Effectiveness of Indian *Sui Generis* Law on Plant Variety Protection and its Potential to Attract Private Investment in Crop Improvement

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Effectiveness of *sui generis* system of plant variety protection has become contentious in the absence of its definition in Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement. India legislated the *sui generis* law, the Protection of Plant Variety and Farmers’ Rights in 2001 and notified its rule in 2003. However, the Act is yet to be enforced. Effectiveness of legislation depends on the clarity and scope of its legal provisions, associated rules and regulations. The manner in which these are implemented also contributes to the effectiveness. An examination of this Act and its rules by applying certain *de minimis* requirements essential to ensure effectiveness of an IPR system, concludes that the Act is effective in design and scope. Certain omissions in the rules may affect this effectiveness. The Act, apart from being effective under the flexibility allowed by TRIPS Agreement, also harmonizes other national commitments India has from international agreements on domestic biodiversity, plant genetic resources for food and agriculture, economic, social and cultural rights, human rights and right to development. This paper examines the potential of this legislation in spurring private investment in Indian plant breeding, strengthening seed industry and making available quality seed to farmers for achieving all round agricultural development. The Act may facilitate enhanced private investment in selected crops and seed supply systems, while strengthening of public research is imperative to achieve balanced agricultural growth and access of technology to farmers at competitive cost.

**Keywords:** *Sui generis*, plant variety protection, TRIPS Agreement, PBR, CBD, PPVFR Act

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Intellectual property regime on innovations as defined by the Indian Patent Act, 1970, excluded patenting of all living forms by skilful definition of ‘invention’. In more explicit expression, a method of agriculture or horticulture, was excluded from patentable subjects. However, with the membership of India in the World Trade Organization and its consequent obligation to comply with the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement, it had to make amendments to the Patent Act. The Patent (Amendment) Act (PAA), 2002 redefined the invention and the subsection 4(d) of this Act dispensed away the exclusion from patentability provided to any process for ... curative, prophylactic...
or other treatment of ... plants to render them free of diseases or to increase their economic value or that of their products. The PAA, under Subsection 4(j), emphatically excludes plants and animals in whole or in any parts thereof other than microorganisms, seeds, varieties and species and essentially biological processes for production or propagation of plants and animals from patentable subjects. In relation to the patentability of microorganisms, the PAA, under Subsection 4(b) clarified that ‘discovery of any living things occurring in nature’ is not patentable. The PAA, however, did not define microorganisms possibly leaving this important responsibility to subsequent amendments or to the judicial interpretation. The post-WTO patent regime of India, therefore, does not allow to patent seed, plant variety and species. Hence, commitment of India to Article 27 3(b) of TRIPS Agreement takes to the obvious choice of an effective sui generis system for the protection of intellectual property on plant varieties. Accordingly, India legislated a sui generis system in 2001 under the Protection of Plant Varieties and Farmers’ Rights (PPVFR) Act. In September 2003, the Ministry of Agriculture notified the rules of this Act, which still remains unimplemented. Effectiveness of legislation depends on its legal framework as well as the manner in which it is implemented in realizing the legislative goals. This paper examines the sui generis system of protection of plant varieties, what makes this system effective, to what extent the framework of the PPVFR Act is effective and what will be its impact in attracting private investment in Indian plant breeding. As the Act is yet to be implemented, this analysis is based on the legislative framework.

**Sui Generis System and Flexibility**

The TRIPS Agreement neither defines sui generis nor elaborates what makes the sui generis system ‘effective’. It does not suggest any existing plant variety protection system such as International Union for the Protection of Plant Varieties (UPOV) as a model. The Latin word *sui generis* means generated by one self and hence also meaning ‘of its own kind’ or ‘unique’. It is hence implied that a *sui generis* system of plant variety protection devised by a country need not maintain either total identity or similarity with such legislations of other countries or groups of countries, provided all these systems are effective. This sharpens the focus to the undefined qualified requirement of the *sui generis* system. Lack of these definitions is rightly interpreted to provide flexibility in structuring the *sui generis* system while safeguarding its effectiveness.

