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Intellectual property rights for inclusive and sustainable agricultural development : issues and challenges in India

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Abstract Two Intellectual Property Rights (IPR) systems are highly relevant to crop sector in India. They are Geographical Indications and Protection of Plant Varieties and Farmer's Rights. In this paper, an attempt is made to examine the potential effect of these on inclusive and sustainable agricultural development. Creation of producer groups, review of product standard from time to time, value chain development under GI system, characterisation of farmers varieties to promote their use in plant breeding are the key measures for realising the full potential of the IPR systems for inclusive and sustainable agricultural development.

Keywords Geographical indications, farmers' rights, plant variety protection, IPR, seed, competition, sustainability, inclusiveness

JEL codes O34, O38, Q01, Q18, R58

Introduction

Under the World Trade organization (WTO) agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) it is mandatory for member countries to provide IPR to plant varieties and biological materials. In this backdrop, India is providing IPR to plant varieties and seeds under multiple IPR mechanisms. Mainly two Intellectual Property Rights (IPR) systems are highly relevant to crop sector in India. They are Geographical Indications (GI) under the Geographical Indications of Goods (Registration and Protection) Act of 1999 and Plant Variety (PV) rights under the Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act of 2001. Both are "*sui generis*" type IPR Acts enacted as compliance mechanism under TRIPS agreement. In this paper, an attempt is made to examine the progress and potential effect of these two IPR systems on inclusive and sustainable agricultural development and identify future interventions/ corrective measures needed.

A geographical indication is a sign used on products that have a specific geographical origin and possess

qualities or a reputation that are due to that origin. Geographical indications (GIs) are indications that identify a good as originating in the territory of a country, or from a region or locality within that territory, where a given quality, reputation, or other characteristic of the good is essentially attributable to its geographic origin. Indian GI act specifies that in case the good is a manufactured good, one of the activities of either production or of processing or the preparation of goods concerned takes place in the territory or region or locality as the case may be, for GI registration. Further, under Indian GI Act, any name which is not the name of a country, region or locality of the country shall also be considered as GI, if it relates to specific geographic area and is used upon in relation to particular goods originating from the country, region or locality as the case may be. For instance, "basmati" is not name of a place, but it is GI assigned to specific rice type which meet specific quality standards and cultivated in specific areas of Indo-Gangetic plains of India.

GI by signalling distinctness and intrinsic quality of a product helps in building reputation for the product

and mitigate the problem of “asymmetry of information” between producers and consumers. Hence, GI products are expected to command premium price in markets. Promotion of diversity in goods, protection of producers against unfair competition and misappropriation and protection of consumers against counterfeit goods are some of the benefits associated with GIs.

Plant variety right is a limited period exclusive right granted to a breeder for producing and marketing seeds of the variety developed by the breeder, so as to encourage development of new varieties of plants. In India under the PPV&FR Act of 2001, not only breeders’ rights but also farmers’ rights (both as breeders and users of seeds) are protected.

Methodology

The current study is mainly based on secondary data on GIs and plant varieties registered under GI Act, 1999 and PPV&FR Act 2001 respectively. The data were collected from respective authorities’ websites. Simple tabular analysis was used for analysing the secondary data. Besides this, examination of key provisions in the two IPR Acts that aid in sustainable and inclusive development in agriculture was carried out. A review of literature was also carried out to draw some insights regarding needed interventions for strengthening role of these two IPRs in inclusive and sustainable development.

Results and discussion

GI status in India

In India, Registration of GIs began in 2004-05 after the GI Act came into effect from 15th September 2003. Under Indian GI Act, broadly five categories of goods are registered. They are (i) agricultural (ii) food stuff (iii) manufactured (iv) handicraft and (v) natural. Protection period under GI act is 10 years from the date of filing but can be renewed from time to time. Till march 2022, 420 registrations were effected under GI Act, of which 55% were GIs for handicraft goods. Agricultural GIs constituted 30%. In contrast, at the global level GIs relating to wines and spirits accounted for 56.1% of total GIs in force in 2020, followed by agricultural products and foodstuffs (38.6%) (WIPO 2021). Handicrafts accounted for only 3.6 % of total GIs in force at global level in 2020. Number of GIs registered in India increased from 3 in the year 2004-05 to 50 in the year 2021-22 (Figure 1). On average 23 GIs were registered per year in India during 2004-05 to 2021-22, with 7 GIs from agricultural sector, and 13 GIs from handicraft sector and the rest 3 GIs from other sectors.

In 2020, China had the highest number of GIs (7417) for agricultural products in force, followed by Germany (2014) and Portugal (1898) (WIPO 2021). In India, cumulative total of GIs for agricultural products was 112 in 2020-2021 and it increased to 128 in 2021-2022.

