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The Legal Protection of Public and Private Plant Varieties in India: A Comparative Analysis

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Abstract

The enforcement and implementation of Protection of Plant Varieties and Farmers' Rights Act, 2001 has influenced the seed industry in a big way in India. The Protection of Plant Varieties and Farmers' Rights Authority has so far received 3984 applications for registration of plant varieties out of which 487 have been granted Certificates of Registration (CoR). It is interesting to note that farmers' varieties formed 29 percent of all the applications received. Crop-wise analysis of issue of CoR revealed that cereals, (such as maize, bread wheat, rice, pearl millet and sorghum) and cotton along with few pulses formed more than 90 percent of the varieties granted CoR. Public sector contributed for 83 percent of the total CoR issued in all categories of varieties. But in case of new varieties the private sector dominated with a share of almost 90 percent. Two private seed companies namely, Monsanto India Limited and MAHYCO together contributed 16 new varieties out of total 34 new varieties granted CoR. Maize and cotton together contributed for 66 percent of new varieties granted CoR. The widening gap between the public and private sector seed companies in the development of innovations (new varieties, hybrids and proprietary technologies) and getting plant variety protection is alarming. The public sector seed industry has to be revitalised to address the present day challenges of competitiveness in R&D, market access, and efficient technology transfer systems. India is the first country in the world to grant registration for farmers' varieties and this has implications for the developing countries to follow this unique model.

Keywords: Concentration ratio; Conversion ratio; Plant variety protection; Farmers' rights; Farmers' variety; PPV&FR Act; Public and Private seed sector; Registration of varieties

Introduction

Enforcement of legal protection for innovations in plant breeding by the plant breeders and traditional farming communities in producing suitable varieties producing food, fodder, fibre, fuel and other commodities, provide adequate incentive for research, promote trade and regulate use of plant genetic resources. As early as 1990, the [1] World Bank reported the existence of massive evidence that appropriate legal protection acted as an incentive for productive research. According to the United Nations Conference on Trade and Development (UNCTAD, 1991) [2], intellectual property rights (IPRs) constitute an important element of trade negotiations. Ravishankar and Sunil (2000) [3] stated that in the new millennium, the research paradigm would undergo a transformation, and suggested that 'the interplay of IPRs, technology development and technology transfer will determine the research contours and portfolios'. Linton and Torsekar (2011) [4] reported that market access, intellectual property rights and regulatory review processes are the three factors identified by industry sources as important to innovation in biotech seeds.

India as a member of WTO and signatory to the TRIPS enacted the 'Protection of Plant Varieties and Farmers' Rights Act, 2001' (herein after referred as Act), for which Rules were notified in 2003 [5,6] (The Gazette of India Extraordinary, 2001 and The Gazette of India, 2003). For the purpose of this Act, in exercise of the power conferred under sub-section (1) of the Section 3, the Central Government established the 'Protection of Plant Varieties and Farmers' Rights Authority' (herein after referred as Authority) on 11th November, 2005 (The Gazette of India, 2005) [7]. Specifically so as to promote the encouragement for the development of new varieties of plants and to protect the rights of the farmers and breeders the Authority shall provide for registration of new and extant plant varieties, develop, characterize and document

the registered varieties, create compulsory cataloguing facility for all varieties of plants, ensure that seeds of varieties registered under the act are available to farmers and provide for compulsory license, collect statistics with regard to plant varieties, including the contribution of any person at any time in the evolution or development of any plant variety and maintain National Register of plant varieties [8].

The PPV&FR Act was formulated in the year 2001 for protection of plant varieties in India by integrating the rights of breeders, farmers and village communities. It is therefore very important to understand the impact of this law on the Indian seed industry in general and the farming community in particular. This becomes more important in the context that even today in India, the organized sector (including both private and public sector companies) account for about only 15 to 20 percent of the total seed distributed in the country [9] (MoA, 2102).

