



Indian PVP legislation: Response of various stakeholders for the regulation of horticultural crop varieties

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In the pre-plant variety protection era, most of the innovations were compensated in terms of their professional growth. There was a golden saying that “knowledge will increase when it is shared”, has now lost its significance. We are currently living in the era of encasing the knowledge. A nation's ability to convert knowledge into wealth and social good through process of innovation will determine its future. The new inventions in high performance genetic research will support plant breeding. The breakthrough in molecular plant breeding will contribute significantly in modern plant breeding which require huge investments. Unless these proprietary products are protected, the commercial organization will not invest resources (Kochhar 2011). In this context, issues of protection and exploitation of Intellectual Property (IP) are going to become critically important all around the world.

Plant Variety Protection (PVP) encourages and promotes plant breeding activities and provides the breeder with the possibility of recovering investment in plant breeding work by making the reproduction and commercial exploitation of varieties (ASSINSEL 2012, <http://www.worldseed.org>). This activity benefits the region with improved productivity.

The World Trade Organization (WTO) under the Article 27.3 (b) of the Trade Related Aspects of Intellectual Property Rights (TRIPS) for Protection of Plant Varieties to its Member Countries provided different options namely patent, by an effective *sui generis* system or a combination of both (Bala Ravi 2004). As a corollary to this, as a member country, India opted for the *sui generis* system of PVP and enacted the Protection of Plant Varieties and Farmers' Rights (PPV and FR) Act in 2001 (Jordens and Button 2011). This legislation provides a more comprehensive framework for the PVP containing several deviations from the International Union for the Protection of New

Varieties of Plants (UPOV) model. One of the important objectives of this Act is to stimulate public and private investment in plant breeding research for the development of new plant varieties, growth of the seed industry and availability of high quality seed and planting material to farmers for an accelerated agricultural development (PPV and FR Act 2001). The Act is unique to benefit the national situations yet matching with the larger global commitment. It attempts to optimize and balance claims for protection by both plant breeders and the farmers and is the first of its own kind in the world (Kapur 2011).

Soon after the enactment of PPV and FR Act, there was an argument that farmers' rights (FR) provided in *sui generis* system may dilute plant breeders rights (PBR) and thus may affect the private investment. According to the Association of Plant Breeders for the Protection of Plant Varieties (ASSINSEL 2012, <http://www.worldseed.org>), the Act mixes Plant Breeders Rights and Farmers' Rights (FR), which are two different issues. Their association in a single text is not obvious since they could have been addressed separately in two different pieces of law and the protection provided to plant breeders is definitely not effective (Hanchinal *et al.* 2011). According to Biswajit Dhar, in addition to potential opposition from plant breeders in the formal sector, the challenge for the PPV and FR Act will be when it is implemented. The degree of success that India is able to demonstrate in its implementation should provide basis for adoption of similar legislation in other countries (Kochhar 2011).

Taking stock of the opinion of formal seed sector of developed countries and the individuals, nine years after the implementation of the PVP legislation the analysis was made on the success achieved and the present paper deals with analytical review on the response of public institutions, private seed companies and farmers for the registration of varieties for granting PVP certificates in horticultural crops in accordance with PVP legislation.

Over the years, horticulture has emerged as an

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indispensable part of agriculture, offering a wide range of choices to the farmers for crop diversification. Horticulture sector holds a wide range of crops, viz. vegetables, fruits, ornamentals, medicinal and aromatic crops, spices and plantation crops, etc. This sector contributes about 25% of GDP from about 8% of the area. India initiated the process of developing guidelines for the conduct of species specific Distinctiveness, Uniformity and Stability (DUS) test or "Specific Guidelines" for individual crops species and the notification process started in the year 2009 with two crop species, viz. ginger and turmeric. Presently in 50 crop species, species specific guidelines are developed and these crops are notified for registration of crop varieties (Table 1).

