadu Pollution Control Board to take action against those involved in illegal sand mining, emphasizing the importance of environmental protection and the need for strict enforcement of environmental laws.

A new bill is also pending in the parliament regarding amendment in Biodiversity Act.^{xiii}

Traditional Knowledge Digital Library (TKDL)^{xliii}:

TKDL is a digital library that contains information about traditional knowledge related to agriculture and other fields. It provides a platform for the protection and preservation of traditional knowledge. The Traditional Knowledge Digital Library (TKDL) is a digital repository of traditional knowledge related to various fields such as medicine, agriculture, and industry. It was created by the Council of Scientific and Industrial Research (CSIR) in India in collaboration with the Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (AYUSH) and other stakeholders.^{xliiv}

TKDL promotes farmers' rights by protecting their traditional knowledge from being patented by corporations without their consent or compensation. Farmers' traditional knowledge about medicinal plants, agricultural practices, and biodiversity conservation are often exploited by corporations for commercial gain, leading to biopiracy^{xliv}. TKDL provides a mechanism for farmers to document their traditional knowledge in a digital format, which is searchable and accessible to patent examiners globally. This helps to prevent the grant of patents on traditional knowledge that is already in the public domain and ensures that farmers receive appropriate compensation for any commercial use of their knowledge.

In India, the exclusion of traditional knowledge and methods of agriculture from patentability is defined under Section 3(j) and 3(h) respectively of the Indian Patents Act, 1970. Section 3(j) of the Patents Act states that inventions which are mere discoveries of any living or non-living substance occurring in nature, and those which are mere admixtures of such substances are not patentable. This includes traditional knowledge and practices related to medicines, plants, and other naturally occurring substances. Section 3(h) of the Patents Act states that any method of agriculture or horticulture is not patentable. This provision excludes traditional methods of farming and agriculture from being patented. The purpose of these sections is to prevent biopiracy and protect India's traditional knowledge and cultural heritage from exploitation by external parties.

Biopiracy refers to the exploitation of traditional knowledge, genetic resources, and biological resources of indigenous communities or countries by individuals or organizations without their permission or compensation. It involves the patenting of traditional knowledge or biological resources by outsiders, who then use the patents to claim exclusive ownership and rights over the resources, without sharing the benefits with the local communities.

In India, biopiracy has impacted farmers and indigenous communities in several ways. For instance, farmers have been unable to access or cultivate certain crops or varieties that have been patented by companies, thereby affecting their livelihoods. Indigenous communities have also been deprived of their traditional knowledge, which has been patented and commercialised by outsiders without their consent or compensation.^{xlvi}

Examples of how TKDL promotes farmers' rights include the successful challenge of a US patent granted on the use of turmeric for wound healing^{xlvii}. In this case, the Indian government used prior art information from TKDL to show that the use of turmeric for wound healing was already known in the traditional Indian medical system. TKDL has also helped to prevent biopiracy of neem and basmati rice, which are important agricultural crops in India. The digital library has documented the traditional knowledge associated with these crops, making it difficult for corporations to patent them without proper compensation to farmers.

To further elaborate on how TKDL promotes farmers' rights, it is important to note that traditional knowledge is often passed down from generation to generation through oral tradition. However, in a rapidly changing world where the market for traditional knowledge is expanding, there is a need to document and protect traditional knowledge.

Furthermore, TKDL is an important tool for protecting biodiversity and promoting sustainable development. Traditional knowledge related to agriculture, medicinal plants, and biodiversity conservation is often critical for the sustainable use and management of natural resources. By documenting this knowledge, TKDL promotes the conservation and sustainable use of natural resources, while also protecting the rights of farmers and indigenous communities.

In addition to protecting farmers' rights, TKDL also promotes the dissemination of traditional knowledge, which is an important aspect of promoting sustainable development. Traditional knowledge related to agriculture, biodiversity conservation, and medicinal plants has been developed and refined over centuries, and is often specific to a particular region or community. This knowledge is often critical for the sustainable use and management of natural resources, and can also contribute to the development of new products and services.

By digitizing traditional knowledge, TKDL makes it accessible to a wider audience, including researchers, entrepreneurs, and policymakers. This can help to stimulate innovation and entrepreneurship in rural areas, and contribute to the development of new products and services that are based on traditional knowledge.

Furthermore, TKDL is an important tool for protecting the intellectual property rights of farmers and indigenous communities. By documenting traditional knowledge, TKDL helps to establish a prior art record that can be used to challenge the grant of patents that are based on such knowledge. This is particularly important in the context of biopiracy, where corporations seek to patent traditional knowledge without acknowledging or compensating the communities that developed it.

In addition to digitizing traditional knowledge, TKDL also works to raise awareness about the importance of traditional knowledge and the need to protect it. This is done through various outreach programs, including workshops, seminars, and publications. By raising awareness about the value of traditional knowledge, TKDL helps to ensure that it is recognized and respected, and that the rights of farmers and indigenous communities are protected.

It is worth noting that TKDL has been successful in preventing biopiracy not just in India, but also in other countries. For example, the United States Patent and Trademark Office (USPTO) has signed a memorandum of understanding (MOU) with the CSIR to access TKDL. This has helped to prevent the grant of patents on traditional knowledge that is already in the public domain, not just in India but also in the US.