This paper examines in detail how the act has influenced the plant variety protection (PVP) in India after the authority has started implementing the act. The specific objectives of the paper are:

a. To analyse the year-wise growth in the issue of certificates of registration (CoR) by the authority to plant varieties seeking protection under the act;

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b. To assess the share of public and private sector seed companies in the total CoR issued;

c. To examine the share of public and private seed companies in the new varieties issued CoR; and

d. To analyse the crop-wise share of CoR issued.

Data and Methodology

This is an analytical study based on the secondary data. The published secondary sources such as annual reports, minutes of the meeting, issues of Plant Variety Journal of India and website of the Plant Variety Protection and Farmers' Rights Authority have been used to collect and compile the data. The comparison is made in the percentage contribution of different kinds of varieties to the total number of CoR issued. Conversion ratios have been worked out to find the ratio of applications received by the authority to the CoR issued under various categories of varieties at a particular point of time. The percent share of public and private sector seed companies in the total CoR issued along with the detail of contribution of each private and public sector seed company to the new varieties issued CoR is critically analysed. The crop-wise percent share in total CoR issued is analysed. The concentration ratios for 2, 4 and 6 crops have been worked out to understand the dominance of certain crops which have received highest CoR and the disparities in issue of CoR by the authority.

Results and Discussion

Applications received by the authority for Plant Variety Protection (PVP) under the act

Once notified, applications may be filed for registration of varieties of the particular crop species under the categories of new plant varieties, Essentially Derived Varieties (EDV), extant varieties (notified under the Seeds Act, 1966), extant (Variety of Common Knowledge) and farmer's varieties. As on October 2012, the registration of varieties is open for 57 crops. The number of applications filed for registration of varieties under the act and the number of CoR granted has been given in Table 1. The first application was filed on 21 May 2007. The authority has so far received 3984 applications as on 24 September 2012 for registration [10] of plant varieties including open pollinated varieties, hybrids, parental lines and transgenic varieties from different stakeholders such as farmers, public and private sector including multinational seed companies. Out of those, Certificates of Registration (CoR) were issued for 487 plant varieties as on 3 October 2012. The first CoR was issued on 12 February 2009.

The maximum number of applications was received under the category of extant varieties followed by farmers' varieties and new varieties. It is interesting to note that farmers' varieties formed 29

percent of all the applications received and were in higher number than the new varieties. However, farmers' varieties formed only 1 percent of the varieties issued CoR, whereas new varieties contributed for almost 8 percent. Maximum number of CoR (91 percent) was under the extant varieties' category. The year-wise analysis of applications received for registration of varieties is given below.

2008-09: Out of 460 applications received, 97 were from ICAR, 67 from SAUs, 3 from farmers' and 293 from private seed sector companies including both Indian and multinationals. Thus, private companies' share was almost 64 percent. Out of 460 applications received 171 applications were under the category of new varieties, 260 applications were under the extant category and 3 were farmers' varieties.

2009-10: Out of 568 applications, 227 were for new varieties, 297 for extant varieties and 44 for farmers' varieties. Maximum numbers of applications were received for cotton (259), and cereals such as rice (98), sorghum (58), maize (54), pearl millet (44) and bread wheat (10). Among pulses, applications were received for pigeon pea (15), green gram (13), French bean (3), black gram (3) followed by chickpea and garden pea with one entry each. Cotton alone contributed for 46 percent of the total applications and cereals (rice, sorghum, maize, pearl millet and bread wheat) also contributed for 46 percent. Thus, cotton and cereals together made for 92 percent of total applications received.

New varieties: The number of applications received were highest for cotton (87), followed by rice (41) and maize (33). PPV&FRA [11] for the first time in the country issued CoR for two new varieties (male sterile and restorer line of bread wheat) developed by the Maharashtra Hybrid Seeds Company Limited (MAHYCO).

Extant varieties: Out of 123 CoR issued, 107 belonged to ICAR, 11 were from private sector and 5 from different SAUs.

Farmers' varieties: Three farmers' varieties of rice *viz.*, Indrasan, Hansraj, and Tilak Chandan were granted registration, thus making India the first country in the world to have done so. The maximum numbers of applications received were for rice (33) followed by bread wheat (6) and pigeon pea (2) and for sorghum, chickpea and french bean only one application was received.

