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## LINKING HERITAGE AND INNOVATION THROUGH GEOGRAPHICAL INDICATIONS AND FARMERS' VARIETIES FOR A SUSTAINABLE HORTICULTURAL FUTURE: A REVIEW

**T.K. Nagarathna**

Professor of Crop Physiology, University of Agricultural Sciences, Bangalore – 560065, Karnataka, India  
(Former Registrar, Protection of Plant Varieties and Farmers' Rights Authority,  
Government of India, New Delhi)

E-mail: [tk.nagarathna2020@gmail.com](mailto:tk.nagarathna2020@gmail.com)

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### ABSTRACT

The integration of Geographical Indications (GIs) and Plant Variety Protection (PVP) offers a transformative pathway for safeguarding India's horticultural heritage while promoting innovation, equity, and sustainability. Both are complementary forms of intellectual property rights that recognize and reward distinct aspects of agricultural creativity- GIs protect the geographical reputation and cultural identity of products, whereas PVP, under the Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act, 2001, secures the rights of breeders and farming communities over plant genetic resources. Together, these frameworks strengthen the link between traditional knowledge, biodiversity conservation, and market value. In horticultural crops, where regional identity and varietal diversity are closely intertwined, the synergy between GI and PPV&FR offers dual benefits, legal protection and socio-economic empowerment of farmers. However, realizing their full potential demands greater awareness, institutional coordination, and integration of policy mechanisms. Promoting participatory registration of farmers' varieties, establishing traceability systems, and fostering public-private-community partnerships can enhance the visibility and value of traditional horticultural products. The convergence of these two systems thus serves not only as a mechanism of intellectual property protection but also as a catalyst for sustainable rural development and global recognition of India's horticultural excellence.

**Keywords:** Geographical Indications, Plant Variety Protection, Farmers' Rights, Horticultural Innovation, Biodiversity Conservation, Rural Empowerment.

### Introduction

In the evolving landscape of agricultural innovation, the twin pillars of Geographical Indications (GIs) and Plant Variety Protection (PVP) represent two distinct yet complementary forms of Intellectual Property Rights (IPRs). Both mechanisms serve the overarching goal of protecting innovations and traditional knowledge systems that sustain farmers' livelihoods and promote rural development (Rangnekar, 2010; Das, 2010).

While GIs emphasize the regional uniqueness and reputation of a product, PVP, as implemented under the Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act, 2001, safeguards innovations in plant breeding, including those developed by farmers (PPV&FR Authority, 2024). Together, they form the "seeds of identity and innovation," ensuring that both origin-based reputation and genetic resource development receive rightful recognition and economic value (Ramana Murthy *et al.*, 2022).

## Geographical Indications: Concept and Current Status

### Understanding Geographical Indications

A *Geographical Indication* identifies goods especially agricultural and horticultural products originating from a specific territory and possessing qualities, reputation, or characteristics essentially attributable to that geography (WIPO, 2023). For horticultural crops, this linkage often arises from unique agro-climatic conditions, local cultivation practices, and traditional knowledge systems that give products their distinctive features.

The GI system not only protects the name and reputation of such products but also:

- Enhances marketability and export potential,
- Prevents misuse of regional names,
- Promotes collective ownership and benefit-sharing, and
- Contributes to rural branding and tourism (Das, 2010; Devraj & Rao, 2018).

### Growth of GI Registration in India

India has witnessed a remarkable surge in GI registrations in recent years. The Union Minister of Commerce & Industry, Shri Piyush Goyal, announced a target of 10,000 GI tags by 2030 at the GI Samagam held in New Delhi in January 2025 (PIB, 2025).

Over the past decade, the number of authorized GI users increased from 365 in 2014 to nearly 29,000 in 2024, with agriculture and horticulture contributing significantly to this growth (Department for Promotion of Industry and Internal Trade [DPIIT], 2024). The agricultural sector now holds the second-highest number of GI registrations, after handicrafts.

