RESEARCH ARTICLE

Traditional Rice Farming in Wayanad, Kerala: Insights into Varieties and Farmer Perspectives

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Abstract

The Indian subcontinent hosts a rich diversity of rice landraces. Because of their superior adaptation to the local climate, disease resistance, and other traits, several traditional paddy varieties have been maintained and cultivated over the years. The rising adoption of hybrid rice varieties due to the growing demand for food, on the other hand, places traditional varieties' existence under threat and could eventually lead to their extinction. The present study intends to document the traditional rice varieties utilised in the Wayanad region in Kerala and the reasons why farmers prefer them to hybrid varieties, through field trips and interviews. During the research, we interviewed 15 traditional rice farmers. Through literature reviews and interactions with farmers, we were able to compile information about the traditional rice varieties grown in the Wayanad district. These include the varieties Aayiram kana, Thondi, Gandhakashala, Chennellu, Njavara, Mullankaima, and Jeerakashala. Natural disasters, lack of available labor, and lack of proper policy from the government were the most significant challenges that farmers faced. The findings showed that farmers in Wayanad continue to grow traditional rice types for several reasons, including self-consumption, adherence to tradition, and protection of genetic diversity. In a world where lifestyle disorders are common and the need for food is continuously increasing, efforts must be hastened to document, conserve, and promote indigenous rice varieties with therapeutic benefits and resilience to diseases and stress. Moreover, traditional rice farming may pave the path for sustainable agriculture due to its lower cost and maintenance requirements. The present study serves as a repository for the Wayanad indigenous varieties that are being cultivated and the rationale behind this practice.

Highlights:

- Documented 7 indigenous rice varieties in Wayanad, Kerala.
- Nearly 55 traditional varieties have vanished from Wayanad.
- Major challenges: labour shortage, ineffective policies, wildlife interference, price fluctuations
- Urgent need for documentation, conservation, and policy action.

Keywords: Rice, Traditional varieties, Kerala, Farmers, Genetic diversity

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Introduction

More than half of the global population, especially in Asia, relies on rice (*Oryza sativa* L.) as a primary source of nutrition (Mondal *et al*., 2021). 60% of the world's population resides in Asia, where more than 90% of rice is cultivated and consumed. Rural residents rely heavily on rice production for their livelihood (Gosal *et al*., 2009). India, like many other countries in South Asia, consumes a lot of rice in various forms, including cooked, puffed, and pounded. Rice production and trade have converged in Southeast Asia (SEA) as a major economic sector (Baldwin *et al*., 2012). In 2016, 90% of the world's rice supply was produced in Asia, where a total of 453.2 million tonnes of rice were harvested (Omar *et al*., 2019). In tandem with the rising global population, the need for rice is forecast to rise. As a result, the Asian region as a whole is perpetually preoccupied with finding solutions to meet the rising demand for rice (Omar *et al*., 2019).

The Indian subcontinent is known for its remarkable variety of rice landraces, which contribute to the region's agricultural heritage (Mondal *et al*., 2021). These landraces, or traditional paddy varieties, have been nurtured and cultivated over generations due to their exceptional adaptation to the local climate, resistance to diseases, and possession of other favorable traits (Mathew *et al*., 2023). However, the increasing popularity and adoption of hybrid rice varieties pose a significant challenge to the existence and preservation of these traditional varieties, ultimately placing them at risk of extinction. The rich diversity of rice landraces in the Indian subcontinent is a result of centuries of careful selection and cultivation by farmers (Haydock *et al*., 2021). These landraces have evolved through natural and human-driven processes, adapting to various local agro-climatic conditions across the subcontinent. However,

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the growing demand for food, coupled with the desire for increased productivity and profitability, has led to the widespread adoption of hybrid rice varieties. As a result, farmers have gradually shifted away from traditional varieties, resulting in their neglect and reduced cultivation (Mathew *et al*., 2023). This shift towards hybrid rice cultivation poses a serious threat to the existence and conservation of traditional paddy varieties (Tripathi *et al*., 2019). If traditional landraces are no longer actively grown and conserved, they become vulnerable to genetic erosion and the loss of unique traits. The potential extinction of these varieties would not only result in the loss of cultural heritage and culinary diversity but also limit the options for future crop improvement and adaptation to changing environmental conditions. The primary objective of the present study is to document the traditional rice varieties that are utilised by farmers in the Wayanad region of Kerala. The study aims to understand the reasons behind farmers' preference for these traditional varieties over hybrid varieties.