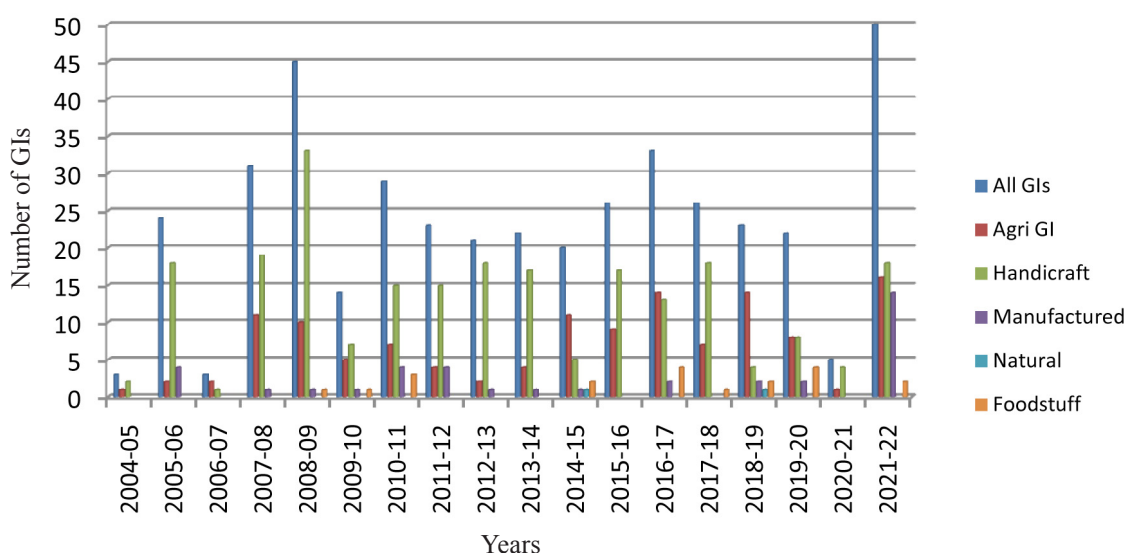


Figure 1 Progress of GI registration in India

These agricultural GIs covering 48 crops/goods is spread over 28 states (Table 1). Maharashtra, Karnataka and Kerala are the top three states with 25, 22, and 19 agricultural GIs respectively. Rice followed by mango and chilli are the top 3 crops constituting 32 percent of Agricultural GIs registered under the GI act of India. Some GIs with respect to crops viz., betel leaf, cardamom, chilli, coffee, pepper and rice are shared between two or more states due to spread of geographic area of production of these GI goods across these states. This spread of agricultural GIs across crops and states in India indicates, the potential of GIs in regional development and crop diversity maintenance.

As per GI Act of India “any association of persons or producers or any organization or authority established by or under any law for the time being in force representing the interest of producers of the concerned goods, who are desirous of registering of a geographical indication in relation to such goods” have to apply for GI registration. Accordingly, diverse actors like, coffee board, tea board, spices board, State Agricultural Universities, Directors of Horticulture of different states, producer groups of different commodities and in some cases processors associations/co-operatives, marketing associations, state agro-industries development corporations, North Eastern Regional Agricultural Marketing Corporation Limited (NERAMAC) in case of GI of commodities in North Eastern states were the applicants for the 128 agricultural GIs. Subsequent to the registration of these GIs, these diverse actors are the registered owners of these GIs. In the case of Basmati rice, The Agricultural and Processed Food Products Export Development Authority (APEDA) is the applicant for GI and owner of the GI. Thus, the situation in India is in contrast to situation in some countries like Japan, Cambodia and Laos wherein the producer’s association is the only body authorized to apply for GI (Marie-Viven 2020).

As second part of GI registration, any person claiming to be the producer of the goods in respect of which a GI has been registered, has to apply for registration as authorised user. In case of agricultural goods definition of producer is persons dealing with production, processing, trading or dealing. Based on available data regarding authorised users registered (https://www.ipindia.gov.in/IPIndiaAdmin/writereaddata/Portal/Images/pdf/Details_of_GI_Authorised_User_Applications_Registered_as_on_July_15__2022.pdf)

out of 128 agricultural GIs in India, only with respect to 75 agricultural GIs, authorised users are registered. Number and nature of authorised users varied with commodity and also with extent of area delineated for each GI. Besides individual farmers/ producers, Tribal Cooperative Marketing Development Federation of India Limited (TRIFED), Agricultural Producers Cooperative Marketing Society Limited in different states and some private companies are some of the registered authorised users of various agricultural GIs. In case of 3 agricultural GIs, i.e., Jalgaon Banana, Alphonso Mango and Solapur Pomegranate (all from Maharashtra) the number of authorized users ranged between 1082 to 1766. In case of another 12 agricultural GIs, number of registered authorized users ranged between 100 to 733. Out of these 12 agricultural GIs, 8 were from Maharashtra. In case of 9 agricultural GIs, Tribal Cooperative Marketing Development Federation of India Limited (TRIFED) is the registered authorized user (Table 2). This indicates potential for development of tribal communities through these 9 agricultural GIs.

