

## Who are the Owners of Plant Genetic Resources? An Analysis Based on the Status and Trends of Registration under the PPVFR Act 2001

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### ABSTRACT

This research paper discusses India's Protection of Plant Varieties and Farmers' Rights Act, 2001, which aims to balance compliance with the WTO-TRIPS agreement and promote agricultural innovation. Since 2009, only 5113 varieties across 84 different crops have been registered, initially dominated by public sector entities like ICAR institutions. However, this trend has shifted with increasing involvement from farmers and private sector seed companies, suggesting potential privatization of genetic resources previously in the public domain. To counter this issue, the paper proposes a state-led approach to registration, advocating for implementing institutional mechanisms and welfare schemes to support farmers. It argues that by leveraging revenues from registered varieties, the state can ensure equitable access, benefit-sharing, and conservation of agrobiodiversity. The paper emphasizes the necessity of ongoing monitoring of the registration processes and intellectual property rights enforcement at regional levels to prevent the unwarranted privatisation of essential genetic resources. It also underscores the importance of collaborative efforts between public and private sectors, enhanced by proactive state government participation. Such partnerships are crucial for driving agricultural innovation and conserving agrobiodiversity, fostering sustainable growth within India's agricultural sector. This approach aligns with global sustainability goals and national interests in safeguarding biodiversity.

**Key Words:** PPVFRA, Farmers' Variety, Extant variety, agrobiodiversity, private property status.

**JEL codes:** O13, Q16, Q18, Q57

### I

### INTRODUCTION

Innovations and the protection of property rights have long been recognized as catalysts for progress and growth across various industries, including agriculture. The legal protection of intellectual property rights is essential for encouraging innovation and developing a conducive market for goods and services (Kumar and Sinha, 2015). The field of agriculture has seen notable progress, especially in crop improvement and biotechnology, where the development of new and improved varieties relies heavily on unique gene resources, often found in traditional plant varieties, landraces, or wild relatives.

The conservation of agrobiodiversity is crucial for advancing agricultural development and ensuring the sustainability of farming systems (Dale and Polasky, 2007; Deb, 2021). Preserving genetic resources contributes to the progress of agricultural practices and plays a vital role in safeguarding food and nutritional

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security, particularly among small and marginalized farming households (Rasheed *et al.*, 2021; Connors *et al.*, 2021). Alarming reports indicate a significant decrease in agrobiodiversity and an overreliance on a limited number of crops, raising concerns regarding the sustainability of global food systems. The State of the World's Biodiversity for Food and Agriculture report (Commission on Genetic Resources for Food and Agriculture, 2019) by the UN Food and Agriculture Organization highlights that, despite the presence of a vast array of 3,82,000 species of vascular plants worldwide, just nine crops account for more than 66 per cent of total crop production by weight. This declining agrobiodiversity (Fuglie and Marder, 2015; Pingali, 2017) in farmers' fields is increasingly threatening the resilience of the agricultural system.

In response to the pressing need for agricultural development and the conservation of traditional plant varieties, India enacted the Protection of Plant Varieties and Farmers' Rights Act (PPV&FR Act) in 2001. This landmark legislation not only provides legal protection to intellectual property rights in the agricultural sector but also extends these rights to farmers, recognizing their dual role as conservers of traditional varieties and developers of new ones.

The unique system of intellectual property rights established by the PPV&FR Act recognises the distinctiveness of India's socioeconomic system, farm-level agricultural practices, and long-term agricultural development perspectives. This legislation is particularly important given that many Indian farmers are small-scale operators who grow traditional crops and depend on agrobiodiversity for food security. It protects these farmers' rights as key contributors to the agricultural innovation process. The PPV&FR Act also promotes the application of modern crop improvement techniques, necessitating the supply of genetic material to fulfil various breeding objectives, such as yield maximization and loss reduction. Farmers actively contribute to this valuable genetic resource through *in situ* conservation efforts, ensuring its availability for agricultural progress. In this background, this paper tries to draw some early indications of the impact of the law on the ownership status of valuable genetic resources based on the provisions of the Act and registration status, as well as signal some of the potential threats. It also suggests some policy approaches to ensure socially just outcomes while acknowledging the need for further micro-level studies.

## II

### METHODOLOGY

The Protection of Plant Varieties and Farmers' Rights Authority was established in 2005 in accordance with the requirements of Section 3 of the PPV&FR Act. The registration process was initiated in May 2007, and the first set was completed in 2009. This paper is based on the analysis of some of the provisions of the Act and the compilation of data on the registration of plant varieties from 2009 to 2022. The analysis draws upon data obtained from the website of the Protection of Plant Varieties and Farmers' Rights Authority (<https://plantauthority.gov.in>). As the data is only for a

short period (14 years), the paper is descriptive, based on simple averages, percentages, and linear diagrams, as well as a critical approach to some of the procedures for registration envisaged under the Act.

### *The Genesis of the PPVFR Act*

As per the Indian Patents Act, 1970, "plants and animals in whole or any part thereof other than microorganisms but including seeds, varieties and species and essentially biological processes for production or propagation of plants and animals" are not patentable. As a signatory to the WTO agreement, which came into effect in 1995, India was to comply with the Trade Related Intellectual Property Rights (TRIPS) agreement. Intellectual property rights cover "copyright and related rights (i.e., the rights of performers, producers of sound recordings and broadcasting organisations); industrial property rights (patents; trademarks including service marks; geographical indications; industrial designs; the layout-designs of integrated circuits; undisclosed information including trade secrets and test data) and the protection of new varieties of plants ". So the PPV&FR Act came into being in 2001, the world's first *sui generis* regime protecting farmers` rights and new plant varieties. The Act acknowledges the role of the farmer as a conserver of traditional genetic wealth and a developer of new varieties. The objectives of the Act, as stated in its preamble, are : (i) To recognise and protect the rights of farmers in respect of their contribution towards conserving, improving, and making available plant genetic resources for the development of new plant varieties; (ii) To protect plant breeders rights to accelerate agricultural development in the country; (iii) To incentivise both the public and private sector to invest in R&D for the development of new plant varieties (especially those suited to Indian climatic and other conditions); (iv) Facilitate the growth of the seed industry in India to ensure the availability of high-quality seed and planting material to farmers; (v) To give effect to sub-paragraph (b) Article 27(3) of the TRIPs Agreement.

