

Original Research Article

Geographical Indications of vegetable crops in India- role in farmer's empowerment and agro-biodiversity management

ABSTRACT

In this paper an attempt has been made to study role of Geographical Indications (GIs) in farmers' empowerment and biodiversity management focusing on vegetable crops GIs. Data was collected from GI registry website. Till 2023-24, 200 agricultural GIs were registered constituting 31 percent of total GIs registered in India. Total number of registered GIs in vegetables was 32 constituting 16 percent of agricultural GIs. In case of 19 vegetable GIs registered, that is in case of 59 percent of registered GIs in vegetables, farmers' organizations were the exclusive registered owners of GIs indicating farmers' empowerment. GIs in vegetables registered were spread across 10 crops. Maximum number of GIs were registered in chilli crop (14) and it was followed by brinjal (6). Out of 32 vegetable GIs, only with respect to 13 vegetable GIs, authorised users were registered till 2023-24, indicating gap and lag in effective use of GIs in farmers' empowerment. 32 Vegetable GIs registered in India were spread across 16 states. Maharashtra state had highest number of vegetable GIs i.e., 5 followed by Goa (4) and Kerala (4). Registered GIs in chilli crop was spread across 13 states. 6 GIs in brinjal were spread across 6 states. Similarly, in 3 GIs in garlic were spread across 3 states. This pattern indicates potential role of GIs in agro-biodiversity conservation.

Keywords: *Geographical Indications, Vegetables, Agriculture, Authorized users, biodiversity, empowerment*

1.INTRODUCTION

Perishable nature of many agricultural goods, especially vegetables weakens farmer's bargaining positions versus distributors and collectors. However, Geographical Indications (GIs) for regional agricultural products can help to address this problem to some extent by increasing product differentiation and added value in case of some vegetables. According to the definition by the World Intellectual Property Organization (WIPO), geographical indications (GIs) are signs used on products

that have a specific geographical origin and possess qualities, reputation, or other characteristics that are essentially attributable to that place of origin. They differentiate products based on local natural factors and traditional production methods. This allows farmers to obtain price premiums on the market, directly boosting income. As consumer awareness and appreciation for authentic, region-specific products grow, GIs can serve as a valuable marketing tool for producers by mitigating information asymmetry, leading to increased exports and revenue generation. Successful geographical indications also stimulate local tourism and infrastructure improvement. GI tagged products often serve as economic engines for the regions where they originate.

Agricultural products typically have qualities that derive from their place of production and are influenced by specific local, geographical factors such as climate and soil. Accordingly, a majority of GIs throughout the world are applied to agricultural products falling into different categories such as grain crops, fruits, vegetables, spices, beverages etc. Further as agricultural GI commodity production cannot be de-localized, it is anticipated that GIs motivate producers to preserve natural environmental conditions and conserve plant varieties with specific unique quality features. This will also aid in making crop production climate resilience. In this backdrop in the current paper an attempt has been made to examine status of GIs for vegetables in India and their role in farmers' empowerment and biodiversity management.

2.REVIEW OF LITERATURE

2.1. Farmers empowerment and economic development

GIs increase the scope of better revenues for local producers and small scale entrepreneurs. Any duplication and misappropriation of GIs by unauthorized parties are disadvantageous for consumers as well as legitimate producers. Importantly, prevalence of such type of act is likely to deceive consumers as they buy the product by considering as genuine product with specific qualities and characteristics. The GI tag, acts as to tool to prevent such type of malfunctioning (1).

By promoting the unique quality of products under GI mechanism, the agricultural producers can capture economic value of agricultural products in market place (2). The added economic value of agricultural products will then provide the subsequent effects that contribute to development of agriculture. It will encourage entrepreneurship, professionalism and enhance skill of local labour in producing, managing and improving quality of agricultural products, thus it will increase the

competitiveness of local agricultural products. GI registration provides the registered proprietor and the authorized user the exclusive right to protect the registered GI on the specified goods. Collective Monopolization of the market through a GI enables the producers to control prices, i.e., can charge premium prices, thereby enhancing profits. It has been reported that 80% consumers are ready to pay 20-30% higher prices as they believe that GI products are having better qualities over other goods (3).

