

## Climate-friendly Innovations for Plant Varieties in India

Vijay K Tyagi<sup>1†</sup> and Priya Kumari<sup>2</sup>

<sup>1</sup>Faculty of Law, University of Delhi, Delhi – 110 007, India

<sup>2</sup>Kirit P Mehta School of Law, NMIMS, Mumbai – 400 056, India

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Innovation in agriculture and plant varieties is essential to serve the needs of the increasing population, maintain food security, and adhere to the principles laid down in international conventions. However, innovation in all areas including agriculture should be wary of its impact on the environment. Section 29 of the Protection of Plant Varieties and Farmers Rights Act, 2001 stipulates that a plant variety causing serious harm to the environment is incapable of registration. Nevertheless, the primary criteria for gaining registration is proof of the variety being distinct, uniform and novel. Farmers' plant varieties lack uniformity, which paves the way for commercial breeders to gain registration. Undoubtedly, the varieties developed by commercial breeders generate higher yields. However, the same does not conform to local ecological demands and is even less nutritious when compared to the varieties developed by the farmers. Thus, there are several consequences of permitting commercial plant varieties to take over the farmers' plant varieties. This paper is an attempt to highlight the need for agricultural innovations to be ecologically friendly thereby, leading to a movement towards safe technology. It will also advocate for an alteration in Section 29 of the Act to make it mandatory for registration of a new plant variety.

**Keywords:** Plant Variety, Climate Change, Farmers' Variety, Ecology, Agrobiodiversity, Food Security

Due to an increase in population and shrinking land availability, food security is going to become a major concern in the forthcoming years.<sup>1</sup> The right to food has been declared as a fundamental right in cases such as *Kishen Pattnayak v State of Orissa*<sup>2</sup> and *People's Union for Civil Liberties (PUCL) v Union of India*.<sup>3</sup> One of the State's onuses regarding the right to adequate food is providing people with the means to secure their livelihood and ensure food security.<sup>4</sup> It is essential here to understand the meaning of food security first. Food security "exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life".<sup>5</sup>

Agricultural activities are the only source of earnings for a large section of the Indian population. While 82% of farmers are small and marginal landholders, 70% of India's rural households pin their hope on agriculture as a source of their income to date.<sup>6</sup> Therefore, guaranteeing food security at the level of household means that either people must earn enough to buy food or cultivate enough to be able to feed themselves.<sup>1</sup> These small and marginal land-holding farmers majorly rely on the local innovation system to fulfil their food

requirements. The crucial aspect of the local system of innovation is that it fulfils nearly all aspects of food security. It is affordable, accessible and of good quality. Their methods are guided by ancestral culture and customs which constantly evolve and adjust to changing ecological conditions. Agro-biodiversity is quintessential to augment durability in farming because diminishing heterogeneousness leads to an increase in susceptibility to natural forces, pest/weed attacks, and other plant diseases.<sup>7</sup> Since agro-biodiversity ensures both income generation and food security at the household level, it is of paramount significance to smallholders and subsistence farmers.<sup>1</sup>

Intellectual Property Rights (hereafter IPRs) have been stated<sup>8</sup> (Commission on Intellectual Property Rights, 2002) to be a means by which economic and social rights can be met. Due to the same, India enacted the PVPFR Act to incentivize private players to produce an improved variety of seeds. But the PVPFR Act also had another aim. This was to ensure food security while acknowledging challenges like population growth, decreasing land for cultivation, water issues, climate change, a decline in crop diversity, etcetera.<sup>9</sup> However, unhindered activities of the private actors often impinge upon the scarce resources of impoverished people lacking sufficient food and harm the agro-biodiversity.<sup>1</sup>

<sup>†</sup>Corresponding author: Email: vijaytyagi31@gmail.com

It is with this backdrop in mind, that this paper is divided into three sections. The first part will focus on the registration or the DUS criteria under the PVPFR Act and highlight the difficulty the farmers face in getting their varieties registered. Secondly, it will emphasize how the ecological concerns are overlooked in the PVPFR Act leading to ecological imbalance and climate change concerns in Indian agriculture. The last part will be an attempt to lay down ways in which the current methods of agricultural innovations can be made more environmentally friendly and closer to fulfilling food security rights of all.