Trends in filing of Applications for PVP by various stakeholders

A plant variety is eligible for protection under the PPVFR Act if it is new, distinct from existing or commonly known varieties, and when a variety fulfils these criteria, it is listed in a national register or catalogue which publicly discloses that the variety is protected. Applications which have fulfilled all requirements and have been finally accepted by the Registrar for registration. The criteria of *Novelty* (to avoid protection for plant varieties that have already been exploited or are a matter of common knowledge, a new variety in which a breeder seeks protection must not have been sold in the market for more than a specified period of years prior to the date of application for protection. The Act specifies the maximum number of years during which such pre-application sales have occurred), *Distinctness* (the PPVFR Act states that a protectable plant variety must be "clearly distinguishable in one or more essential characteristics from any other variety whose existence is a matter of common knowledge at the time when protection

is applied for, the Conduct of Tests for Distinctness, and Stability (PPVFR Guidelines) use both qualitative and quantitative plant characteristics, including such visible attributes as leaf shape, stem length and colour, to determine if the difference between varieties is clear and consistent. The concept of distinctness is critical to determining the scope of a breeder's or farmers right in plants that are closely related but not identical to a protected variety) and *Stability* (the stability requirement is a temporal one, requiring the breeder to show that the essential characteristics of its variety are uniform over time, even after repeated reproduction or propagation. In practice, what has been shown to be homogeneous is usually considered to be stable as well. For this reason, the stability requirement has engendered the same sort of critiques as the uniformity requirement in its preclusion of protection for cultivated landraces and other traditional plant varieties) is decided by the Authority.

The performance of public sector institutions in filing applications for PVP with respect to horticultural crops from the beginning was not encouraging. When the registration process came into force in the year 2009, only one application was filed in the year 2010, followed by 38 applications in 2011, 26 applications in 2012, nine applications in 2013, 54 applications in 2014 and 22 application in 2015 (Table 2). Looking to the slow trend, the PPV and FR Authority made efforts to conduct awareness/ training/capacity building programs in the State Agricultural Universities (SAUs), ICAR research institutes and public sector seed companies viz., National Seed Corporation and State Seed Corporations. Out of 149 applications filed by the public seed sector (Table 4), 130 varieties were Extant Varieties notified under the Seeds Act, 1966 (Extant Notified) and Extant Variety of Common Knowledge (Extant (VCK)) and only 19 varieties under the new varieties category. While none of the varieties were filed for registration under Essentially Derived Varieties (EDV) category, indicating that either the public research institutes are not making efforts to protect their varieties by IPR or not much research efforts are made to develop new varieties and EDVs, which is important to maintain balance and control seed price to some extent in the market.

Table 1 Horticultural crop species notified for registration

Group	No.	Crop species
Vegetables	17	Ginger, Turmeric, Chilli, Bell Pepper and Paprika, Tomato, Brinjal, Okra (Lady's finger), Cauliflower, Cabbage, Potato, Onion, Garlic, Bitter Gourd, Bottle Gourd, Cucumber, Pumpkin
Fruits and nuts	14	Mango, Apple, Pear, Grapes, Pomegranate, Indian jujube (Ber), Cherry, Almond, Apricot, Coconut, Walnut, Papaya, Muskmelon, Watermelon
Spices and condiments	4	Black pepper, Coriander, Fenugreek, Small cardamom
Ornamental crops	10	Rose, Chrysanthemum, Bamboo Leaf or Boat Orchid, Spray or Singapore Orchid, Vanda or Blue Orchid, Orchids (<i>Cattelya</i>), Orchids (<i>Phalaenopsis</i>), Jasmine, Gladiolus, China Aster
Medicinal and aromatic plants	5	Isabgol (<i>Blond Psyllium</i>), Menthol mint, Damask Rose, Periwinkle, Brahmi (<i>Indian pennywort</i>)

Table 2 PVP applications received in horticultural crops (Applicant wise/year wise)

	2009	2010	2011	2012	2013	2014	2015	Total
Public		1	38	26	9	54	22	150
Private		130	153	95	226	109	207	920
Farmer				8	48	270	595	921
Total		131	191	129	283	433	824	1991

Public Sector

With respect to granting PVP certificates only 58 certificates could be granted under the Extant Notified category (Table 3). Out of the 16 crop species, where applications were received from public sector (Table 5), more number of applications are in brinjal and tomato

Table 3 PVP certificates issued in horticultural crops year-wise/applicant-wise

	2009	2010	2011	2012	2013	2014	2015	Total
Public		1	16	8	2	31		58
Private								
Farmer								
Total		1	16	8	2	31		58

