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Farmers' Rights: A Euro-Indian Comparison through the lens of Intellectual Property Rights

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Intellectual Property is profoundly contributing to the field of agriculture. It is used in agriculture to reward innovative breeding procedures that produce new varieties. In emerging nations, farmers have a significant role in the political, social, and economic facets of society. Agriculture provides a substantial amount of work and means of subsistence for people. Plant variety protection regulations are distinct from patent law in both India and European countries. Plant variety protection regulations are distinct from patent law in both India and European countries. This study aims to give a comparative perspective between the European and Indian regime's protection of farmers' rights and plant varieties, as well as the effect of international protocols and conventions. The Protection of Plant Varieties and Farmers Rights Act of 2001 is examined in this study along with its key components. More significantly, the measures that benefit farmers are emphasised, along with the importance of the awards and recognitions that the Indian government has instituted. This paper therefore aims to explore the state of farmers' rights under intellectual property law in two diverse regions: Europe and India.

Keywords: Agriculture, Benefit Sharing, Farmers Rights, Genetically Modified Crops, IPRs, Livelihood, Plant Variety Protection, Seed Saving, Traditional Farming

Intellectual property (IP) laws play a pivotal role in safeguarding the rights of innovators and creators such as patents, plant variety protection (PVP), etc. However, these laws also have significant implications for farmers, especially in the context of seed saving, traditional farming practices, and access to genetic resources. One significant requirement for the preservation of plant genetic diversity, the cornerstone of global food and agricultural production, is the protection of farmers' right.[1] Farmers have been the protectors and creators of agricultural biodiversity from the beginning of agriculture. Plant varieties were developed and diversified by careful selection of their best seeds and propagating material, as well as interchange with other farmers. Some of the newly discovered plants in the wild were raised under cultivation. An unbelievable amount of plant diversity for food and agriculture has developed from a limited number of early plants and variations over thousands of years of constant management and cultivation by farmers.[2]

In underdeveloped and developing nations, farmers' rights are an important route for improving nutrition, food security and livelihood. The primary obstacle to achieving greater food security is not only production of food but also access to it. The majority of farmers lack access to commercial cultivars and cannot afford the inputs needed for production, such as herbicides and fertilisers.[3] To sustain yields and quality, they rely on the diversity of cultivated plants, which enable them to adjust food production to challenging and frequently marginal situations. The accomplishment of Sustainable Development Goals 1 (no poverty), 2 (zero hunger), and 15 (life on land) thus depends critically on enabling farmers to preserve and grow this diversity and on acknowledging and compensating them for their contribution to the global genetic pool.[4] After the engagement of Intellectual Property under the agricultural domain i.e., Plant Variety Protection (PVP) was introduced, which further limited the rights of farmers enhancing the breeders to produce and protect new varieties of plants. It has been argued that the implementation of strict intellectual property laws will damage the agricultural foundation of third-world nations by weakening the cultural and ethical framework that regards basic biological processes as sacred rather than as goods to be bought and sold.[5] It also creates a crisis of values that influence long-term social structure, technical advancements, and development agendas.[5] The perceived imposition of IPRs in agriculture has a tendency to marginalise weak

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developing countries and badly influence their agricultural biodiversity and food security, in contrast to the idea that IPRs will ensure food security by encouraging agricultural biotechnology.[7] This paper therefore aims to explore the state of farmers' rights under intellectual property law in two diverse regions: Europe and India.

Brief History of Plant Variety Protection

After agriculture was modernised and the Green Revolution brought higher-yielding, improved varieties of wheat, rice, maize, and other cereals in the 1960s and 1970s, plant variety saw a significant shift. Although this resulted in a notable rise in food production globally, it also caused a significant increase in the number of regionally adapted plant types that were essential to farmers and future plant breeding to be replaced.[8] The rise of different legal frameworks that restrict access to and use of genetic resources has presented a different challenge. This has made things difficult for researchers, breeders, both public and private, and most importantly, farmers. Regulations pertaining to seed (variety release and seed marketing), intellectual property rights (patents and plant breeders' rights), and bioprospecting of genetic resources have a significant impact on farmers' access to, use of, and opportunities for exchanging, saving seeds and propagating material. According to reports, this has made it harder for farmers who still practise diversity farming in many regions to preserve and perpetuate plant genetic diversity in agriculture. Farmers' Rights was initially used as a political term in the early 1980s. The phrase was first used by civil society activists to draw attention to farmers' significant yet underappreciated contributions to production of plant varieties. The concept was initially conceived as a means of rebuffing the growing call for plant breeders' rights that was being made at the time in international negotiations. It swiftly evolved into a means of highlighting the contributions made by generations of farmers without compensation, who laid the groundwork for all contemporary plant breeding. The international treaty contains no legally-binding guidelines on how farmers' rights should be implemented at the national level.