### Registration Process and the DUS Criteria

The procedures for registration of a variety serve several purposes. The effect of their foundation and existing usage in different countries is also dissimilar concerning the rights that are available to farmers. Most of the procedures<sup>10</sup> which have been developed for the registration of varieties, do not recognize farmers' varieties. Also, they do not recognize new varieties developed by farmers in participatory plant breeding. The objective behind the development of seed regulation and variety registration was to increase crop production.<sup>1</sup> This was to be achieved by providing safeguards to farmers against the purchase of poor-quality seeds of poorly performing varieties.<sup>10</sup>

Farmers perform an extremely essential function in the very survival of humans, and thus, farmer's rights are important for millions of farmers all around the world. Farmers' rights are particularly important in countries where agricultural practices are based on the usage of traditional varieties or varieties conserved and improved by farmers themselves.<sup>11</sup> The International Convention for the Protection of New Varieties of Plants established the International Union for the Protection of New Varieties of Plants (hereafter UPOV) in the year 1961. The aim was to provide an effective plant variety protection system and encourage the development of new varieties.<sup>12</sup> The UPOV Convention, 1991 has further strengthened plant breeders' rights and restricted the farmers' privilege. As a result of this, breeding by the private sector has increased dramatically in developed countries.

India became a signatory to the Agreement on Trade-Related Aspects of Intellectual Property (hereafter TRIPS) in the year 1994. Consequentially, it had to enact a law on the protection of plant varieties

in consonance with Article 27.3(b) of TRIPS, which provides as under:

*“Members may also exclude from patentability:*

*Plants and animals other than micro-organisms, and essentially biological processes to produce plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective sui generis system or by any combination thereof. The provisions of this subparagraph shall be reviewed four years after the date of entry into force of the WTO Agreement”*.<sup>13</sup>

Thus, TRIPS left it open for the countries to prepare legislation on plant varieties by patent laws, an effective *sui generis* system or by a combination of both. In 2001, India enacted a *sui generis* legislation namely, the Protection of Plant Varieties and Farmers' Rights Act, 2001 which came into force in 2005. It is a one-of-a-kind piece of legislation since it equalises both farmers' and breeders' rights and strives to balance their interests. According to Section 14 read with Section 23 of the PPVFR Act, a farmer can apply for registration under any of the three categories, new varieties, farmers' varieties, and essentially derived varieties.

The Act makes farmers' varieties a subcategory of extant variety. By doing so, the Act allows farmers to apply for registration of varieties that they have been cultivating for generations. It also makes sure that these varieties are not misappropriated.

### Farmers' Variety and the PPVFR Act

One of the most important features of the PPVFR Act is the provisions regarding the farmers' varieties. According to Section 2(k), farmers as those who “cultivate crops by cultivating land, and those who oversee pharming directly or indirectly through other people, or anyone who conserves and preserves severally or jointly, with any other person through selection and identification of the useful properties”.<sup>14</sup>

A farmer's variety is one “which has been traditionally cultivated and evolved by the farmers in their fields or is a wild relative or landrace of a variety about which the farmers possess the common knowledge”.<sup>15</sup> This emphasizes community rights, which is an aspect that has been ignored by the UPOV Convention.

Farmers' variety, as a subclass of extant variety, must meet the same distinctness, uniformity, and stability characteristics as extant variety. Farmers who

apply for registration must guarantee that their crops meet the DUS requirements.