Table 4 Share of public and private sector institutions in filing varieties for IPR and IPR issued in horticultural crops

Varieties	Varieties filed for IPR		IPR granted	
	Public	Private	Public	Private
New	19	466		
Extant	130	450	52	3
EDV	0	3		
Total	149	919	52	3

(21) followed by potato (19). In private sector also more number of applications are in tomato (226) followed by okra (115) (Table 5). In literature it is reported that public institutions are not commercially exploiting their varieties after getting PVP certificates, though in the Act there is a provision for licensing and cross licensing for the purpose of promoting Research and Development (R&D) on well adapted crop varieties (Dhar 2002). This may be due to lack of confidence or little knowledge on IPR issues and poor negotiation capacity. Hence, some system should be worked in the public seed industry/institutions to provide incentives for the variety developers and a portion of the royalty/benefit sharing be distributed so that the inventor takes interest to develop new varieties and apply for granting PVP certificates.

Private Sector

From the beginning of registration process, the performance of the private sector in filing applications for granting PVP is encouraging as indicated in Table 2. When the registration process was started, the Authority could receive 130 applications during the year 2010 from private sector as against one application from public sector. The trend continued in the subsequent years, filing 153 varieties in 2011; 95 applications in 2012; 226 applications in 2013 and 109 applications in 2014 207 applications indicating good response from the private sector in comparison to public institutions. It is evident from the trend that private seed companies are investing more for their research and development in "high value-low volume crops" as they are commercial in nature. The investment is also more in the development of research varieties as evidenced by the Table 4. Maximum numbers of applications (466) were in the new variety category. There were three applications in the category of EDV indicating their preference to cosmetic breeding also. With respect to granting PVP certificates

to private seed industry, since all the varieties except two varieties which are in the Extant Notified category, are either new variety or VCK category which require DUS testing either for two season or one season respectively with two locations. In case of EDVs the testing will be recommended on case to case basis. There were more applications filed in brinjal (241) followed by tomato (226) and okra (115), indicating that the private seed industry would like to concentrate much of their research efforts in such crops where there is more business (Table 5) which are indigenous to our country and where there is consumer preference. The crops namely, bitter gourd (22 applications), bottle gourd (9) and cucumber (6) which are indigenous to our country but the crops were notified recently. Hence, only few applications were received in these crops.

It is expected that in the forthcoming years, we may expect more applications for registration of their varieties. In ornamental crops, viz. rose, five applications were filed for registration by the foreign breeders with their registered offices in India, which indicate, that the PPV&FR Act, 2001 is not only a balanced Act but also favourable to the private seed industry dealing with horticultural crops.

Though, the Central Government has notified 50 horticultural crop species, the response for filing applications is only in 28 crops. Hence there is a need to have more awareness / capacity building programs and also interphase meeting with public and private seed sector by the Authority in collaboration with National Agricultural Research System (NARS) and Private Institutions throughout India in general and in the regions where horticultural seed industry is concentrated in particular.

Farmer

The filing of applications for registration of farmers' varieties (Table 5) in horticultural crops came into force after the notification of two horticultural crops, viz. ginger and turmeric in 2009, eight crops, viz. tomato, brinjal, okra, cauliflower, cabbage, potato, onion, garlic in 2010 and other crops in subsequent years. The data indicate that in the first five (2007 - 2011) years, not a single application was filed by the farmers. However, during the year 2012, the Authority could receive six applications. Looking to the lukewarm response of the farmers for the registration of their varieties in different horticultural crop species, the Authority in collaboration with NARS, Krishi Vigyan Kendras (KVK) and Non-Governmental organizations (NGO). Massive awareness programs were taken up from the year 2013. As a result, 38 applications were received during 2013 and record number of 198 applications in 2014 and 361 applications in 2015, indicating a positive response for the awareness programs. Amongst the fruit crops more number (180) of application were filed in mango, which is as expected. Since mango crop was evolved in India, wider genetic diversity exists. In vegetables maximum number (66) of applications were registered in brinjal followed by turmeric (43), and bottle gourd (33), which are indigenous to our country. Many other crops which are origin to our