According to global value chain approach for agro-food supply chains, there are three means by which GIs may facilitate upgrading of small scale producers. They are capturing higher margins, stimulating collective action and enabling diversification into downstream processing sector etc. (4). In the case of nascent PDO (Protected Designation of Origin) system for Hungarian Mako' Onion, none of the three means worked in empowering small-scale producers (4). This was due to (i) consumer scepticism (ii) the decision to specify exclusively the three outdated varieties in PDO, acting as obstacle in producer's switching to high yielding varieties (iii) state socialism system leading to lack of skill in joint mobilization on the part of small scale producers and farmers scepticism regarding collective action (4). For addressing these, greater emphasis on marketing and building effective network with regional actors external to the value chain for diversification are the suggested measures (4).

GIs not only generate more economic benefits than ordinary products, but also contribute to the growth of agricultural economy by promoting the development of agricultural product trade and the enhancement of agricultural product price (5). However critical review of economic literature covering period 2007-2018, revealed that price premiums can only be achieved over the long term and only some GI speciality products will be able to achieve a price premium (6). This in-turn is due to the associated higher production costs and unequal distribution in the value chain in some GI products. Some studies based on meta-analysis reported highly positive correlation between GI products and farm income, and GI and agricultural product price increase (7). Further the study reported that the correlation coefficient between GI products and per capita income was higher than the correlation coefficient between GI products and agricultural product price increase(7). Some studies using rigorous econometric analysis, reported that GI for vegetables and fruits had positive effect on added value, but GIs for highly processed commodities like sugar and tea had negative effect on agricultural value added (8). However, the effect on farmers' income was positive in both kinds of commodity GIs

(8). In the case of Turkey it was observed that agricultural enterprises participating in GI Kelkit sugar (dry) beans production program realised lower gross profit per unit area compared to non-GI producers. However, it was opined that in the long run term, the higher price premium for GI sugar beans can cover the variable costs resulting in higher income of GI farmers (9).

2.2 Biodiversity conservation/management

GI can be a mechanism to valorise origin based products whose quality stem from the high biodiversity (10). However, there are contradicting arguments on GIs contribution to biodiversity. When GI specification in an agricultural crop imposes the use of local plant varieties, GI can contribute to biodiversity conservation (11). However, this contradicts with the concept of diversity and multiplicity (11) when only specific varieties are specified in a GI. Thus it is being argued that GI can contribute positively to biodiversity, provided the GI applications are environmentally friendly and compatible with the maintenance of landscape mosaic (10, 12). Some studies are indicating that farmers' varieties protected under GI can serve as donors in breeding programs targeted at developing varieties with specific adaptation trait and increased resource use efficiency (13). In case of Europe, a study proved positive correlation between PDO production and ecologically valuable landscapes (14).

In the case of Mishima Potato GI in Japan, it was reported that the GI contributed to nine Sustainable Development Goals (SDGs) at all stages namely production stage, transformation and commercialization stage (15). Biodiversity conservation/management is one among the nine SDGs. Based on systematic review of literature (of 20 studies) on GI and SDGs, it was observed that biodiversity was targeted in 4 studies and both positive and negative impact of GI on various SDG indicators including biodiversity conservation were there (16). Some studies argued for activating producer's rights in discussion on biodiversity conservation through GIs and consideration of biodiversity as a part of GI by design to increase efficiency in biodiversity protection (17).

3.DATA AND METHODOLOGY

In India. Geographical Indications of goods (registration and protection) 1999 Act, came into effect from 15-9-2003. Under this act GI registry is maintained by Department for Promotion of Industry and Internal Trade Ministry of commerce & Industry. Hence data on registered GIs on vegetables was collected from this registry website at https://www.ipindia.gov.in/IPIndiaAdmin/writereaddata/Portal/Images/pdf/Year_wise_GI_Application_Register_-_26-04-2024.pdf (18). The data was analysed using tabular analysis approach. Data on selected vegetable GIs in different countries was collected from Origin website. <https://www.origin-gi.com>.(19).