This flexibility of the *sui generis* system is important for developing countries like India for three major reasons. First, it will facilitate in striking a balance between promotion of private interest in national plant breeding and safeguarding the vital public good role being served by plant varieties in enhancing the livelihood opportunities of farming communities, in poverty alleviation, in promoting food security, and in conserving the agrobiodiversity and associated traditional knowledge. Many developing countries are notable for agriculture as the major or
only source of income for majority of their populations, for their very low productive assets and for their wealth of genetic diversity present as large number of farmer-selected traditional varieties. The traditional ethics and cultural lore followed by these farming communities over long years value a public rather than exclusive ownership on propagating material of all plants. They may find difficulty in coming to terms with a rigid plant variety protection regime which may deny the traditional rights of farmers in saving, reusing, sharing or selling seeds. Such sudden change is fraught with serious socio-economic, ecological, legal and political implications. The second aspect is the conflict between TRIPS Agreement and other legally and morally binding international declarations, treaties and conventions concerned with poverty alleviation, economic development, human rights protection and bio-resources conservation. The relevant legally binding instruments are the UN Convention on Biological Diversity (CBD)\(^5\), the International Treaty on Plant Genetic Resources (ITPGR)\(^6\) for Food and Agriculture and UN International Covenant on Economic, Social and Cultural Rights (CESCR)\(^7\). The legally non-binding instruments are the Universal Human Rights Declaration (UHRD)\(^8\) and UN Declaration on the Right to Development (DRD)\(^9\). The conflicts that these international instruments have with TRIPS Agreement are discussed later. As these international instruments have important bearing on large public good concerns and are binding on Member countries as much as the TRIPS Agreement, the Members should have the right to harmonize these conflicts in their national legislation until the sources of conflicts are addressed. The third important aspect is that, as an IPR protection device, the \textit{sui generis} system is equivalent to the patent system in the stringency of offered protection. This is explicit from the TRIPS Agreement Article 27 3(b) which affirms that plants and animals other than microorganisms are excluded from patentability. Having made such affirmative exclusion, TRIPS Agreement avers that protection to plant varieties may be provided by patents or an effective \textit{sui generis} system or by any combination thereof. The option is left to the Member states and those states, which choose to disallow the stringency of patent on plant varieties, shall opt for an effective \textit{sui generis} system.

**Conflict Between TRIPS Agreement and Other International Treaties**

Ever since the Food and Agriculture Organization set up an independent Commission on Plant Genetic Resources in 1983, India has been championing the cause of farmers’ against rising intellectual property rights on new seeds in an attempt to check the adverse effects of this regime on the livelihood of farmers in developing countries, conservation of their rich agro-biodiversity and the regional and household food security. This led to the development of the concept called Farmers’ Rights (FR)\(^10\). It recognized that farmers world over, particularly from the biodiversity-rich developing countries including India, are singularly responsible for creation and conservation of rich genetic resources in all crop
plants which provide the bedrock and springboard of global agriculture. No new plant variety can be developed, now or in future, without these genetic resources and associated traditional knowledge. Hence, FR are defined as the rights arising from the past, present and future contributions of farmers in conserving, improving, and making available plant genetic resources, particularly those in the centres of origin/diversity. The ITPGR affirmed FR shall include the rights to save, use, exchange and sell farm saved seed and other propagating material, and to participate in decision making on access to genetic resources and in the fair and equitable sharing of the benefits arising from the use of the plant genetic resources for food and agriculture. India has signed the ITPGR in 2001 and the Treaty became legally binding from 29 June 2004.

The importance of FR in earning a livelihood ensuring a harvest and contributing to the household food security of people increases with the increasing dependency on agriculture-linked subsistence and the magnitude of their resource scarcity. In no case may people be deprived of its own means of subsistence, asserts Article 1 of the UN Covenant on Economic, Social, and Cultural rights. Denial of FR leads to denial of better harvest, better access to food and health and better income to the poor, it attracts violation of human rights as provided under Article 25 of UHRD. For many poor farmers, who largely depend on agriculture for livelihood, reasonable access to increased production and increased income are important for their economic development. When an unaffordable seed cost of an intellectually protected plant variety prevents these farmers from increasing their production and income, it amounts to denial of a universal and inalienable right to development for every human person and all people. FR also averred to assist the farmers and farming communities to participate fully in the benefits derived at present and in future, from the improved use of plant genetic resources through plant breeding and other scientific methods. It is important to bear in mind that, on analyzing the implication of TRIPS Agreement on human rights, the UN Sub-Commission on the Promotion and Protection of Human Rights declared that the TRIPS Agreement violates the right of everyone to enjoy the benefits of scientific progress, its applications, the right to health and the right to food. Similarly, the UNDP Human Development Report also warned the negative consequences of TRIPS Agreement on food security, indigenous knowledge, bio-safety and access to healthcare.