### Prominent and High-Value GI Crops

Several horticultural GIs have demonstrated tangible economic benefits:

- **Darjeeling Tea (West Bengal)** – India's first GI product (2004), whose global price rose fivefold post-registration (Tea Board of India, 2022).

- **Basmati Rice (North India)** – GI registration in 2010 led to export growth from USD 3.2 billion (2016–17) to USD 4.7 billion (2018–19) (APEDA, 2020).
- **Alphonso Mango (Maharashtra)** – recognized globally for flavor and export potential.
- **Coorg Orange (Karnataka)** and **Nendran Banana (Kerala)** – region-specific fruits that sustain rural economies.

### Recent GI Registrations in Agricultural and Horticultural Categories

Seven of the ten most recent GI registrations belong to the agricultural and horticultural sector, including Kandhamal Haldi (Odisha), Koppal Grapes (Karnataka), Guntur Sannam Chilli (Andhra Pradesh), Lakadong Turmeric (Meghalaya), Sikkim Black Rice (Sikkim), Karnataka Ragi (Karnataka), and Bhopal Sharbati Rice (Madhya Pradesh) (GI Registry of India, 2025).

These examples underline the growing recognition of agricultural biodiversity and regional identity within the GI ecosystem.

### Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act, 2001

#### Overview

The PPV&FR Act, 2001 is a pioneering legislation globally, acknowledging the contribution of farmers as breeders, conservators, and cultivators of plant genetic resources (Seshia, 2020). It allows registration of:

- New varieties developed by breeders,
- Extant and notified varieties, and
- Farmers' varieties traditionally selected and maintained by local communities.

The Act provides for benefit-sharing, compensation, and recognition awards for farmers contributing valuable germplasm that aids new variety development (PPV&FR Authority, 2024).

**Table 1:** Different legal frameworks of Geographical Indication and Protection of Plant Varieties and Farmers' Rights Authority Act, 2001

Aspect	Geographical Indications (GI)	PPVFR Act, 2001
Law	Geographical Indications of Goods (Registration and Protection) Act, 1999	Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act, 2001
Administered by	Controller General of Patents, Designs & Trademarks, under DPIIT (IP India)	PPV&FR Authority, under Ministry of Agriculture
Focus	Protects products linked to a specific geographical origin and qualities due to that origin	Protects new or extant plant varieties and breeders'/farmers' rights

Subject Matter	Goods (like Darjeeling Tea, Basmati Rice, Alphonso Mango, Mysore Silk, etc.)	Plant varieties (like Pusa Basmati 1121, CO-4 Tomato, Suvarna Wheat, etc.)
Duration of Protection	10 years (renewable indefinitely)	15 years for crops / 18 years for trees and vines
Beneficiaries	Producer groups, cooperatives, associations (Collective right)	Breeders, institutions, and farmers (individual rights)

### Current Status

As of the latest records, India has a total of 658 Geographical Indications (GIs) registered across various states, reflecting the country's rich diversity in agricultural, horticultural, handicraft, and industrial products (Table 2). Of these, 197 GIs (about 30%) belong to the Agriculture and Horticulture category, making it the second-largest sector in GI registrations, next only to Handicrafts, which account for 342 registrations.

Among the states, Uttar Pradesh leads with 77 GIs (14 agricultural and 53 handicrafts), followed by Tamil Nadu with 68, Maharashtra with 52, Karnataka with 48, and Kerala with 39 registrations. Other prominent

contributors include West Bengal (34) Assam (33), Gujarat (28), Odisha (27), and Uttarakhand (26). States such as Madhya Pradesh (24), Andhra Pradesh (21), and Rajasthan (21) also hold a significant number of registered products, indicating regional specialization in both agricultural and traditional goods. In contrast, smaller states like Jharkhand (1), Haryana (2), and Sikkim (2) have relatively fewer registrations, highlighting the scope for expanding GI recognition in these regions. Overall, the wide distribution of GIs across the country depicts India's immense cultural and biological wealth, with each registration contributing to the protection of indigenous knowledge, promotion of rural economies and enhancement of product authenticity in global markets.