Intellectual property and Agriculture

Farmer rights, seed breeding, and agricultural innovation are all greatly impacted by intellectual property rights (IPR) regimes. IPR regimes, such as PVP systems and patents, promote innovation by giving breeders and inventors exclusive legal protection. This promotes funding for agricultural research and development. [9] In agriculture IPR are essential for safeguarding genetically modified crops and scientific advancements. Patents for genes, characteristics, or techniques can be acquired, leading to breakthroughs in agricultural improvement.[10] IPR promotes innovation, but in order to guarantee that a wide range of farmers can utilise crucial agricultural technologies, a balance must be struck. Achieving this equilibrium is essential for tackling issues related to global food security and securing the rights of farmers.

IPR regimes—PVP systems in particular—grant breeders the sole right to produce and own new plant varieties. Investment in breeding initiatives and the release of improved seed types are encouraged by this protection. IPR regimes have an impact on farmers' rights regarding the usage of seeds stored from their farms.[11] Certain systems permit farmers to preserve and replant seeds from protected types, whereas others forbid such actions, which has an impact on conventional agricultural techniques. International agreements like the Convention on Biological Diversity (CBD) and the Nagoya Protocol interact with IPR regimes. These agreements, which affect farmers' access to a variety of plant material, are intended to guarantee a just and equitable sharing of benefits resulting from the use of genetic resources. Because IPR-protected varieties are expensive, farmers find it difficult to obtain new and improved plant varieties owned by the breeders. This emerges as one of the significant issues of fair access to innovations and their possible effects on small-scale agriculture's financial viability and livelihood.[12]

IPR laws influence agricultural innovation in two ways: *firstly*, they restrict access to specific technology while also encouraging private investment. Establishing a sustainable and fair agricultural innovation ecosystem requires striking a balance between the interests of farmers, breeders, and the general public. *Secondly,* accessing patented technologies or protected plant types are expensive as a result of IPR protection. This prevents farmers with low financial means from adopting novel approaches and accessing the improved varieties of seeds.[13] Giving certain companies exclusive rights results in a concentration of power in their hands and the emergence of monopolies in the markets for seeds and agricultural inputs. Small-scale farmers' options are hampered by this concentration, which reduces competitiveness. Plant variety protection and other

related IPR regimes limit farmers' customary rights to store, use, exchange, and sell seeds they have saved from their farms. This has an impact on farmers' independence and capacity to employ conventional farming methods leading to an unstable livelihood.[14]

Farmers Rights vis-a-vis IPR: A Euro-Indian Perspective

The global debate over farmers' rights in the context of intellectual property law continues to evolve as new technologies and practices emerge. Striking the right balance between promoting innovation and safeguarding the interests of farmers is an ongoing challenge that requires careful consideration and periodic legal updates. The treatment of farmers' rights under intellectual property law varies significantly across Europe and India. While Europe attempts to balance the interests of plant breeders and farmers through the Farmers' Exemption.[15] In contrast, India's legislation explicitly recognizes and protects farmers' rights, reflecting a commitment to preserving traditional knowledge and practices.