2010-11: Out of total 642 applications, the maximum number of applications (246) was for vegetables (namely brinjal, tomato, okra, cauliflower, onion, cabbage and potato) followed by 129 in industrial/commercial crops (cotton, jute and sugarcane), 95 in coarse cereals (maize, pearl millet and sorghum), 91 in oil seeds (sunflower, castor, ground nut etc), 59 in cereals (rice and wheat), 14 in spices (turmeric, ginger, black pepper, small cardamom) and 8 in pulses. Among the individual crops, continuing the trend as observed in 2009-10, the numbers of applications received were the highest in cotton (125), followed by brinjal (108) and tomato (67).

New varieties: The maximum applications were received for brinjal (66), followed by cotton (54), maize (43), sunflower (39), tomato (38), rice (30), pearl millet (28), sorghum (24), okra (22), cauliflower (20) and others. It is quite evident that by opening the registration of vegetable crops, there is a sharp increase in number of applications for vegetable crops which are economically very important and breeders are eager to register their varieties.

Extant varieties: Out of 131 applications for extant varieties notified under the Seeds Act, 1966, for registration, 56 applications were filed by ICAR, 65 by SAUs and 10 by private seed companies. Maximum number of applications were received in cotton (44), followed by rice (30), sorghum (16), jute (08), bread wheat (08), pearl millet (06), maize

Items	New varieties	Extant varieties	Farmers' varieties	EDVs	Total
Number of PVP applications received by the authority ^a	1104	1737	1141	02	3984
% Share to total PVP applied	27.71	43.59	28.63	0.05	100
Number of Certificates of Registration granted ^b	38	443	06	-	487
% Share to total Certificates of Registration granted	7.80	90.96	1.23	0.00	100

Table 1: Number of applications seeking PVP and number of CoR issued.

Source: Compiled by the authors from PVPFRA annual reports for the year 2008-09, 2009-10, 2010-11, minutes of the meeting, issues of Plant Variety Journal of India and website.

^aAs on 24 September 2012; ^bAs on 3 October 2012

(07), chickpea (05), black gram (03), field pea (02) and pigeon pea (02).

Farmers' varieties: Out of 30 applications of different crops of farmers' varieties, major share was from rice (24), followed by french bean/ kidney bean (4), ground nut (2) and one chickpea.

Conversion ratio for various categories of varieties

The conversion ratio for various categories of varieties is presented in Table 2. Conversion Ratio is operationalized as the ratio of number of applications received by the authority for plant variety protection to the number of CoR granted by the authority under each category of varieties at a particular point of time expressed in percent values. It can be expressed as follows:

Conversion Ratio=(Number of applications received by the authority/Number of CoR granted by the authority)×100

Since no EDV has received CoR so far by the authority, the conversion rate is zero for EDVs. Extant varieties have the highest CoR followed by new varieties. It is rather ironical and disappointing to note that conversion ratio for farmers' varieties is very less (less than 1%). It is too early to comment on the status of conversion ratios for various categories of varieties at present since issue of CoR has started only a few years ago. However, it is expected that conversion ratio for farmers' varieties should increase dramatically in the years to come from the present value of 0.52% to justify the objectives of plant variety protection and farmers' rights as stated in the title of the act.

Issue of Certificates of Registration by the authority under the act

After thorough examination of the varieties applied for PVP, the PVPFRA [12-14] will issue CoR with unique registration number for each variety. The year-wise issue of CoR under various categories of variety has been given in Table 3. There has been an increasing trend in the issue of CoR over the years except for the year 2010. Maximum numbers of CoR were issued for extant varieties which contributed up to 91 percent of total CoR issued. New varieties contributed nearly 8 per cent whereas share of farmers' varieties was only 1 percent. The authority has not issued a CoR for any EDV as on October 2012.