### Issues in the PPVFR Act

The PPVFR Act recognizes the multiple roles played by farmers. They select plants that have utility from the wilderness and domesticate them by mastering their means of perpetuation. They further modify their traits to make farm produce more storable and palatable. Farmers undertake an array of crop improvement activities. The PPVFR Act affirms that farmers have a claim to be treated as breeders.<sup>16</sup>

The UPOV approach is implemented in the PPVFR Act. It stipulates that all varieties must comply with DUS requirements in order to be registered and protected. This is where a difficulty with the preservation of farmer's variety, and thus farmer's rights, occurs.

Farmers' variants are usually niche-oriented. They are obtained through an unofficial seed exchange mechanism. Farmers' varieties tend to be 'relatively homogeneous' with 'distinct identities'. This could be due to a recurrent propagation process.<sup>17</sup> However; it is unclear whether these characteristics can be demonstrated in accordance with the PPVFR Act's standards. It's likely that the level of difference required for registration between two farmers' varieties is neither observable nor traceable.

A farmer who has cultivated a crop for centuries considers criteria other than those linked to proprietary and innovation claims.<sup>15</sup> Farmers are more concerned with "yield stability, risk avoidance, low dependence on external inputs, and traits that contribute to storage, cooking, and flavour" than with "distinctiveness, uniformity, and stability".<sup>17</sup> Seeds are carefully picked and cultivated to fulfil general human needs as well as particular consumption needs.<sup>18</sup> Indian farmers, unlike professional plant breeders, use more traditional breeding processes rather than relying on contemporary technology for laboratory-based research.<sup>19</sup>

Farmers maintain a degree of variability to provide for environmental aberrations and to adapt to consumer preferences. As a result, farmer's cultivars do not always meet DUS requirements.<sup>17</sup> They are intimately linked to agricultural biodiversity and hence may fall short of the homogeneity standard. Farmers must go through years of experiments and selections before they can produce a crop that is suitable for horizontal distribution in a certain

geographic and agronomic region. Plant breeders, on the other hand, skip this step entirely and use mass selection to create varieties that excel in performance.<sup>17</sup> Farmers find it difficult to use the registration system and reap the benefits that follow from it because of the complications of the standards that must be met in order for a variety to be registered. Regarding this, it has been concluded:

*The extent to which this provision will be meaningful in practice is, however, open to debate. To obtain protection, farmers' varieties must conform to the UPOV criteria of distinctness, uniformity, and stability. Given that breeding efforts of farmers typically occur in situ, and those farmers (unlike breeders in the formal breeding programmes) cannot entirely control the agroecological conditions in which varieties are bred, it is questionable to what extent varieties claimed by farmers will meet these qualifying criteria.*<sup>20</sup>

The Authority granted significant relaxations concerning the uniformity criteria for farmers' varieties through a regulation issued in 2009. As per the notification, a relaxation could be granted in uniformity standard to permit more varieties than those allowed under the "Plant Variety Journal of India". Also, on meeting the uniformity standard, the variety shall be considered to have fulfilled the stability criteria as well.<sup>21</sup> This facilitated a rise in the number of applications received. However, registrations were granted to merely 13.82% of the total applications received.

Commercial breeders may be successful in protecting their varieties. Farmers, on the other hand, may not be able to benefit from the protection granted under the legislation. This is primarily because of the built-in antiquity and their inability to meet the DUS standards, which are uncritically copied from the UPOV Convention. Farmers are unlikely to get a major economic return if the approach to farmers' rights is based on IPRs.<sup>22</sup>

India is a signatory of the Convention on Biological Diversity. Thus, India must strive to conserve agro-biodiversity. To achieve that, the protection of farmers' varieties is necessary because these varieties are directly linked with agro-biodiversity. The Act and various regulations issued from time to time provide a complex legal framework that recognizes the rights of farmers and sets up a framework to assist them in registering their varieties. The legal framework needed to address the issues related to the registering of farmers' varieties should be framed in a manner that the concerns related

to uniformity and agro-biodiversity can also be addressed.