Yet another legally binding commitment of India in the context of plant variety protection is to the CBD. The CBD affirms national sovereignty over biodiversity and associated traditional knowledge (TK) and confers the natural and legal ownership of all plant genetic resources (PGR) and associated TK to the concerned local communities. These communities in the Indian context ipso facto are the farming and tribal communities, who had been creating and conserving the PGR and TK. Article 8(j) of this Convention confers right to contracting...
parties to create national legislation to respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant to the conservation and sustainable use of biological diversity. Article 16.5 of this Convention mandates that IPRs on innovations created on PGR and TK shall be subject to national legislations and international law and such IPRs shall not run counter to the Articles of the CBD. Articles 8(j) and 15.7 of CBD entitle each contracting party to ensure fair and equitable sharing of the results of research and developments and the benefits arising from the commercial and other utilization of PGR and TK.

Indian system of social justice and jurisprudence lays emphasis on moral rights doctrine. The socio-economic compulsions imposed by the Indian agrarian scenario, India’s legal binding to the mentioned three important international undertakings and its moral commitment to uphold human rights and developmental needs of its numerous poor farmers, leave no option, but to harmonise its sui generis law on protection of plant varieties in the larger interests of its farmers, its plant genetic resources and developmental needs. Hence, it is important that this harmonization is effected in the Indian sui generis legislation on protection of plant varieties under the flexibility available in TRIPS Agreement.

Limits of Effective Sui Generis System

While leveraging the flexibility available in the TRIPS Agreement, it is important to ensure that the sui generis system evolved is ‘effective’. With the TRIPS Agreement not elaborating what constitutes effectiveness of a ‘sui generis system’, the definition of effectiveness is left to wide interpretation. Such interpretations, however, have to recognize two important aspects. First, the sui generis system is less rigid than the patent system. Second, notwithstanding the lesser rigidity, as an instrument of intellectual property protection it must satisfy certain de minimis requirements. These requirements widely recognized for different forms of intellectual property rights have following features:

(i) definition of protectable subject matter,
(ii) definition of essential criteria which render subject matter eligible for protection,
(iii) definition of scope and duration of protection,
(iv) allowing balance of privilege in favour of IP right holder,
(v) provision of rights of priority,
(vi) national treatment and independence of IPR,
(vii) creation of administrative and judicial framework for effective enforcement of the provisions on protection and dispute settlement,
(viii) maintenance of a healthy balance between the private benefit accruable from IPR and the public good flowing from the working of the IPR.

In addition, the legal framework may include such other elements which harmonize the legislation with the socio-political and eco-environmental predilections of the state and its international
commitments connected to the legislative topic without compromising on the above mentioned requirements.

**Framework of Indian Legislation on Protection of Plant Varieties**

Indian Parliament passed the PPVFR Act in 2001 after protracted legislative and civil society interactive process stretching to eight years. The objectives of the Act, as explicit from its title, are intellectual property protection on plant varieties and protection of rights of farmers. The farmers’ rights arise from their role in conserving, improving and making available plant genetic resources for the development of new plant varieties. Another objective of the Act is to stimulate investment in plant breeding research, promote development of new plant varieties, growth of seed industry and availability of high quality seed and planting material to farmers for an accelerated agricultural development. The Act has 97 sections stacked in 11 chapters. The notified rules have 76 sections arranged in nine chapters with four schedules and 45 forms. The legal framework of the Act and Rules is examined for its effectiveness in relation to the above discussed *de minimis* elements.

**Protectable Subject Matter**

The Act defines protectable subject matter under Sections 2(h), (i), (j), (l), (y), 14, 23 and 29(2). The Act uses the expression ‘registration’ for the process of establishing protection. The intellectual property right awarded on a protected variety is termed as plant breeder’s right (PBR). Extant varieties *inter alia* Section 5 of Seeds Act, 1966\(^{13}\) and new plant varieties as defined under subsections 2 (j) and (i) are rendered protectable subject matter under Sections 14 and 15. The Act and Rules, while not specifying the species or genera of crops brought under this legislation, vest the authority to make such specifications for the purpose of registration of varieties other than extant varieties and farmers’ varieties with the Government of India under subsection 29(2). Government of India, which is the competent authority to implement this Act, is yet to define the species and genera for the purpose of registration of new varieties. There is scope to interpret Section 29(2) as it excludes extant varieties and farmers’ varieties from the purview of regulation assigned to Government of India. However, Rule 24 prescribes that registration of extant varieties (including farmers’ varieties) of those specified species and genera, on satisfaction of eligibility criteria, has to be completed within three years from the date of notification under the Act. Parties eligible to seek registration in accordance with Section 16 are breeder, farmer or group of farmers or community of farmers or assignees of these parties, and universities or publicly funded agricultural research institutions. The legal entity status allowed to these public research institutions under Section 16(f) for the purpose of variety registration is not available to private research institutions.