Materials And Methods

The research was conducted in the Wayanad region of Kerala (11.7032° N, 76.0834° E), India (Fig. 1). Fifteen traditional rice farmers from different areas within Wayanad were selected as participants in the study. The selection aimed to represent a diverse range of farmers practicing traditional rice cultivation. Structured interviews were conducted with the selected farmers using the snowballing technique (Biernacki & Waldorf, 1981). The interviews aimed to understand the reasons behind farmers' preference for traditional rice varieties over hybrid varieties. Open-ended questions were used to gather qualitative data on various aspects such as taste preferences, cultural significance, market demand, seed availability, and perceived benefits of traditional varieties. Through literature surveys and field visits, information regarding the traditional rice varieties of Wayanad was collected. During the field exploration and interviews, detailed records were maintained to document the characteristics of the traditional rice varieties cultivated in Wayanad.

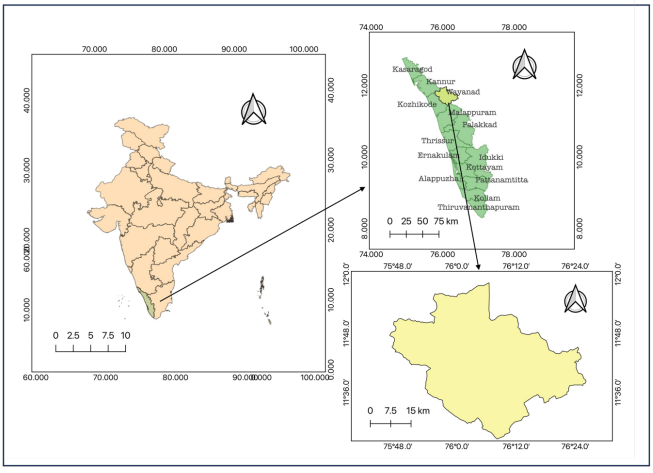

Fig. 1: Site indicating where the present study was conducted

Results and Discussion

Profile of the selected traditional rice varieties

The study identified seven traditional rice varieties that are presently being cultivated in the area under investigation (Fig. 2). Information regarding the traditional rice varieties of Wayanad, namely *Aayiram kana, Thondi, Gandhakashala, Chennellu, Njavara, Mullankaima,* and *Jeerakashala*, was collected through a literature survey. A detailed profile of the selected traditional rice varieties is represented in Table 1. The traditional rice varieties that have been carefully selected possess exceptional characteristics that make them stand out in various aspects. Among their remarkable qualities are their strong resistance to diseases and their significant medicinal potential. Moreover, it has a high concentration of bioactive phytochemicals like oryzanol, lecithin, tocopherols and tocotrienols and micronutrients like Cu, Fe, Mn and Zn showing significant health benefits like antioxidant effect, antidiabetic effects, anticancer effects, anti-inflammatory effect, neuroprotective effects, and works against Alzheimer's disease (Azmi *et al*., 2013; Horie *et al*., 2016; Imam *et al*., 2012; Imam & Ismail, 2013; Kim *et al*., 2013; Li *et al*. 2011; Lin *et al*., 2019; Matsumoto *et al*., 2016; Okuda *et al*., 2018; Quagliariello *et al*., 2016; Veena *et al*., 2023; Wu *et al*., 2013; Wunjuntuk *et al*., 2016). Three of the seven traditional varieties, *Gandhakashala, Mullankaima,* and *Jeerakashala*, are aromatic (Table 1). *Gandhakashala*, a translucent gem among the traditional rice varieties of Wayanad, is renowned for its pearl-like appearance after cooking (Rasheed *et al*., 2021).

The traditional rice varieties Jeerakasala and Gandhakasala are highly regarded in the Wayanad district of Kerala. Jeerakasala is noted for achieving the highest straw yield of 4385 kg/ha (~1774 kg/acre), while Gandhakasala yields 4038 kg/ha (~1634 kg/acre) (Susamma *et al*., 2005). Among the 160 traditional rice varieties found in Wayanad, nearly 55 have unfortunately become extinct. This situation necessitates the implementation of a robust procurement system and diligent supervision by public sector or governmental bodies. Furthermore, surveys in Wayanad reveal that the Valichoori variety, which is protected under the Protection of Plant Varieties and Farmers' Rights Act (PPVFRA, 2018), exhibits the highest levels of productivity.