These legal provisions play an important role in the protection of IPR related to farmers and ensure that their contribution to agriculture is recognized and protected

The Tribunal Reforms (Rationalisation and Conditions of Service) Act 2021

This Act has made changes to several laws, including the Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act. The Tribunal Reforms Act, 2021 calls for the dissolution of over nine appellate boards and tribunals (including the Cinematograph Act of 1952, Customs Act of 1957, Geographical Indications of Goods Act of 1999, Protection of Plant Varieties and Farmers' Rights Act of 2001, and Patents Act of 1970) and the transfer of appellate tribunal functions to other legal entities and High Courts. Amidst the tumultuous discussions during the Monsoon Session of Parliament, the swift passage of the Tribunal Reforms Bill, 2021 has drawn considerable criticism from the esteemed Supreme Court of India.^{xlvi}

Appellate tribunals and their operations within the Indian Constitution hold significant implications, as they help alleviate the burden on Indian courts and facilitate expedited case resolution. However, the current government decision aims to dissolve these appellate tribunals. The ongoing process of creating and dismantling tribunals raises questions about the constitutional and rational basis for such actions, leading to an essential discussion and examination of the elements that make up an effective, government-independent, and consistent framework for the functioning of tribunals.

The Act^{xlix} also aimed to reduce the financial burden on the government, as the establishment and functioning of various tribunals involved significant expenses. By merging some of the tribunals and transferring their functions to other bodies, the government aimed to optimise the utilisation of resources and reduce unnecessary expenditure.

IV. Other case laws

Bt Brinjal controversy (2010)^l: This case was filed by environmental groups against the Indian government for allowing the commercialization of genetically modified Bt Brinjal. The case highlighted the need for transparent and participatory decision-making in matters related to biotechnology. This case refers to the controversy surrounding the commercial release of Bt brinjal, a genetically modified (GM) eggplant, in India. In 2009, the Indian government approved the commercial release of Bt brinjal, which had been genetically engineered to be resistant to pests.

However, this decision was met with widespread opposition from activists and farmers, who raised concerns about the safety and environmental impact of the crop. Many critics argued that Bt brinjal posed a threat to traditional varieties of eggplant, and that its commercial release could lead to increased pesticide use, harm to pollinators, and reduced biodiversity.

The controversy led to a series of public consultations and protests, with the government ultimately imposing a moratorium on the commercial release of Bt brinjal in 2010. The moratorium has remained in place since then, and the future of Bt brinjal in India remains uncertain.

Geographical Indications case (2005): This case was filed by the Indian government against a UK company for using the name "Darjeeling" on its tea without proper authorization^{li}. The case established the importance of protecting geographical indications and promoting fair trade. Even though the Government has taken several initiatives towards protecting "Darjeeling" Tea India and abroad; the statistics show that violations are still taking place: around 40 million kg of tea per annum are being sold globally as "Darjeeling tea", whereas the actual production of authentic Darjeeling tea is around 9 million kg only.^{lii,liii} It shows the vast leakages in the lawful profits of tea growers and farmers in India.

Basmati Export Development Foundation (BEDF) case (2002): This case was filed by BEDF against the US company RiceTec Inc. for claiming ownership of the Basmati rice variety.^{liv} The case established the importance of protecting the collective rights of farmers

and promoting fair trade. India began taking the protection of its geographical indications seriously in 1997, when the United States Patent and Trademark Office granted a patent to Ricetec Inc. for new types of rice called 'Basmati'. The patent was controversial because India claimed that it was invalid, and that the marketing of the rice by Ricetec under the name 'Basmati' was not acceptable because 'Basmati' was a geographical indication in India. Ricetec had been using similar trademarks such as 'Texmati', 'Kasmati', and 'Jasmati' to sell their version of Basmati rice for several years, claiming that the new varieties had better characteristics than the original Basmati and could be grown successfully in North America.^{lv} **The Nagoya Protocol**^{lvi} on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the Convention on Biological Diversity (CBD)^{lvii} has a significant impact on farmers' rights in India. The Protocol aims to promote the conservation and sustainable use of biological diversity and ensure the fair and equitable sharing of benefits arising from the utilization of genetic resources.

One of the key provisions of the Nagoya Protocol is that access to genetic resources and traditional knowledge associated with genetic resources must be based on prior informed consent (PIC) and mutually agreed terms (MAT) between the provider and the user. This means that farmers who are the custodians of traditional knowledge related to plant genetic resources have the right to control access to this knowledge and negotiate fair and equitable benefit-sharing agreements with companies and other users who wish to use their knowledge. The Indian government has taken several steps to implement the Nagoya Protocol and protect the rights of farmers. In 2014, India enacted the Biological Diversity Act, which provides for the conservation of biological diversity and the fair and equitable sharing of benefits arising from the use of genetic resources. The Act establishes the National Biodiversity Authority and State Biodiversity Boards to oversee the implementation of its provisions.

In 2016, the government of India released the National Biodiversity Act Guidelines, which provide detailed guidance on the implementation of the Nagoya Protocol in India. The guidelines emphasize the importance of ensuring that farmers and local communities are fully involved in the decision-making process related to the use of genetic resources and traditional knowledge.

The PPVFR Act was amended in 2019^{lviii} by the Protection of Plant Varieties and Farmers' Rights (Amendment) Act, 2019, which received presidential assent on August 6, 2019, and came into force on October 30, 2019. The amendments made to the PPVFR Act in 2019 provide for the recognition and protection of farmers' rights over traditional varieties of crops, and establish a mechanism for the sharing of benefits arising from the use of those varieties.