**Essential Criteria that Render Subject Matter Eligible for Protection**

The Act, under Section 15, clearly delineates the essential criteria to be satis-
fied for registration of all protectable subject matter. These requirements in the case of extant varieties (which also include farmers’ varieties) are distinctiveness, uniformity and stability, while the new variety additionally requires novelty. The subsection 15(3)(a) further explains the differences in the definition of novelty in respect of new variety bred in India and introduced from outside. Essentially derived variety (EDV) defined under Section 2 (i) of the Act is to be dealt as new variety. The Act is explicit also on other requirements to be satisfied while applying for registration of a plant variety. All applications, except those from farmers, are to be complete in respect of the requirements stipulated under Section 18. These include a sworn affidavit affirming absence of terminator technology (genetic use restriction technology) in the candidate variety and a declaration on the geographical origin of material used for breeding the candidate variety, when such parental material was accessed from Indian genetic diversity, and that this parental material was lawfully accessed. Farmers are exempted from paying application fee mandatory with each variety application. According to Section 20, application may also be accepted conditionally. Section 21 stipulates for advertisement of all applications, except those on EDBs, to invite opposition, if any, on the registration of the candidate variety. Wherever such opposition is received, further processing is resumed only after appropriate resolution of the opposition. Grant of registration (PBR), according to Section 15, will be only on satisfactory verification of novelty, distinctiveness, uniformity and stability of the variety, as may be applicable. The grant of PBR is to be notified. Thus, the Act has well defined criteria and transparent procedures for determining eligibility of a candidate variety, its registration and publication.

Scope and Duration of Protection
Scope of protection of a plant variety is delineated under Section 28. Grant of registration confers exclusive right to the breeder, his/her legal successor, agent or licensee to produce, sell, market, distribute, import or export the variety (i.e., the planting material of the variety). This right, referred to as the plant breeder’s right (PBR), shall not be exercisable in case of EDV as stipulated under Sections 23 and 43 without entering into mutually agreed terms on its commercialization between the PBR holder of the EDV and the natural/legal owner of the initial variety from which the EDV was derived. Section 27 requires breeder of each registered variety to deposit a specified quantity of voucher seed or planting material of the candidate variety and its parental lines at the notified National Gene Bank. According to Section 24 (6), the duration of registration is 18 years for varieties of vine and tree species and 15 years for the varieties of rest of the species, which, however, shall be initially allowed for a period of nine and six years, respectively. Maintenance of registration is subject to the annual payment of fee as specified under Rule 39, default of which may forfeit the registration. No maintenance fee is payable on farmer’s varieties. Under specified and valid reasons stated under Sections 33 to 38, the Authority may re-
voke and rectify any registration granted, either *suo moto* or on request, and a fair opportunity is given to the PBR holder to counter the revocation process.

The PBR grant under this Act is exclusive of FR and Researchers’s Rights (RR). The RR allow any person to freely use a right protected plant variety for conducting an experiment or research, including use as a parental variety for creating other varieties and registering such new varieties under this Act. However, Section 30 restricts RR not to include repeated use of a registered variety as parental line for commercial production of a new variety. RR safeguard against unethical appropriation of genetic diversity represented in a protected plant variety. This discouragement of monopoly on genetic resource is important to developing countries endowed with rich genetic diversity for promoting public participation in conservation.

Another important feature of the Act with implications on its scope, as provided under Section 2 (k), is the legal definition of farmer as cultivator, conservator and breeder. Chapter VI of the Act with eight sections is exclusively devoted to different entitlements under FR, although this chapter is not exhaustive on FR. The most important aspect of FR having implication on PBR is the entitlement on seed as affirmed in the ITPGR. The Act under subsection 39(1) (iv) allows farmer to save, use, sow, re-sow, exchange, share or sell his farm produce including seed of a variety protected under this Act in the same manner as he/she was entitled before the coming into force of this Act, with the exception that farmer shall not be entitled to sell branded seed of a variety. Branded seed, under Section 39, is explained as the seed of a registered variety marketed in a package or container and labeled in a manner indicating that the seed is that of a variety protected under this Act. However, Section 17(4) excludes the registration of assigned denomination as a trademark. The provision on branded seed may effectively restrain any potential commercial seed sale of a registered variety under FR on seed. Hence the commercial scope offered under PBR is not significantly affected by the grant of RR and FR. These rights are essential for harmonizing Indian *sui generis* law on plant variety with its agrarian scenario, national commitment to other international agreements pertaining to FR, sovereignty on the PGR, and other legal and moral rights entitled to Indian farmers for their livelihood, household food security and economic development.