A key factor that makes these traditional rice varieties special is their diverse crop durations. Ranging from 70 days for *Njavara* to 180 days for *Aayiram kana* and *Mullankaima*, these rice types cater to different agricultural and culinary needs. The shorter crop duration of *Njavara* allows for quicker harvests and a shorter cultivation cycle, making it a practical choice for regions with limited growing seasons or for farmers seeking multiple harvests in a single year. *Njavara*, rooted in Ayurvedic medicine, is a medicinal rice variety cultivated in the low-lying regions of Wayanad (Deepa *et al*., 2008). Treasured for its use in rejuvenating therapies, *Njavara* rice possesses a balanced nutritional profile and specific phytochemicals with therapeutic efficacy, like in the treatment of neurotic issues (Deepa *et al*., 2008; Rasheed *et al*., 2021). *Njavara* rice is renowned for its high protein, vitamins, fibre, and mineral (Phosphorus, Potassium, Magnesium, Sodium, and Calcium) content (Deepa *et al*., 2008). On the other hand, *Aayiram kana* and *Mullankaima*, with their longer crop durations, demonstrate resilience and adaptability to

Fig 2: Traditional Rice varieties of Wayanad. A) *Aayiram kana*; B) *Thondi*; C) *Gandhakashala*; D) *Chennellu*; E) *Njavara* F) *Mullankaima*; G) *Jeerakashala*

various environmental conditions, offering sustainable options for those looking for enduring rice varieties. In terms of yield, *Aayiram Kana* possesses a high yield (2200 kg/acre), whereas *Gandhakashala* and *Mullankaima* (825 kg/acre) were found to be the low-yielding varieties among the studied varieties (Table 1). *Aayiram Kana,* a cherished traditional rice variety in Wayanad, is known for its unique characteristics, high-yielding nature, and tolerance to diverse agro-climatic conditions (Rasheed *et al*., 2021). It plays a crucial role in sustaining food security for local communities.

Thondi, cultivated in the hilly terrains of Wayanad, stands out with its tall stature and aromatic grains (Muralikrishnan *et al*., 2021). *Chennellu*, also known as Kerala red rice, predominates the midlands of Wayanad. Its red pericarp indicates a high anthocyanin content, conferring potent antioxidant properties (Kerala State Biodiversity Board, 2021). *Mullankaima*, cultivated in the fertile Kuppam region of Wayanad, has gained attention for its high iron content. Consumption of this traditional rice variety may be beneficial in combating iron deficiency anemia, and studies have investigated its effectiveness in improving iron bioavailability (KAU, 2018). *Jeerakashala*, or Wayanadan Jeerakasala, is a traditional rice variety grown in the undulating terrains of Wayanad. Valued for its unique flavor and aroma reminiscent of cumin seeds (jeera), *Jeerakashala* rice has a low glycemic index, making it a suitable choice for individuals with diabetes (KAU, 2018). While comprehensive phytonutrient profiling of modern rice varieties (MRVs) is limited, however, availiable evidences indicates lower concentrations of bioactive compounds compared to traditional rice varieties (Tables 1 & 2).

Demographic Information of Surveyed Farmers

For this research study, a mixed-method approach was employed to gather comprehensive data on traditional rice varieties from local farmers of the Wayanad district. Both in-person and over-the-phone interviews were conducted with fifteen farmers who cultivate traditional rice varieties, selected randomly from different villages in the study area. The interviews were designed to capture valuable insights into the farmers' knowledge, practices, and perceptions regarding traditional rice cultivation. Among the fifteen farmers surveyed, a diverse age range was represented, providing a holistic view of generational involvement in traditional rice farming. The largest age group consisted of farmers aged 50 to 65, comprising 40% of the respondents. The second-largest age group included farmers aged 65 to 80, accounting for 33% of the participants. Farmers aged 35 to 50 constituted 27% of the surveyed population. This age distribution highlights the continued interest and engagement of the older generations in preserving the traditions of rice cultivation, while also indicating the involvement of younger farmers in this practice.