4.RESULTS AND DISCUSSIONS

According to Indian GI act of 1999, the applicant for a GI can be any association of persons or

Table.1 Distribution of Geographical Indications in India across various category goods in different years

Year	Agriculture	Food stuff	Handicraft	Manufacturing	Natural Goods	Total GIs	Share of agriculture(%)
2004-05	1		2			3	33
2005-06	2		18	4		24	8
2006-07	2		1			3	67
2007-08	11		19	1		31	35
2008-09	10	1	33	1		45	22
2009-10	5	1	7	1		14	36
2010-11	7	3	15	4		29	24
2011-12	4		15	4		23	17
2012-13	2		18	1		21	10
2013-14	4		17	1		22	18
2014-15	11	2	5	1	1	20	55
2015-16	9		17			26	35
2016-17	14	4	13	2		33	42
2017-18	7	1	18			26	27
2018-19	14	2	4	2	1	23	61
2019-20	8	4	9	1		22	36
2020-21	1		4			5	20
2021-22	16	2	18	14		50	32
2022-23	24	7	19	5		55	44
2023-24	48	20	61	8	1	168	29
Total	200	47	343	50	3	643	
Share of different category GIs in total GIs (%)							
	31.10	7.31	53.34	7.78	0.47	100.00	

producers, or any organization or authority representing the interest of the producers of the concerned goods. Further under Indian GI act of 1999, authorised users with respect to each GI must also get registered. GI tag for the registered products ensures that only authorized users or community within a geographic region or locality involved in development/production of registered products can use the GI tag to claim benefits out of visual branding and marketing. In India, till 2023-24 a total of 643 GIs were registered comprising of agricultural crops, food stuff, handicrafts, manufacturing goods and natural goods. Agricultural crops constituted 31.10% of the total registered GIs (table.1). Handicrafts category goods constituted the highest percentage of registered GIs (53.34%), and the share of natural goods in registered GIs was lowest (0.47%) (table.1). The share of agricultural GIs in total registered GIs was least in the year 2005-06 (8%) and was maximum in 2006-07(67%). Out of 20 years considered in the study, only in three years (2006-07,2014-15 and 2018-19) the share of agricultural goods in registered GI was more than 50%. Highest number of GIs in agriculture was registered in the year 2023-24 (that is 48).). On average 10 agricultural GIs per year was registered against 32 GIs per year covering all types of goods. Out of 20 years considered in the study, in 7 years more than 10 agricultural GIs per year were registered.

In Agriculture, registration of GIs started in the year 2004-05 but in vegetable sector it started in the year 2008-09 (table.2). Till 2023-24, total number of registered GIs in vegetables was 32 against 200 agricultural GIs. Thus the share of registered vegetable GIs to the agriculture GIs was 16 percent. The share of vegetables was highest in the year 2021-22 (31%) followed by 2010-11 and 2022-23 with 29 percent (table.2). However, the highest number of GIs in vegetables was registered in the year 2023-24. Further out of 20 years under consideration, only in 10 years GIs in vegetables were registered.

Table.2 Trend of agricultural GIs and GIs in vegetable

Year	Agriculture	Vegetables	Vegetable share(%)
2004-05	1		0

2005-06	2		0
2006-07	2		0
2007-08	11		0
2008-09	10	1	10
2009-10	5		0
2010-11	7	2	29
2011-12	4	1	25
2012-13	2		0
2013-14	4		0
2014-15	11	3	27
2015-16	9	1	11
2016-17	14	2	14
2017-18	7		0
2018-19	14		0
2019-20	8	2	25
2020-21	1		0
2021-22	16	5	31
2022-23	24	7	29
2023-24	48	8	17
Total	200	32	16

Registered vegetables GIs were spread across 10 crops i.e., brinjal, chilli, cucumber, dolichos bean, garlic, ladies finger, keradapini, onion, snap melon and tomato (table.3). Maximum number of GIs were registered in chilli crop (14) and it was followed by brinjal (6). Out of 32 vegetable GIs, in case of 19 vegetable GIs, GI applicants were exclusively farmers group based institutions (farmers' association, farmer producer company or co-operatives). In case of four vegetable GIs that is one brinjal, two chillies and one garlic GIs, farmer producer companies were the GI applicants. In case one vegetable GI (Khola chilli) farmers group along with department of Science and Technology, Goa were the applicant for GIs. In case of 3 vegetable GIs commodity boards like Spices Board, and Organic Commodity boards were the applicants for GIs. In case of four vegetable GIs from North East India, North Eastern Regional Agricultural Marketing Corporation Limited (NERAMAC) which functions under the Ministry of Development of North Eastern Region (MDoNER) was the applicant for GI. Under Indian GI act protection is for 10 years and can be renewed every ten years. 15 vegetable GIs for which initial 10 years was over, were renewed for protection (table.3).