Impacts of GIs

GIs can play a role in agricultural sustainability and economic development through several ways (Blakeney 2021). Production of specific types of crops registered as GIs cannot be “delocalised” and also must be produced following specific practices so as to ensure quality control. Quality control is essential for commanding premium price in market. The premium price is expected to reinforce adoption of sustainable agricultural practices and conserve the resources like soil quality, and biodiversity. It is also anticipated that as GIs are collective IPR linked to a particular good, particular territory/location and authorized users, enables all the authorised producers to have their share in premium commodity market. GIs are viewed as club goods because of excludability and non-rivalry properties (Rangnekar 2004). GI being a mechanism of reputation building through collective action of producers of particular goods in a given “terroir”, aids in sharing cost of quality maintenance, monitoring and reputation building (Lence et al. 2007; Moschini et al. 2008). Further, GIs in agriculture are expected to have some spinoff effects like creation of rural employment, agri-tourism, preserve traditional knowledge and cultural expression. In the backdrop of these expected

Table 1 Distribution of Agricultural GIs registered in India till 2021-22

| S. No. | Goods/Crop | Number of GIs | Share (%) | States | No. of states |
|--------|--------------------|---------------|-----------|---|---------------|
| 1 | Banana | 7 | 5 | Goa(1), Karnataka(2), Kerala (1), Maharashtra(1), Tamil Nadu (2) | 5 |
| 2 | Beetel leaf | 4 | 3 | Bihar(1), Karnataka(1), Kerala(1), Uttar Pradesh (1) Madhya Pradesh(1) | 5 |
| 3 | Beetel nut | 1 | 1 | Karnataka (1) | 1 |
| 4 | Black cumin | 1 | 1 | Himachal Pradesh(1) | 1 |
| 5 | Brinjal | 2 | 2 | Karnataka (1), Maharashtra(1) | 2 |
| 6 | Cardamom | 3 | 2 | Karnataka(1), Kerala(1), Sikkim(1), Tamil Nadu(1) | 4 |
| 7 | Cashewnut | 1 | 1 | Maharashtra (1) | 1 |
| 8 | Chikoo | 1 | 1 | Maharashtra (1) | 1 |
| 9 | Chilli | 10 | 8 | Andhra Pradesh (1), Goa (2), Karnataka (1), Kerala(1), Maharashtra(1), Manipur(1), Mizoram (1), Nagaland (1), Sikkim (1) West Bengal(1) | 10 |
| 10 | Citrus | 1 | 1 | Karnataka(1) | 1 |
| 11 | Clove | 1 | 1 | Tamil Nadu (1) | 1 |
| 12 | Coconut | 1 | 1 | Tamil Nadu (1) | 1 |
| 13 | Coffee | 7 | 5 | Andhra Pradesh (1), Odisha (1), Karnataka (5), Kerala(3) Tamil Nadu(1) | 5 |
| 14 | Cucumber | 1 | 1 | Nagaland(1) | 1 |
| 15 | Custard Apple | 1 | 1 | Maharashtra (1) | 1 |
| 16 | Fig | 1 | 1 | Maharashtra (1) | 1 |
| 17 | Garlic | 1 | 1 | Tamil Nadu(1) | 1 |
| 18 | Ginger | 2 | 2 | Assam(1), Mizoram (1) | 2 |
| 19 | Grapes | 2 | 2 | Maharashtra (1), Karnataka(1) | 2 |
| 20 | Guava | 1 | 1 | Uttar Pradesh (1) | 1 |
| 21 | Indian Bay leaf | 1 | 1 | Uttarakhand(1) | 1 |
| 22 | Indian butter tree | 1 | 1 | Uttarakhand(1) | 1 |
| 23 | Jaggery | 3 | 2 | Maharashtra (1), Kerala(2) | 2 |
| 24 | Jasmine | 4 | 3 | Karnataka (3), Tamil Nadu (1) | 2 |
| 25 | Jowar | 1 | 1 | Maharashtra(1) | 1 |
| 26 | Kewda flower | 1 | 1 | Odisha (1) | 1 |
| 27 | Kidney bean | 1 | 1 | Maharashtra (1) | 1 |
| 28 | Lemon | 2 | 2 | Assam(1), Manipur (1) | 2 |
| 29 | Litchi | 2 | 2 | Assam (1), Bihar (1) | 2 |
| 30 | Mango | 12 | 9 | Andhra Pradesh (1), Bihar(1), Gujarat(1), Karnataka(1), Kerala(1), Maharashtra (2), Uttar Pradesh (2), West Bengal(3) | 8 |
| 31 | Mangosteen | 1 | 1 | Maharashtra(1) | 1 |
| 32 | Mehandi | 1 | 1 | Rajasthan (1) | 1 |
| 33 | Onion | 2 | 2 | Karnataka(1), Maharashtra(1) | 2 |
| 34 | Orange | 7 | 5 | Arunachal Pradesh(1), Karnataka (1), Maharashtra (2), Manipur (1), Meghalaya(2) | 5 |
| 35 | Pepper | 1 | 1 | Kerala (1) Karnataka(1), Tamil Nadu(1) | 3 |
| 36 | Pineapple | 2 | 2 | Kerala (1), Tripura (1) | 2 |
| 37 | Pomegranate | 1 | 1 | Maharashtra(1) | 1 |