**Balance of Privilege in Favour of PBR Holder**

Apart from clear definition of the criteria and processes that qualify a plant variety for grant of PBR and the scope and duration of PBR, the Act and its Rules are crafted to maintain balance of privilege in favour of the PBR holder. This is evident from the provisions and rules regarding admission of application, third party opposition to registration, grant of registration, modification or revocation of registration and compulsory licensing of PBR. This is also discernable in the definition of novelty of variety introduced from outside, provisions on extension of duration.
of registration, determination of benefit share and grant of *ex parte* injunction on alleged PBR infringement.

**Provision of Right of Priority**

Right of priority is allowed in the Act under Sections 20 and 31. An application submitted in accordance with Section 14 is usually accepted either conditionally or absolutely. Priority is reckoned from the date of acceptance except when conditions are not complied on time. Application of a variety registered in a convention country is allowed right of priority if such application is filed in India within 12 months from the date on which the application was first made in a convention country. The Act defines convention country as the one with which India has a mutual agreement for granting PBR to the citizens of both countries on reciprocity basis or a country which shares membership with India in an international convention for protection of plant varieties.

**National Treatment and Independence of PBR**

A plant variety, which has received PBR or patent in a convention country, shall be required to satisfy the eligibility requirement of novelty as defined under subsection 15(3), apart from other relevant criteria set out in the same section of the Act for being considered for registration in India. Notwithstanding the PBR or patent received by the candidate variety in one or more convention countries, its application for registration under this Act will be independently examined in accordance with appropriate registration procedure elaborated in the Act. Section 32 of the Act invokes the principle of reciprocity for the grant of plant variety registration applied by citizens of convention countries.

**Administrative and Judicial Framework for Effective Enforcement of the Act and Dispute Settlement**

The Act, as elaborated in Chapter II, seeks to establish a national Protection of Plant Variety and Farmers’ Rights Authority (PPVFRA) with a Chairperson and 15 *ex-officio* and nominated members as the apex body assisted by Registrar General of Plant Variety Registry and possibly a few Registries of Plant Variety located at different regions of the country to administer the Act. Administration of the Act proposes to reach out to the district administration at grass root level. PPVFRA is vested with the responsibility of establishing and maintaining a National Register of Plant Varieties with comprehensive database on farmers’ varieties and all other distinct varieties in public domain (Sections 8 and 13). Under Section 19, the PPVFRA is also made responsible for the conduct of tests to determine eligibility of candidate varieties for grant of registration. Rule 29 elaborates the manner and method of conducting tests for varieties other than EDV. According to Rule 29 (6) and (7), the on-field testing for distinctiveness, uniformity and stability (DUS testing) is to be conducted on a minimum of two locations by a few empanelled institutions having adequate capability. The independence and high professional capability of these institutions in conducting fair and stringent testing have an important role in en-
suring effectiveness of the system. The eligibility tests on EDV are not yet defined (see Rule 35) and are expected to vary from case to case (Rule 29(5)). Rule 37 promises grant of registration within three years from the date of filing the application on timely fulfillment of all other requirements by the applicant. PBR-holder has freedom to transfer the right to any agent or licensee and such transfers are to be notified to the PPVFRA.

The PPVFRA is responsible for the determination and grant of benefit sharing (Sections 26 and 41) and compensation eligible to farming communities under Section 39 (2) for ensuring availability of seeds of registered varieties to farmers in adequate quantity and at reasonable price (Section 47) and for promotion of agrobiodiversity conservation (Section 39 (iii)). Section 47 provides for compulsory licensing of protected varieties, if three years after grant of registration, the PBR-holder fails to meet the demands of farmers for the seed or planting material of the variety and to supply the same at reasonable price. Compulsory licensing is invoked only after allowing reasonable opportunity to the PBR-holder for complying with these requirements. Whenever, a variety is compulsorily licensed, a reasonable compensation is awarded to the PBR-holder. National Gene Fund (NGF) is another institutional device the Act seeks to establish (Sections 45 and 46) for promoting conservation and sustainable use of genetic resources.