Under Indian GI act, subsequent to GI registration, authorised users with respect to each GI need to be get registered. It is observed that out of 32 vegetable GIs, only with respect to 13 vegetable GIs (i.e. 41 percent of vegetable GIs), authorised users were registered till 2023-24 (table.3). This is in line with reporting by (20). The total number of authorised users in vegetable crops was 699 out of which Naga tree tomato had highest number of authorised users i.e., 292 followed by onion (Lasalgaon onion) with 150 authorised users and cucumber (Naga cucumber) with 111 authorised users. In case of 6 vegetable GIs (that is 19 percent of vegetable GIs), institutions other than farmers' groups were also the registered authorised users (table.4). These institutions are involved in farmers' development in their respective regions. North Eastern Regional Agricultural Marketing Corporation (NERAMC) functions under the administrative control of Ministry of Development of the North Eastern Region (MDoNER). NERAMC, besides being a marketing agency, is an implementing agency of the Ministry of Agriculture and Farmers Welfare's (MoAFW) 10,000 FPO (Farmer Producer Organization) formation and promotion scheme and has developed 220 FPOs (NERAMAC Website).

Table.3 Details of Geographical Indications in Vegetable Crops

Crop	Geographical Indication	Applicant Name	Application date	Certificate date	Valid up to	Number of Authorised users
Brinjal	Udupi Mattu Gulla Brinjal	Mattu Gulla Gowers' Association	03-03-2010	17-10-2011	02-03-2030	
	Jalgaon Bharit Brinjal	Navnirmiti Shetkari Mandal	30-09-2014	03-06-2016	29-09-2024	21
	Vellore Spiny Brinjal	South India Multi State Agriculture Cooperative Society Limited	29-10-2021	22-02-2023	28-10-2031	
	Ramnagar Bhanta (Brinjal)	Kashi Vishwanath Farmer Producer Company	04-11-2020	31-03-2023	03-11-2030	
	Agsechi Vayingim (Agassaim Brinjal)	Agassaim Brinjal Growers and Sellers Association	28-06-2021	31-07-2023	27-06-2031	
	Nayagarh Kanteimundi Brinjal	Neelamadhav Krushi Sanghathan	08-02-2021	02-01-2024	07-02-2031	
Chilli	Naga Mircha	The Secretary, Department of Horticulture & Agriculture	22-08-2007	02-12-2003	21-08-2027	2
	Guntur Sannam Chilli	Spices Board	29-10-2008	28-05-2010	28-10-2028	2
	Byadagi Chilli	Spices Board (Ministry of Commerce & Industry)	01-08-2008	27-01-2011	31-07-2028	2
	Mizo Chilli	North Eastern Regional Agricultural Marketing Corporation Ltd (NERAMAC)	27-01-2012	23-03-2015	26-01-2032	81
	Bhiwapur Chilli	Bhiwapur Mirchi Utpadak Samutha Gat	26-03-2014	30-11-2016	25-03-2034	20
	Khola Chilli	1.The Khola/Canacona Chilli Cultivator's Group Association (TKCCGA); 2.Department of Science & Technology (DST), Government of Goa	06-08-2018	28-08-2019	05-08-2028	5
	Harmal Chilli	The Harmal-Pernem Chilli (Mirchi) Growers Association	14-01-2019	14-09-2021	13-01-2029	10
	Edayur Chilli	Edayoor Chilli Grovers Association (ECGA)	03-10-2019	14-09-2021	02-10-2029	
	Hathei Chilli	Manipur Organic Mission Agency (MOMA)	18-09-2017	14-09-2021	17-09-2027	
	Ramnathapuram Mundu Chilli	Ramnath Mundu Chilli Producer Company Limited	16-11-2020	22-02-2023	15-11-2030	
	Almora Lakhori Mirchi	Uttarakhand Organic Commodity Board (UOCB)	11-04-2022	08-11-2023		
	Nandurbar Mirchi	Dr.Headgevar Sewa Samiti	20-10-2021	30-03-2024	19-10-2031	

