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Agricultural Innovation and the Protection of Traditional Rice Varieties: Kerala a Case Study

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In an endeavor to promote agricultural innovation, the Government of India introduced two pieces of legislation: (i) the Protection of Plant Varieties and Farmers' Rights Act, 2001, which provide for the registration of traditional crop varieties as farmers' varieties, and for the sharing of benefits when those varieties are incorporated into new commercial varieties; and (ii) the Geographical Indications of Goods (Registration and Protection) Act 1999, which provides for the registration of indications to promote the marketing of goods which derive their quality and characteristics from their geographical origin. This article tests the effectiveness of this legislation in promoting agricultural innovation, reporting on a survey of 401 farmers of traditional rice varieties in Kerala, South West India. The study revealed that farmers were either unaware of the legislation, or unaware of its functions. They have not been much involved in the registration of farmers' varieties and have not made any benefit-sharing claims in relation to the varieties which have been registered. They have tended to confuse the registration of geographical indications with the registration of farmers' varieties. This suggests, as a first step, the necessity for awareness raising about the purposes of both pieces of legislation with Indian farmers.

Keywords: agricultural innovation, traditional rice cultivation, farmers' varieties, Kerala, geographical indications, intellectual property

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INTRODUCTION

This article discusses a research project conducted in Kerala to consider the extent to which two pieces of legislation: Protection of Plant Varieties and Farmers' Rights Act, 2001 (PPVFR Act) and the Geographical Indications of Goods (Registration and Protection) Act, 1999 (GIs Act). have encouraged technological innovation by and technology transfer to traditional rice farmers in Kerala. A total of 401 rice farmers were surveyed in Wayanad, Malappuram, and Palakkad, the principal rice producing areas of Kerala to assess their awareness of the legislation and the extent to which they have utilized it in their farming and marketing activities. The first section of the article outlines the legislative background to the enactment of the two Acts. The second section describes rice cultivation in Kerala. The third section details the principal provisions of the PPVFR Act. The fourth section identifies which of the traditional rice varieties in Kerala have been registered as farmers' varieties under the PPVFR Act The fifth section identifies which of those traditional rice varieties are embraced by registrations under the GIs Act. The sixth section examines the relationship between rice registered under the PPVFRA and the GIs Act. The seventh section reviews the literature concerning the role of legislation in promoting agricultural innovation. The

eighth section reports the results of the surveys of the awareness of rice farmers in Kerala of the PPVFR Act and the GIs Act. The final section outlines the conclusions of the study.

LEGISLATIVE BACKGROUND

When India became a member of the World Trade Organization (WTO) on 1 January 1995, it was obliged to comply with the provisions of the WTO Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) (see Watal, 1997; Das, 2006; Kochupillai, 2011; Singh and Aggarwal, 2013). This agreement requires WTO members to enact a suite of intellectual property laws, including for the protection of plant variety rights and to provide for the prevention of the misleading use of geographical indications. In discharging these TRIPS obligations India enacted the PPVFR Act and the GIs Act. The PPVFR Act recognizes farmers' rights and the contribution of traditional communities in identifying biological resources from which new plant varieties can be bred. In this regard, it differs from the Convention establishing the International Union for the Protection of New Varieties of Plants (UPOV) to which some 75 countries have subscribed[1]. The UPOV Convention, which was enacted in 1961 and revised in 1978 and 1991, limits in its latest iteration the capacity of farmers to save seed for future harvests, unlike the PPVFR Act and makes no mention of farmers rights and provides for longer periods for protection of plant varieties than the Indian legislation. In a recent letter to the Union Agriculture Minister and PPRFR Authority Chairperson, concern has been expressed by agricultural scientists, activists and farmer leaders about "an undesirable attempt to align the PPVFR Act and UPOV by extending the length of protection for registered varieties" (The Hindu, 2019).

The most significant feature of the PPVFR Act in addition to the recognition of farmers' rights is the recognition of the possibility of the registration of farmers' varieties. This has led to a degree of tension between the nurturing of farmers and the encouragement of the Indian seed breeding industry. In 2002 a National Seeds Policy was with the objective of creating "a facilitative climate for growth of a competitive and localized seed industry" (Ministry of Agriculture, 2002). Clause 2.11 of the 2002 Policy provided that "seed exchange among farmers and seed producers will be encouraged to popularize new/non-traditional varieties" and clause 2.12 enjoined that "seeds of newly developed varieties must be made available to farmers with minimum time gap." To implement the new policy a Seeds Bill was introduced in the Rajya Sabha on 9 December, 2004. The Bill met with opposition from farmers, concerned about their traditional rights over seeds, as well as civil society and politicians concerned about the influence of foreign multinational seed companies and the threatened loss of biodiversity from monocultures. Responding to this criticism, the Seeds Bill 2004 has undergone three revisions. The most recent version, prepared in 2011 is still pending and may be presented in the forthcoming session of the Parliament (Parayil, 1992; GoI, 2002).

[1]See https://www.upov.int/export/sites/upov/members/en/pdf/status.pdf (accessed October 5, 2019).