Regarding their educational backgrounds, the surveyed traditional farmers exhibited a range of educational levels. A little over half of the participants (53%) had completed high school. Meanwhile, 27% of the farmers had completed Upper Primary education, which includes elementary and middle school levels. An additional 13% had achieved Higher Secondary education, reflecting their attainment of secondary school qualifications. The remaining 7% had completed Primary School education. These findings reveal the diverse educational backgrounds of traditional rice farmers, emphasising that the cultivation of traditional rice varieties is not limited to those with higher or lower education levels. Instead, it is a practice embraced by farmers from various educational backgrounds, showcasing the inclusive and egalitarian nature of traditional farming practices in the region.

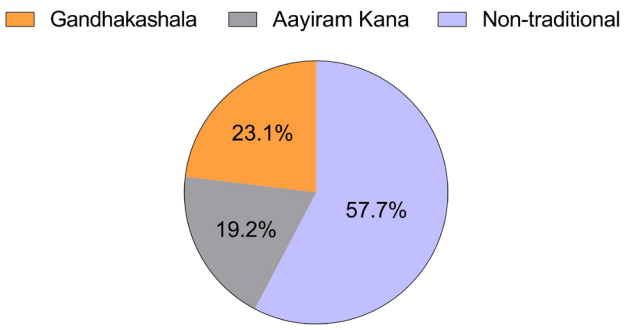

Fig 3: Traditional and non-traditional varieties cultivated in Wayanad

Table 1: Profile of the selected traditional rice varieties

Sl. No.	*Variety*	*Crop duration (days)*	*Grain type*	*Yield/acre*	*Properties*	*Other information*
1	*Aayiram Kana*	180	Grain is straw in color	2200 kg	High biotic/abiotic stress tolerance	Less input requirement (Lopus, 2024)
2	*Thondi*	120	Grain is Red in color, short grain length, medium grain width	1040 kg	Source of vitamin B, High fibre content, Resistant to pest attack	Lodging, used as fodder, culinary importance (Koshy *et al*., 2025, Krishnankutty *et al*., 2025)
3	*Gandhakashala*	120-160	Grain is straw in color Short length, medium with, round grains, white kernel	825 kg	High amylose, potassium, and antioxidants. Tolerant to pests and diseases	Aromatic rice, lodging, Khariff season crop, used as fodder. (Manjunatha *et al*., 2018)
4	*Chennellu*	120	Grain is golden yellow or red grains in color , short grain length, narrow grain width	1512 kg	Resistant against bacterial blight	Lodging, Red type during Khariff season in uplands and yellow type during khariff and rabi season in wetlands, Used in the treatment of diarrhea and vomiting, used as fodder (Koshy *et al*., 2025)
5	*Njavara*	70-75	Grain is yellow or black in color Tall, lanky lodging, short to medium panicles, red kernal, medium grain length, narrow grain width	1600 kg	Rich in vitamin C, antioxidants, proteins, and phenolic (12.4 mg GAE/g bran), flavonoid (8.5 mg QEE/g bran), fiber content. pest and disease-resistant,	Non-Aromatic rice, Low-yielding, Khariff season in uplands and summer crop in wetlands, anti-inflammatory activity, improves lactation, effective in psoriasis and skin lesions treatments. (Joseph *et al*., 2007; Rao *et al*., 2010)
6	*Mullankaima*	160-180	Grain is straw in color	825 kg	Resistance to drought, High vitamin A content	Easy to digest, aromatic rice, used as fodder (Lopus, 2024)
7	*Jeerakashala*	140-150	Grain is straw in color with golden yellow streaks; slightly longer and slender grains, white kernel	960 kg	High fiber content, antioxidant properties, rice is suited for diabetic persons due to its low calories	Aromatic rice, lodging, Khariff season crop, resistant to pests and disease, susceptible to lodging (Manjunatha *et al*., 2018)

The survey conducted among farmers provided valuable insights into their vast experience and expertise in agriculture. Among the surveyed farmers, a significant proportion, 60%, boasted a considerable 10 to 30 years of experience in farming. Remarkably, 20% of the participating farmers stood out with over 50 years of experience in the field of agriculture. These seasoned farmers brought with them a wealth of traditional knowledge and wisdom passed down through generations, contributing to the preservation and continuation of time-tested farming practices. Additionally, the survey revealed that 13% of the farmers were relatively newer entrants to the agricultural domain, with below ten years of experience. Another 7% of the surveyed participants had acquired a moderate experience of 30 to 50 years in farming. An interesting commonality among all the surveyed farmers was their ability to identify different types of seeds. This finding highlighted the farmers' awareness and familiarity with seed varieties, demonstrating their deep understanding of the nuances involved in traditional rice cultivation.