Under Chapter VIII of the Act, Plant Varieties Protection Appellate Tribunal (PVPAT) enjoying the status of a District Court, with a Chairperson, Judicial and Technical Members, is provided to decide on the disputes arising from interpretation or implementation of the Act. Sections 65 and 66, 70 to 73 prescribe stringent penalties for offences against the Act. An appeal against the decision of the PVPAT, according to Section 55, shall lie in the High Court of respective jurisdiction. The Act, under Sections 65 and 66, allows ex parte injunctions on complaints against the PBR infringements. Penalties provided for various offenses, as provided under Sections 70 to 73, may vary from 3-month prison or fine of Rs 50,000 or both, three year prison or fine up to Rs 20 lakhs or both. Offences by seed companies are dealt under Section 77. There is a direction in the Act that the PVPAT may, wherever possible, hear and decide such appeal within a period of one year from the date of filing. However, according to Section 59, until the establishment of PVPAT, the Intellectual Property Appellate Board (IPAB) established under Trademarks Act, 1999 will perform this function with one modification will render this function. The modification is that the Technical Member of the bench that IPAB may constitute for the purpose of discharging the judicial role assigned to PVPAT shall be appointed in accordance with Section 55(3) of PPVFR Act. The rules on the PPVFR Act notified by the Ministry of Agriculture are totally silent on the PVPAT as well as on the appointment of the Technical Member. This omission, if persisting, may unfavourably affect the effective jurisprudence of this Act.

Thus, the PPVFR Act, viewed exclusively from its legal framework, provides
an effective *sui generis* system crafted to suit the Indian context. This effectiveness, however, is not totally translated in the notified Rules of this Act for its major omission on the jurisprudential system. These omissions in rules, it is hoped, will be appropriately rectified. Finally, an effective legal framework of the Act alone will not make the legislation an effective *sui generis* system unless the administrative and judicial enforcement of the Act is indeed effective.

**Healthy Balance Between the Private Benefit Accrueable from IPR and the Public Good Possible from the Working of the IPR**

All IPRs are expected to ensure a healthy balance between the private gains arising from the exclusive right and the public benefit expected to flow with the working of the IPR. The exclusive right underlying the PBR, while allowing a kind of monopoly on the commercialization of the propagating material of a registered variety, requires that such propagating material is made accessible to the needy farmers and that it benefits them either as increased income or as other tangible societal gains. The commercial gains accrued by the PBR holder under the exclusive marketing right are expected to promote more and more investment in crop improvement or other domains of agriculture and thereby serve the larger cause of Indian farmers and agriculture. In other words, when propagating material of a variety or the specific method of its cultivation is monopolized in a manner to make it unaffordable to a larger section of farmers, the PBR granted indeed fails in realizing the expected potential public good. This, particularly in countries with high predominance of resource poor farmers, demands adequate public policies to balance the technology cost and profit of the PBR holder on one side and the price of technology service to farmers, on the other. A provision on compulsory licence is one such policy framework commonly followed in IPR legislations in many countries. The regulatory bodies administering the IPR are empowered to regulate or discourage anti-common monopolistic practices, particularly when the technology in question has high public good value, least or no competition and vital relevance to the livelihood of many.

Four important balancing provisions provided in PPVFR Act are FR, RR, compulsory licensing and revocation of registration. FR and RR are essentially not balancing provisions, although these have a balancing function. The FR may influence the exclusive right in variable manner depending on the propagation system and technology used for large-scale production of propagating material. RR can potentially shorten the market life span of a variety when competitors use the very same genetic resources, including the registered variety, for developing superior varieties. For every step in genetic enhancement of a crop, the public and the country stand to gain. This apart, monopolization of genetic resources under a stringent IPR regime and prevention of its access to others for further public good use is unethical and immoral.

Compulsory licensing is essentially a device to safeguard the public interest
against monopolistic practices, including partial or total failure of the IPR-holder in working the IPR. One major public good objective of this Act is to facilitate availability of high quality seed and planting material to Indian farmers. The PPVFR Act, under Sections 47 to 53, provides scope for compulsory licensing when the PBR-holder consistently fails to meet the farmers’ demand for seed or other propagating material of the protected variety at reasonable prices. Recognizing the infrastructure and time required for commercial production of planting material, a plant variety should attract this provision only after completion of three years since its registration. The PPVFR Authority is empowered to initiate action on compulsory licensing either *suo moto* or on specific complaint. While awarding such compulsory licensing, the Act provides for a reasonable compensation to the PBR-holder. Accelerated agricultural development through genetically improved plant varieties is another goal of this Act. To ensure this, the Authority is empowered to act either *suo moto* or on specific complaint for revoking registration of a variety which may prove to be a source of concern to the national or regional agricultural interest.