RICE CULTIVATION IN KERALA

Rice cultivation in Kerala dates back to 3000 BC (Manilal, 1991). It is the staple food crop of Kerala, but since the 1980s its cultivation has been in steady decline, from 8,500,000 hectares in 1980–81 to 1,980,000 hectares in 2017 (GoK, 2017). The traditional rice growing areas like Palakkad and Alappuzha have 49.93 and 56.97% declines in the areas cultivated for rice between 1960–61 and 2009–10 (Karunakaran, 2014). Among the factors which have been identified as contributing to this decline are: competition from other crops, the difficulties involved in rice cultivation, such as biotic stress caused by diseases and weeds, low levels of productivity, uneven rainfall, land degradation, ground water depletion, chemical pollution, climate change and labor shortages (Mani, 2009; Athira and Kumar, 2016).

Kerala has always had rice shortages. During 1960–61, the peak period for rice production, the shortage of rice was 40.12% of the total demand and this increased to 83.45% in 2009–10 (Karunakaran, 2014). With the expected demand for rice to increase in the coming years, food security will be imperiled, unless this situation can be improved. Farmers will have to increase yields by adopting high yielding varieties, or utilize those traditional varieties which are suitable for marginal lands.

A survey conducted by the Kerala Agricultural University during November 2018 among 873 traditional rice farmers of Wayanad, identified 105 traditional varieties of rice in the region, of which 62 were being cultivated, but that <10 were being cultivated on a sizeable scale (KAU, 2018).

THE PROTECTION OF PLANT VARIETIES AND FARMERS' RIGHTS ACT, 2001

The objectives of the PPVFR Act as enumerated in its preamble are: (i) To recognize and protect the rights of farmers in respect of their contribution toward 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.

The protection under the PPVFR is afforded to a "breeder" or persons claiming through the breeder who is defined in section 2(c) as "a person or group of persons or a farmer or group of farmers or any institution which has bred, evolved or developed any variety."

The PPVFR, uniquely amongst national schemes for the protection of plant varieties, contains a scheme of protection for "farmers' varieties." Section 2(l) of the PPVFR Act defines as a "farmers' variety" a variety which—

(i) has been traditionally cultivated and evolved by the farmers in their fields; or

TABLE 1 | Registered farmers' rice varieties cultivated in Kerala.

Variety	Registration number
Mullankayama (Mullanchanna)	572/2012
Thonnuran thondi	573/2012
Kurumottam	576/2012
Kunjootti matta	580/2012
Marathondi	583/2012
Onavattan	584/2012
Chenthandi	585/2012
Koduveliyan	588/2012
Thuroodi	589/2012
Valichoori	591/2012
Chennellu	56/2013
Gandhakasala	57/2013
Chomala	58/2013
Jeerakasala	59/2013
Veliyan	60/2013
Thondi	61/2013
Kottathondi	20 of 2016
Kayama	21 of 2016
Mannuveliyan	22 of 2016
Adukkan	23 of 2016

Source: PPVFRA (2018).

(ii) is a wild relative or land race of a variety about which the farmers possess the common knowledge.

"Farmer" is defined in section 2(k) to mean any person who—

(i) cultivates crops by cultivating the land himself; or
(ii) cultivates crops by directly supervising the cultivation of land through any other person; or
(iii) conserves and preserves, severally or jointly, with any person any wild species or traditional varieties or adds value to such wild species or traditional varieties through selection and identification of their useful properties.

Section 39 of the PPVFR Act provides for the registration of farmers' varieties and section 24(1) provides for the issue of a certificate of registration. On receipt of a copy of the certificate of registration section 24(1) provides that the Protection of Plant Varieties and Farmers' Rights Authority, established under the PPVFR Act may invite claims of benefit sharing in relation to the registered variety. This benefit sharing may relate both to farmers' varieties and new varieties which may have been derived from them. In assessing claims, the Authority is required by section 26(5) to take into account: (a) the extent and nature of the use of genetic material of the claimant in the development of the variety relating to which the benefit sharing has been claimed and (b) the commercial utility and demand in the market of the variety relating to which the benefit sharing has been claimed. Section 26(6) requires the amount of benefit sharing to be deposited by a breeder in the National Gene Fund, established under the PPVFR Act.

An important source of agricultural innovation is the genetic resources conserved by traditional farmers. Section 39(1) (iii) of the PPVFR Act provides that "a farmer who is engaged in the conservation of genetic resources of land races and wild relatives of economic plants and their improvement through selection and preservation" shall be entitled to recognition and reward from the National Gene Fund, established under section 45 of the Act. This is provided that conserved material has been used "as donors of genes" in varieties registrable under the Act.

Where a breeder or other person making application for registration of any variety under the Act makes use "of genetic material conserved by any tribal or rural families in the breeding or development of such variety," section 40 of the Act requires this to be disclosed in the application for registration.

Section 41 provides that a claim may be submitted to the National Gene Fund "on behalf of any village or local community in India" which has contributed to "the evolution of any variety." The section sets up machinery for the verification of such a claim and for the relevant breeder to pay the compensation into the National Gene Fund, which will then be paid to the claimants.

The recognition of the rights of farmers and communities in relation to the conservation of genetic resources is an aspect of the International Treaty on Plant Genetic Resources for Food and Agriculture, 2001 which India ratified on 10 June 2002.

REGISTRATION OF FARMERS' VARIETIES IN KERALA

The Plant Variety Rights Journal of India, which is published by the Protection of Plant Varieties & Farmers' Rights Authority (PPVFRA), records the registration of 20 Farmers' Varieties of rice cultivated in Kerala (**Table 1**) (PPVFRA, 2015).