Kochupillai (2011) discusses the origin of the Act, linking its necessity to the obligations under the TRIPS agreement and India's New Agricultural Policy 2000. Historically, the public sector dominated seed development in India, particularly for high-volume, low-value seeds like food grains. The Act was designed to balance the interests of private seed developers and the agricultural community. It aimed to protect private research and development in new seed varieties and support farmers contributing to the genetic resource pool by preserving wild and traditional varieties. These varieties are prized for their unique qualities, such as yield, nutrient content, taste, adaptability to stress, and resistance to pests and diseases (Nayar, 2011; Latha *et al.*, 2013; Rathna Priya *et al.*, 2019). With advances in biotechnology, the role of private enterprises in seed development has become more significant, a shift also supported by the Seed Act of 1966. Marothia, 2013, in the base paper on Documentation of Farmers' Varieties and Associated Traditional Knowledge, narrates the international and national aspects of protecting traditional knowledge and

indigenous varieties. Kumar (2020) elaborates on the current provisions and registration processes under the PPVFR Act, reflecting these considerations.

### *Registration Status of Varieties*

Protection of Plant Varieties and Farmers' Rights Act, 2001 establishes an effective system for protecting plant varieties and the rights of farmers and plant breeders and encourages the development of new varieties. The Act is unique in recognising the role of farmers and their rights regarding their contributions towards conserving and improving the local plant genetic resources, which form the basis for developing new plant varieties. The Act protects farmers' right to conserve, store, cultivate, exchange, and develop new varieties. The role of breeders and private and public sector players in varietal development and the seed industry is also equally acknowledged. The broad objective was the attainment of agricultural development of the nation. There was also a legal obligation as the country ratified the Global Agreement on Trade-Related Intellectual Property Rights.

For registration, varieties are grouped into three categories:

1. *New Varieties (NV)*: Varieties which are developed through scientific breeding techniques

2. *Essentially Derived Varieties (EDV)*, in respect of a variety (the initial variety), shall be said to be essentially derived from such initial variety when it— (i) is predominantly derived from such initial variety or from a variety that itself is predominantly derived from such initial variety while retaining the expression of the essential characteristics that results from the genotype or combination of the genotype of such initial variety; (ii) is distinguishable from such initial variety; and (iii) conforms (except for the differences which result from the Act of derivation) to such initial variety in the expression of the essential characteristics that result from the genotype or combination of the genotypes of such initial variety;

3. *Extant Varieties (EV)*: The term Extant is used to refer to *something very old and still existing*. EV, as per the Act, means a variety available in India, which include

(i) *Extant-Notified*: All the varieties notified under the Seeds Act, 1966

(ii) *Farmers' Variety*: Farmers' Varieties (FV) are the varieties traditionally cultivated and evolved by the farmers in their fields or are a wild relative or landrace of a variety about which the farmers possess common knowledge. The FVs are those varieties that have been there in natural forms and are conserved *in situ* through constant cultivation at farms or deliberate efforts to conserve. The farmers are generally aware of the characteristics of these traditional varieties. Over time, a few varieties were improved through the constant selection process by farmers or/and through the natural adaptation process. A farmer can register a variety as a breeder (NV) or a conserver (FV) according to the process of development or conservation. In that context, one can register as a developer of a variety (NV) or a conserver (FV).

(iii) *Extant –VCK: Variety of Common Knowledge*. The Act does not define this group. However, in the Plant Variety Journal of 2009, PPV & FRA has defined VCK

as a variety that is not released and notified under Seed Act 1966 but is well documented through publications and satisfies the definition of a variety or should have either an entry in the official register of varieties or in the course of being made or should find inclusion in a reference collection or a precise description in a publication or has become a matter of common knowledge and is under cultivation or marketing at the time of filing the application for registration.

(iv) *Extant –VPD*: any other Variety in the Public Domain; Individual farmers or farmer groups/communities and institutions can register a variety, and the registration is voluntary. The holder of the legal rights is entitled to a share of the profit generated when such genetic material is commercially utilised, *i.e.*, for developing new varieties or its commercial use. The registration of varieties is effected based on the three essential attributes of Distinctiveness, Uniformity, and Stability (DUS), which are to be ensured through scientific methods. New Varieties should also qualify for the novelty attribute, while Farmers' Varieties are exempted from these specifications.

### III

#### TRENDS IN REGISTRATION

Most of the reports on the PPVFR Act and its dimensions in India are from the legal side, and there are only limited studies focussing on the impacts of the PPVFR Act. In his 2012 paper, Kaye Lushington examined the major issues related to the registration of crop varieties by farmers in India under the Act. Based on the available data up to that point, he observed that the trends in registration did not suggest that the Act had spurred innovation. Lushington concluded that the right to register farmers' varieties primarily served to recognize farmers' historical contributions to preserving traditional biodiversity. He noted that no tangible financial benefits had accrued to farmers who registered their varieties, implying that the value of these varieties may lie mainly in their potential for further research. Additionally, Lushington highlighted the lack of data on the use of farmers' varieties in India, complicating efforts to determine their true role in the agricultural sector.