V. Instances of IPR benefiting farmers in India:

1. Turmeric from Erode: Turmeric from the Erode district of Tamil Nadu has been granted GI status, which has helped farmers in the region to earn higher prices for their crops. According to a report by The Hindu BusinessLine, the GI certification has enabled Erode farmers to sell their turmeric at prices that are 20-25% higher than the market rate.^{lix}
2. Neem patent controversy: In the 1990s, the US Patent and Trademark Office granted a patent to a US-based company for a process of extracting an anti-fungal agent from neem tree seeds. The patent was opposed by various groups in India, who argued that the use of neem for medicinal purposes had been known for centuries in India and that the patent represented biopiracy. The Indian government eventually succeeded in having the patent revoked, and the incident raised awareness of the need to protect traditional knowledge and prevent the exploitation of natural resources.
3. Turmeric GI tag: Turmeric from the Salem district of Tamil Nadu was granted a GI tag in 2016. This helped farmers in the region to increase their income as they were able to sell their turmeric at a premium price under the Salem turmeric name.

4. Nagpur Orange GI tag: Nagpur oranges were granted a GI tag in 2014, which helped farmers in the region to brand their oranges and sell them at a higher price.
5. Kalanamak rice: In Uttar Pradesh (Siddharthnagar, Sant Kabirnagar, Mau and Azamgarh districts), farmers have been growing a variety of rice called Kalanamak for generations. Kalanamak rice is highly valued for its aroma and taste, but it was not recognized as a distinct variety until recently. In 2012, Kalanamak rice was granted Geographical Indication (GI) status, which has helped farmers in Uttarakhand to protect their rice variety and charge higher prices for their crops.^{lx}

VI. Instances of IPR NOT benefiting farmers in India:

1. Bt cotton farmers in India: Bt cotton was introduced in India in the early 2000s and was initially hailed as a success, with farmers reporting higher yields and reduced pesticide use. However, in recent years, there have been concerns that Bt cotton has not delivered the expected benefits to farmers in terms of profitability. For example, in Gujarat, Bt cotton farmers have reported lower yields and higher costs, which has led to increased indebtedness and suicides.
2. Patenting of haldi (turmeric) products: In recent years, there has been a growing market for products made from haldi, such as turmeric powder, supplements, and skincare products. Some farmers and small-scale entrepreneurs in India have been able to use this opportunity and market their products at a premium price. However there is no evidence to suggest that such activity has resulted in favourable prices for farmers as well.
3. Lack of compensation for traditional knowledge: Indigenous communities in India have long held knowledge about the medicinal properties of various plants, which has been used to develop modern medicines. However, there have been cases where companies have patented these plants without providing adequate compensation to the communities from which the knowledge originated. For example, in the case of the anti-diabetic drug Sitagliptin, which is derived from the Java plum, the company that developed the drug did not acknowledge the traditional knowledge of tribals and farmers.
4. Bt cotton controversy: Bt cotton was introduced in India in the early 2000s with the promise of higher yields and reduced pesticide use. However, there have been concerns that the technology has not delivered the expected benefits to farmers in terms of profitability. Many farmers have reported high debt and low yields due to the high cost of Bt cotton seeds.
5. Biopiracy: There have been cases where companies have patented traditional knowledge related to agriculture without adequately compensating the communities from which the knowledge originated. For example, in 1995, the US Patent and Trademark Office granted a patent on neem to a US company, which led to protests from Indian farmers and activists who argued that neem was a traditional knowledge and could not be patented.
6. Lack of awareness about IPR: Many farmers in India are not aware of IPR laws and how they can benefit from them. This can lead to exploitation by companies or individuals who take advantage of their lack of knowledge.
7. Lack of access to legal support: Many farmers in India do not have access to legal support to help them obtain patents or protect their intellectual property rights. This can make it difficult for them to protect their innovations and benefit from them.
8. Bt cotton farmers, Maharashtra: Bt cotton was introduced in India in the early 2000s as a genetically modified crop that was supposed to reduce pesticide use and increase yields. However, many farmers in Maharashtra who switched to Bt cotton have not been able to realize the expected benefits. In fact, some farmers have reported lower

yields and increased costs due to the high cost of seeds and pesticides. Additionally, many farmers have been forced to take on debt in order to afford the inputs required for Bt cotton farming.

9. Bt cotton, which was introduced in India in the early 2000s, was initially hailed as a success, with farmers reporting higher yields and reduced pesticide use. However, there have been concerns that the technology has not delivered the expected benefits to farmers in terms of profitability. Some farmers have reported lower yields and higher costs due to the need to purchase new seeds every year and to use specific pesticides and fertilizers.^{lxi}
10. The controversy over neem patenting in the 1990s, where the European Patent Office granted a patent to a US company for the use of neem as a fungicide and insecticide. The patent was revoked in 2005 after protests from farmers and activists, who argued that neem was a traditional knowledge that had been used in India for centuries and that it should not be patented by foreign companies.
11. The controversy over genetically modified (GM) crops in India, where farmers and activists have raised concerns about the impact of GM crops on traditional varieties, biodiversity, and farmers' livelihoods. Some farmers have reported lower yields and higher costs due to the need to purchase GM seeds and use specific pesticides and fertilizers. There have also been concerns about the concentration of ownership and control of seeds and agricultural inputs by multinational corporations.