All of these registrations have been filed with the PPVFRA by the Secretary of Seed Care. Seed Care describes itself as "an Association of Indigenous & Traditional Crop Conservers of Malabar" (MSSRF, 2019) The Malabar region is the area of southwest India, including the state of Kerala lying between the Western Ghats and the Arabian Sea. Seed Care has been operating since 2012 with the objectives of conserving and promoting the cultivation of traditional crop varieties in the Malabar region, protecting "farmer rights on seeds and associated knowledge systems" and building farmer networks concerned with agrobiodiversity conservation (MSSRF, 2019). The address given for Seed Care is "C/o M. S. Swaminathan Research Foundation, Community Agrobiodiversity Center, Puthoorvayal, Wayanad, Kerala." The M S Swaminathan Research Foundation (MSSRF), was established in 1988 in Chennai, by the geneticist Professor M.S. Swaminathan as a not-for-profit trust. "Aiming to accelerate use of modern science and technology for agricultural and rural development to improve lives and livelihoods of communities" (MSSRF, 2019).

SEED CARE has explained that the registration of the famers' varieties of rice listed above was for the purposes of securing their availability for farmers; to instigate some pride among the farmers' by getting scientific validity to the varieties nurtured by them; and third, to attract breeders to access the scientifically

validated varieties and accrue benefits for the farmers. In 2011–12, SEED CARE conducted a baseline survey in Wayanad to identify the traditional varieties of rice cultivated and area of cultivation, with special focus on speciality rice varieties (SEED CARE, 2012, p. 48). Based on the survey, seeds of 10 speciality rice varieties were obtained for purification and four locations selected within the context of the national seed village programme, in which selected villages cultivate seed to be provided to neighboring villages (India, 2002). In its 2013–2014 Annual Report SEED CARE listed the 10 purified varieties: Adukkan, Thondi, Mullan kayama, Gandhakasala, Jeerakasala, Chomala, Veliyan, Chennellu, Chenthadi, Kalladiaryan (SEED CARE, 2014, p. 36). During 2013–14, a total of 3.15 tons of seeds was distributed to interested farmers, extending the existing area of 44.8 ha under traditional rice cultivation to a total of 74.8 ha (SEED CARE, 2014, p. 36). In its 2014–2015 Annual Report the SEED CARE mentions the generation of 853 kg of purified seeds of nine traditional varieties: Kalladiaryan (191 kg), Jeerakasala (106 kg), Chennellu (63 kg), Adukkan (135 kg), Chomala (76 kg), Thondi (40 kg), Veliyan (30 kg), Gandhakasala (178 kg), and Mullankaima (34 kg) and its distribution to 54 farmers (SEED CARE, 2015, pp. 35–36).

In relation to the marketing of traditional varieties of seed, the 2013–14 Annual Report refers to a market study on the Gandhakasala variety was conducted with the help of Passau University, to look at the current status of the cultivation of the variety and to estimate the potential of collective marketing (SEED CARE, 2014, p. 36). The study noted that the variety was mostly traded on the informal market, due to the lack of common procurement and processing and a uniform price and recommended the establishment of a "Farmers' Society/Consortium or a Producers' Company" and by the formation of Self-Help Groups (SHGs)/Joint Liability Groups (JLGs) under the umbrella of an NGO (SEED CARE, 2014, p. 36). Finally, the 2013–14 Annual Report refers to efforts made for marketing of selected varieties under the brand name of "SEEDCARE" (SEED CARE, 2014, p. 36).

The 2014–15 Annual Report describes SEED CARE as a brand name for the marketing of traditional varieties of rice and mentions that Chennellu (red rice with medicinal value) was secured a rate of Rs. 25/kg as against the normal rate of Rs. 15/kg and Gandhakasala (aromatic variety) obtained Rs. 100/kg against the normal rate of Rs. 80/kg. (SEED CARE, 2015, p. 36).

The Community Agricultural Biodiversity Center (CAbC) was established in 1997 in Wayanad as one of a number of the regional centers of the MSSRF, confining its activities to the Western Ghats regions in Kerala (CAbC, 2019). The Center describes itself as having been "established to promote community conservation systems of rural and tribal people through research, extension and advocacy" working "in partnership with rural and farming communities for sustainable agricultural and rural development" (CAbC, 2019). The 2014–15 Annual Report of SEED CARE Mentions the activities of the CAbC in the promotion of the marketing of traditional rice varieties through a "farmer-trader interface" and reports that 120 farm households benefited from the increased procurement price of rice (SEED CARE, 2015, p. 36).

In 2016 the CAbC assisted with the formation and registration of Wayanad Agri Marketing Producer Company Limited (WAMPCo), a farmer producer company named with the objectives of marketing traditional varieties of rice, vegetables, coffee and pepper and providing technical support to increase the productivity and quality of traditional crop varieties (SEED CARE, 2017, p. 32).

Also mentioned in the Annual Report is the activity of the CAbC in the compilation of traditional and organic practices followed in rice cultivation in Wayanad (SEED CARE, 2015, p. 36).