Later, Venkatesh and Pal, 2014 and Venkatesh *et al.*, 2015 examined the early impact of Plant Variety Protection (PVP) on the Indian seed industry. They concluded by indicating the growth of the Indian seed industry and its confidence in the PVP mechanism, highlighting the trends in the exchange of germplasm, number of varieties released, breeder and quality seeds produced, and number of public-private partnerships. Furthermore, Venkatesh *et al.*, 2016 based on the field-level study, confirmed the positive perception of most seed industry respondents on the Act. Thus, the early indications signal positive impacts on seed sector operators, while the benefits to farmers (as conservers) are not visible.

Our compilation of the registration status of the varieties from 2009 to 2022 shows the registration of 5,113 plant varieties belonging to 84 different crops. Despite the impressive number of registered varieties, it is essential to recognise that India

boasts a vast and diverse floristic richness, with approximately 320 species, including 60 endemic species. These encompass 51 cereals and millets, 31 legumes, 109 fruits, 54 vegetables, 12 oilseeds, 24 fibre plants, 27 spices and condiments, and 26 other species (Natarajan *et al.*, 2018). Such high floristic diversity suggests that the registered varieties represent only a miniscule fraction of India's rich genetic resources.

Various stakeholders, farmers including farmer groups or communities, State Agricultural Universities, Central/State Research Institutions, and private seed companies, apply for variety registration under the Act. The ownership status of the registered varieties falls into three broad categories: Farmer, Private, and Public. The Farmer category comprises individual farmers and groups or communities of farmers. The Public category includes institutions under the Indian Council of Agricultural Research (ICAR) and other research institutes, with a separate grouping for State Agricultural Universities (SAUs). The private category mainly consists of private seed companies. Table 1 presents the registration pattern of registered varieties by various agencies (ownership status). Over 14 years, farmers (which include individuals and groups) emerged as the major owners, accounting for nearly 40 per cent of all registered varieties, predominantly as conservers of traditional varieties (Farmers' Variety). The public sector, including ICAR institutions and SAUs, held ownership of 31 per cent of the varieties, closely followed by the private sector with a 29 per cent share. ICAR institutions own two third of all varieties registered by the public sector (64 per cent).

TABLE 1. OWNERSHIP STATUS OF REGISTERED VARIETIES UNDER PPV&FR ACT (2009-2022)

Year (1)	Private sector (2)	Public Sector			Farmer (7)	Total (8)	
		ICAR (3)	SAU (4)	Others (5)			Total (6)
2009	16 (9.50)	144	5		149 (88.69)	3 (1.79)	168(100)
2010	0 (0)	44	5		49 (100)	0 (0)	49(100)
2011	21(18.10)	55	40		95 (81.90)	0 (0)	116(100)
2012	55 (25.94)	122	32		154 (72.64)	3 (1.41)	212(100)
2013	104 (34.21)	123	31		154 (50.66)	46 (15.13)	304(100)
2014	124 (14.89)	154	96		250 (30.00)	459 (55.10)	833(100)
2015	121 (31.42)	44	15	5	64 (16.62)	200 (51.94)	385(100)
2016	148 (24.46)	80	24	8	112(18.51)	345 (57.02)	605(100)
2017	95 (25.60)	24	15	16	55(14.82)	221(59.57)	371(100)
2018	93(19.50)	18	47	4	69(14.46)	315 (66.04)	477(100)
2019	239(60.50)	49	37	0	86 (21.77)	70 (17.72)	395(100)
2020	192(45.28)	40	57	6	103 (24.29)	129 (30.42)	424(100)
2021	217(42.63)	90	83	15	188 (36.93)	104 (20.43)	509(100)
2022	82(30.94)	22	23	2	47 (17.74)	136 (51.32)	265(100)
Total	1507(29.47)	1009	510	56	1575 (30.80)	2031 (39.72)	5113(100)

Source : Compiled by Authors

Category-wise, the Extant Varieties constitute 81 percent (Extant+ Extant VCK+ Extant Notified + Farmer's Variety) of all registered varieties (Table 2). The registration details of this group were furnished as EVs without separate category-wise details till 2012. Since 2012, registration details of VCK varieties were shown separately, and from 2019 onwards, Notified Varieties were also shown separately. However, the details of Ext-VPD are not clear. Of the total 4161 Extant Varieties, 49

per cent are Farmers` Varieties, 25 per cent are Extant Varieties, 16 per cent are EDVs, and the rest are Notified Varieties.

Of all registered varieties, around 40 per cent were Farmers' Varieties, with more than 75 per cent registered between 2014 and 2018. Farmers' Varieties are owned by individual farmers or groups/communities of farmers. The highest number of Farmers' Variety registrations (approximately 477) was from Odisha, with the Director of Agriculture and Food Production in Bhubaneswar playing a major role in facilitating these registrations. The initiatives taken by the Government of Odisha is also reported as early as 2005 (Srinivasan, 2005). Two authorities, the Director (Agriculture and Food Production), Government of Odisha, and the Director of Central Rice Research Institute (CRRI), Cuttack, facilitate the applications.