### **Respective Legislations in Malaysia and the African Union**

In the year 2004, the Malaysian Parliament passed a law protecting the rights of breeders and farmers. The Protection of New Plant Varieties Act 2004 (hereafter the Malaysian Act) focuses on addressing the region's role of "farmers, local communities, and indigenous people."<sup>23</sup> Farmers can file an application to have their novel plant variety registered and enjoy the privileges of a breeder under Section 13(1) of the Malaysian Act. Plant varieties must meet the following criteria in order to be registered: they must be novel, distinct, uniform, and stable (N-DUS). In circumstances when the plant variety was established by a "farmer, local community or indigenous people," the conditions are partially loosened. Even if the variety is novel, unique, and identifiable, the plant variety may be registered and breeders' rights provided in such situations, pursuant to Section 14 of the Malaysian Act.

As a result, even if the variety is not uniform and stable, it must be identified for registration purposes.<sup>24</sup> Furthermore, a plant variety is identifiable if "it can be distinguished from any other plant grouping by the expressions of one characteristic, that characteristic is identifiable within individual plants or within and across a group of plants," and "such characteristics can be identified by any person skilled in the relevant art," according to Section 14(3) (e) of the Malaysian Act. Here, the authorities have sought to solve the issue of farmers' non-compliance with DUS norms by providing for this relaxation and changing the prerequisites of uniformity and stability expressly for farmers' variety.

The African Union is made up of 55 sovereign member nations. In the year 2000, the "African Model Legislation for the Protection of Local Communities, Farmers, and Breeders, and for the Regulation of Access to Biological Resources" (hereafter the African Model Legislation) was passed. Its objective was to "ensure the protection, assessment, and sustainable use of biological resources, including agricultural genetic resources, as well as knowledge and technology to preserve and increase their variety as a way of supporting all life support systems."<sup>25</sup> The DUS requirements are recognized as a prerequisite for registering a new variety under Section 29 of the African Model Legislation.

Farmers' rights are addressed in a separate part of the African Model Legislation.<sup>26</sup> The farmer is also recognized as a plant breeder. A variety with any variation with some specified qualities defined by the local agricultural community is eligible for protection through a variety certificate, according to Part V of the African Model Legislation. More crucially, according to Section 25 (2) of the African Model Legislation, the variety does not have to fulfil the DUS criterion to be protected. As a result, the model legislation eliminates this need for awarding intellectual property protection to farmers' variations. The variety certificate grants the local community "exclusive rights to increase, grow, use, sell, or license the usage of the variety." A notable feature of the African Union's model legislation is Section 30 (2) which prioritizes the rights of farmers over the rights of breeders.

The goal of this legislation is to preserve and maintain variants with certain characteristics that the local community has selected. The relaxation will allow farmers and the local community to safeguard and conserve types that are less uniform and stable but have developed with time. The principles of homogeneity and stability, as previously mentioned, are diametrically opposed to agricultural biodiversity. By allowing for the protection of less uniform kinds, an attempt has been made to conserve agro-biodiversity.

### **Section 29 of the PVPFR Act and Ecological Concerns**

Undoubtedly, the PVPFR Act needs to be commended as it went a step ahead of the UPOV.<sup>27</sup> But setting up the same criteria of registration for both the farmers' and commercial breeders' varieties became problematic for the former, as mentioned above. However, this is not the sole matter of concern. It is well-known that the methods employed by farmers to develop their crops have several benefits. This includes the production of seeds that are suited for evolution and can adapt to the altering demands of the environment.<sup>28</sup> The contribution of farmers' varieties towards agro-biodiversity has also been reiterated from time to time.<sup>29</sup>

Conventional forms of agriculture have been highly resistant to environmental concerns. This has been acknowledged even by international organizations.<sup>30</sup> Traditional Indian agriculture has been stated to be ecologically friendly and less expensive which generates good yield (Badgley & Perfecto, 2007).<sup>31</sup> As soon as the PVPFR Act came into existence, the concern that plant breeders' varieties might take over

varied traditional varieties was raised.<sup>20</sup> The former would focus on cash crops or certain limited crops with higher commercial potential. Such monoculture combined with the usage of chemicals<sup>32</sup> or fertilizers will tender the varieties prone to diseases and natural disasters.<sup>20</sup>