Table 5 Trends in filing of Applications for PVP by various stakeholders

Crops	2010			2011			2012			2013			2014			2015			Total	%
	Public	Private	Farmer	Public	Private	Farmer	Public	Private	Farmer	Public	Private	Farmer	Public	Private	Farmer	Public	Private	Farmer		
Black pepper				4			2					4						1	11	0.8
Brinjal		64		2	68		12	52		3	43	10	4	9	21		5	35	328	23.5
Coconut												6			1			1	8	0.6
Mango								4							60			116	180	12.9
Okra		10			24			8			59	3	3	8	7		6	3	131	9.4
Onion					9				1	1		1	6		4	3		7	32	2.3
Orchid												3			1				4	0.3
Potato				16	3			9		2		3		5	9	1	4	11	63	4.5
Small cardamom	1								1			4			3			2	11	0.8
Tomato		31		2	44		10	24		1	98	4	5	17	11	3	12	11	273	19.6
Bitter gourd													3	21	9		1	19	53	3.8
Bottle gourd															19			14	33	2.4
Cabbage															2				2	0.1
Cauliflower		19		2	5					2	23				2		3	4	60	4.3
Coriander															10				10	0.7
Cucumber														6	10				16	1.1
Fenugreek															5			6	11	0.8
Pumpkin															20				20	1.4
Apple															1			8	9	0.6
Pomegranate															1			1	2	0.1
Rose															1			3	4	0.3
Grape															1			4	5	0.4
Walnut																		2	2	0.1
Chrysanthemum				2			2											2	6	0.4
Chilli																		30	30	2.2
Apricot																		1	1	0.1
Isabgol																		1	1	0.1
Sunflower																		1	1	0.1
Bellpepper																		4	4	0.3
Acid lime																		5	5	0.4
Garlic																		24	24	1.7
Turmeric	4			4			2											43	53	3.8
Ginger																		2	2	0.1
Total	5	124	0	32	153	0	28	93	6	9	223	38	21	66	198	7	31	361	1395	100
%	0.4	8.9	0	2.3	11	0	2	6.7	0.4	0.6	16	2.7	1.5	4.7	14.2	0.5	2.2	25.9	100	

country needs to be encouraged for filing farmers' varieties (Table 5).

Creating awareness

As suggested, there is a need to create awareness among scientist, policy makers and breeders as well as farmers and village communities as the PVP law in India is relatively new

(APEDA 2011-14). Since the Authority has the jurisdiction of entire India and cannot move the length and breadth of the country to organize the awareness programs but can only facilitate the same.

It is suggested that to make the Indian PVP law more effective, continued efforts should be made on periodic training to trainers from ICAR/SAU/NGO/KVK and

other stakeholders. Further, there is a need to continue the awareness programs among scientists, policy makers, farmers and village communities in the agro-biodiversity regions of India.

Indian legislation of Protection of Plant Varieties and Farmers' Rights is found to be a balanced Act, as there is overwhelming response from private seed sector in addition to public institutions for registration of their varieties to obtain PVP certificates. With awareness programs and capacity building good response was received from farming communities in filing the farmers' varieties in as many as 33 crops for grant of PVP certificates. It is suggested to put in more efforts for the awareness of the legislation. A mechanism should be evolved to encourage the plant breeder of public institutions to develop productive varieties and get IP protection. For commercialisation of public bred varieties, workable system should to be developed.

SUMMARY

Protection of Intellectual Property (IP) is extremely important for supporting and driving innovations, to ensure against unfair trade practices. The Plant Variety Protection (PVP) encourages and promotes plant breeding activities and export. Indian plant variety protection law is unique as it simultaneously aims to protect the plant breeders as well as farmers' rights. The analytical review in the registration of horticultural crop varieties, indicates that the private seed sector has taken keen interest in protecting their proprietary varieties in comparison to the public institutions. Though 50 horticultural crop species have been notified for registration, the filing of application is restricted to few crop species. With extensive awareness programs involving all stakeholders, dramatic progress could be achieved not only in filing applications but also receipt of applications in more number

of crop species. Since India is one of the centres of origin for many horticultural crop species of economic importance, it is essential to protect the plant genetic resources (PGR) in the form of farmers' varieties through IP Rights.

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