The European Union Perspective

Europe has a complex landscape of intellectual property laws that impact farmers. The primary focus is on the European Union (EU) and its sui generis system of plant variety protection that emerges as a significant means of balancing the interest between the farmers and breeders. The EU Directive 98/44/EC on the legal protection of biotechnological inventions allows for the patenting of plant varieties obtained through non-conventional methods like genetic engineering. However, the EU has also recognized the importance of preserving farmers' rights. The "Farmers' Exemption" under Article 14 of the Community Plant Variety Rights (CPVR) Regulation allows farmers to save, use, exchange, and sell farm-saved seeds of protected varieties. [16] This provision aims to balance the interests of plant breeders and farmers.[17] The European Patent Convention (EPC) prohibits patents on plant and animal varieties but allows patents on biotechnological processes for producing plants and animals. This has led to debates over the scope of patent protection, especially concerning genetically modified organisms. Farming techniques have traditionally been impacted by the Common Agricultural Policy of the European Union, which aims to maintain agricultural markets and provide food security.[18] Plant Variety Rights (PVR), which grant breeders exclusive rights, are a well-established mechanism for safeguarding plant varieties in Europe. Agricultural discoveries are impacted by the European Patent Convention (EPC), which regulates the patent system in Europe, encompassing biotechnology inventions. The distribution of assistance and subsidy programs for farmers has a direct impact on the profitability of farming in Europe leading them towards a sustainable livelihood practice.[19]

After the CPVR, the Common Agricultural Policy (CAP) and its implementing rules have largely established the legal framework for farmers' rights in the European Union (EU) and affiliated nations. One of the main objectives of the EU's CAP policy is to control agricultural markets and give financial assistance to small scale farmers. It consists of market support initiatives, programs for rural development, and direct payments to farmers. Cross-compliance, which mandates farmers follow specific environmental, food safety, and animal welfare requirements, is a requirement for receiving CAP funds. Farmers are guaranteed to contribute to larger societal aims through compliance.[20] The Climate Adaptation Plan (CAP) incorporates greening strategies that promote climate-friendly agriculture, biodiversity protection, and sustainable farming practices. These programs seek to strike a balance between social and environmental concerns and economic feasibility.

Germany offers dedicated initiatives to promote ecologically sustainable agricultural methods. Farmers that take action to save the environment could get financial assistance. In order to encourage farmers to switch to or continue using organic farming methods, Germany offers financial incentives and support with certification. France provides subsidies, support for rural development, and incentives for ecologically responsible farming techniques in line with the EU's CAP and CPVR.[21] Initiatives in France that prioritise ecologically friendly and sustainable farming methods are helping the country make the shift to agroecology. Also, the Agricultural Transition Plan in the United Kingdom delineates the transition from a direct payment model to one that compensates farmers for public goods like sustainable land use and environmental stewardship.[22] The goal is to give farmers financial help in exchange of seeds and improved plant varieties for producing public goods including addressing climate change, mitigation, and water quality improvement and biodiversity protection.

Many European nations are integrating environmental stewardship into their frameworks for farmers' rights in

context of the PVP, offering financial rewards for actions that support the preservation of biodiversity, resilience against climate change, and sustainable land management. Germany is among the nations with dedicated initiatives to promote organic farming. The goal of financial incentives and certification support is to persuade farmers to start or continue using organic farming methods. Beyond traditional income assistance, farmers are increasingly being rewarded for producing public benefits, as evidenced by the UK's CAP reforms and initiatives.[23] This involves endorsing actions that improve rural communities, the environment, and general social well-being. In Europe, farmers' rights are becoming more closely linked to larger sustainability objectives, demonstrating a dedication to striking a balance between agricultural output, industrial intervention and social and environmental concerns.[24]

Policies at the EU level and initiatives from individual member states determine how much European legislation safeguards farmers' rights and advances agricultural sustainability. In order to maintain a reasonable quality of living and stable farmers' income, the CAP offers direct payments to farmers as income support. The economic rights of farmers are protected in part by this support. With the help of the CAP and CPVR, agricultural markets are regulated, unfair competition is avoided, and farmers throughout the EU are given equal opportunities.[25] Cross-compliance, or coordinating agricultural operations with environmental, food safety, and animal welfare regulations, is required of farmers that get CAP funds. This advances larger social objectives while defending farmers' rights.