The Swaminathan Foundation was asked by the authors about its objectives in securing registration of the 15 Kerala farmers' varieties it replied that "there were three primary objectives: First, to secure the legal rights of custodian farmers on their varieties; second, to instigate some pride among the farmers' by getting scientific validity to the varieties nurtured by them; and third, to attract breeders to access the scientifically validated varieties and accrue benefits for them." (Swaminathan Foundation, 2018). It also explained that SEED CARE has decided not to continue registration of traditional varieties for other crops as the Indian Biological Diversity Act 2002 gives protection to community rights if such varieties have been included in the Peoples Biodiversity Registers.

Section 28 of the PPVFRA confers the exclusive right of a registrant of a plant variety "to produce, sell, market, distribute, import or export the variety." The PPVFRA in section 26, together with rule 40 of the PPVFR Rules provides for inviting claims of benefit sharing in relation to varieties develop from registered varieties. There is no data on any benefit-sharing to date and the Swaminathan Foundation has indicated that it has made no benefit-sharing claims in relation to the varieties which it has registered (Swaminathan Foundation, 2018).

It should be noted that in addition to its rice conservation activities in Wayanad, the SEED CARE conducts similar activities in Chennai, where it conserves 500 accessions of different rice varieties at its Community Gene Bank, which have been multiplied in association with the Regional Rice Research Station, Tamil Nadu Agricultural University (TNAU) and at Tirur, Odisha in its Biju Patnaik Medicinal Plants Garden and Conservation Center in Jeypore, where it has supplied seed materials of 75 traditional rice landraces and 27 popular rice landraces to central and state government institutions (SEED CARE, 2016, p. 19).

GEOGRAPHICAL INDICATIONS OF GOODS (REGISTRATION AND PROTECTION) ACT, 1999 (GIS ACT)

Rice Registered Under the GIs Act

The GIs Act came into force on 15 September 2003. This Act does not contain a preamble stating its objectives, other than "to provide for the registration and better protection of geographical indications relating to goods." Geographical indications protection allows producers of commodity products such as rice to differentiate their production from the generic commodity and thus to secure premium prices.

The definition of geographical indications in section 2(3) of the GI Act utilizes the language of TRIPS Article 22.1 in requiring an indication which associates the quality or characteristics of goods with their place of production.

To date 12 geographical indications have been registered for rice in India of which six are from Kerala: "Navara Rice," "Pokhali Rice," "Palakkadan Matta Rice," "Wayanad Jeerakasala Rice," "Wayanad Gandhakasala Rice," and "Kaipad Rice." In the cases of Navara and Pokhali rice, the geographical indication is indirect, as the geographical origin has to be inferred from the name. The other six registered geographical indications for rice also include a number in which the geographical origin has to be inferred from the name: "Kalanamak Rice" (of Uttar Pradesh) "Ajara Ghansal Rice" and "Ambemohar Rice" (of Maharastra) "Gobindobhog Rice" and "Tulapanji Rice" (of West Bengal). Basmati Rice," as registered as a geographical indication for rice produced in the states of Punjab, Haryana, Delhi, Himachal Pradesh, Uttarakhand, and parts of western Uttar Pradesh and Jammu & Kashmir[2]. Madhya Pradesh, Rajasthan and Bihar were excluded from this registration, on March 15, 2018 as not being in the traditional Basmati rice growing area in the Indo-Gangetic Plain' (S.S. Rana & Co, 2018). In relation to the final rice geographical indication: "Joha rice of Assam," the geography is explicit.

The reputation of a product, being associated with a geographic area is usually established by resort to historical writings. In the application for the registration of "Navara Rice," reference was made to mention of the therapeutic qualities of the rice in the *Susruta Samhita* (2500 BCE) and the *Ashtanga Hridaya* (500 BCE)[3]. The Statement of Case for "Palakkadan Matta rice" traces it to the times of the Cheras and Cholas (first to fourth century BCE) when the Palghat District, where it is grown was part of Tamil Nadu and is referred to in the Tamil classic *Tirukkural* (dated variously from 300 BCE to seventh century CE)[3]. In the applications made for "Wayanad Jeerakasala Rice" and "Wayanad Gandhakasala Rice" reference is made to mentions of the cultivation of these rices in the "old verbal recitations in Malayalam called "Krishippatu" describing the agricultural practices followed in Malayalakkara during the seventeenth century[3]. In the application for "Kaipad rice" it is conceded that the name "Kaipad" was not explicitly referred to in the ancient "Kayal literature"[3], but was mentioned by Francis Buchanan in *A Journey from Madras through the Countries of Mysore, Canara, and Malabar*, which he undertook in 1801–1802[4]. Finally, in the application for "Pokkhali rice" the applicants refer to extracts from the Cochin State Manual published by the Cochin State Government in 1911, which contains "a detailed description of Pokkhali cultivation mentioning characteristics of traditional Pokkhali cultivars and its peculiar agro-climatic and soil characteristics."[3]

[2]Reg. No 145.

[3]Application form, available at http://www.ipindia.nic.in/registered-gls.htm (accessed December 18, 2019).

[4]Reprinted by Cambridge University Press, 2012.

TABLE 2 | Registered Geographical Indications of Traditional Rice from Kerala.