Farmers' varieties: As on October 2012, six farmers' varieties have

Items	New varieties	Extant varieties	Farmers' varieties	EDVs
Number of PVP applications received by the authority ^a	1104	1737	1141	02
Number of Certificates of Registration granted ^b	38	443	06	-
Conversion Ratio (%)	3.44	25.50	0.52	0.00

Table 2: Conversion Ratio for various categories of varieties (as on 3 October 2012).

Year	New variety	Extant variety	Farmers' variety	Total
2009	2	163	3	168
2010	-	49	-	49
2011	15	102	-	117
2012	21	129	3	153
Total	38	443	6	487
% Share	7.80	90.96	1.23	100

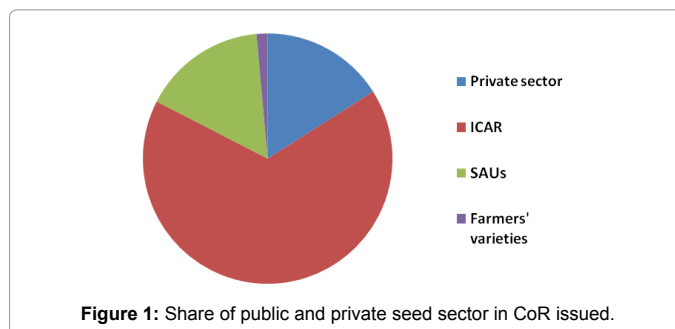
Source: Compiled by the authors from PVPFRA annual reports for the year 2008-09, 2009-10, 2010-11, minutes of the meeting, issues of Plant Variety Journal of India and website

Table 3: Year-wise issue of CoR (as on 3 October 2012).

Sl. No.	Sector	Number	% Share	
1	Private	78	16.01	
2	Public	ICAR ^a	325	66.73
		SAUs ^b	78	16.01
3	Farmers' Varieties	6	1.23	
	Total	487	100	

Source: Compiled by the authors from PVPFRA annual reports for the year 2008-09, 2009-10, 2010-11, minutes of the meeting, issues of Plant Variety Journal of India and website.

aICAR=Indian Council of Agricultural Research; bSAU=State Agricultural University
Table 4: Share of public and private seed sector in CoR issued (as on 3 October 2012).



	Private	Public		Total
		ICAR	SAUs	
Number of new varieties	34	3	1	38
% Share	89.47	7.89	2.63	100

Source: Compiled by the authors from PVPFRA annual reports for the year 2008-09, 2009-10, 2010-11, minutes of the meeting, issues of Plant Variety Journal of India and website.

Table 5: Share of public and private sector among new varieties issued CoR (as on 3 October 2012).

received CoR in two most important staple crops of the country namely rice and wheat. Farmer-bred varieties in other crops such as pigeon pea, sorghum, chickpea, french bean, ground nut etc. are yet to be granted CoR. It is to be noted that farmers' varieties have the lowest conversion rate (less than 1%) among the group of new varieties, extant varieties and farmers' varieties.

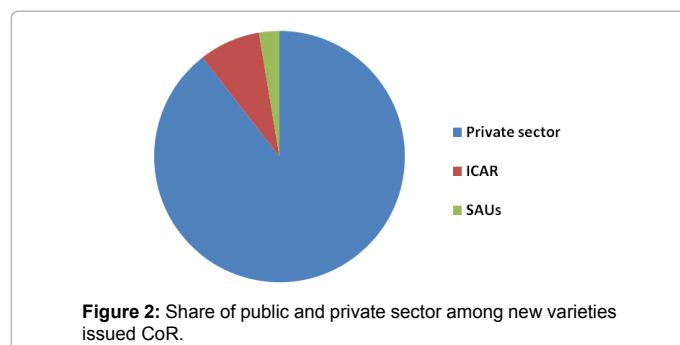
Share of public and private seed sector in CoR granted by the authority

The share of public and private sector in CoR issued is given in Table 4 and Figure 1. The public sector's share among total CoR issued was 83 percent whereas private sector's share was 16 percent.

The farmers' varieties contributed for only 1 per cent. ICAR alone contributed for 67 percent which was due to its efforts in getting all its varieties notified under Seeds Act, 1966 being applied for PVP.