Breeders are granted exclusive rights to utilise their plant varieties under the EU's PVP system. Farmer privileges are recognized by the EU PVP system, such as the right to conserve seeds for future plantings on their own holdings. There can be limitations on farmers' capacity to trade or sell stored seeds.[26] Current CAP amendments have an impact on how farmers' rights are viewed in the EU as a whole. CAP reforms touch on topics including the use of seeds, access to genetic resources, and striking a balance between farmers' and breeders' rights. The European Union coordinates its policies with global accords that tackle the rights of farmers, such as the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). Although farmers' rights are recognized under the EU's PVP system, there are obstacles and restrictions that affect how these rights are really put into practice. The development of laws intended to achieve a more balanced approach between safeguarding farmers' rights and preserving breeders' interests in the context of plant variety conservation may be influenced by ongoing reforms and international agreements.[27]

The Indian Legal Perspective on Plant Variety Protection

In India it is a complicated and multidimensional matter to evaluate the effects of intellectual property rights (IPR) and farmers' rights on agricultural communities. It entails analysing how laws, regulations, and international trade agreements affect farmers' rights, their access to genetic resources, and their capacity to profit from their farming methods. One important consideration in agricultural policy and practices is the effect that Intellectual Property Rights (IPR) have on farmers' rights and traditional knowledge. India has developed an intellectual property regime concerning farmers' rights, largely governed by the Protection of Plant Varieties and Farmers' Rights Act (PPV&FR Act) of 2001.[28] Through a variety of age-old agricultural techniques, farmers worldwide play a significant role in both establishing and preserving the genetic diversity of crops. However, the dominance of agribusiness in the global seed market and the vigorous efforts to promote genetically modified plants and seeds pose a threat to farmers' rights and conventional agricultural methods like sharing and preserving seeds.[29] Buyers of seeds acquired both the product (the seed) and the means of manufacture. Farmers did not purchase seeds annually from commercial breeders or seed companies since naturally occurring seeds could multiply themselves endlessly. In a nation like India, where agriculture is the main industry, it is not just about producing enough food to feed the population. It is also essential for creating jobs.[30] Farmers are concerned about their growing reliance on cutting-edge technologies and corporate monopolies on seed, which may be controlled by outside parties using economic tactics. The price of seed can be controlled by transnational companies (TNCs) or corporate breeders thanks to this monopoly power.[31]

Traditional Knowledge and Farmers' Rights

Traditionally, farmers trade and conserve their seeds so they can be planted again next season. IPR, particularly patents on plant types or seeds, limits farmers' ability to freely save and share seeds, which

causes them to lose control over their farming methods.[32] The conservation of plant varieties affects the availability of genetic resources for crop improvement. Farmers' access to these resources are restricted by patents and other intellectual property protections placed on particular plant types or genetic characteristics. This has an impact on the creation of hardy and regionally adapted crop types. Numerous farming communities depend on customs that have been handed down over the years. Sustainable agriculture depends on farmers' rights, particularly their capacity to store, use, exchange, and sell farm-saved seeds.[33] If certain processes or techniques are patented, IPR may have an impact on these traditional farming practices.[34] As a result of these farmers can be prevented from applying their own traditional expertise. Apart from concerns regarding the environment and food safety, the advancement of transgenic technology raises questions about the socio-economic effects on farmers and farming methods. Farmers are being reduced from developers to simple consumers with the granting of IPRs over seed and plants, and society is quickly losing important farmer knowledge.[35] Due to the design of IPRs in contemporary trade, traditional knowledge cannot be safeguarded. Traditional knowledge, for example, is not patentable due to its intrinsic lack of originality and consequent lack of innovative character.[36] According to Vandana Shiva, patenting traditional knowledge and engaging in biopiracy constitute double theft. First, it permits the theft of originality and creativity; second, the exclusive rights granted by patents over knowledge pilfered the traditional people's means of subsistence, which are derived from biodiversity and traditional knowledge. Patents have the potential to eventually lead to monopolies and exorbitant prices for commonplace goods. One or two instances of these fraudulent invention claims based on biopiracy could be considered errors.