Contd...

| S. No. | Goods/Crop | Number of GIs | Share (%) | States | No. of states |
|--------|------------|---------------|-----------|---|---------------|
| 38 | Raisin | 1 | 1 | Maharashtra(1) | 1 |
| 39 | Razma | 1 | 1 | Uttarakhand(1) | 1 |
| 40 | Redgram | 2 | 2 | Karnataka(1), Maharashtra(1) | 2 |
| 41 | Rice | 19 | 15 | Assam(3), Bihar (1), Chhattisgarh (1), Kerala(6), Madhya Pradesh (1), Maharashtra(2), Manipur (1), Uttar Pradesh (2), West Bengal (2), Punjab(1), Haryana(1), Delhi(1), Himachal Pradesh(1), Uttarakhand(1), Jammu and Kashmir(1) | 15 |
| 42 | Saffron | 1 | 1 | Jammu and Kashmir(1) | 1 |
| 43 | Strawberry | 1 | 1 | Maharashtra(1) | 1 |
| 44 | Tea | 4 | 3 | Assam(1), Himachal Pradesh(1), Tamil Nadu (1), West Bengal (1) | 4 |
| 45 | Teak | 1 | 1 | Kerala(1) | 1 |
| 46 | Tomato | 1 | 1 | Nagaland(1) | 1 |
| 47 | Turmeric | 4 | 3 | Maharashtra (2), Odisha (1), Tamil Nadu (1) | 3 |
| 48 | Wheat | 1 | 1 | Gujarat (1) | 1 |
| | Total | 128 | 100 | | |

Source https://www.ipindia.gov.in/writereaddata/Portal/Images/pdf/GI_Application_Register_List_14-07-2022.pdf

Note Figures in parenthesis indicate number of agricultural GIs

Table 2 Details of agricultural GIs where TRIFED is the authorised user

| S. No. | Application No. | Year of registration | GI | State | crop | Registered authorised user |
|--------|-----------------|----------------------|---------------------------|----------------|----------|---|
| 1 | 241 | 2017-18 | Banaganapalli Mango | Andhra Pradesh | Mango | TRIFED (Ministry of Tribal Affairs, Govt. of India), Regional Office, Hyderabad |
| 2 | 610 | 2019-20 | Kandhamal turmeric | Odisha | Turmeric | TRIFED, Ministry of Tribal affairs, RO, Bhubaneswar |
| 3 | 466 | 2014-15 | Kachai Lemon | Manipur | Lemon | TRIFED, Ministry of Tribal affairs, RO Guwahati |
| 4 | 439 | 2016-17 | Joha Rice of Assam | Assam | Rice | TRIFED, Ministry of Tribal affairs, RO Guwahati |
| 5 | 558 | 2018-19 | Boka Chaul rice | Assam | Rice | TRIFED, Ministry of Tribal affairs, RO Guwahati |
| 6 | 602 | 2019-20 | Chak-Hao (Black rice) | Manipur | Rice | TRIFED, Ministry of Tribal affairs, RO Guwahati |
| 7 | 115&118 | 2008-09 | Assam (orthodox) Logo-tea | Assam | Tea | TRIFED, Ministry of Tribal affairs, RO Guwahati |
| 8 | 1&2 | 2004-05 | Darjeeling Tea | West Bengal | Tea | TRIFED, Ministry of Tribal affairs, RO Kolkata |
| 9 | 611 | 2018-19 | Jeera phool | Chhattisgarh | Rice | TRIFED, Regional Office, Raipur, Ministry of Tribal Affairs |

multiple effects, several studies examined impact of GIs on different dimensions of development across different countries.

Larson (2007) while analysing GIs impact on biodiversity observed that, economic viability of a specific livelihood tied to a genetic resource, contributed to conservation of biodiversity in developed countries. That is the link between genetic resource and quality, thereby differentiation of product for competing in market by way of GI and value chain development in developed countries contributed positively in biodiversity conservation. But in developing countries, negligible effects and negative effects were more frequent due to weaker or underdeveloped institutional context. To avoid successful GI implementation becoming as mechanism to exclude poor farmers and consumers, Larson (2007) argued for clear policies of regulation and product development, value chains that address local, regional, national and export markets.