Cert. no	Geographical indication	Applicant	Date available
40	Navara rice	Navara Rice Farmers Society Navara Eco Farm, Karukamanikalam, Chittur College, P.O., Palakkad−678 104, Palakkad, Kerala	20/06/2007 Until 24/11/2024
41	Palakkadan matta rice	Palakkadan Matta Farmers Producer Company Limited Karukamanikalam, Chittur College P.O., Palakkad−678104	20/06/2007 Until 17/04/2025
81	Pokkali rice agricultural	(i) Kerala Agricultural University P.O. Thrissur District, Kerala−680 656 (ii) Pokkali Land Development Agency, N. Paravur, Ernakulam District, Kerala	26/05/2008 Until 28/01/2027
137	Wayanad jeerakasala rice	(i) Kerala Agricultural University and (ii) Jilla Sugandha Nellulpadaka Karshaka Samithi, Rural Agricultural Wholesale Market, Sulthan Bathery, Wayanad−673 592, Kerala	31/05/2010 Until 21/09/2019
138	Wayanad gandhakasala rice	(i) Kerala Agricultural University and Wayanad (ii) Jilla Sugandha Nellulpadaka Karshaka Samithi	31/05/2010 Until 21/09/2019
242	Kaipad rice	(i) Malabar Kaipad Farmers' Society Ezhome Grama Panchayat, Ezhome P.O, Kannur−670 334, Kerala (ii) Kerala Agricultural University	30/10/2013

Source: "Registered GIs" Geographical Indications Registry available online at http://ipindiaservices.gov.in/GirPublic/Application/Details/81 (accessed 11 August 2019).

Registrants of Geographical Indications for Rice From Kerala

The GIs Act establishes a system for the registration of geographical indications. Section 11(1) of the GIs Act provides geographical indications may be registered by "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 the producers of the concerned goods…" Generally, these applicants are involved in ensuring that farmers cultivating the varieties embraced by the geographical indication registrations, adhere to prescribe cultivation and processing standards. This has the effect of preserving the commercial reputation of the geographical indication. The registrants of the geographical indications for traditional rice varieties from Kerala are listed in **Table 2**.

The applicant for the "Navara" geographical indication was the Navara Rice Farmers Society, at Karukamanikalam, near Chittur. Its President, Mr. P. Narayanan Unny, was the proprietor of the Navara Eco Farm, at which purification of the Navara variety had been undertaken since 1994 (Priyadershini, 2018). Mr. Unny, had apparently sought to register the geographical indication with three farmers from his farm, but this had been rejected by the Geographical Indications Registry which said that it was not prepare to accept a geographical indications

registration from a single farm (Shaji, 2018) and the Navara Rice Farmers Society, was established to overcome this difficulty (Marie-Vivien, 2015). The Registry sought assurances that the interests of other Navara rice growers would be represented by the Society (Marie-Vivien, 2015, text at n. 24). The applicant consulted with stakeholder farmers, the Kerala Agriculture University, rice millers and traders (Priyadershini, 2018) and the assistance of the National Bank for Agriculture and Rural Development (NABARD) was obtained for seed purification, multiplication and expansion of the area of cultivation (The Hindu, 2010).

The "Palakkadan Matta Rice" registration was obtained by the Palakkad Matta Farmers Producer Company Ltd, whose Chairman was Mr. P. Narayanan Unny, the President of the Navara Rice Farmers Society. The company comprised 10 of the 5,000 producers of the varieties embraced by the registration (Marie-Vivien, 2015).

The Pokkali Land Development Society and Kerala Agricultural University (KAU) were joint applicants for the geographical indication "Pokkali Rice" (The Hindu, 2006). They are also the inspection bodies named in the registration[3].

KAU and the Wayanad Zilla Nellulpadaka Karshaka Samithi (a farmers' collective), were joint applicants for the geographical indications "Wayanad Jeerakasala Rice" and "Wayanad Gandhakasala Rice" (The Hindu, 2010).

The Malabar Kaipad Farmers' Society (MKFS) of Ezhome obtained the registration of the geographical indication "Kaipad Rice" (Nazeer, 2014). The society was formed for the promotion of "Kaipad" farming in Kannur, Kasaragod, and Kozhikode on the initiative of the College of Agriculture at Padannakkad in Kasaragod (Nazeer, 2014).

RELATIONSHIP BETWEEN RICE REGISTERED UNDER THE PPVFRA AND THE GIs ACT

The existence of two separate pieces of legislation applying to farmers' varieties is a recipe for confusion if the separate functions of both pieces of legislation are not appreciated. The PPVFRA is concerned with the registration of farmers' varieties and the GIs Act is concerned with the designations under which varieties are marketed.

Confusion may arise for because a number of different varieties of rice can be embraced by a single geographical indication. For example, the registration of the geographical indication "Navara rice" covers two varieties of Navara: black glumed and yellow glumed. The registration of the geographical indication "Palakkadan Matta" include 10 varieties: Aryan, Aruvakkari, Chitteni, Chenkazhama, Chettadi, Thavalakanna, Eruppu, Poochamban, Vattan Jyothy, and Kunjukunj (The Hindu, 2008). and the registration permits the addition to this list of more rice varieties with matta properties and cultivated in Palakkad can be added after examination (see discussion in Kochar, 2008, p. 341). However, it should be noted that the geographical indications registration only concerns the right to use the registered designation in marketing and does not affect the right of farmers to cultivate the varieties which are included in a registered designation.

An illustration of some of the confusion surrounding the legislation protecting farmers' varieties is a report that on 1 June 2018 that the state government of Kerala and the Kerala Agriculture University had objected to a petition filed by a farmer from Palakkad for registering "Navara" under the PPVFR Act (Sushma, 2018). The basis of the objection was that as Navara had been cultivated for centuries it was "not ethical to patent it under a single farmer's name" (Sushma, 2018). This report illustrates some confusion about the effect of the registration of a farmers' variety, which has nothing to do with patenting.