Seed Sovereignty and Biodiversity

The protection of IPR under the agricultural domain in India, especially as they relate to plant breeders' rights, have a big impact on seed sovereignty and biodiversity in the farming industry. The right of farmers to store, exchange, and utilise their own seeds in order to uphold their traditional ways of farming and retain authority over their agricultural systems is known as "seed sovereignty".[37] Large seed businesses frequently produce and market proprietary seeds as a result of IPR protection. Farmers become reliant on buying these seeds, which ends in higher expenses and decreased resilience because commercial seeds do not have as much genetic diversity as they have. The production of traditional and locally adapted seed varieties is declining as a result of IPR protection, which often concentrates on homogeneous and commercially viable variants. Agriculture becomes more vulnerable to diseases, pests, and shifting environmental circumstances as a result of this loss of diversity and limited access to the improved varieties. Resilience and food security depend on agricultural biodiversity. IPR protection pushes aside diverse and locally adapted crops in favour of a small number of commercially useful cultivars, which jeopardises larger attempts to conserve biodiversity.[38] Additionally, the focus on using IPR to protect certain plant types encourages genetic homogeneity and monoculture. Crops become more susceptible to environmental pressures and illnesses as a result of this lack of diversity. The PVP endangers native and indigenous seeds that have long been used by local communities as a source of their livelihood. Breeders' exclusive rights on these seeds prevent them from being grown or sold in local marketplaces, which lowers the diversity of agricultural products.[39]

IPR protection transfers decision-making authority over seeds from regional organisations to outside parties like global companies. Community-based methods for conservation, breeding, and seed selection are compromised by this. This has an impact on conventional farming methods as well, such as farmers' generations-long process of selecting and enhancing seeds. The creativity and adaptability ingrained in conventional agricultural systems are hampered by legal prohibitions on these activities. It is essential to strike a balance between farmers' rights acknowledgment and IPR protection in India.

Access to Genetic Resources

Farmers' rights to sustenance and a means of living are closely related to their access to seeds and plants. Farmers all throughout the world rely directly on the harvests of genetic diversity they plant for food, fodder, and seed for the following season.[40] The genetic material of plants, animals, and microbes that are useful for food production and agriculture is referred to as genetic resources. This covers seed, livestock, and other supplies required in the production of crops and livestock. Farmers' access to

genetic resources is restricted by strict IPR protection, such as patents on plant varieties or seeds. Small-scale farmers are especially affected since they can have trouble affording or obtaining proprietary seeds.[41] Large seed businesses frequently commercialise seeds as a result of this kind of protection. Farmers find it more difficult to freely store and exchange seeds if they are forced to buy these commercial seeds. It encourages the growth and marketing of a small number of high-yielding cultivars, disregarding a variety of crops that are more suited to the local environment. This results in a reduction of biodiversity in agriculture, making farming systems more vulnerable to pests, diseases, and environmental changes. Mechanisms for just and equitable benefit-sharing with nearby communities are absent in IPR systems.[42] This hampers the communities who have contributed to the discovery and conservation of genetic resources towards receiving a portion of the financial gains from their commercialization.

Impact of International Agreements on Farmers Rights

Plant variety protection is one of the strict IPR norms that members of international trade agreements are frequently required to follow. This leads to limitations on farmers' customary rights to freely preserve, use, and trade seeds, especially in cases where patented or protected varieties are at stake. Stronger IPR regulations promote international companies to commercialise seeds. Farmers' access to traditional and regionally adapted varieties are restricted as they are forced to buy pricey patented seeds. Farmers have to pay more for seeds as a result of IPR protection, particularly if patented seeds predominate the market. Due to their limited financial means, small-scale and subsistence farmers are disproportionately affected by this economic hardship.[43] Trade agreements contain clauses that strengthen genetic resource intellectual property protection. This makes it more difficult for farmers to obtain a variety of plant kinds and genetic material for breeding, which hinders their capacity to adjust to shifting environmental circumstances. The preservation of traditional knowledge owned by farming communities is not sufficiently addressed by global agreements. In the event that safeguards are lacking, traditional farming methods are appropriated without providing farmers with just remuneration or recognition.[44] When negotiating IPR-related clauses in trade agreements, multinational businesses frequently possess more negotiation strength. This leads to disparities that put the needs and rights of farmers and the community at large below the interests of major seed companies. Members of international trade agreements are frequently under pressure to align their domestic legal systems with international norms. This results in the implementation of IPR laws that put commercial objectives ahead of the rights of farmers.[45] The focus on IPR protection for commercially viable cultivars causes diverse, regionally adapted crops to be overlooked. This led to a decline in agricultural biodiversity, increasing the susceptibility of farming systems to diseases, pests, and climate change.