**Table 2:** State-wise Geographical Indication Tags (GI tags) in India

Sl.No.	State	GIs	Sl.No.	State	GIs
1.	Andhra Pradesh	21	16.	Maharashtra	52
2.	Andaman & Nicobar Islands	7	17.	Manipur	7
3.	Arunachal Pradesh	21	18.	Meghalaya	8
4.	Assam	33	19.	Mizoram	7
5.	Bihar	16	20.	Nagaland	5
6.	Chhattisgarh	7	21.	Odisha	27
7.	Goa	10	22.	Punjab	2
8.	Gujarat	28	23.	Rajasthan	21
9.	Haryana	2	24.	Sikkim	2
10.	Himachal Pradesh	11	25.	Tamil Nadu	68
11.	Jammu & Kashmir	24	26.	Telangana	18
12.	Jharkhand	1	27.	Tripura	4
13.	Karnataka	48	28.	Uttarakhand	26
14.	Kerala	39	29.	Uttar Pradesh	77
15.	Madhya Pradesh	24	30.	West Bengal	34
16.	Puducherry	2			

As of the latest records, the Protection of Plant Varieties and Farmers' Rights Authority (PPVFRA) has issued a total of 9,817 certificates under the PPV&FR Act, 2001, reflecting India's growing recognition of plant genetic innovation and conservation. Notably, 4,969 certificates (50.6%) have been granted under the Farmers' Variety category, underscoring the vital role of farming communities in maintaining and developing the country's rich agrobiodiversity. Among these, nearly 96% pertain to rice varieties, highlighting the crop's dominance in farmers' breeding efforts, while only a limited number

represent horticultural crops. Additionally, 1,989 certificates have been awarded to public institutions, and 2,858 to the private sector, indicating a balanced participation of research organizations and commercial breeders in variety development and protection. This distribution illustrates the increasing awareness and adoption of the PPV&FR framework across sectors, while emphasizing the need to encourage more registrations from horticulture and underrepresented crop groups ([www.ppvfraplantauthority.gov.in](http://www.ppvfraplantauthority.gov.in)).

Several horticultural crops have been successfully registered under the PPV&FR framework. For instance, Navara Rice (Kerala) and Mushkbudji Rice (Jammu & Kashmir) hold both cultural and economic significance and have achieved dual recognition under PPV&FR and GI systems (PPV&FR Annual Report, 2024).

Many local landraces such as Byadagi Chilli, Elakki Bale (Banana), Siddu Jackfruit, and Mattu Gulla Brinjal are consideration for registration as Farmers' Varieties, reflecting farmers' innovation and adaptation capacity.

**Table 3:** Products with both Geographical Indication and PPVFR protection

GI Product	GI Feature	PPV&FR Link
Basmati Rice	GI for the grain grown in specific Indo-Gangetic plains (Haryana, Punjab, UP, Uttarakhand, HP, J&K, Delhi)	PPV&FR has registered multiple Basmati varieties (e.g., Pusa Basmati 1121, 1509, 1637, etc.)
Alphonso Mango	GI for mangoes grown in Konkan (Maharashtra)	PPV&FR lists several mango varieties, including Alphonso and its selections
Coorg Orange, Nanjanagud Banana, Udupi Mattu Gulla Brinjal	GI for specific regional horticultural crops	PPV&FR Act allows registration of varieties of these crops if distinct, uniform, and stable (some are already registered)

## Convergence of GI and PPV&FR Systems

### The Combined Framework

Although GIs and PPV&FR operate under distinct legal mechanisms, their objectives converge in protecting agricultural innovations and regional identities (Rangnekar, 2010). A product can benefit simultaneously from both:

- GI protects the name and reputation, while
- PPV&FR safeguards the genetic resource and farmers' breeding rights.

This dual framework enhances economic returns and sustainability, especially when traditional landraces or farmers' varieties are recognized under both systems (Seshia, 2020).