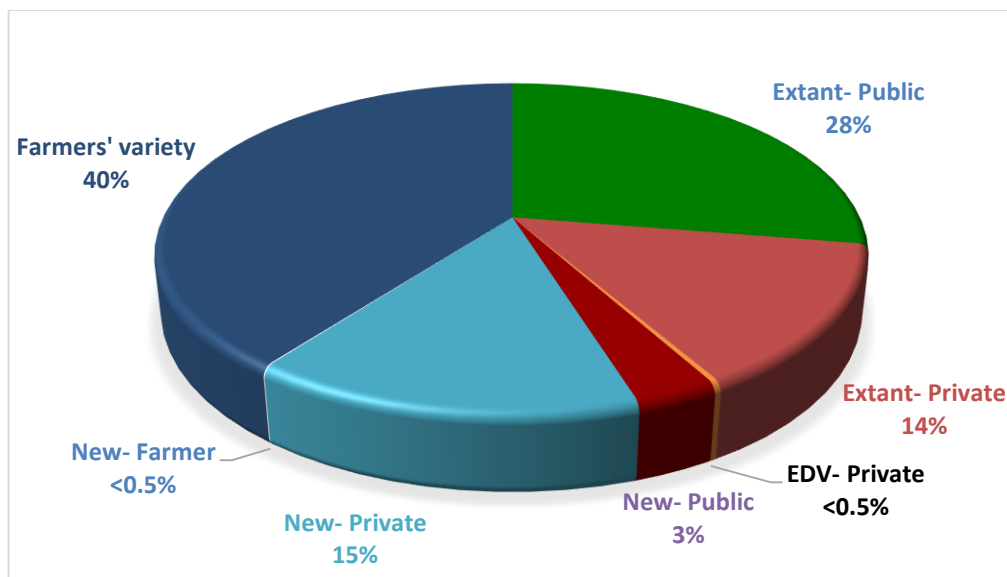
Only 14 EDVs were registered during the study period, while 938 New Varieties forming 18 per cent of total registrations were made (Table 2; Figure 1).

TABLE 2. CATEGORY-WISE REGISTRATION STATUS OF VARIETIES REGISTERED UNDER PPV&FR ACT (2009-2022)

Year	Extant	EXTANT-VCK	Extant – Notified	Farmer Variety	Total Extant Varieties	EDV	New Varieties	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2009	163	0	0	3	166 (98.81)	0	2 (1.19)	168 (100)
2010	49	0	0	0	49 (100)	0	0 (0.00)	49 (100)
2011	101	0	0	0	101 (87.07)	0	15 (12.93)	116 (100)
2012	162	20	0	3	185 (87.26)	1 (0.47)	26 (12.27)	212 (100)
2013	150	55	0	46	251 (82.56)	0	53 (17.44)	304 (100)
2014	206	60	0	459	725 (87.04)	0	108 (12.96)	833 (100)
2015	61	60	0	200	321 (83.37)	0	64 (16.63)	385 (100)
2016	55	78	0	345	478 (79.01)	0	127 (20.99)	605 (100)
2017	46	53	0	221	320 (86.25)	0	51 (13.75)	371 (100)
2018	64	64	0	315	443 (92.87)	0	34 (7.13)	477 (100)
2019	4	126	69	70	269 (68.1)	13 (3.29)	113 (28.61)	395 (100)
2020	0	64	108	129	301 (70.99)	0	123 (29.01)	424 (100)
2021	0	60	183	104	347 (68.18)	0	162 (31.82)	509 (100)
2022	0	32	37	136	205 (77.35)	0	60 (22.65)	265 (100)
Total	1061	672	397	2031	4161 (81.38)	14 (0.27)	938 (18.35)	5113 (100)

Source : Compiled by Authors.

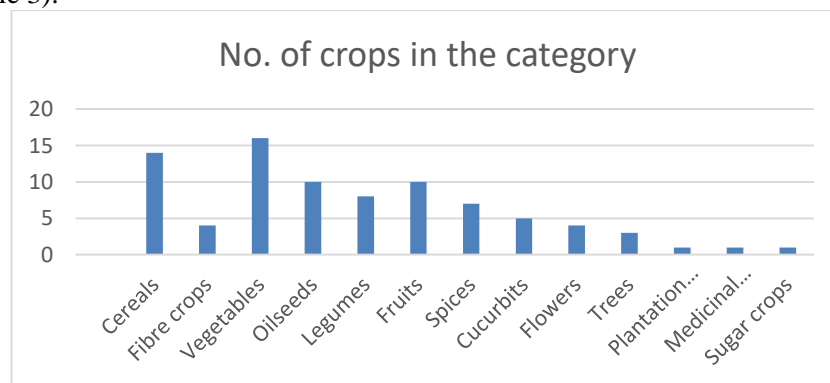
(Figures in brackets are percentage to total)



Source : Based on data compiled by the authors.

Figure 1. Proportion of Varieties Registered Under Different Categories Over 14 Years (2009-2022)

The plant varieties were registered in the 13 major crop categories, which include food (Vegetables, Cereals, Legumes, Fruits, Spices, Cucurbits, Sugar crops) and non-food crops (Fibres, Oilseeds, Flowers, Trees, Plantation Crops, Medicinal, and Aromatic plants). With respect to the number of crops in which varieties were registered, vegetable crops lead with 16 crops, followed by cereals (14 crops) and fruits and oilseeds (10 each) (Figure 2; Table 3). But in the case of the number of varieties registered, cereals alone constitute a majority (67 per cent), followed by fibre crops (10 per cent), vegetables (8 per cent), oilseeds (6 per cent), and legumes (5 per cent) (Figure 3; Table 3).



Source: Based on data compiled by the authors.