Share of public and private seed sector in new varieties granted CoR by the authority

The share of public and private sector among new varieties issued CoR is given in Table 5 and Figure 2. It was very interesting and ironical to note that though the public sector contributed to 83 per cent of total varieties issued CoR, its share in new varieties was only 11 per cent. On the other hand, private sector dominated with 89 percent contribution in case of new varieties which received CoR. It reflected the general



Private Seed Company	Number of CoR issued	Crops
Monsanto India limited	9	Maize (9)
Maharashtra Hybrid Seeds Company Limited	7	Sorghum (3), Pearl millet (2), Bread Wheat (2)
JK Agri Genetics Limited	3	Maize (2), Sorghum (1)
Nusun Genetics Research Limited	3	Cotton (3)
Ankur Seeds Private Limited	3	Cotton (3)
Rasi Seeds Private Limited	2	Cotton (2)
Devgen N.V.	2	Sorghum (1), Pearl millet (1)
Syngenta India Limited	1	Pearl millet (1)
Indo-American Hybrid Seeds (I) Private Limited	1	Rice (1)
Kaveri Seed Company Limited	1	Cotton (1)
Pioneer Overseas Corporation	1	Pearl millet (1)
Vibha Agrotech Limited	1	Cotton (1)
Total	34	Maize (11), Cotton (10), Sorghum (5), Pearl millet (5), Bread wheat (2), Rice (1)

Source: Compiled by the authors from PVPFRA annual reports for the year 2008-09, 2009-10, 2010-11, minutes of the meeting, issues of Plant Variety Journal of India and website

Table 6: List of private companies which received CoR for new varieties (as on 3 October 2012).

trend in the growth of the Indian seed sector wherein private seed companies have been bringing more innovations in the form of new varieties, hybrids and proprietary technologies in the last two decades.

In the last decade (2002-11) the major growth drivers of seed industry in India are the single cross maize hybrids, Bt cotton hybrids, hybrid pearl millet, hybrid rice and hybrid vegetables developed by the private sector [15,16], while comparing the seed laws of Asian countries noted that in India, the Seed Bill, 2004 makes it compulsory for registration of seeds for sale and the new law benefits the private sector. According to Pray and Nagarajan (2012) [17], the dramatic growth in private sector R&D and innovations appears to have five major causes: market demand, policy liberalization, advances in basic science and engineering, intellectual property rights, and government investment in research and education. In case of public sector, ICAR received 3 CoR for its maize hybrids and Dr. Panjabrao Deshmukh Krishi Vidyapeeth (SAU in Maharashtra state) received 1 CoR for its diploid cotton hybrid.

Share of various private seed companies in CoR granted for their new varieties

The list of private companies which received CoR for their new varieties has been given in Table 6. Out of total 34 new varieties issued CoR, Monsanto India Limited and Maharashtra Hybrid Seeds Company Limited (MAHYCO) together contributed 16 varieties, with

the combined share of 47 percent. It was interesting to note that all the 9 innovations from Monsanto were maize hybrids whereas MAHYCO has broad based innovations in the form of hybrids and improved varieties of sorghum, pearl millet and bread wheat. JK Agri Genetics Limited, Nusun Genetics Research Limited and Ankur Seeds Private Limited received 3 CoR each. The crop-wise analysis indicated that maize and cotton dominated with 11 and 10 varieties respectively contributing together for 62 percent of CoR issued for new varieties. Exploitation of heterosis in sorghum and pearl millet has led to many new hybrids which have replaced the traditional improved varieties in the last decade. At the same time, plant breeders are interested in getting their rights secured for these new varieties/hybrids which may earn significant commercial revenues.