### Conservation and Benefit Sharing

Dual registration under GI and PPV&FR creates multi-layered protection for biodiversity. Communities registering a variety under PPV&FR become eligible for benefit-sharing when their genetic material is used in breeding new varieties (PPV&FR Authority, 2024). Simultaneously, a GI tag preserves the regional market identity and provides branding advantages.

This synergy strengthens both on-farm conservation and economic empowerment, aligning with India's commitments under the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) (FAO, 2019).

## Challenges and Limitations

Despite their complementarity, the convergence of GI and PPV&FR faces several challenges:

- Low awareness among farmers and producer groups about registration procedures and benefits.
- Overlapping jurisdictional mandates between agencies handling GI (DPIIT) and PPV&FR.
- Weak post-registration commercialization mechanisms in many states.
- Limited research linkages between ICAR institutes, SAUs, and community seed systems.
- Incomplete implementation of benefit-sharing provisions due to inadequate documentation of traditional germplasm (Ramana Murthy *et al.*, 2022).

India's agriculture remains 89% informal, with smallholders being the main custodians of genetic diversity (NSSO, 2023). Empowering them through institutional and financial mechanisms is critical to strengthen the GI-PPV&FR interface.

### Future Thrusts

Many traditional landraces and farmers' varieties, often linked to Geographical Indications (GIs), can be registered under the PPV&FR Act in the "Farmers' Variety" category, providing formal recognition to community-led conservation and breeding efforts. Once registered, the concerned farming communities become eligible for benefit-sharing whenever their genetic material is utilized in the development of new varieties, thereby ensuring fair reward and acknowledgment for their contribution to agricultural

biodiversity. This system establishes a dual layer of protection, wherein the GI safeguards the product's name, reputation, and market identity, while the PPV&FR framework protects the underlying biological resource and the rights of breeders and farmers. Together, these mechanisms promote both economic empowerment and genetic conservation, strengthening the link between traditional knowledge, intellectual property protection, and sustainable rural development.

To realize the full potential of GI and PPV&FR frameworks in horticulture, the following thrust areas are vital:

1. **Integrated Policy Approach:** Develop a harmonized national strategy linking GI registration with PPV&FR protection for region-specific crops.
2. **Capacity Building and Awareness:** Organize training for farmers, FPOs, and rural entrepreneurs on IPR management, branding, and legal protection.
3. **Cluster-Based Development:** Promote cluster cultivation of GI crops to ensure quality, traceability, and export consistency.
4. **Digital Documentation and Traceability:** Establish blockchain-enabled systems for traceability and digital GI-PPV databases (DPIIT, 2024).
5. **Research Collaboration:** Strengthen partnerships among ICAR, SAUs, and local communities for identification and registration of farmers' varieties.
6. **Benefit Sharing and Incentivization:** Ensure equitable benefit distribution for communities contributing to genetic conservation and innovation.
7. **International Promotion:** Brand Indian horticultural GIs globally and seek inclusion in the WIPO Lisbon System for transnational recognition (WIPO, 2023).

### Conclusion

GI tags and PPV&FR registrations operate in parallel yet complementary domains, each serving a distinct purpose in protecting agricultural innovations and regional heritage. While GIs safeguard the reputation, uniqueness, and identity of location-specific products, the PPV&FR framework secures the rights of farmers and breeders over plant genetic resources. When effectively interlinked, these two systems can create a powerful synergy that not only enhances market value and global recognition but also ensures equitable benefit-sharing and long-term conservation of biodiversity in agricultural and horticultural crops.

The coexistence of Geographical Indications and Plant Variety Protection systems offers India a unique opportunity to create a sustainable, equitable horticultural future. GIs celebrate place-based identity, while PPV&FR honors farmers' innovation and biodiversity stewardship.

Integrating these systems ensures that both economic prosperity and genetic diversity are preserved. As India advances toward the ambitious goal of 10,000 GI registrations by 2030, aligning farmers' rights with innovation-driven protection will be essential to achieving inclusive and sustainable growth in horticulture.

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