Section 29 (1) of the PVPFR Act was a welcome move considering the above apprehensions. It reads as under:

*“Notwithstanding anything contained in this Act, no registration of a variety shall be made under this Act in cases where prevention of commercial exploitation of such variety is necessary to protect public order or public morality or human, animal and plant life and health or to avoid serious prejudice to the environment”.*<sup>33</sup>

Moreover, Section 29 (3) has mandated non-registration of such varieties, which utilize technologies harmful to living beings thereby, signaling towards usage of safe technology in agriculture. These two subsections entail that the legislation is intended to protect life and the environment *vis-à-vis* the rights of plant breeders. However, no procedure or guideline has been mentioned in the entire PVPFR Act or associated rules for the implementation of Section 29.

The reality is since the expansion of plant breeders' rights, Indian agriculture in general, and farmers, have in particular suffered a lot. The prominent example of cotton can be cited here.<sup>34</sup> Traditionally, cotton used to be grown along with food crops. But after the introduction of Monsanto's version of cotton seeds in India, a trend of monoculture began. This led to the crops being infested with diseases and an increase in natural disasters like drought.<sup>34</sup> Moreover, crop diversity has reduced so much that India is left with only about forty rice varieties.<sup>35</sup>

These big corporations or plant breeders have been entering developing economies and giving them the hope that their modified seeds would provide a solution to problems like climate change. However, it has been noted<sup>35</sup> that these breeders on their seeds being climate friendly spend no more than 1 percent of the entire expenditure. The way to reduce poverty, maintain biodiversity and fulfil climate and ecological demands is through the access of seeds and networks to small farmers.<sup>36</sup>

A totality of issues including natural disasters and climate change has become a matter of concern in agriculture. Even though the interests of farmers were given a space in the PVPFR Act, it too has added to pushing them into poverty and the environment into

distress. Like the PVPFR Act, a solution for these must be *sui generis* in nature that is, specially tailored for a developing economy like India.

### Conclusion

A framework to manage concerns about uniformity and agro biodiversity is necessary to resolve difficulties linked to the registration of farmers' varieties. Three legislative frameworks governing the registration of farmer's variety were addressed by the researchers. The African Union has chosen a strategy based on the notion of an “integrated seed system”.<sup>10</sup> The approach recognizes the necessity for multiple seed systems to coexist in a nation, depending on government support and control requirements. To put it another way, a line must be created here between traditional and non-traditional seed systems. Furthermore, the traditional seed system must be safeguarded. Such deregulation of the traditional or informal system would allow farmers' variations to continue to get adequate support and utilization.

The obligation for farmers and local communities to meet DUS standards has been eliminated under African Law. Even after adopting UPOV's DUS standards, Malaysian authorities have attempted to alleviate farmer concerns by substituting uniformity and stability standards with identifiability. According to Section 14(3)(e)(i) & (ii) of the Malaysian Act, a plant variety is identifiable if “it can be distinguished from any other plant grouping by the expressions of one characteristic and that characteristic is identifiable within individual plants or within and across a group of plants” and “such characteristics can be identified by any person skilled in the relevant art”. The person to identify one such characteristic will be appointed by the Plant Varieties Board.

The researchers believe that the Malaysian system is more suited to Indian settings since uncontrolled systems, such as the African Union, will be ineffective in identifying unique kinds. Uniformity criteria are at the heart of the Indian framework's problems. The authors propose that uniformity and stability be substituted with identifiability as a modification. That is, if a farmer's variety is different and identifiable, the Act should allow it to be registered. It will have two functions. First, it will guide the selection of different farmer's varieties, preventing commercial breeders from misappropriating them. Second, it will make it easier for farmers to register their kind/variety. Finally, the above-mentioned modification, together with efforts by authorities at the

state-wide levels to raise farmer knowledge regarding the registration of farmers' varieties, would allow farmers to realize their legal entitlements.