Interestingly, the applicant for registration of Navara as a farmers' variety under the PPVFR Act. had already secured registration of Navara as a geographical indication under the GIs Act. This registration did not confer exclusive marketing or cultivation rights upon the registrant, but merely protected the right of farmers in the geographical area associated with Navara cultivation, to use the designation in the marketing of their products.

It should be noted that the PPVFR Act provides in section 15(4) that a new variety shall not be registered under the Act "if the denomination given to such variety—(viii) is comprised of solely or partly of geographical name." However, a proviso to section 15(4) states that "that the Registrar may register a variety, the denomination of which comprises solely or partly of a geographical name, if he considers that the use of such denomination in respect of such variety is an honest use under the circumstances of the case."

LEGISLATIVE SUPPORT FOR AGRICULTURAL INNOVATION-IN INDIA-LITERATURE REVIEW

As recited in Article 7 of the TRIPS Agreement, intellectual property rights should contribute to the promotion of technological innovation and technology transfer, by providing incentives for investment and research. However, in the field of agricultural innovation the literature does not provide very strong support for this proposition. It has been observed that the vibrant Indian seed industry developed in the absence of intellectual property protection (e.g., Gadwal, 2003; Pal et al., 2007). It has been pointed out that even in the USA, there is little evidence that plant variety rights protection has resulted in an increase in the range of plant materials available to farmers or to an increased rate of innovation (Alston and Venner, 2002; Carew and Devadoss, 2003; Kolady and Lesser, 2009). There is limited experience from developing countries on the impact of plant variety protection. It has been suggested that in countries such as India and China, where it is difficult to ensure the physical security of inbred lines because of the close proximity of plots of competing enterprises, plant variety rights protection is welcomed for protecting hybrid varieties (Correa, 2015). A 2004

survey of Indian seed breeders suggested that diversification of farmers into self/open pollinated varieties would be contingent upon the effective implementation of plant variety protection (Srinivasan, 2003). The survey also indicated that the lack of this protection was a major constraint in obtaining elite varieties from abroad.

In relation to rice cultivation in Kerala, the experience seems to suggest that the separate statutes which purport to encourage agricultural innovation appear to be somewhat contradictory in their operation and do not have the full support of beneficiary communities.

The registration of "Palakkadan Matta Rice" as a geographical indication was apparently obtained in the face of opposition from the scientific community in the state and the Department of agriculture "refuted any link between geography and Palakkad matta rice" (ICAR, 2007). Additionally, the millers who have major say in deciding the market price of rice claim that the registration was not going to increase the price of Palakkadan matta and claimed that the quality of the rice came from milling and had no link to the geography (ICAR, 2007). An academic study undertaken in Chittur taluk of Palakkad district, in 2011 concluded that the impact of GI registration "was marginal in terms of increase in annual agricultural income and possession of farm and household assets" but that" GI registration was partially successful in securing higher price (Rs. 14.01/kg), maintaining area of cultivation and increasing institutional participation among farmers" and that consumers preferred the GI rice (Rose, 2011). On the other hand, an UNCTAD study disclosed that origin guaranteed agricultural products could secure a price premium in India of between 10 and 15% (Das, 2009).

A recent study of the impact of geographical indications on the well-being of rice farmers in Kerala confirmed that a price premium could be secured for rice marketed under its geographical indication (Radhika et al., 2018). It noted that the financial returns were greatest for Navara followed in order by Palakkadan Matta, Gandhakasala, Kaipad, Jeerakasala and Pokkali and that this was attributed to the energy involved in the marketing of the different rice types under their geographical indication (Radhika et al., 2018, pp. 8–9).

In a study of the attitude of farmers to the registration of the geographical indication for Pokkali rice, Anson and Pavithran (2014) suggest a generally indifferent or negative reaction of farmers, with a threat to the sustainability of the production of the rice over the next 10–20 years because the new generation was not willing to continue with for Pokkali rice production. They also suggest that rethinking of the GI Act is necessary as although the economic value of the GI products in the market is very high, supply chain management is not in the hands of the producers and thus the major profit goes to intermediaries.

Soam (2005) mentions the symbiotic relationship between Pokkali rice and prawn production in the flooded paddy fields and that paradoxically, the greater profitability of prawns is causing farmers to abandon rice production. Soam (2005) also mentions the potential for Jeerakasala and Gandhakasala rice, scented varieties grown organically in the Wayanad District of the Kerala State, especially by the Kurichiyas tribe, to be marketed by GIs.

A major obstacle which has been identified to the development of export markets for farmers' varieties of rice are the restrictions imposed by the Indian Government on non-Basmati rice (GoI, 2015; Adhikari et al., 2016).

SURVEY METHODOLOGY

Field visits were organized in the three principal traditional rice-producing districts in Kerala viz., Wayanad, Malappuram and Palakkad, during the crop years 2018 and 2019. Since authentic records or lists of such farmers were not available, focus group discussions were conducted in each of the districts comprising scientists, regional agricultural development officers in the state, lead farmers, local government members and other development workers at the local level. Information regarding farmers predominantly cultivating traditional rice varieties was sought during these discussions and lists of farmers were compiled.