Torok et al. (2020) reviewed empirical studies on the economic impact of GIs. More specifically they focused on three aspects viz., market size, price premium and impact on rural development. They found it is impossible to draw any general conclusions about the economic impact of GIs. This in turn is due to (i) considerable heterogeneity between different GI products and between the outcome for similar GI products in different regions (ii) higher costs associated with producing GI products and indirect costs associated with complying with the GI regulation and (iii) uncertainty regarding flow of price premium to primary producers in value chain.

Based on review of studies analysing environmental effects of GIs, Milano and Cazella (2021) observed that GIs in European countries generated more positive environmental results. In contrast in developing countries with greater social inequality and also high biodiversity, GIs had some kind of negative environmental effects. Milano and Cazella (2021) identified six different factors underlying these diverse results. They are (i) Social governance i.e social organization to achieve collective participation and action in the construction and management of the GI (ii) the existence of policies to encourage the desired productive practices (iii) the existence and

communication of a clear connection between the product and its terroir (iv) insertion of clear and applicable environmental objectives in the technical specification of the GIs (v) profitability of the GI and its capacity to leverage other activities like tourism and (vi) existence of technical assistance appropriate to the reality of GI. Andrea et al. (2020) analysing justification for approved amendments to product specification of registered GIs in European Union, observed that market changes, available new technology and strengthening product quality were the most important justification. By in-depth analysis, they observed that environmental justifications were indirectly used as a means to achieve better market competitiveness.

Pick and Viven (2021) compared effectiveness of state driven GI system in Vietnam and producer driven GI system in France, in ensuring representativeness of relevant stakeholders. They observed that under producer driven GI system, prolonged negotiations and (production practice) standards that can continue to be challenged post GI registration were the results. On the other hand, in state driven GI system, little understanding and low use of GIs by stakeholders were the results. Further Pick and Viven (2021) argued that rules for the representation of all GI users in the decision making processes do not necessarily lead to fairness. They suggested a in-between solution where in the first stage state organizes a consultation of a wide range of stakeholders of the value chain and second with those outside the value chain such as local representatives, traders and consumers. They also suggested re-examination of representativity throughout the long life of a GI.

Impact and performance of GIs in India

In Indian context as stated earlier there is diversity in GI ownership and authorized users. Hence, GI is being viewed as a hybrid between a public quality standard and a (collective) IPR (Bienabe and Viven 2017). Further in case of some goods like basmati rice, Darjeeling tea, GI registration was effected after they already got worldwide reputation. In the case of basmati rice GI registration was effected only during the year 2015-16. By this time India faced legal battle in several countries and paid huge cost for competition. This could have been avoided if India registered its basmati GI early (Mulik and Crespi 2011).

In India, still many agricultural GIs are not yet widely used to harness potential, thus considered as sleeping GIs (Marie-Viven 2020). The diversity in proprietors and authorized users of GI in India, and their varied capacities in promoting the products by creating brands, and regulating production standards, indicates that the effectiveness and impact of GIs in India will be case and context specific (Das 2010). Marie-Viven (2020) suggested a provision in law, making it mandatory to create a collective organization of producers/processors within a short period after the GI is registered in cases where there are no collective bodies and to bring together value chain stakeholders for effective use of GIs. Casbianca and Viven(2022) suggested that in GI conception, exclusion at production stage (by way of limiting area of production of GI good) to preserve distinctive quality of good is necessary exclusion. Inclusiveness in Governance of GI is necessary to increase solidarity and cohesiveness,

In India, rice is the crop with maximum number of GIs registered (Table.1). Premium price in case of GI protected rice types (basmati as well as non-basmati) in India as well at international level are well documented (Yadav et al.2019; Khan 2020; Roy 2019; Ravindra et al. 2018). This premium price reinforces the incentive to produce GI tagged rice and helps in biodiversity management in rice crop. But India's policy on export of non-basmati rice will also have its implication in creating market for the 'non-basmati' type GI tagged scented rice varieties. Besides this, higher the share of benefits to farmers from GI tagged rice value chain, higher will be the incentive effect. In the case of "Pokkali" rice in Kerala, intermediaries' higher share in profits was reported to act as disincentive and discourage farmers (Anson and Pavithran 2014). Subsequently under Rashtriya Krishi Vikas Yojana (RKVY) a scheme was implemented to motivate farmers to cultivate Pokkali rice with a incentive of Rs 10000 per ha (DOA 2013). Radhika and Raju (2021), Radhika et al. (2021), and Napasintuwong et al. (2022) observed issues of unawareness among cultivators of GI rice about GI, post GI registration implementation issues like accessing markets, and quality control in the case of many GI rices from Kerala. They recommended revival of producer societies in order to take collective decisions on defining production area limits, agreeing on code of conduct, identifying indicators of quality

and addressing marketing issues. In case of Tulaipanji rice of West Bengal also marketing problems was reported (Mondal and Dutta 2014; Dipak 2019).