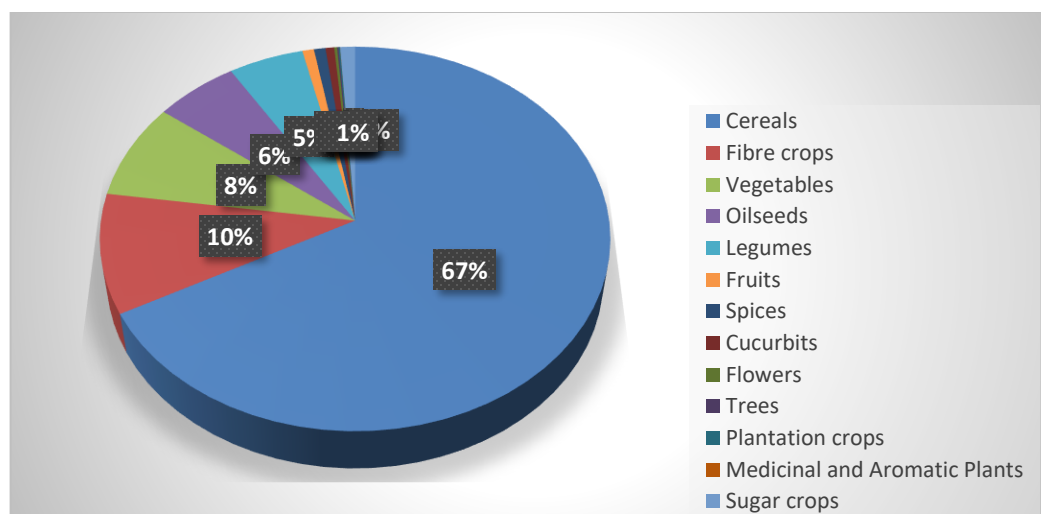
Figure 2. Crop Group wise Registration Status of Plant Varieties (2009 to 2022)



TABLE 3. CROP GROUP WISE REGISTRATION STATUS OF VARIETIES REGISTERED UNDER PPV&amp;FRA (2009-2022)

Crop category (1)	No. of crops in the category (2)	Registration category			EDV (6)	Total no. of varieties registered (7)
		Extant (3)	Farmer (4)	New (5)		
Cereals	14 (16.67)	991 (29.12)	1850 (54.36)	562 (16.52)	0	3403 (100)
Fibre crops	4 (4.76)	338 (65.76)	1 (0.19)	161 (31.33)	14 (2.72)	514 (100)
Vegetables	16 (19.04)	259 (64.12)	21 (5.19)	124 (30.69)	0	404 (100)
Oilseeds	10 (11.90)	218 (72.67)	33 (11.00)	49 (16.33)	0	300 (100)
Legumes	8 (11.90)	204 (75.56)	49 (18.14)	17 (6.30)	0	270 (100)
Fruits	10 (8.33)	5 (7.35)	54 (79.40)	9 (13.25)	0	68 (100)
Spices	7 (5.95)	28 (68.29)	12 (29.27)	1 (2.44)	0	41 (100)
Cucurbits	5 (4.76)	29 (85.29)	5 (14.71)	0 (0.00)	0	34 (100)
Flowers	4 (3.57)	5 (45.46)	5 (45.46)	1 (9.08)	0	11 (100)
Trees	3 (1.19)	0 (0.00)	1 (12.50)	7 (87.50)	0	8 (100)
Plantation crops	1 (1.19)	6 (100.00)	0 (0.00)	0 (0.00)	0	6 (100)
Medicinal and aromatic plants	1 (1.19)	1 (100.00)	0 (0.00)	0 (0.00)	0	1 (100)
Sugar crops	1 (1.19)	46 (86.79)	0 (0.00)	7 (13.21)	0	53 (100)
<b>TOTAL</b>	<b>84 (100)</b>	<b>2130 (41.66)</b>	<b>2031 (39.72)</b>	<b>938 (18.34)</b>	<b>14 (0.28)</b>	<b>5113 (100)</b>

Source : Compiled by Authors; Figures in brackets are percentage to total.



Source : Based on data compiled by the authors.

Figure 3. Crop Group wise Variety Registration Status (2009-2012)

Farmers` Variety dominates in the fruits (79.41 per cent), cereals (54.36 per cent) and flowers (45.46 per cent) category. All the registered varieties of plantation crops and medicinal and aromatic plants are Extant Varieties. Extant Varieties are the major group in Sugar crops, Cucurbits, Legumes, Oilseeds, Spices, Fibres, Vegetables, and Flowers. Most New Varieties are registered in Tree crops, Fibres, Vegetables, and Cereals. All the EDVs are in Fibre crops (Table 3).

Table 4 and Figures A-D furnish the crop groupwise, variety category-wise, and ownership-wise details of registered varieties for 14 years. There was an increasing trend in the registration process up to 2014, which was not sustained later. Since then, there has been high inter-year variation. There was a peak of 833 registered varieties in 2014, while the lowest number of registrations, 49 varieties, occurred in 2010. Though no specific trend in the registration of varieties in different crop group categories was observed, there was an increase in the registration of cereals in the Farmers' Variety category from 2014 to 2018.

TABLE 4. CATEGORY-WISE OWNERSHIP STATUS OF REGISTERED VARIETIES UNDER PPV&FRA (2009-2022)

Year (1)	Extant			Extant (notified)				Extant (VCK)			EDV			New variety			FV			
	Public		Pri- vate	Public		Pri- vate					Pri- vate	Public	Pri- vate	Public	Pri- vate	Far- vate mer	(20)	(21)		
	ICAR (2)	SAU (3)	Others (4)	ICAR (5)	SAU (6)	Other (7)	Other (8)	ICAR (9)	SAU (10)	Other (11)	Other (12)	Pri- vate (13)	Public (14)	Pri- vate (15)	ICAR (16)	SAU (17)	Other (18)	(19)	(20)	(21)
2009	144	5		14														2		3
2010	44	5																		
2011	52	40		9											3			12		
2012	121	32		9							20		1	1				25	3	
2013	111	31		8					1		54				11			42		46
2014	110	91		5					19	2	39				25	3		80		459
2015	34	12	5	10					3	3	54				7			57		200
2016	31	18	4	2					2		76				47	6	4	70		345
2017	17	11	16	3							53				7	4		39		221
2018	11	47	4	2					6		58				1			33		315
2019	2	2			32	35		2	4		122		13		11			102		70
2020					27	57	6	18	8		56				5			118		129
2021					70	82	7	24	4		1	55			16	1	7	138		104
2022					16	20		1	3	1	1	27			3	2	1	54		136
Total	677	294	29	62	145	194	13	45	50	6	2	614	0	14	137	16	12	772	3	2028

Source Authors compilation.