The role played by the private sector in agricultural research has significantly impacted farming communities and agrobiodiversity. This has further been brought to light by the recent agricultural trends and their relationship with IPR. There are several challenges to food security in India. Keeping in mind the challenges, both the innovation and components of food security need to be considered simultaneously. The "Innovation Report" talks about the intersection of modern and TK, which will demand "significant investment in coordination and management".<sup>37</sup> Such a policy, if fully participatory, will be an appropriate approach. As per Asbjorn Eide:<sup>37</sup>

*"one should not advocate a status quo concerning traditional production systems, but...when seeking to promote more effective methods [one] must take traditional knowledge and experience as the starting point and translate it into approaches where modern science and traditionally adopted principles are combined to maximize the prospects for adequate food consumption, nutritionally balanced, and in respect of ecological constraints"*.

International Assessment of Agricultural Knowledge, Science and Technology (IAASTD 2008) advocates for a similar strategy.<sup>37</sup>

International obligations in this area emphasize food security. This requires the plant variety protection mechanism to account for the fundamental human right to food as something which is closely related to the management and protection of plant varieties. This essentially means that the legal framework on plant variety protection should adequately recognize human rights considerations of food security and not be limited to commercialization. The commercialization of food crops is an important but not the only consideration in the process of agricultural management. There exist considerations that are just as important as and more central than commercialization. These considerations include conservation and sustainable use of agrobiodiversity and ensuring food security for individuals.

India is the second-most populous country in the world. With the rise in population, the challenges to food security will increase over time. Here, two challenges need immediate intervention to avoid future problems. First, to regulate the variety of protection under the Act in a manner that the issues related to health,

environment, and ecology can be addressed. Second, the local innovation systems need protection and encouragement to foster food security at the local level and their role in agrobiodiversity management. The authors have tried to address the second challenge by arguing for relaxation in registration criteria for the registration of farmers' varieties. The authors have also suggested a framework so that the farmers' varieties can get protection under the Act and foster food security at the local level which will, in turn, help in agrobiodiversity management. Therefore, the main task is to address the first concern by proper implementation of Section 29 of the Act.

### **The Way Forward**

DUS cannot be the only standard for registration of new varieties under the PPVFR Act, if issues related to food security, environment and ecology are to be addressed. In a personal interview with the corresponding author, Prof. (Dr.) L. Pushpa Kumar said, "there is a need for proper implementation of Section 29 of the PPVFR Act so that the protected varieties not only yield higher productivity but also the food is healthy, nutritious and in conformity with the high standards of ecology and environment". He calls it a move towards 'safe technology'. As biodiversity or environment-specific studies in Environment Impact Assessment or by Genetic Engineering Appraisal Committee (hereafter GEAC) are conducted before approving any genetically modified organism, or GMO, Authority shall conduct some studies to identify the impact of new varieties, whenever such suspicion or need arises. Therefore, the researchers suggest that the Authority should notify a regulation to properly implement the mandate of Section 29.

To properly implement the same, the Authority should constitute an Expert Panel consisting of experts from the domain of health, nutrition, ecology and environment. The Authority in consultation with experts should notify the standards in respective areas and publish the standards in the Plant Variety Journal of India. So, at the time of registration, the varieties must conform to these standards in addition to the DUS criteria.

Apart from the above measures, the following policy measures can be taken to address the concerns related to food security and agro-biodiversity:

(i) Enable research and the development of national and community-based seed banks aimed at diversification of crops;<sup>37</sup>

(ii) Promote collective participatory breeding to bridge the gap between traditional knowledge and the needs of local farmers with the assistance of the scientific potential of national and international institutions;<sup>37</sup>

(iii) To avoid problems and to ensure biosafety, it will be desirable to seek the mutual incorporation of the GEAC and the Authority in their respective decision-making processes.<sup>38</sup>

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