Kishore (2018) reported in the case of Malabar Pepper and Vazhakulam Pineapple (2 agricultural GIs) producers were not being benefitted directly as these producers are dependent on powerful intermediaries. Lalitha et al.(2021) observed that though cost of cultivation of Bhalia Wheat (GI) in Gujarat was lower than irrigated wheat, yield of Bhalia wheat was lower. Despite of premium price commanded by Bhalia wheat, changes in the consumer's preference in favour of readymade flour to make bread, demands from urbanization, changing climate, availability of canal water were leading to reduction in area under Bhalia wheat, which is cultivated under Conserved Soil Moisture Condition. Lalitha and Soumya (2022) analysed eight agricultural GIs spread over three states, using SWOT (Strength, Weakness, Opportunity and Threat) framework. In case of Bhalia wheat and pokkali rice, they observed strong geo link and production in sustainable manner. Absence of clearly defined value chains, absence of functioning farmers collectives and lower use of GIs were identified by them as weakness. In the case of 7 GIs out of 8 selected GIs, they observed declined in area under cultivation.

GI Overlap with PV Rights

Primarily agricultural GIs offer legal protection to specific crop outputs along with protection to authorized producers with respect to each specified output. However, in a specific crop GI output can arise from several varieties of the crop. For example basmati rice is protected under GI act, but in basmati rice category, till date 43 varieties were notified under Seeds Act of 1966 (AIREA-All India Rice Exporters' Association). Further some of these basmati rice varieties are registered under PPV&FR Act, thereby protecting rights to produce and market seeds. Moreover, in the case of open pollinated varieties seeds and grains are interchangeable. Besides Basmati registration under both GI act and PPVFR Act, some more attempt for registering some other GI tagged rice varieties with PPVFR Authority are noticed recently like in case of Kalanamak (Yadav et al. 2019), Jeeragasala and Ghandakasala rice from Kerala. This is due to development of varieties of different GI rices with higher yield, resistance and tolerance to various

biotic and a-biotic stresses. Similar may be the case in the case of other agricultural GIs also.

In the case of Navara rice some controversy is documented in the literature (Blakeney et al. 2020). This is because under GI, Navara rice is registered for collective right but under PPVFRA an individual farmer applied for registration. Thus there is overlap between PPVFR and Agricultural GI Act in the case of “subject matter” but with different “scopes”. As long as there is no conflict between right holders under PPV&FR Act and authorized users under GI act, simultaneous protection under both the acts are possible

Status of plant varieties registered under PPV&FR Act

For implementing PPV&FR Act, the PPV&FR Authority was created under Ministry of Agriculture and Farmer’s Welfare. Under PPV&FR Act plant varieties are registered for protection by farmers, private seed companies and public sector research institutions. Protection period under PPV&FR act is 15 years for field crops and 18 years for perennials and vines. Plant varieties with DUS (Distinct, Uniform and Stable) characteristics are eligible for protection under this act. Plant varieties under this act are registered under four categories viz., Extant-notified, Extant-Varieties of Common Knowledge (VCK), new varieties and Essentially Derived Varieties (EDVs). Farmer’s varieties are a sub category under extant varieties. Protection for extant varieties is a unique feature of Indian PVR act and is limited period opportunity available. Hence application for registration of extant varieties under different crop species have to be submitted before a specified date fixed by PPV&FR authority. Protection to farmers varieties is yet another unique feature of Indian PPV&FR act. Registration under PPV&FR act confers exclusive right on the breeder or his successor, authorised person, agent or licensee to produce, sell, market, distribute, import or export the variety seeds.

Plant breeding is a cumulative and sequential innovation process, that is a new variety development requires access to existing varieties or biological material. Hence, to facilitate follow on innovations, certain provisions are there in PPV&FR Act. One such provision is researcher’s exemption provision. That is a researcher can use varieties protected under PPV&FR