While there have been instances where farmers in India have benefited from IPR, there have also been controversies and issues surrounding the impact of IPR on farmers' livelihoods and traditional knowledge. It is important to have strong regulations and policies in place to ensure that farmers are able to fully benefit from IPR and that traditional knowledge is protected and fairly compensated.

VII. Exhaustion of intellectual property rights (IPR) and farmer rights

The legal concept of **exhaustion of intellectual property rights (IPR)** refers to the point at which the owner of a patented product or technology loses the right to control its use and distribution. In the context of seed patents, exhaustion occurs when a farmer purchases patented seeds and subsequently uses the resulting crops for planting, without obtaining additional seeds from the patent holder.

The legal treatment of exhaustion of IPR in the United States and India has been the subject of several high-profile cases, including *Bowman v. Monsanto*^{lxii} and the *Pepsico potato farmers case*^{lxiii}.

In *Bowman v. Monsanto*^{lxiv}, a case that went before the United States Supreme Court in 2013, the court ruled that Monsanto's patent on genetically modified soybean seeds was not exhausted by Bowman's purchase of the seeds from a grain elevator, as Bowman had subsequently grown new seeds without Monsanto's permission. The court held that the exhaustion doctrine did not apply to self-replicating technologies like seeds, and that Monsanto's right to control the use of its patented seeds extended to subsequent generations of those seeds.

A comparison: How courts differ in USA and India on exhaustion of IPR and farmers rights?

In the United States, the concept of exhaustion of IPR is well-established and is generally interpreted to mean that once a patented product is sold, the patent holder's rights over that product are exhausted. This means that the buyer can resell, use, or modify the product without further permission or liability to the patent holder. This principle has been upheld by the US Supreme Court in various cases, including the landmark case of *Quanta Computer Inc. v. LG Electronics case*.^{lxv}

In India, the concept of exhaustion of IPR is less well-established, and there is no clear legal framework for it. However, the courts have recognized the importance of protecting farmers' rights and have issued several judgments that uphold farmers' rights over plant varieties.

For example, in the case of *Nuziveedu Seeds*,^{lxvi} The Delhi High Court held that farmers have the right to use patented genetically modified seeds without further permission or liability to the patent holder. The court also held that the exhaustion of patent rights principle applies to seeds sold to farmers, meaning that once a farmer has purchased a patented seed, the patent holder's rights over that seed are exhausted.

Overall, while both India and the United States recognize the importance of protecting intellectual property rights and farmers' rights, the legal frameworks and judicial interpretations differ in some key ways. In India, the courts have tended to be more protective of farmers' rights, while in the United States, the principle of exhaustion of IPR is more well-established and recognized.

In the United States, the principle of exhaustion of patent rights is codified in the Patent Act, specifically in 35 U.S.C. § 271(c), which states that patent holders have the exclusive right to make, use, sell, and offer to sell their patented invention. However, this exclusive right is subject to the doctrine of patent exhaustion, which means that once a patented product is sold, the patent holder's rights over that product are exhausted.

In India, the Protection of Plant Varieties and Farmers' Rights Act (PPV&FR Act) includes provisions related to the exhaustion of farmers' rights. Section 39 of the PPV&FR Act provides that a farmer who has lawfully obtained a variety can use, sow, exchange, share or sell such variety, including harvested material. The section also provides that a farmer is entitled to save, use, sow, resow, exchange, share or sell his farm produce, including seed of a variety protected under the Act, except under certain specified conditions.

In the case of *Monsanto v. Nuziveedu Seeds*^{lxvii}, the Delhi High Court interpreted Section 39 of the PPV&FR Act to mean that farmers are free to use patented genetically modified seeds for the production of crops without seeking the permission of the patent holder, as long as the farmer has legitimately obtained the seeds. The court held that the patent holder's rights over the seeds are exhausted once they are sold to the farmers.

Section 84 of the Indian Patents Act, 1970 provides for compulsory licensing of patented inventions in certain circumstances, including when the invention is not being worked in India, or when it is not available to the public at a reasonably affordable price. Compulsory licensing allows a third party to manufacture and sell the patented product without the consent of the patent holder, in exchange for payment of a royalty. This provision allows the government to issue a license to use a protected plant variety to any person for the purpose of public interest or to meet emergency situations.

Bt Cotton seeds were originally developed by Monsanto, which held the patent on the technology, but were sold at a high price, making them unaffordable for many Indian farmers. India implemented price controls on Bt cotton seeds in order to reduce their cost. The move was aimed at reducing the price of the seed and increasing access to it for Indian farmers, who had been struggling with high seed prices and low yields. The government used the Essential Commodities Act to regulate the prices of genetically modified (GM) cotton seeds, which were sold by Monsanto under the brand name Bollgard. The government fixed the maximum sale price of Bt cotton seeds at Rs 800 (about USD 12) for a packet of 450 grams of seeds, and also mandated that seed companies must obtain government approval before raising the price of the seeds.^{lxviii} The price control order, 2015 controls maximum selling price of cotton seeds and also the trait value under licensing agreements.^{lxix}

Several international agreements and national laws have been enacted to protect IPRs in agriculture. These include the International Convention for the Protection of New Varieties of Plants (UPOV), the Agreement on Trade-Related Aspects of Intellectual Property Rights

(TRIPS), and the PPV&FRA in India. The TRIPS agreement requires member countries to provide minimum standards for the protection and enforcement of IPRs.