Economic Disparity (Technological Divide)

Protecting IP, especially in the agricultural sector, exacerbates economic inequality among farmers. It becomes difficult for farmers with low incomes to obtain innovative agricultural technologies that are shielded by PVP. Large-scale, resource-rich farmers and smaller, resource-constrained farmers thus experience a technology divide. Proprietary seed variations become commercialised as a result of IP protection for seeds. Since they must buy these seeds rather than save regular seeds, small-scale farmers incur higher expenditures.[46] The reliance on store-bought seeds exacerbates economic inequality. Some copyrighted technologies and seeds have licensing costs attached to them; farmers who cannot afford these are not allowed to use these improved varieties. This hinders their ability to increase productivity and reduces their ability to compete in the market.[47] Big companies and agribusinesses have a competitive edge over smaller, family-run farms because they can afford to invest in and safeguard their intellectual property. Inequality of income and instability in livelihood within the agricultural sector results from this. When it comes to negotiating contracts or licensing agreements pertaining to patented technologies, farmers frequently lack negotiation leverage. The concentration of financial and technological resources in the hands of a small number of powerful agricultural enterprises is facilitated by PVP.[48] Farmers are marginalised and find it more difficult to compete as a result of this concentration. It results in the establishment of market monopolies by businesses with exclusive rights to particular technology or seeds. Farmers' options are restricted by this concentration of market power, which results in unfair business practices. Farmers are forced to use a limited range of technology due to the

exclusive rights bestowed by intellectual property protection. This can make it harder for them to look into different, potentially more cost-effective, locally relevant alternatives. For rural communities, economic imbalances brought up by IP protection have wider ramifications. There can be differences in the overall development of rural areas because although some farmers benefit greatly from access to cutting-edge technologies, others might experience financial difficulties.[49]

Comparison

The protection of farmers' rights under intellectual property rights (IPR) is a topic of great importance, particularly in the agricultural sector. In this regard, a comparison between Europe and India provides valuable insights into the differences and similarities in the legal frameworks governing farmers' rights protection. In Europe, farmers' rights are protected under the Plant Variety Protection (PVP) system parallelly running with the CAP, which grants breeders exclusive rights over new plant varieties for a limited period of time.[50] However, farmers are allowed to save and use seeds from protected varieties for their own use on their own land, subject to certain conditions. This system aims to balance the interests of breeders and farmers, while promoting innovation and ensuring food security. In India, farmers' rights are protected under the Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act, which does not recognise the contributions of farmers in conserving, improving, and making available plant genetic resources for the development of new plant varieties. The Act provides for the registration of new plant varieties and the establishment of a National Gene Fund to support the conservation and sustainable use of plant genetic resources by the breeders exclusively. The PVP system in Europe is limited to new plant varieties, while the PPV&FR Act in India covers all plant varieties for a certain period of time.[51] According to Chidi Oguamanam, both in established and emerging nations, unsustainable types of industrial agriculture are swiftly replacing traditional farming methods as well as the underlying ecological and epistemological worldviews of indigenous and local populations.[52] Third-world farmers were against the idea of monopoly rights (IPRs) over seeds and plants because it went against indigenous agro-ecological ethics, which forbids the commercialization of public domain and communal knowledge in agriculture.[53] Overall, the comparison between Europe and India highlights the importance of balancing the interests of breeders and farmers in the protection of farmers' rights under IPR. It also underscores the need for a comprehensive legal framework that considers the diverse needs and perspectives of all stakeholders in the agricultural sector.

Challenges and Future Directions

In India, IPRs in agriculture include plant varieties, seeds, and traditional knowledge. Farmers encounter several obstacles and constraints when attempting to exercise their intellectual property rights (IPRs). It seems that the enforcement of intellectual property rights (IPRs) over plant varieties and seeds has marginalised weaker developing countries and had a severe influence on their food security and agriculture.[54] Farmers find it difficult to understand and manage the legal framework pertaining to intellectual property rights, especially when it comes to agriculture. Legal knowledge is necessary to comprehend the subtleties of patents, plant variety protection, and other IPR procedures, but small-scale farmers lack this knowledge. A lot of farmers, particularly those in rural regions, are ignorant of the consequences of intellectual property rights.[55] They find it challenging to comprehend how IPR may impact their rights and farming methods because of this ignorance. Furthermore, when cultivating crops, farmers frequently rely on traditional knowledge that has been passed down through the years. But a major issue is biopiracy, which occurs when businesses or people use traditional knowledge without paying for it. Farmers find it difficult to assert their ownership rights and preserve their traditional expertise.[56] Farmers have long saved seeds for upcoming crops in many agricultural communities. The ability of farmers to conserve, exchange, and sell seeds is restricted by the adoption of plant variety protection and seed patents. Their capacity to preserve crop diversity and adjust to local conditions are impacted by this.[57] Small-scale farmers are not able to afford the expenses of purchasing patented seeds and technology. This lessened their production and competitiveness by limiting their access to the newest agricultural advancements.[58] Additionally, farmers find it difficult to assert their rights even when they are aware of them and have legal options. Effective enforcement is hampered by the time-consuming and expensive nature of legal procedures, as well as the lack of legal knowledge among farmers. Seed monopolies can result from the concentration of seed markets in the hands of a