Harmonization of the Act with Domestic Socio-Eco-Political Predilections and International Commitments

Some of the features of the PPVFR Act are crafted for its harmonization with India’s unique socio-political, economic and ecologic compulsions and its binding international commitments. Many of these features do not essentially have an apparent influence on the effectiveness of the Act. First among these features is the recognition of farmer as breeder with right to register farmers’ variety. The second feature is the entitlement to rural and tribal communities for an equitable share of benefit in recognition of their important role in generation and conservation of agro-biodiversity and associated traditional knowledge. The third feature is the establishment of NGF to institutionalize benefit sharing, reward and recognition to promote conservation of genetic diversity. The fourth feature is the safeguarding of farmers against unethical business practice of passing off seeds of registered varieties with tall claims on their performance (subsection 39(2)). The fifth feature is an imposed requirement to establish an instrument on mutually agreed terms between the PBR holder of an EDV and legal or natural owners of the initial variety from which the EDV was derived, prior to the marketing of a registered EDV (Sections 23 and 43). The sixth feature is the protection of farmers against innocent infringements (Section 42) and exemption allowed to them from paying fees prescribed for transactions under this Act (Section 44). The possible effect of protection of farmers against innocent infringement on the effectiveness of this Act is minimized to the extent that this provision does not allow repeated infringement.

Section 26 of the Act provides for benefit sharing with local communities or Indian institutions, which have been responsible for the generation or conservation of genetic resource deployed in the
pedigree of the registered variety. Registration of varieties may also attract Section 6 of the Biological Diversity Act, 2002. This Act also stipulates determination of benefit sharing while granting approval for seeking IPR on a product developed from Indian biodiversity. This is consistent with the CBD, which is a legal binding on India. While determining benefit sharing, the Act offers fair and reasonable opportunity to the breeder to defend his/her interest. The revenue recovery procedure could be resorted to for recovering the awarded benefit sharing.

Impact of PPVFR Act on Investment in Plant Breeding

One important objective of this Act is to stimulate public and private investment in plant breeding research for the development of new plant varieties, growth of seed industry and availability of high quality seed and planting material to farmers for an accelerated agricultural development. While the public investment in plant breeding is not directly related to IPR aspects, the anticipated impact of this Act on public investment depends also on other public policies related to agriculture. Private investment in plant breeding had been increasing over the years and how far this Act will facilitate enhanced investment is examined in rest of this paper.

An analysis of this aspect will be more realistic on sectional basis with a good appreciation of crop pattern, role of reproductive system, current seed replacement rate, and the technology underlying production of high quality seed and planting material. Compared with the agriculture of other countries of equivalent size in cropped area, Indian agriculture is vastly diverse. More than a dozen cereal species occupy nearly 53% of the cropped area, an equal number of pulses crop species share about 12.5% of area, more than half-a-dozen oilseed crop species occupy about 8% area and many species of vegetables and fruit trees occupy about 4% area and several other species of commercial and plantation crops, spices and condiments occupy rest of the area.

These crops represent all forms of reproductive propagation, such as exclusively vegetative, vegetative and sexual, and sexual with self or cross pollination. This huge diversity in crop species, their propagation system and the farming operated by more than 115 million holdings present a mixed bag from seed industry point of view. Indian agriculture is notable for very low seed replacement rate, which varies from less than 2% in potato to 42% in pearl millet and sunflower. In other words, on an average, more than 80% of the cropped area is sown every year with farm saved seeds. Crops in which hybrid technology is commercialized with tangible economic superiority enjoy relatively higher seed replacement rate, varying from 12 to 42%. The low seed replacement rate and the huge acreage under crops offer vast opportunities for trade on good quality seed irrespective of their reproductive system. Besides, the Indian farmers are extremely eager to receive new and good quality seed.

The PBR under PPVFR Act in conjunction with FR and RR may offer variable commercial opportunities on quality planting material depending on the crop propa-
gation system, technology deployed for production of propagating material and potential size of seed market. The three propagation systems are propagation by vegetative parts (example, potato, sugarcane, grafts of horticultural crops, etc), propagation by self-pollinated seeds (example, rice, wheat, grams, groundnut, etc) and propagation by cross-pollinated seeds (example, maize, pearl millet, sunflower, rape seed, mustard, several vegetable crops, etc). FR have the potential to restrict the repeated sale of planting material of crops, which are propagated by vegetative and self-pollinated seed. This, however, does not preclude commercial opportunity and private investment in those crops, which have large market size or low multiplication rate or skill deficiency among farmers to produce their own planting material (for example, the graft hybrids of many horticultural crops). In the case of cross-pollinated seed crops, FR will be restricted to locally evolved or improved populations, with no impact on commercial hybrids. Genetically improved populations of these crops may also command attractive seed market. Therefore, the commercial disadvantage arising from FR to private investment is largely confined to low volume, low value crops, where the private interest is anyway low. RR and consequent lack of proprietary protection to the genetic material can discourage entry of superior exotic germ plasm, including new genes and promising stocks and scions of horticultural crops through private research channel. Here, intervention of the government through multilateral or bilateral agreements under International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) may minimize the disadvantage.