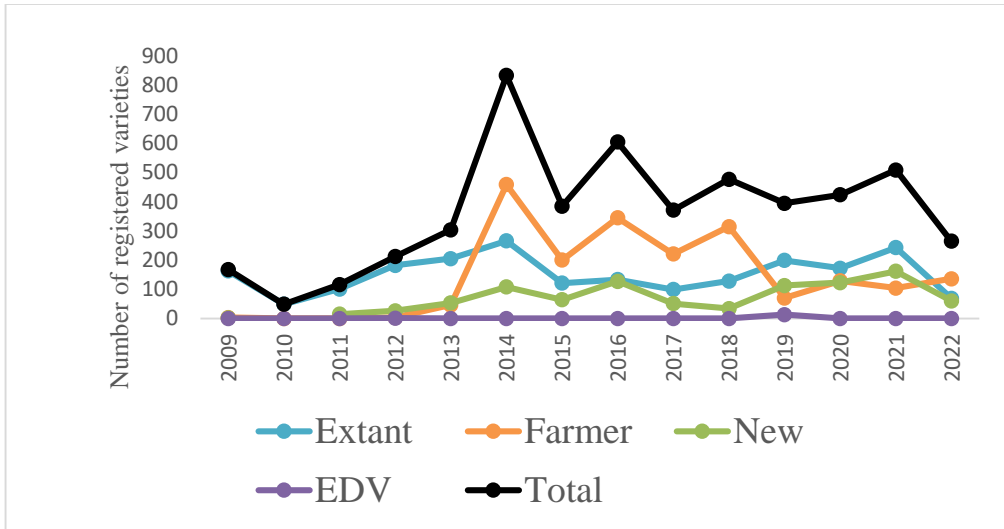


Figure 4 A. Trends in Category-wise Plant Variety Registration (2009-2022) (All crop categories)

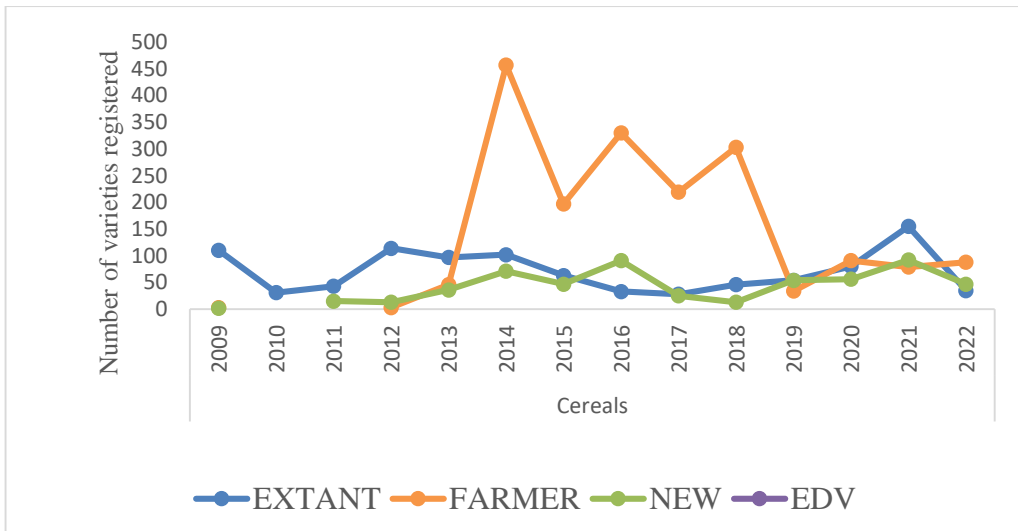


Figure 4 B. Trends in Category-wise Plant Variety Registration (2009-2022) (Cereals and Millets)

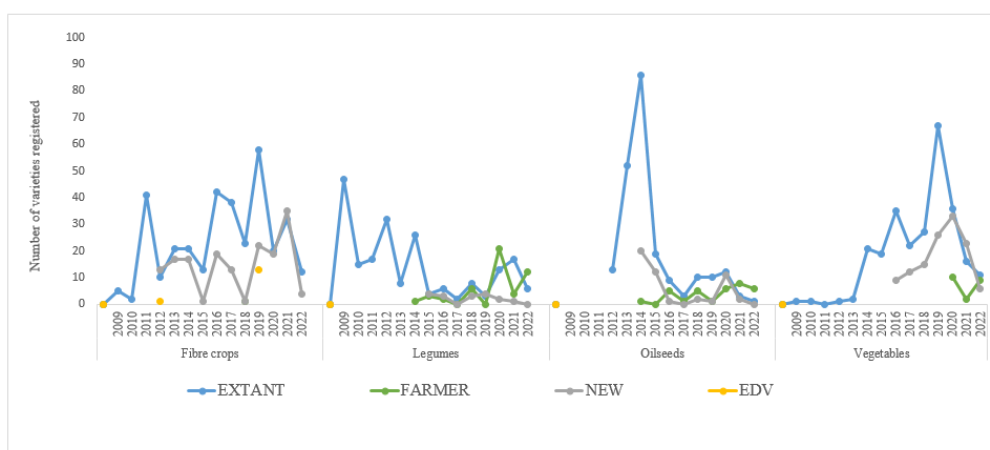


Figure 4 C. Trends in Category-wise Plant Variety Registration (2009-2022) (Fibre crops, Legumes, Oilseeds and Vegetables)



Source : Based on data compiled by the authors

Figure 4 D. Trends in category-wise plant variety registration (2009-2022) (Cucurbits, Spices and Other crops (Fruits, Flowers, Trees, Plantation crops, Medicinal and Aromatic plants and Sugar crops.))