	Banaras Lal Bharwamirch	Pragatisheel Arajiline Farmer Producer Company Limited	03-02-2022	30-03-2024	02-02-2032	
	Dalle Khursani	North Eastern Regional Agricultural Marketing Corporation Limited (NERAMAC)	10-12-2018	14-09-2021	09-12-2028	1
Cucumber	Naga Cucumber	North Eastern Regional Agricultural Marketing Corporation Limited (NERAMAC)	10-12-2018	14-09-2021	09-12-2028	111
Dolichos Bean	Attappady Aattukombu Avara	Attappady Aattukombu Avara Uthpathaka Sangham	16-03-2020	30-11-2022		
Garlic	Kodaikanal Malai Poundu	1. Department of Biotechnology, Mother Teresa Women's University; 2. Tamil Nadu State Council for Science and Technology	01-06-2018	30-07-2019	31-05-2028	2
	Kanthalloor Vattavada Veluthulli	Anchunad Vattavada Kanthalloor Veluthulli Udpadaka Karshaka Sangham	12-04-2021	30-11-2022		
	Ratlam Riyawan Lahsun (Garlic)	Riyawan Farm Fresh Producer Company Limited	11-01-2022	01-03-2024	10-01-2032	
Ladies Finger	Sat Shiro Bheno (Sat Shirancho Bhendo)	Goa Local Vegetables and Tubers Growers Association	08-11-2021	31-07-2023	07-11-2031	
Keradapini	Bodo Keradapini	Bodo Ethnic- Agro Food Producer's Association	29-08-2022	30-03-2024	28-08-2032	
Onion	Bangalore Rose Onion	Bangalore Rose Onion Grower's Association	30-07-2010	25-03-2015	29-07-2030	
	Lasalgaon Onion	Baliraja Shetkari Gat	22-07-2014	31-03-2016	21-07-2034	150
	Alibag White Onion	Alibag Pandhara Kanda Shetkari Utpadak Gat	16-01-2020	16-11-2022		
Snap melon	Kodungallur Pottuvellari	Kodungallur Pottuvellari Karshaka Kshema Vikasana Samithi	19-04-2021	30-11-2022		
Tomato	Naga Tree Tomato	North Eastern Regional Agricultural Marketing Corporation Ltd (NERAMAC)	27-01-2012	23-03-2015	26-01-2032	292

Table.4 Details of vegetable GIs with Institutions (other than farmer groups) as Authorised users

S. No	Crop	Geographical Indications	Number Authorised users(institutions)	Details of authorised users
1	Brinjal	Jalgaon Bharit Brinjal	1	Krishi Vigyan Kendra, Jalgaon
2	Chilli	Naga Mircha	1	TRIFED, Ministry of Tribal affairs, RO Guwahati
3	Chilli	Guntur Sannam Chilli	1	TRIFED (Ministry of Tribal Affairs, Govt. of India), Regional Office, Hyderabad
4	Chilli	Mizo Chilli	2	North Eastern Regional Agricultural Marketing Corporation (NERAMAC), Ministry of Development of the North Eastern Region (MDoNER), TRIFED, Ministry of Tribal affairs, RO Guwahati
5	Cucumber	Naga Cucumber	1	North Eastern Regional Agricultural Marketing Corporation (NERAMAC) Ministry of Development of the North Eastern Region (MDoNER)
6	Tomato	Naga Tree Tomato	2	North Eastern Regional Agricultural Marketing Corporation (NERAMAC) Ministry of Development of the North Eastern Region (MDoNER)

Table.5 State wise Geographical Indications in Vegetable crops

S. No	State	Number of GI	Number of crops	Crop
1	Andhra Pradesh	1	1	Chilli(1)
2	Assam	1	1	Keradapini(1)
3	Goa	4	3	Brinjal(1),Chilli(2), Ladies Finger(1)
4	Karnataka	3	3	Brinjal(1), Chilli(1), Onion(1)
5	Kerala	4	4	Chilli(1), Dolichos Bean(1), Garlic(1), Snap melon(1)
6	Madhya Pradesh	1	1	Garlic(1)
7	Maharashtra	5	3	Brinjal(1), Chilli(2), Onion(2)
8	Manipur	1	1	Chilli(1)
9	Mizoram	1	1	Chilli(1)
10	Nagaland	3	1	Chilli(1), Cucumber(1), Tomato(1)
11	Odisha	1	1	Brinjal(1)
12	Sikkim	1	1	Chilli(1)
13	Tamil Nadu	3	3	Brinjal(1), Chilli(1), Garlic(1)
14	Uttar Pradesh	2	2	Brinjal(1), Chilli(1)
15	Uttarakhand	1	1	Chilli(1)
16	West Bengal	1	1	Chilli