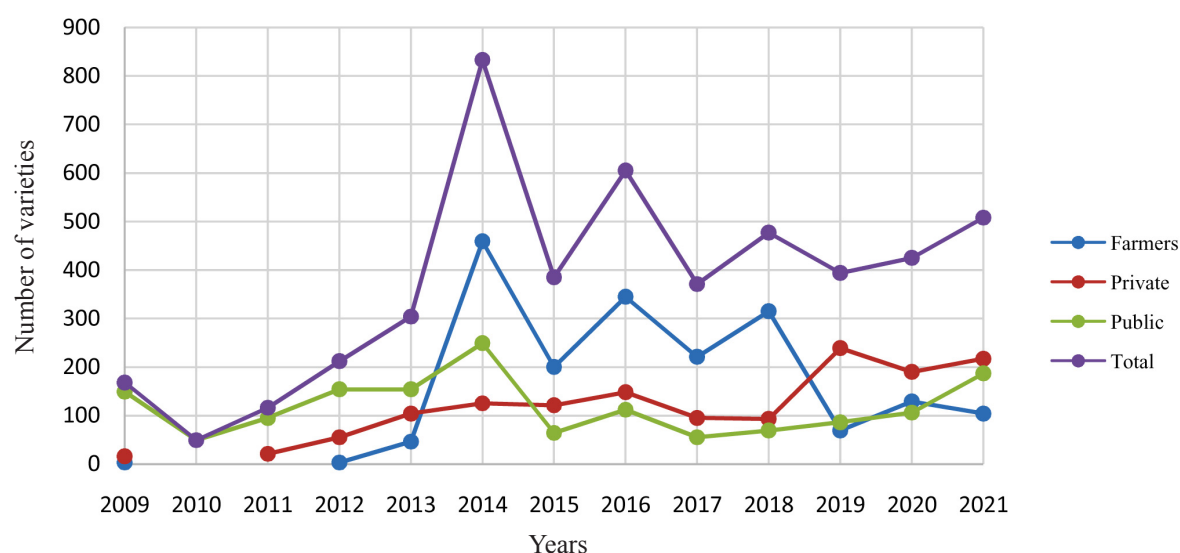
act for their research purpose, but the researcher needs to seek authorization from the registered breeder if he has to use the registered variety repeatedly in the production of a newly developed variety. Another provision for facilitating follow-on innovation, while preserving incentives for both initial variety developer and follow on developer is Essentially Derived Variety (EDV) concept. According to UPOV 1991 convention, a variety shall be deemed to be EDV when three conditions are cumulatively fulfilled. The conditions are (i) EDV is predominantly derived from the Initial Variety (IV) (ii) EDV is clearly distinguishable from the initial variety and (iii) except for the difference which results from the act of derivation, the EDV conforms to the initial variety in the expression of the essential characteristics that result from the genotype or combinations of genotypes of the initial variety (UPOV, 2017).

The trend in registration of plant varieties for plant variety right is captured in Figure 2. The status of plant varieties registration under PPV&FR act as at 31-12-2021 is given in the table 3. In total 4847 varieties were registered with PPV&FR authority till 31-12-2021. In total varieties registered, farmers are leading with 39 percent followed by public sector with 32 percent. As is evident from Table 4, farmers varieties registered under PPV&FR Act are spread over 34 crops and different states indicating their contribution in varietal diversity creation and management. Besides exercising rights as breeders, farmers can also claim benefit sharing when their varieties are used as parents in new varieties developed. In this way, PPV&FR system is attempting for inclusive growth. However to enable the farmers to have their share in benefits, their varieties need to be characterised and special characteristics like biotic or abiotic stress tolerance, nutritional richness need to be documented for accelerating their use in future breeding programs.

In order to avoid extending/manipulating the protection period of a hybrid by way of sequential application for protection to individual parents and hybrids, a provision of mandatory composite registration is implemented under the PPV&FR Act. Hence a hybrid along with its parents have to be registered at the same time for protection. If one or more of the parents is previously registered then the validity period of the hybrid will be that of the period of protection of the earliest

Table 3 Distribution of plant varieties registered under PPV&R Act as on 31-12-2021

| Category of breeders | Extant | New | EDV | Total | Share of different category breeders |
|---------------------------------------|--------|-----|-----|-------|--------------------------------------|
| Farmers | 1894 | - | - | 1894 | 39 |
| Private | 687 | 723 | 14 | 1424 | 29 |
| Public | 1364 | 165 | - | 1529 | 32 |
| Total | 3945 | 888 | 14 | 4847 | 100 |
| Share of different types of varieties | 81 | 18 | 0 | 100 | |

**Figure 2** Trend of varieties registered under PPV&FR Act

registered parent among its parents. Further, as per the current Act, it is not feasible to register the three-way crossed or double-crossed or multi-parent chain-crossed hybrids.

Under PPV&FR Act, at any time, after the expiry of three years from the date of issue of a certificate of registration of a variety, any person interested may make an application to the authority showing that the reasonable requirements of the public for seed or other propagating material of the variety have not been met or that the seed or other propagating material of the variety is not available to the public at a reasonable price and request for the grant of a compulsory licence. This provision acts as a check on abuse of IPR right by way of limited production of seeds of a protected variety which is in high demand, or selling of seeds at exorbitant price. Thus some provisions are there in

PPV&FR act to check abuse of IP rights and control price, so as to ensure affordability of seeds and in-turn ensure inclusiveness.

Emerging challenges

Disputes regarding area delimitation under GIs like basmati rice is one emerging challenge in both national (Mishra and Fatesaria, 2022) and international arena. Climate change is emerging as another challenge to GI framework as climate change affects quality of products and also changes suitability of area (Henry, 2022).