When the registration process began in 2007, ICAR institutions (public sector) were most active in filing registrations, especially in the Extant Varieties. But this momentum was not sustained. Over 50 percent of Extant Variety registrations by the public sector were completed before 2015, while the private sector achieved the same milestone by 2018.

Over the years, the private sector registered approximately five times more New Varieties (772) than the public sector (165), and the private sector solely carried out EDV registration. The public sector mainly owned Extant Varieties and New Varieties. In contrast, private sector registrations included Extant and New Varieties in almost

equal proportions (14 per cent and 15 per cent, respectively) (Figure 1). New Varieties were developed and registered predominantly by the private sector (15 percent), and the public sector owns only 3 percent. Farmers contribute only less than 0.5 percent of registered New Varieties. This also confirms the earlier reports by Venkatesh and Pal in 2014 and Venkatesh *et al.* in 2015. A similar study by Suvita *et al.*, 2020 also confirms the active involvement of private entities in registering plant varieties, underscoring that the Act provides incentives for them to develop new varieties. They also highlight the positive link of new crop varieties with India's agricultural exports by creating a market monopoly.

Of the 2031 varieties under farmers' ownership, only three are new varieties, and the rest are presumably traditional ones. The farmer ownership is as conserver of local cultivars. Individual farmers own more than fifty per cent of these traditional varieties, while the rest is owned by a group or community of farmers (Figure 5).

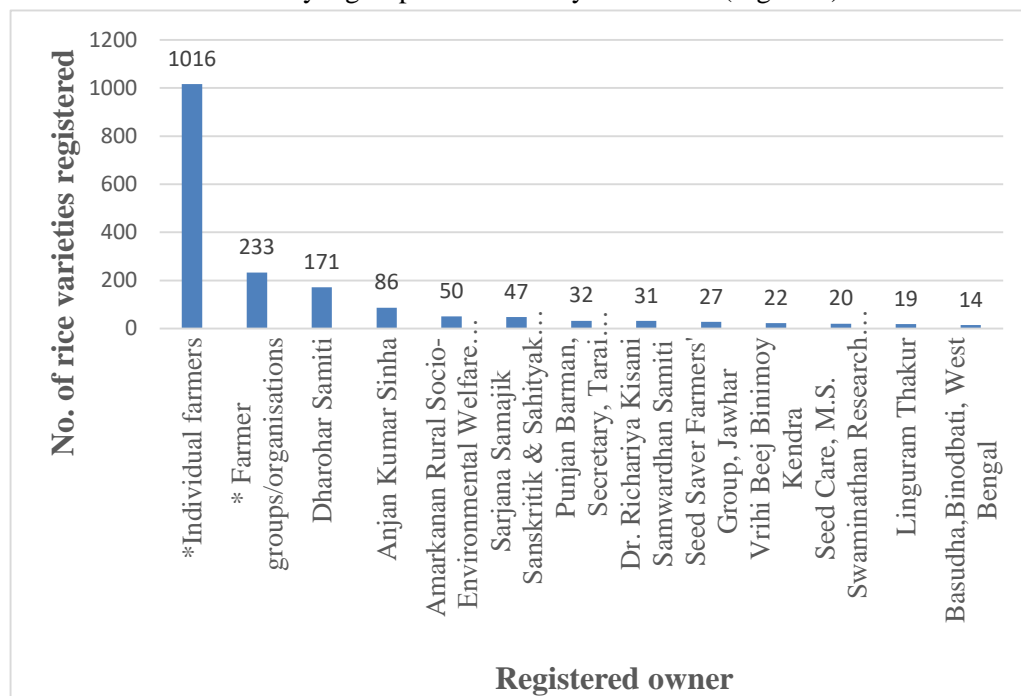


Figure 5. Owners of Rice Varieties Registered as Farmers' Variety from 2009-2022.

#### Registration Process and Ownership Issues

The application format for registration of New and Extant Varieties follows the same prescribed form, while Farmers' Variety registration requires additional details about the farmer as both the conserver and developer of the variety. Individuals, groups of farmers, and communities of farmers have the right to register Farmers' Varieties. However, the Act does not define the terms "group" and "community of farmers".

When the application is for registration as a conserver, applicants must provide a certificate from a competent authority confirming that the specific variety is cultivated exclusively by the applicant group or community of farmers in their respective village. The certificate is: *It is hereby certified that the above-said candidate variety is bred/developed and continuously conserved and cultivated only by the applicant farmer/group of farmers / community of farmers who is / are permanent residents of above-said village(s) and I am fully conversant with the applicant farmer/group or community of farmers and that the candidate variety is due to their efforts* which is to be authenticated by Chairperson / Secretary of the Concerned Panchayat, Biodiversity Management Committee or Concerned District Agricultural Officer or Director of Research/Director of Extension of concerned State Agricultural Universities or Concerned District Tribal Development Office /Zonal Project Director (ICAR). The elected representatives often lack the technical expertise to scientifically justify the claim and may rely on social, political, or regional lineages to support the claim. This situation may lead to widespread registration of traditional varieties/landraces in the name of specific individuals or farmer groups, potentially transforming public property rights into private ones. NGOs have also patronized certain farmer organizations, resulting in the registration of multiple traditional varieties, such as scented rice varieties, in Wayanad District, Kerala (*Chennellu, Chomala, Veliyan, Thondi, and scented rice varieties like Gandhakasala, Jeerakasala*, to cite a few) These are the main varieties cultivated in the Wayanad District of Kerala and possess unique attributes (Department of Agricultural Development and Farmer's Welfare, Government of Kerala and Kerala Agricultural University). From a legal perspective, the ownership of these varieties rests with the members of the organisation.