Numbers in parentheses indicate number of GIs

32 Vegetable GIs registered in India were spread across 16 states as given in table.5. Maharashtra state had highest number of vegetable GIs i.e., 5 followed by Goa (4) and Kerala (4). Kerala state registered their GI in four different vegetable crops i.e., chilli (1), dolichos bean (1), garlic (1), snap melon (1). Goa, Karnataka, Maharashtra and Tamil Nadu registered their GI in 3 different vegetable crops. Registered GIs in chilli crop was spread across 13 states (table.6). 6 GIs in brinjal were spread across 6 states. Similarly, in 3 GIs in garlic were spread across 3 states. This indicates contribution of GIs in agro-biodiversity management. Out of 10 vegetables crops which were registered as GIs in India, in 6 crops GIs were found in other countries also (Table.7). In these 6 crops India's share in GIs ranged between 5 to 48 percent.

Table.6 Crop wise number of GIs in Different States

S. No	Crop	Number of GI	Number of States	State
1	Brinjal	6	6	Goa(1), Karnataka(1), Maharashtra(1), Odisha(1), Tamil Nadu(1), Uttar Pradesh(1)
2	Chilli	14	13	Andhra Pradesh(1),Goa(2), Karnataka(1), Kerala(1), Maharashtra(2), Manipur(1), Mizoram(1), Nagaland(1), Sikkim(1), Tamil Nadu(1),Uttara khand(1),Uttar Pradesh(1), West Bengal(1)
3	Cucumber	1	1	Nagaland(1)
4	Dolichos Bean	1	1	Kerala(1)
5	Garlic	3	3	Kerala(1),Madhya Pradesh(1), Tamil Nadu(1)
6	Keradapini	1	1	Assam(1)
7	Ladies Finger	1	1	Goa(1)
8	Onion	3	2	Karnataka(1),Maharashtra(2)
9	Snap melon	1	1	Kerala(1)
10	Tomato	1	1	Nagaland(1)

Numbers in parentheses indicate number of GIs

Table.7. Distribution of selected vegetable GIs across countries

S. No	Crop	Number of GIs in India	Number of GIs in countries other than India	Total GIs	Share of India(%)	Name of countries
1	Brinjal	6	9	15	40	Spain (1), Greece (1), India (6), Italy (1), Japan(3),Malaysia(1),Turkey(2)
2	Chilli	14	15	29	48	China (3), Spain (5), France (1), India (14), Mexico (4), Thailand (1), United States (1),
3	Cucumber	1	5	6	17	China (1), Germany (1), India (1), Japan (1), Malaysia(1),Russian Federation(1)
4	Garlic	3	40	43	7	Brazil(1),China(16),Spain(1),France(4),India(3),Italy(2), Japan(1),Korea(7),Mangolia(1), Poland(1),Portugal(1),Thailand(1),Turkey(2),Vietnam(2)
5	Onion	3	41	44	7	China (13), Czech Republic(1), Germany(1), Spain(3), France(2),Hungary(1),India(3), Italy(3),Japan(4),Korea(3),Mali(1),Niger(1),Slovenia(1), United states(6),Vietnam(1)
6	Tomato	1	19	20	5	Bulgaria(2),Chile(2),China(1),Germany(1),Spain(1),Greece(1),India(1),Italy(3),Japan(4),Korea(1),Russian Federation(1),Turkey(1), United States(1)

Source: Organization for an International Geographical Indications Network (<https://www.origin-gi.com/>) as on 21-5-2024)

Numbers in parentheses indicate number of GIs

5.CONCLUSION

Secondary data analysis, revealed that in case of 59 percent of registered GIs in vegetables, farmers' organizations were the exclusive registered owners of GIs indicating farmers' empowerment. GIs in vegetables registered were spread across 10 crops. Maximum number of GIs were registered in chilli crop (14) and it was followed by brinjal (6). Out of 32 vegetable GIs, only with respect to 13 vegetable GIs, authorised users were registered till 2023-24, indicating gap and lag in effective use of GIs in farmers' empowerment. 32 Vegetable GIs registered in India were spread across 16 states. This pattern indicates potential role of GIs in biodiversity conservation. More studies using primary data

and case study approach in future will yield some more insights for maximizing GI role in farmers' empowerment and biodiversity management.

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