The data collection combined quantitative and qualitative surveys, which were all conducted through on-site interviews. The quantitative survey was conducted through a questionnaire with both open and closed questions. We interviewed 374 farmers in Wayanad, 285 in Malappuram and 314 in Palakkad. Thirty percent of the sample was decided as the sample size and rounded to 100 for uniformity in size from each district. A first overview of the results was presented in two focus group meetings that were held in April, 2018 and April-May, 2019. These meetings were attended by researchers from Kerala Agricultural University and from the University of Western Australia.

The questions of the quantitative survey focused on the various structural and socio-economic features of the traditional rice cultivation system that were relevant for the analysis of farmers' knowledge of the PPVFR Act and the GIs Act in promoting agricultural innovation (questionnaire in **Annex 1**).

Qualitative interviews, conducted through an interview outline based on semi-directive questions, derived from the questionnaire in **Annex 1**, were held with MSSRF, Thanal, an NGO in Wayanad, which has been working with traditional rice farmers for a number of years and Thirunelly Agri Producer Company Ltd, a farmers' collective. These were considered to be the local NGOs with the greatest interest in traditional rice cultivation in Kerala.

SURVEY RESULTS

The objective of the surveys undertaken was to evaluate the effectiveness of the PPVFR Act and the GIs Act in promoting agricultural innovation among rice farmers in Kerala. The results of the survey disclose a range of reasons that the respondent farmers gave for cultivating traditional rice varieties (**Table 3**).

The reasons expressed by farmers show some innovation in the perception about their choice of variety. The palatability,

TABLE 3 | Reasons given by farmers for choosing to cultivate traditional varieties.

Variety	Reason for adopting the variety
Valichoori	Higher productivity; procurement by Government agency; to be in unison with neighboring farms
Gandhakasala	Aromatic rice; commanding higher price; demand from friends and relatives; suitable as fodder; Higher milk yield if used as fodder; higher tolerance to pest and diseases
Jeerakasala	Aromatic rice; commanding higher price; demand from friends and relatives
Adukkan	Considered to be very healthy; resistant to pests; usage as fodder; to be in unison with neighboring farms; seed availability, relatively large grains
Navara	Medicinal value; demand from the miller; permanent buyers
Chitteni	Traditionally followed variety; Low pest attack; chemicals not required; taste; guaranteed yield; tolerance to pest and diseases
Rakthasali	Demand from the miller; seed availability; permanent buyers
Thondi	Traditionally followed variety; low pest attack; usage as fodder; tasty considered to be healthy; to be in unison with neighboring farms

higher straw yield and straw preference by cattle are reasons expressed by farmers from other parts of India too, for preferring traditional rice varieties (Basu, 2017).Even though, as per the following table, farmers are largely unaware of the legislative support for these varieties, at least the popularity and mention they have received in the media, due to Government recognition have led to these varieties remaining in the mainstream. Farmers are aware of their multiple superior qualities, as expressed above and try to sustain their cultivation. Thus, legal recognition, even though not so far tangibly beneficial to the farmers, seems to have motivated some younger farmers to go for traditional varieties, and with extension efforts this trend might develop.

The survey results point toward this. Total area cultivated by farmers below 45 years of age was more than 25% under traditional rice, where as in the case of modern varieties this percentage was less, as is supported by the observations of Rose (2011), Radhika (2014), and Shamna (2014) (**Table 4**).

However, most of the farmers were not aware about the legislative support available for those who cultivate these varieties and the benefits that can be accrued.

The cultivation of traditional rice varieties in Kerala has to be seen in the context of a 70% decline from 1960–61 to 2009–10 in the area under paddy cultivation. The constraints identified by farmers as impacting traditional rice cultivation are identified in **Table 5**.

The three NGOs which were interviewed identified the legislative support for agricultural innovation in the context of their particular missions. Thus, MSSRF utilized the PPVFR Act as a vehicle for genetic resource conservation, but had shifted its focus to conservation of rice within the Indian Biological Diversity Act 2002. Thanal's primary concern was with the promotion of organic rice farming in Kerala and urged practical government support for the cultivation of traditional varieties through the popularization of those varieties in the local markets as well as through the public distribution system of the state and post-harvest support, for storage and processing at the local level and particularly for small scale farmers. Thirunelly Agri Producer Company was primarily concerned with the marketing of rice and urged that government policy for traditional rice should be consistent from year to year and that there should be a guaranteed minimum price. It made no reference to the GIs Act as an aid to traditional rice marketing. Each of these NGOs regarded the intellectual property laws in support of agricultural innovation to be of little effect.

CONCLUSIONS

Even though Kerala has the highest (Human Development Index (HDI) in India (0.72 in 2015) and literacy rate (93.91 in the 2011 census) among the Indian states, the farmers surveyed disclose an imperfect and vague knowledge of the functions and details of the PPVFR and GIs Acts. For example, the protection of the varieties Chitteni Chettadi and Thavalakkannan were erroneously reported by the farmers surveyed as being protected by a geographical indication[5]. Also unclear on the part of respondents was who benefitted from the two different kinds of protection and the effects of registration.