Crop-wise issue of Certificates of Registration by the authority

The crop-wise share of CoR is outlined in Table 7. As of now, only six crops have received CoR for new varieties viz., maize (14), cotton (11), pearl millet (5), sorghum (5), bread wheat (2) and rice (1). These 6 crops together got 364 CoR in all categories of variety which accounted for 75 percent of all CoR issued. Thus, it could be concluded that as on 3 October 2012, cereals and cotton have dominated among those varieties which have received CoR. Maize and cotton together contributed for 25 out of 38 new varieties contributing for 66 percent of new varieties granted CoR. It is also interesting to note that 6 crops which received CoR for new varieties also formed the crops which received highest CoR in all categories of varieties put together.

Concentration ratio for various crops

Concentration ratio gives the clear picture about the concentration of certain crops in issue of CoR by the authority. Two crop concentration ratio gives the share of two crops which have received highest CoR to the total number of CoR issued at a point of time and is expressed

Crop	New Variety	Extant Variety	Farmers' Variety	Total	% Share
Maize	14	80	-	94	19.30
Bread wheat	2	72	2	76	15.60
Cotton	11	50	-	61	12.52
Rice	1	53	4	58	11.90
Pearl millet	5	36	-	41	8.41
Sorghum	5	29	-	34	6.98
Chick pea	-	21	-	21	4.31
Green gram	-	21	-	21	4.31
Pigeon pea	-	16	-	16	3.28
Field pea	-	15	-	15	3.08
Black gram	-	10	-	10	2.05
Jute	-	10	-	10	2.05
Lentil	-	10	-	10	2.05
Garden pea	-	5	-	5	1.02
Sesame	-	3	-	3	0.61
Castor	-	3	-	3	0.61
Kidney bean	-	3	-	3	0.61
French bean	-	2	-	2	0.41
Rapeseed	-	2	-	2	0.41
Black gram	-	1	-	1	0.20
Small cardamom	-	1	-	1	0.20
Total	38	443	6	487	100

Source: Compiled by the authors from PVPFRA annual reports for the year 2008-09, 2009-10, 2010-11, minutes of the meeting, issues of Plant Variety Journal of India and website

Table 7: Crop-wise issue of CoR (as on 3 October 2012).

Item	Concentration Ratio (%)	Contributing crops
2 crop concentration ratio	34.9	Maize, bread wheat
4 crop concentration ratio	59.32	Maize, bread wheat, cotton, rice
6 crop concentration ratio	74.71	Maize, bread wheat, cotton, rice, pearl millet, sorghum

Table 8: Concentration Ratio at 2, 4 and 6 crops (as on 3 October 2012).

in percent values. Similarly 4-crop concentration ratio and 6-crop concentration ratio are also calculated. The concentration ratio for 2, 4 and 6 crops is given in Table 8. It could be observed that the two-crop concentration ratio is almost 35% which is more than one-third of total CoR issued. Four-firm concentration ratio is 59% and constitutes three-fifth of the total CoR issued by the authority. Six-crop concentration ratio is 75% which is three-fourth of the total CoR issued by the authority. It is clearly evident that there is heavy disproportion in the number of CoR received by various crops.

A healthy trend would reflect the lowest concentration ratio. Lower concentration ratio would also mean the diverse basket of crops with equitable grant of CoR by the authority. In the years to come it should be expected that the concentration ratio decreases to reflect a healthy trend.

Conclusions and Policy Implications

The conversion ratio for farmers' varieties was less than 1% where as it was 3.5% and 25.5% for new varieties and extant varieties respectively. Public sector contributed for 83 percent of the total CoR issued under all categories of varieties. But in case of new varieties the private sector dominated with a share of almost 90 percent. Two private seed companies namely, Monsanto India Limited and MAHYCO together contributed 16 new varieties out of total 34 new varieties issued CoR. Maize and cotton together contributed for 66 percent of new varieties granted CoR. The 2-crop, 4-crop and 6-crop concentration ratio were 35%, 59% and 75% respectively indicating that only few crops have dominated in getting CoR by the authority. The widening gap between the public and private sector seed companies in the development of innovations (new varieties and hybrids) and getting their plant variety protection is alarming. The public sector seed industry has to be revitalised to address the present day challenges of competitiveness in R&D, market access, and efficient technology transfer systems. In the years to come, the authority has to expand the basket of crops eligible for registration by including all cultivated crops of horticultural, medicinal and aromatic, floricultural, forest and other species. The concentration ratio should also decrease in the years to come to reflect the diverse set of crops without neglecting any of the crops in terms of granting CoR. The conversion ratio for farmers' varieties should increase dramatically in the years to come from the present value to justify the objectives of plant variety protection and farmers' rights as stated in the title of the act.