In response to this concern, public notice 11 of 2020 by the PPVFRA has made certification by State Agricultural Universities or Central Agricultural Universities, ICAR, CSIR, or relevant government institutions mandatory for Farmers' Variety registration, which must state that *the candidate variety is bred/developed and continuously conserved and cultivated only by the applicant farmer/group/community*. This move aims to ensure that genetic resources are registered under the exclusive ownership of the actual conservers/developers. Despite these measures, it remains challenging to certify the conservation claim of a particular group or individual under practical situations.

The unique attributes of varieties can vary based on geographical and agro-climatic conditions where they are grown. For example, scented varieties from Wayanad or salinity and submergence-tolerant *Pokkali* varieties in Kerala are highly location-specific. Even in such instances, ownership of these varieties cannot be confined to a specific group or community of farmers within this geographical limit, as these groups may not encompass all farmers in the same locality. Information asymmetries and farmers' relatively poor economic status can create an environment conducive to informed groups and individuals claiming ownership. These farmer

groups may be registered or non-registered, sometimes associated with political, social, or religious associations, and may receive informal or formal patronage from Non-Governmental Organizations (NGOs). Informed farmer groups are well aware of the rapid advancements in breeding techniques and the commercial prospects of unique genetic resources. Therefore, it is crucial to clearly define the term "group/community of farmers" in the Act as well as develop a foolproof system to ensure the claims by such groups and individuals.

The potential risk of transferring ownership from the public domain to private (individuals or farmer groups) is more prominent in the case of food grains and millet, as these crops possess a substantial number of traditional varieties and can be a long-term threat to food security. Under these circumstances, it would be ideal for the state to take responsibility for ensuring the title deeds of traditional varieties nurtured by the farming community through generations.

While the Act aims to incentivise conservation and innovation, there is a potential threat of privatizing common property resources, limiting the access of the farming community to valuable genetic resources. Biotechnological advancements increase the demand for genetic resources, mainly available in traditional varieties and landraces. To ensure intergenerational equity and to protect the collective efforts of generations of farmers, it is more appropriate for the state, specifically the Department of Agriculture in respective states, to take ownership of field-level conservation efforts (*in situ* conservation) of traditional varieties and landraces. The public sector should be the ideal agency to register and own these resources, safeguarding the rights of the custodian farmers and facilitating welfare schemes designed to benefit farmers from the income generated. This approach would also necessitate policy decisions on access and benefit-sharing to ensure that the farming community generally receives due monetary benefits.

#### IV

#### CONCLUSIONS

The analysis of plant variety registrations under the Protection of Plant Varieties and Farmers' Rights Act, 2001, reveals a concerning disparity between the rich agrobiodiversity in India and the number of registered varieties. The under-representation of registrations by the public sector and State Agricultural Universities (SAUs) compared to the number of formally released or notified varieties is of concern. Initially, when the registration process began in 2007, the public sector, mainly represented by ICAR institutions, took the lead in filing for registrations. However, as time progressed, the private sector and Farmer Varieties (FVs) showed substantial improvement in their registration numbers, raising questions about the socially just distribution of intellectual property rights.

While the intentions behind promoting agricultural production through innovations are commendable, it is imperative to closely monitor the Intellectual Property Rights (IPR) regime at the regional level. This monitoring is crucial to prevent

the undue transfer of valuable genetic resources from the public domain to private property. The registration of traditional varieties by farmers and farmer groups warrants closer scrutiny to avoid undue privatisation of genetic resources. As the custodians of the state's natural resources, it is ideal for the state government to take up the responsibility of sponsoring the registration and protection of traditional varieties and landraces. Specific policies must be formulated to protect the interests of custodian farmers and communities, ensuring fair access and benefit-sharing mechanisms. The state can play a pivotal role in implementing welfare schemes for custodian farmers, utilising the funds generated through their utilisation and commercialisation. This approach aligns with previous studies and reports that have emphasised the importance of securing the interests of farmers and communities while conserving agrobiodiversity and promoting agricultural development.

Along with registration, the on-farm conservation of traditional crop varieties is crucial for ensuring community-level food and nutritional security. This approach also maintains societal ownership and access to these genetic resources. The evident benefits of *in situ* conservation add significant value. However, the current system demands technological, institutional, and infrastructural support to encourage farmers to cultivate traditional varieties and landraces. For instance, the scented paddy varieties in Wayanad require specialised milling technology, which is not widely available. Financial benefits, being a major driver of crop/variety choices, market development, and demand generation are also essential. It is desirable for the State Governments to establish an institutional mechanism to keep in view the agro-ecology of the region and design an incentive mechanism (monetary and non-monetary) for conserving the agrobiodiversity, while ensuring the welfare of the present and future generations of the farming community in particular and the society in general. Marothia *et al.*, 2007 also emphasise this aspect while discussing the conservation of the scented rice varieties in Chhattisgarh. The rich diversity of crops (spices, plantation crops, medicinal and aromatic plants, vegetables, tubers) in states like Kerala is the wealth of the society that needs to be nurtured and legally protected.

In conclusion, addressing the existing gaps in plant variety registrations and IPR implementation in India is essential. By closely monitoring the process and ensuring equitable distribution of intellectual property rights, the country can protect its valuable agrobiodiversity from being inappropriately privatized. The active involvement of state governments will be crucial in achieving the dual objectives of agricultural innovation and agrobiodiversity conservation for the sustainable growth of India's agricultural sector and ensure incentives for the farmers.

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