small number of multinational companies. This harms the agricultural biodiversity by giving farmers fewer or no seed options and making them more reliant on a small number of types of varieties.[59] Traditional farming methods are threatened by climate change, which also affects agriculture. In light of shifting climatic conditions and the demand for novel crop types that are resilient to emerging difficulties, farmers find it difficult to exercise their rights.[60] In addition to this, farmers' capacity to properly claim their rights is hampered by inconsistent or missing provisions in IPR policies pertaining to agriculture. The difficulties are exacerbated by poor support systems and implementation problems.[61] Therefore, comprehensive laws that support sustainable agriculture and strike a balance between farmers' interests are required to address these issues. Furthermore, it is critical to make steps to increase legal literacy, create awareness, and assist farmers in navigating the IPR landscape. Public-private alliances that safeguard customs and provide equitable benefit-sharing contribute to a more equitable agricultural system.

Balancing Approach

It is crucial to strike a balance between safeguarding innovation and guaranteeing farmers' access to necessary resources, which calls for careful consideration of both the ethical and economic aspects. Maintaining the affordability and accessibility of agricultural innovations, such as seeds and inputs, for farmers in particular while also balancing the need for innovators to recoup their expenditures is a difficulty.[62] As several jurisdictions have done, enshrining farmers' rights in laws grants them specific rights concerning the sharing and utilisation of seeds. Farmers' autonomy is preserved and traditional farming methods are protected because of this acknowledgment. Open-source methods in agriculture, wherein specific seeds or technologies are made publicly available, are promoted by particular initiatives. This strategy seeks to solve concerns about exclusivity while promoting collaboration. Collaborations between commercial and public research organisations can guarantee that discoveries serve the general public while enabling businesses to safeguard their capital. Benefits from the utilisation of genetic resources are guaranteed to be distributed fairly to the communities that possess traditional knowledge when benefit-sharing structures, such as those found in international accords like the Nagoya Protocol, are put into place.

Conclusion

Plant genetic variety allows for adaptation to changing environmental conditions, such as those brought on by climate change, hence it is probably safe to conclude that it is more significant for farming than any other environmental component. To be able to continue playing this crucial role for food security, farmers must be allowed to preserve their rights as the keepers and developers of agricultural genetic variety in the field. The sharing of benefits obtained from the use of those resources, as well as the preservation and ongoing application of traditional knowledge pertaining to the conservation and sustainable use of PGRFA, are contingent upon farmers' rights. Such rights can support farmer participation in PGRFA decision-making, as well as in the saving, using, trading, and selling farm saved seed. Achieving Farmers' Rights entails compensating farmers for their vital contribution to the worldwide pool of genetic resources and enabling them to continue managing, developing, and maintaining agricultural genetic resources. IPR regimes must acknowledge and defend these rights in order to prevent undue restrictions on farmers' ability to carry out their customs. Systems of intellectual property rights should include provisions for fair benefit sharing with farming communities. This entails making certain that the communities who helped to establish these resources receive a portion of the financial gains and livelihood made from the commercialization of plant varieties or products. Farm-saved seeds should be used, exchanged, and sold by farmers, and their rights should be safeguarded by laws and policies. Policies should encourage the transmission of technology to farmers and offer programs aimed at strengthening their capability so they can make better use of genetic resources. This can enable farmers to take advantage of agricultural innovation and to participate in it. International policy changes supplant national policy developments in the area of intellectual property rights. Therefore, before discussing about domestic legislation that results from international obligations, a summary of international instruments is required.

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