While UPOV^{lxx} provides a framework for the protection of new plant varieties through PBRs, there have been concerns about the impact of PBRs on farmers' rights to save, exchange, and sell their own farm-saved seeds. The UPOV Convention allows for exemptions for farmers to use protected varieties for their own use on their own farm, but it does not allow farmers to sell or exchange those seeds without the permission of the breeder. This can limit the ability of farmers, particularly in developing countries, to access and use new and improved plant varieties, as well as to maintain and enhance the genetic diversity of crops.

In the context of agriculture and farmers rights, TRIPS^{lxxi} has been used to protect plant varieties through patents, as well as to protect agrochemicals, GMOs, and other agricultural innovations. This has raised concerns about the impact of IPRs on farmers' rights to save, exchange, and sell their own farm-saved seeds, as well as their ability to access and use new and improved plant varieties. For example, the patenting of GMOs has led to disputes between multinational corporations and farmers over the use of patented seeds, as well as concerns about the potential for genetic contamination and loss of biodiversity.

To address these concerns, some countries, including India, have developed laws and policies that seek to balance the interests of breeders and farmers. For example, the PPV&FRA in India recognizes and protects farmers' rights to use, save, exchange, and sell their own farm-saved seeds, as well as the traditional knowledge and innovations of farming communities. However, there are ongoing debates about the extent to which IPRs in agriculture should be protected, and how they should be balanced against other public interests, such as food security, biodiversity conservation, and farmers' rights.

Conclusion

This research has illuminated the intricate relationship between biological resources, intellectual property rights, and the rights of farmers. By exploring the diverse landscape of biological resources and their critical role in agriculture and food security, the paper has highlighted the need for a legal framework that fosters innovation while safeguarding the rights and livelihoods of farmers. The analysis of intellectual property regimes and their coverage of biological resources emphasizes the importance of access and benefit-sharing mechanisms that ensure equitable returns for farmers who steward this vital heritage. The concrete examples presented throughout the paper serve as a testament to the potential for legal frameworks to empower farmers and promote their economic well-being.

To ensure that IPRs do not infringe on the rights of farmers, it is essential to involve farmers in the development and implementation of IPR policies. This can be achieved by providing farmers with access to information about IPRs and involving them in decision-making processes. It is also important to ensure that farmers have access to a diverse range of plant varieties and that they are not restricted from saving and using seeds from their own crops.

The protection of IPRs is essential for innovation and progress in agriculture. However, it is equally important to ensure that IPRs do not infringe on the rights of farmers. The rights of farmers must be protected, and they should be given the freedom to use, save and share their own seeds. Governments and international organisations need to work together to strike a balance between IPRs and the rights of farmers. The issue of IPRs and the protection of the rights of farmers is a complex and controversial one. There are valid concerns on both sides, and it is essential to find a middle ground that protects the interests of both plant breeders and farmers. Best practices should be adopted to ensure that farmers' rights are not compromised, and they can continue to contribute to the development and growth of agriculture.

This research underscores the need for continuous efforts to strengthen legal frameworks, fostering a balance between innovation and farmer rights. Only through a robust and equitable legal system can we ensure the sustainable utilization of biological resources for a

food-secure future and acknowledge the invaluable contributions of farmers as custodians of our biological heritage.

ⁱTopi Basar, "Traditional Cultural Intellectual Property Rights of indigenous People with special reference to Arunachal Pradesh" in Manoj Kumar Sinha and Jupi Gogoi (eds.), *IPR and Human rights with special emphasis on India* 293 (ILI, Delhi, ISBN No. 978-81-927926-4-4).

ⁱⁱ Dewan, Mohan "IPR protection in agriculture: an overview" (NISCAIR-CSIR, India, 2011) available at: <<https://nopr.niscpr.res.in/handle/123456789/11571>>

ⁱⁱⁱ Tambo, Justice A., "Copyright or copyleft: An assessment of farmer-innovators' attitudes towards intellectual property rights." *Journal of Rural Studies* 74 (2020): 133-141. Available at <<https://www.sciencedirect.com/science/article/abs/pii/S0743016718306491>>

^{iv}Winter, Lauren. "Cultivating farmers' rights: Reconciling food security, indigenous agriculture, and TRIPS." *Vand. J. Transnat'l L.* 43 (2010): 223. Available at <https://heinonline.org/HOL/Page?collection=journals&handle=hein.journals/vantl43&id=226&men_tab=src_hresults>

^v Martha Pskowsk, "Indigenous Maize: Who Owns the Rights to Mexico's 'Wonder' Plant?" *Yale School of the Environment* July 16th, 2019 available at <<https://e360.yale.edu/features/indigenous-maize-who-owns-the-rights-to-mexicos-wonder-plant>> (last visited on April 2nd, 2023).

^{vi} Kochhar, Sudhir. "Institutions and capacity building for the evolution of IPR regime in India: Protection of plant varieties and farmers' rights." (2008).