Conclusions and way forward

Specific provisions are there in both the IPR systems in India i.e GI system and PPV&FR system, which

Table 4 Farmers varieties distribution across crops and states

| S. No. | Crop | Number of varieties | State | No.of states |
|--------|-------------------|---------------------|--|--------------|
| 1 | Apple | 2 | Himachal Pradesh (2) | 1 |
| 2 | Apricot | 30 | Jammu and Kashmir (30) | 1 |
| 3 | Barley | 5 | Jharkhand(2), Madhya Pradesh(3) | 2 |
| 4 | Black pepper | 5 | Kharnataka(2), Kerala(3) | 2 |
| 5 | Blackgram | 2 | Rjasthan(1), Uttar Pradesh (1) | 2 |
| 6 | Bread wheat | 7 | Jharkhand(1), Punjab(1), Uttar Pradeh (5) | 3 |
| 7 | Brinjal | 6 | Bihar (1), Madhya Pradesh (1), Tripura(1), West Bengal (3) | 4 |
| 8 | Cauliflower | 1 | Bihar (1) | 1 |
| 9 | Chickpea | 8 | Bihar(3), Jharkhand(2), Madhya Pradesh (1), Rajasthan(1), Mahrashtra(1) | 5 |
| 10 | Chilli | 1 | West Bengal (1) | 1 |
| 11 | Custard apple | 1 | Maharashtra(1) | 1 |
| 12 | Fenugreek | 1 | Jharkhand (1) | 1 |
| 13 | Field pea | 3 | Jharkhand(3) | 1 |
| 14 | Grapes | 5 | Mharashtra(5) | 1 |
| 15 | Greengram | 6 | Jharkhand(3), Telangana(1), Uttar Pradesh (2) | 3 |
| 16 | Groundnut | 1 | Bihar (1) | 1 |
| 17 | Guava | 1 | Uttar Pradesh (1) | 1 |
| 18 | Indian mustard | 11 | Bihar (1), Chattisgarh (3), Haryana(1), Jharkhan(4), Rajasthan(1), Uttar Pradesh(1) | 6 |
| 19 | Kidney bean | 1 | Jammu and Kashmir (1) | 1 |
| 20 | Lentil | 7 | Bihar (2), Jammu and Kashmir (1), Jharkhand (4) | 3 |
| 21 | Maize | 7 | Himachal Pradesh (3), Jharkhand (1), Rajasthan(2), Uttarakhand(1) | 7 |
| 22 | Neem | 1 | Maharashtra(1) | 1 |
| 23 | Okra | 1 | Maharashtra(1) | 1 |
| 24 | Orchid | 4 | Meghalaya(4) | 1 |
| 25 | Pigeon pea | 10 | Assam(1), Jharkhand(2),Madhya Pradesh (1), Maharashtra(1), Rajasthan(1), Telangana(1), Uttar Pradesh (3) | 7 |
| 26 | Rapeseed | 9 | Assam(3), Jharkhand (2), Tripura(1), West Bengal(3) | 4 |
| 27 | Rice | 1700 | Andaman and Nicobar (5), Assam(16), Bihar (5), Chhattisgarh (360), Gujarat(1), Haryana(1),Himachal Pradesh (1), Jammu&Kashmir(1), Jharkhand(116), Kerala(21), Madhya Pradesh (48), Maharashtra(3), Manipur(12), Odisha(767), Punjab(1), Sikkim(1),Tamil Nadu (6), Tripura(6), Uttar Pradesh (6), Uttarakhand(5), West Bengal (318) | 21 |
| 28 | Sesamum | 1 | Uttar Pradesh (1) | 1 |
| 29 | Small cardamom | 6 | Kerala(6) | 1 |
| 30 | Sorghum | 18 | Karnataka(2), Madhya Pradesh (5), Maharashtra (6), Telangana(2), Tripura(2), Uttarakhand (1) | 6 |
| 31 | Soyabean | 5 | Madhya Pradesh (5) | 1 |
| 32 | Tetraploid cotton | 1 | West Bengal (1) | 1 |
| 33 | Tomato | 3 | Bihar(2), Chattisgarh(1) | 2 |
| 34 | Wheat | 24 | Bihar(1), Jharkhand (7), Madhya Pradesh(5), Rajasthan (2), Uttar Pradesh (6), Uttarakhand(2), West Bengal (1) | 7 |
| | All crops | 1894 | | |

Note Figures in parentheses indicate number of plant varieties

have potential to aid in inclusive as well as sustainable agricultural development. However, there is need for ground level intervention with respect to each individual agricultural GI in terms of creation of producer group, value chain creation, establishment of quality standards and review of standards from time to time. Similarly, in the case of rights under PPV&FR Act, to enable the farmers to have their share in benefits, their varieties need to be characterised and special characteristics like biotic or abiotic stress tolerance, nutritional richness need to be documented for their use in future breeding programs. Competition and pricing behavior of private sector in seed industry more specifically with respect to protected varieties under PPV&FR Act need to be monitored continuously. These actions will accelerate the realization of inclusive and sustainable agricultural development under the current IPR regime in India. Registration under Indian GI act is only the first step towards realizing economic potential of agricultural GIs. Registering these GIs in other countries need to be taken up for realizing market potential through trade. India has to decide on the route to do this.

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