The registration record discloses that all of the farmers' varieties from Kerala registered under the PPVFR Act were obtained by the M S Swaminathan Research Foundation. As it mentioned, its primary motivations for these registrations were to preserve biodiversity and to promote sustainable agriculture (Swaminathan Foundation, 2018). There is no indication as to whether the registered farmers' varieties have contributed to the development of new rice varieties. There is also no evidence of any attempt by SEED CARE or farmers from Kerala to seek any benefit-sharing in relation to use of the registered farmers' varieties in the development of new varieties.

There is no indication as to the reasons for the selection by SEED CARE from these varieties of the 15 which they have registered. The SEED CARE 2014–15 Annual Report refers to "SEED CARE" as a brand name for the marketing of traditional varieties of rice and Chennellu and Gandhakasala as priority varieties for this marketing (SEED CARE, 2015, p. 36). Its marketing of Gandhakasala, might bring it into conflict with KAU and Jilla Sugandha Nellulpadaka Karshaka Samithi, which have secured registration of the geographical indication "Wayanad Gandhakasala Rice." The marketing by SEED CARE of Chennellu might cause difficulties with the Palakkad Matta Farmers Producer Company Ltd, which has included the variety in its registered geographical indication: "Palakkadan Matta Rice."

A number of farmers surveyed expressed some skepticism about the usefulness of geographical indications in securing higher prices for Palakkadan Matta Rice (see also Ajayan, 2009)

[5]In fact, none of these varieties have been registered under the PPVFR, however they are typically marketed under the geographical indication "Palakkadan Matta."

TABLE 4 | Total area under traditional rice by category of age among sample respondents.

Age group	Malappuram	%	Wayanad	%	Palakkad	%	Total	%
25–34	0.71	1.61	0.63	1.11	0.22	0.32	1.56	0.92
35–44	9.41	21.41	23.44	41.65	11.36	16.38	44.21	26.07
45–54	10.62	24.17	9.40	16.7	11.09	16	31.11	18.35
55–64	15.42	35.08	14.25	25.32	20.26	29.22	49.93	29.45
65–74	7.13	16.23	6.23	11.08	22.34	32.24	35.71	21.06
75–85	0.66	1.50	2.33	4.14	4.05	5.84	7.04	4.15
Grand total	43.96	**100.00**	56.28	**100**	69.32	**100**	169.56	100.00

Source: Field survey results 2018–19.

TABLE 5 | Constraints experienced by farmers in traditional rice cultivation.

Sl No		Wayanad $n = 100$	Malappuram $n = 100$	Palakkad $n = 100$	Total $N = 300$
1	Labor shortage	77	71	75	74.33
2	Higher wage rates	77	71	75	74.33
3	Lack of institutional support	66	71	75	70.67
4	Labor migration	69	73	70	70.67
5	Delay in payment of Govt assistance	69	65	62	65.33
6	Water availability	63	57	61	60.33
7	Paddy land conversion	43	57	55	51.67
8	Lack of milling facility	58	44	46	49.33
9	Transportation	65	27	34	42.00
10	Low price of produce	39	41	44	41.33
11	Birds as pest	24	39	35	32.67
12	Poor maintenance of irrigation infrastructure	21	26	30	25.67
13	Procurement delays and issues	45	14	12	23.67
14	Low yield	13	21	25	19.67
15	Neighborhood practices	12	24	19	18.33
16	Animal attack	45	0	0	15.00
17	Lack of access to technology	13	9	7	9.67

Mr. P. Narayanan Unny, the President of the Navara Rice Farmers Society, was quoted as saying that there was a market for this rice among the Keralite population in West Asia, Europe and the USA, but that "the GI status we earned after years of work has not added any flavor to the lives of farmers as we expected" (Ajayan, 2009).

As the cultivation of traditional rice varieties is dependent on the price received, the use of GIs. will help the realization of premium prices and attract more farmers to traditional rice cultivation (Radhika et al., 2018) However, a number of the farmers surveyed identified high labor costs as outweighing the returns from price premiums for rice sold under geographical indications (see also Ajayan, 2009).

The protection and marketing of farmer varieties of rice is a matter of crucial importance in a state like Kerala, which is a representative of a modern agricultural state in an advanced developing country. Although the PPVFR Act and the GIs Act represent legislative initiatives of the Indian Government, designed and advanced for sustaining traditional agriculture, they appear to be unnoticed by the target beneficiaries. The different objectives of the two Acts are unclear, and they are not considered to be user friendly. Agricultural extension programmes with the assistance of legal could address this situation.

The decline in cultivation of traditional rice varieties attributable to the constraints identified in **Table 5** are supported by Karunakaran (2014) who refers to reduced price expectations, reduced availability of labor, impact of government strategies, agro-climatic conditions, irrigation facilities, expected yield, cost of cultivation and declining soil fertility" (Karunakaran, 2014, 22).

Finally, it should be acknowledged that in Kerala, as in many other developing countries, agriculture is a way of living and a continuity of tradition for the average farmer, who has traditionally survived on subsistence production (Kwa, 2001). Viewing agricultural production and marketing as entrepreneurial activities appears to be alien to most farmers. At the same time the increasing urbanization and diversification of occupations in Kerala is relegating traditional rice cultivation to a less significant position in the state economy.

DATA AVAILABILITY STATEMENT

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Human Research Ethics Committee, University of Newcastle, Australia. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

MB wrote the legal material and composed the article. JK and RR conducted the surveys in Kerala. KS provided the agricultural policy material.

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SUPPLEMENTARY MATERIAL

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