^{vii} Chidi Oguamanam, Intellectual Property Rights in Plant Genetic Resources: Farmers' Rights and Food Security of Indigenous and Local Communities, 11 *DRAKE J. AGRIC. L.* 273 (2006) available at: <<https://heinonline.org/HOL/Print?collection=journals&handle=hein.journals/dragl11&id=280>>

^{viii} Regine Andersen, "Stewardship" or "Ownership" How to realize farmers' rights? (Routledge Handbook of Agricultural Biodiversity, 1st Edition, 2017) available at: <https://www.routledge.com/Routledge-Handbook-of-Agricultural-Biodiversity/Hunter-Guarino-Spillane-McKeown/p/book/9781315797359?_ga=1824933995.1680097629&_gl=1*1hkuote*_ga*MTgyNDkzMzk5NS4xNjgwMDk3NjI5*_ga_0HYE8YG0M6*MTY4MDA5NzYzMC4xLjAuMTY4MDA5NzYzMC4wLjAuMA..>

^{ix}Bushra Tariq, "Indigenous Knowledge and Farmers' Rights: International Legal Regime" in Yogesh Pratap Singh, Suvrashree Panda *Tribal Justice: After Seventy Years of Working of Indian Constitution* (Eastern Book Company, 1st Edition 2021).

^x Lisa P Lukose, Alankrita Mathur, "Sustainable Development through the Prism of Indigenous Knowledge: A Revisit to Intellectual Property Rights Issues During Covid Pandemic", 63 *JILI* (2021) 277.

^{xi} Francisca Rodríguez, Andrea P. Sosa Varrotti. (2023) Thirty years of sowing hope to globalise the struggle: women and youth of La Via Campesina in the construction of food sovereignty – a conversation. *The Journal of Peasant Studies* 0:0, pages 1-19. Available at: <<https://www.tandfonline.com/doi/abs/10.1080/03066150.2023.2176758>> (last visited on March 21st, 2023).

^{xii} K.R. Kranthi, G.D. Stone, "Long-term impacts of *Bt* cotton in India". *Nature Plants* 6, 188–196 (2020). Available at: <https://doi.org/10.1038/s41477-020-0615-5>. <https://www.nature.com/articles/s41477-020-0615-5#Abs1> (last visited on March 21st, 2023).

^{xiii} "with *Bt* resistance in another pest and surging populations of non-target pests, farmers now spend more on pesticides today than before the introduction of *Bt*. Indications are that the situation will continue to deteriorate."

^{xiv}Hemant G. Tripathi et al., "Farmers' biodiversity knowledge improves natural enemy conservation in agricultural ecosystems," 183 *Crop Protection* 106777 (2024).

^{xv}Abigarl Ndudzo et al., "CRISPR-Cas9 genome editing in crop breeding for climate change resilience: Implications for smallholder farmers in Africa," 16 *Journal of Agriculture and Food Research* 101132 (2024).

^{xvi}Goudjo Habib Toessi et al., "Farmers' perceptions and management of citrus fungal diseases in Benin," 10 *Heliyon* e32775 (2024).

^{xvii}Macson O. Ogieriakhi and Richard T. Woodward, "Understanding why farmers adopt soil conservation tillage: A systematic review," 9 *Soil Security* 100077 (2022).

^{xviii}Danilo Tedesco et al., "Sustainable management of sweet potatoes: A review on practices, strategies, and opportunities in nutrition-sensitive agriculture, energy security, and quality of life," 210 *Agricultural Systems* 103693 (2023).

^{xix} Balasubramanian Ramakrishnan et al., "Potential of microalgae and cyanobacteria to improve soil health and agricultural productivity: a critical view," 2 *Environmental Science Advances* 586–611 (2023).

^{xx}The Protection of Plant Varieties and Farmers' Rights Act, 2001 (Act No. 53 of 2001).

^{xxi} Section 2(k) reads: "

"farmer" means any person who—

(i) cultivates crops by cultivating the land himself; or

(ii) cultivates crops by directly supervising the cultivation of land through any other person;

or

(iii) conserves and preserves, severally or jointly, with any person any wild species or traditional varieties or adds value to such wild species or traditional varieties through selection and identification of their useful properties;”

^{xxii}Section 2(l) reads: “

“farmers’ variety” means a variety which—

(i) has been traditionally cultivated and evolved by the farmers in their fields; or

(ii) is a wild relative or land race of a variety about which the farmers possess the common knowledge;”

^{xxiii} 39. Farmers’ rights.—(1) Notwithstanding anything contained in this Act,—

(i) a farmer who has bred or developed a new variety shall be entitled for registration and other protection in like manner as a breeder of a variety under this Act;

(ii) the farmers’ variety shall be entitled for registration if the application contains declarations as specified in clause (h) of sub-section (1) of section 18;

(iii) a farmer who is engaged in the conservation of genetic resources of land races and wild relatives of economic plants and their improvement through selection and preservation shall be entitled in the prescribed manner for recognition and reward from the Gene Fund:

Provided that material so selected and preserved has been used as donors of genes in varieties registrable under this Act;

(iv) a farmer shall be deemed to be entitled to save, use, sow resow, exchange, share or sell his farm produce including seed of a variety protected under this Act in the same manner as he was entitled before the coming into force of this Act:

Provided that the farmer shall not be entitled to sell branded seed of a variety protected under this Act.

Explanation.—For the purpose of clause (iv), “branded seed” means any seed put in a package or any other container and labelled in a manner indicating that such seed is of a variety protected under this Act.