The Act is largely expected to strengthen the private interest and public good associated with these crops lacking commercial hybrid technology. In the case of crops possessing commercial hybrid technology, there is already a strong de facto, if not de jure, protection to private investment. This protection, as strong as an operational patent, is facilitated by the inherent elements governing the hybrid seed technology and practised lenience in the enforcement of the Seed Act, 1966 and New Policy on Seed Development, 1988 for establishing trade secrecy and inaccessibility on parental lines. The New Policy on Seed Development, for example, requires deposition of voucher seeds of imported parental lines of all commercialized hybrids with the NBPR. The Indian Council of Agricultural Research, New Delhi, also selectively exempts private sector from disclosing the pedigree of hybrids entered in all India multi-location evaluation and from submitting their parental lines for evaluation. The PPVFR Act requires deposition of voucher seeds of hybrid and parental lines in the National Gene Bank, which makes a departure from existing practice. Private sector, it appears does not welcome this though the Act, for the first time, provides legal protection to the hybrids. The present practice of passing on new hybrids and varieties to farmers under ‘truthful labeling’ and without subjecting to the process of release stipulated under Seed Act will also be regulated by the Act and National Seed Policy, 2001 to establish a level playing ground for pri-
vate and public sector varieties.

The impact of this Act in promoting private investment in Indian plant breeding is expected to be mixed. Investment is likely to increase in hybrid seeds and possibly also in non-hybrid seeds of selected major crops, which offer high volume or high value sale for rapid recovery of capital and profit. In general, private investment on the improvement of many crops propagated either by vegetative or self-pollinated seeds and offering low volume turnover is expected to be low or nil. Several dry land and horticultural crops may fall in this category. Thus the Act, with reference to these groups of crops, is unlikely to change the present investment patterns. This emphasizes the need for a strengthened public investment policy for guiding harmonized growth in all crop sectors. Similarly, a public R&D policy to promote competitive public research and public-private alliances in crop sectors preferred by private sector may discourage private monopolization in critical crop production sectors. Such a public policy should leverage IPRs established by public research for larger public good, use public-private alliance for variety-led technology transfer and servicing, involve the small seed companies and protect them from the anti-competitive practices of big players, and creating capability among farmers for production of quality seed of public research varieties and hybrids (seed village concept of M S Swaminathan Research Foundation). The use of IPR acquired by the Chinese Academy of Agricultural Sciences (CAAS) on Bt-cotton and the involvement of farmers to produce CAAS Bt-cotton seed at lower price for countering high priced seed of Monsanto Bt-cotton is a useful case study in this context.

Case studies from developed countries having long history of stronger IPR on plant varieties tend to suggest that introduction of IPR system may not necessarily lead to expected results on private investment in plant breeding. Such studies exclude the private investment in hybrid seed research because the IPR regime does not contribute to enhanced commercial opportunity to this sector. Therefore, the impact of IPR on the private investment is studied on crops, which do not deploy hybrid technology. Such studies assess the investment made, advances gained in crop productivity and the number and coverage of private sector varieties in crop production. Case studies from USA are more valuable because this country introduced patent on vegetative propagated plant varieties in 1930 and on all plant varieties in 1970. A study at University of Wisconsin showed that patent on plant varieties did neither increase the total R&D activity nor the yield and economic return from new varieties, although it significantly increased the number of private plant varieties (hybrids not included) in certain crops and the over all seed sale by private companies. A more recent study in USA on wheat by International Food Policy Research Institute, Washington concluded that patent did not lead to increased private investment in wheat breeding or increased yield, while the share of acreage sown under private varieties significantly increased. When such is the long term impact of patent on plant varieties on the
private investment in plant breeding and crop productivity in the haven of free economy, there is little reason behind high expectations of all round progress in crop productivity driven by private investment under a regime of *sui generis* system of plant variety protection in developing countries where agriculture largely is a low resource livelihood occupation for majority of the people. In this context, an argument that FR provided in *sui generis* system may dilute PBR and thus may affect the private investment which holds little water. These countries have to strengthen their public research on plant breeding and technology delivery to ensure all round agricultural growth and national food security.

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