Implications for other countries

India has adopted the *sui generis* system for protection of plant varieties and enacted a legislation that explicitly provides for farmers' rights and community rights in addition to plant breeders rights. It has been taken into account that millions of Indian farmers rely mutually on each other for procuring or exchanging seed material. Farmer to farmer seed exchange is a traditional practice in this country and farmers supply as much as 80-85% of the total orthodox seeds sown in the country. India is the first country in the world to grant registration

to farmers' varieties. Yet, it has a long way to go in achieving the objective of upholding farmers' rights. This has implications for other developing countries to follow this model and recognise the rights of farmers as breeders, innovators, conservers, etc. In most of the developing countries (as in India), informal system of seed production, supply and exchange involving farmers and local communities plays a dominant role in agriculture. It is in this context that India's PPV&FR Act is significant at the international level.

References

- World Bank (1990) 'Strengthening Protection of Intellectual Property in Developing Countries: A Survey of Literature', Discussion Paper, Washington, DC, USA.
- UNCTAD (1991) 'Trade and Development Report', UNCTAD, New York, USA.
- Ravishankar A, Sunil A (2000) 'IPR and agricultural technology: interplay and implications for India', Policy Brief 11, National Centre for Agricultural Economics and Policy Research, New Delhi, India.
- Linton Katherine, Torsekar Mihir (2011) 'Innovation in Biotechnology Seeds: Public and Private Initiatives in India and China', Journal of International Commerce and Economics, United States International Trade Commission 3: 189-222.
- The Gazette of India (2001) 'The Protection of Plant Varieties and Farmers' Rights Act, 2001. Extra pt II.
- The Gazette of India (2003) 'The Protection of Plant Varieties and Farmers' Rights Rules, 2003. GSR 738(E).
- The Gazette of India (2005) 'Establishment of Protection of Plant Varieties and Farmers' Rights Authority. SO 1589 (E).
- Singh AK, Singh PK, Srivastava M, Misra DS (2011) 'Implementation of PPV & FR Act, 2001 in India'. In: National Seed Congress, College of Agriculture, Pune, India, pp 154-158.
- MoA (2011) State of Indian Agriculture 2011-12. Report, Department of Agriculture and Cooperation, Ministry of Agriculture, New Delhi, India.
- PVJI (2012) 'Public notice for details of registration certificate for inviting claims of benefit sharing', Plant Variety Journal of India 6: 77-120.
- PPVFRA (2012) 'Minutes of the 17th Meeting of the Authority', 19th October, 2012, Protection of Plant Varieties and Farmers' Rights Authority, New Delhi, India, pp 2-3.
- PVPFRA (2009) 'Registration of plant varieties', Annual Report (2008-09), Protection of Plant Varieties and Farmers' Rights Authority, New Delhi, India, 1-2.
- PVPFRA (2010) 'Progress of Plant Varieties Registry', Annual Report (2009-10), Protection of Plant Varieties and Farmers' Rights Authority, New Delhi, India, 8-16.
- PVPFRA (2011) 'Progress of Plant Varieties Registry', Annual Report (2010-11), Protection of Plant Varieties and Farmers' Rights Authority, New Delhi, India, 7-21.
- Dastagir MB (2008) 'The seed laws of Asian countries under the WTO and IPR regime: a paradigm shift', Outlook on Agriculture 37: 297-301.
- Dravid (2011) 'Future Growth Drivers for Indian Seed Industry', Indian Seed and Planting Material 4: 41-45.
- Pray CE, Nagarajan L (2012) 'Innovation and Research by Private Agribusiness in India', Discussion Paper 01181, Environment and Production Technology Division, International Food Policy Research Institute.

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