(2) Where any propagating material of a variety registered under this Act has been sold to a farmer or a group of farmers or any organisation of farmers, the breeder of such variety shall disclose to the farmer or the group of farmers or the organisation of farmers, as the case may be, the expected performance under given conditions, and if such propagating material fails to provide such performance under such given conditions, the farmer or the group of farmers or the organisation of farmers, the case may be, may claim compensation in the prescribed manner before the Authority and the Authority, after giving notice to the breeder of the variety and after providing him an opportunity to file opposition in the prescribed manner and after hearing the parties, may direct the breeder of the variety to pay such compensation as it deems fit, to the farmer or the group of farmers or the organisation of farmers, as the case may be

^{xxiv}PPV&FR Act, 2001.

^{xxv} “The defence of seeds is part of the defence of traditional ways of farming, showing that seed sovereignty is a key part of food sovereignty.”

La Via Campesina, “Seed laws that criminalise farmers: resistance and fightback” (GRAIN, 8 Apr 2015) *available at*:<<https://grain.org/en/article/5142-seed-laws-that-criminalise-farmers-resistance-and-fightback#4%20Asia%20struggles>> (last visited on March 28th, 2023)

^{xxvi} B L Manjunatha, D U M Rao, M B Dastagiri, “Need for Government Intervention in Regulating Seed Sale Price and Trait Fee: A Case of Bt Cotton” *Journal of Intellectual Property Rights* Vol 20, November 2015, pp 375-387. *Available at*:<<https://krishi.icar.gov.in/jspui/bitstream/123456789/35885/1/JIPR-225.pdf>>(last visited on March 28th, 2023)

^{xxvii} Food and Agricultural organisation, United Nations, “International Treaty on Plant Genetic Resources for Food and Agriculture”*available at*:<<https://www.fao.org/plant-treaty/en/>>(last visited on March 28th, 2023).

^{xxviii} This provision has been deleted by THE TRIBUNALS REFORMS ACT, 2021 (NO. 33 OF 2021).

^{xxix} V.K. Ahuja, “Protection of Geographical Indications: National and International Perspective”, 46 JILI (2004) 269.

^{xxx} Hariharan G , “Basmati, Turmeric And Neem - Patenting And Related Issues - Case Studies”, (2002-03) 2 Law Rev. GLC 185.

^{xxxi} “Background Paper to the Neem Challenge”, *available at*http://www.platformgentechnologie.nl/patents/euro_pat_office/parents/neem_final_backgrounder_nl.shtml. (last visited on March 28th, 2023).

^{xxxii} Vandana Shiva, *Biopiracy the Plunder of Nature and Knowledge*, Berkeley (North Atlantic Books, 2016).

^{xxxiii}*Available at*:<<https://theprint.in/theprint-essential/case-against-farmers-poor-documentation-why-pepsico-india-lost-lays-variety-potato-rights/776644/>>.

^{xxxiv} PARLIAMENT OF INDIA RAJYA SABHA Standing Committee Reports, “Review of the Intellectual Property Rights Regime in India” DEPARTMENT RELATED PARLIAMENTARY STANDING

COMMITTEE ON COMMERCE, ONE HUNDRED AND SIXTY FIRST REPORT (Presented to the Rajya Sabha on 23rd July, 2021)(Laid on the Table of Lok Sabha on 23rd July, 2021).

^{xxxv} “15.3. The Committee noted that the number of registered GI in India has been dismal, manifesting a declining trend from the year 2016-17. It further enquired about the issues of delay in registration of GIs. The Department informed that the delay and pendency is primarily due to the non-compliance of the necessary legal requirements by the applicants.”

^{xxxvi} “19.3. Also, a three-tier IP management mechanism in ICAR has been constituted and accordingly Institute Technology Management Units (ITMUs) have been established in all ICAR institutes in India to undertake initiatives pertaining to filing of IPRs generated in research work as per Indian legislations. It was further apprised that Agrinnovate India Limited, a registered Company of the Department of Agricultural Research and Education (DARE) deals with the commercialization of IPRs generated in agricultural research.”

^{xxxvii} *Monsanto Technology LLC v. Nuziveedu Seeds Ltd.*, (2019) 3 SCC 381.

^{xxxviii} PARLIAMENT OF INDIA RAJYA SABHA Standing Committee Reports, “Review of the Intellectual Property Rights Regime in India” DEPARTMENT RELATED PARLIAMENTARY STANDING COMMITTEE ON COMMERCE, ONE HUNDRED AND SIXTY FIRST REPORT (Presented to the Rajya Sabha on 23rd July, 2021)(Laid on the Table of Lok Sabha on 23rd July, 2021).

^{xxxix} Available at: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:62017TN0683:EN:HTML> (last visited on March 21st, 2023)

^{xl} *N.D. Jayal v. Union of India*, (Writ Petition (Civil) No. 180 of 2001, (2004) 9 SCC 362.

^{xli} *P.S. Vetrivelvam v. State of T.N.*, 2021 SCC OnLine NGT 779.

^{xlii} THE BIOLOGICAL DIVERSITY (AMENDMENT) BILL, 2021 (Bill No. 158 of 2021) Available at: http://164.100.47.4/BillsTexts/LSBillTexts/Asintroduced/158_2021_LS_Eng.pdf (last visited on March 27th, 2023).

^{xliii} Available at: <https://www.tkdil.res.in/tkdil/langdefault/common/Home.asp?GL=Eng> (last visited on March 20th, 2023)

^{xliv} Available at: <https://pib.gov.in/PressReleasePage.aspx?PRID=1852528> (last visited on March 20th, 2023)

^{xlv} Subham S. Chatterjee, “Biopiracy and its Growing Threat to Biodiversity in India: A Bird's Eye View”, 2.1 *NLIU LR* (2011) 24.

^{xlvi} Lisa P Lukose, Alankrita Mathur, “Sustainable Development through the Prism of Indigenous Knowledge: A Revisit to Intellectual Property Rights Issues During Covid Pandemic”, 63 *JILI* (2021) 277.

^{xlvii} Hariharan G., “Basmati, Turmeric And Neem - Patenting And Related Issues - Case Studies”, (2002-03) 2 *Law Rev. GLC* 185.

^{xlviii} Vijay Kumar Singh, “A Prologue - Contemporary Issues in Law and Policy - Ten Major Reflections from 2021”, 6 *UPES LR* (2021) 1.

^{xlix} The Tribunal Reforms (Rationalisation and Conditions of Service) Act 2021

^l John Sebastian, Apoorva Sharma, “BT Brinjal Debate - A Few Comments on GM Crops and Farmers' Rights”, (2013) 8 *NSLR* 140.

^{li} Tea Board of India, “The Experience of Indian Tea Producers: Protection of Darjeeling Tea”, paper presented at the World Wide Symposium on Geographical Indications, San Francisco, 9-11 July 2003 [WIPO/GEO/SFO/03/8]

^{lii} Gautami Govindrajan, Madhav Kapoor, “Why the Protection of Geographical Indications in India Needs an Overhaul”, 8.1 *NLIU LR* (2019) 22.

^{liii} Kasturi Das, *Prospects and Challenges of Geographical Indications in India*, 13 *J. World Intell. Prop.* 148, 160 (2010)

^{liv} *Agricultural and Processed Food Products Export Development Authority v. Daawat Foods Limited*, 2016 SCC OnLine IPAB 1.

^{lv} V.K. Ahuja, “Protection of Geographical Indications: National and International Perspective”, 46 *JILI* (2004) 269.

^{lvi} Available at: <https://www.cbd.int/abs/infokit/revised/web/factsheet-nagoya-en.pdf> (last visited on March 27th, 2023).

^{lvii} S.K. Verma, “Biodiversity and Intellectual Property Rights”, 39 *JILI* (1997) 203.

^{lviii} AMENDMENTS IN PUBLIC NOTICE (01 of 2019) available at: <https://plantauthority.gov.in/sites/default/files/publicnotice-24of2019.pdf>

^{lix} CII Media Releases, “TN Government to setup Turmeric Research Centre in Erode” available at: <https://www.cii.in/PressreleasesDetail.aspx?enc=CVgKO6BmmSU7kLp3+MKuxUfG/7qDhnNrIYI7d8ciRWg7P97ZdrFiAV1igPf8RaAItB983aouWrhwcNV6boLKSg=>> (last visited on March 25th, 2023).

^{lx} Manish Raj, “Kalanamak rice, ‘Buddha’s gift’, awarded GI tag” *Times of India* Oct 04th, 2013 available at: <<https://timesofindia.indiatimes.com/india/kalanamak-rice-buddhas-gift-awarded-gi-tag/articleshow/23485780.cms>>

^{lxi} K.R. Kranthi, G.D. Stone, “Long-term impacts of *Bt* cotton in India”. *Nature Plants* **6**, 188–196 (2020). Available at: <https://doi.org/10.1038/s41477-020-0615-5>.

^{lxii} *Bowman v. Monsanto Co. et al.*, 2013 SCC OnLine US SC 30, 569 US 278 (2013).

^{lxiii} BISWAJIT DHAR, “Points of law in the PepsiCo-potato case” *The Hindu BusinessLine* December 06, 2021 Available at < <https://www.thehindubusinessline.com/opinion/points-of-law-in-the-pepsico-potato-case/article27060326.ece>> (last visited on April 4th, 2023).

^{lxiv} Supra Note lxii

^{lxv} *Quanta Computer, Inc. v. LG Electronics, Inc.*, 553 U.S. 617 (2008).

^{lxvi} *Monsanto Technology LLC v. Nuziveedu Seeds Ltd.*, (2019) 3 SCC 381.

^{lxvii} *Ibid.*

^{lxviii} Ankit Yadav, “The Curious Case of Monsanto's BT Cotton Technology”, (2016) *PL (Comp. L)* July 71.

^{lxix} Ministry of Agriculture and Farmers Welfare, Govt. of India order December 7th, 2015 available at: <http://seednet.gov.in/PDFFILES/Cotton_Seeds_Price.pdf>

^{lxx} UPOV stands for International Convention for the Protection of New Varieties of Plants (Union Internationale pour la Protection des Obtentions Végétales in French). It is an intergovernmental organization that provides a framework for the protection of plant breeders' rights (PBRs) through the establishment of minimum standards for the recognition and protection of new plant varieties.

^{lxxi} TRIPS stands for Agreement on Trade-Related Aspects of Intellectual Property Rights. It is an international agreement administered by the World Trade Organization (WTO) that sets out minimum standards for the protection and enforcement of intellectual property rights (IPRs), including patents, trademarks, copyrights, and trade secrets, among others. The agreement aims to promote innovation and technology transfer while balancing the interests of rights holders and users of intellectual property.