Cultivation practices of traditional rice farmers of Wayanad

Insightful details on the farming methods used by conventional farmers were uncovered by the survey. About 73% of these farmers were found to be opting out of using chemical fertilisers on their crops. They appeared to rely on alternative methods and traditional farming techniques to nurture their crops. Partially replacing chemical fertiliser with organic fertiliser over a seven-year period has been proven to boost yields and restore the diversity of soil microorganisms in a wheat-rice rotation (Li *et al*., 2022). This large percentage of conventional farmers who prefer chemical-free methods indicates a significant propensity towards eco-friendly and sustainable approaches. It demonstrates concern for the environment and a desire to keep agriculture in its natural state by avoiding the use of chemical fertilisers. However, 27% of traditional farmers have opted to employ chemical fertilisers on their crops. The survey findings highlight the distribution of cultivated varieties, with a particular focus on traditional and non-traditional varieties

Table 2: Profile of the selected non-conventional rice varieties

Sl. No.	*Variety*	*Crop duration (days)*	*Grain type*	*Yield/acre*	*Properties*	*Other information*
1	*Uma (MO 16)*	~135-140	Red, medium-bold grain	~8000-9000 kg	High protein content (~7.90 g 100 g^{-1}) but low antioxidant contents, Considered high yield variety in Kerala, best fit in southern kerala lowlands	Suitable for aerobic conditions (Jinsy *et al*., 2015, Krishnankutty *et al*., 2025)
2	*Shreya (MAS 946-1)*	~125-135	Long bold grain, Intermittently chalky	~8000-9000 kg	Less disease susceptible than Uma, best fit in upland or rainfed regions	Highest water productivity (0.60 kg/m^3) (Vanaja *et al*., 2013)
3	*Aiswarya* (PTB 52)	~120-125	Red bran, long & bold grain type	~8000-9000 kg	Southern Kerala lowlands, suited for Ist & IInd crop seasons	High tillering ability, performs well under organic or low input systems (Jinsy *et al*., 2015)
4	KAU Aadhya (MO 24)	~110	Short-bold, White kernel	6500-7000 kg	Resistant against bacterial blight, no antioxidant property like TRVs	Photo-insenstive, non-loding, medium tillering (Babu *et al*., 2025)
5	*Deepthi*	~155-160	Red kernlled grain	~6875kg	Best fit for highlands, good quality and straw yield	Suitable for aerobic conditions (Jinsy *et al*., 2015)

(Fig. 3). According to the survey, the data reveal that out of all the cultivated varieties, only a small proportion, 23.1% of the total, comprises traditional varieties represented by "*Gandhakashala*." Similarly, another traditional variety, "*Aayiram Kana*," constitutes 19.2% of the total. However, the majority of cultivated varieties, accounting for 57.7% of the total, fall under the category of non-traditional varieties. These include varieties like "*Uma*," "*Pavizham*," and "*Aathira*." This data suggests that while traditional varieties like *Gandhakashala* and *Aayiram Kana* continue to be cultivated, they make up only a fraction of the overall cultivated varieties. A growing number of farmers are adopting monoculture techniques and abandoning traditional crop varieties in favour of more profitable ones. One major effect of these issues is the decline in rural areas as people stop farming, and another is the loss of traditional plant species, which threatens biodiversity conservation efforts (Perez-Caselles *et al*., 2020). On the other hand, non-traditional varieties have gained prominence and represent a significant portion of the total cultivated varieties.

Problems Faced by Farmers and Their Perspective on Traditional Rice Varieties

Indigenous paddy has been cultivated and preserved by Wayanad's tribal groups for centuries (Rasheed *et al*., 2021). In the conducted survey, a significant portion of the participating farmers were found to be engaged in the cultivation of traditional rice varieties primarily for self-consumption, constituting approximately 53% of the total respondents (Fig. 4A). This observation coincides with the findings that Rasheed *et al*. (2021) published in their study. Furthermore, a notable proportion of the surveyed farmers, comprising 27% of the respondents, were actively involved in cultivating traditional rice varieties due to their deep-rooted attachment to cultural and traditional practices. These farmers held a strong belief in preserving their heritage and continuing the agricultural customs passed down through generations. For them, the cultivation of traditional rice served as a way to honor their ancestors and uphold the cultural legacy of their communities. Interestingly, around 20% of the surveyed farmers exhibited a different perspective, choosing to

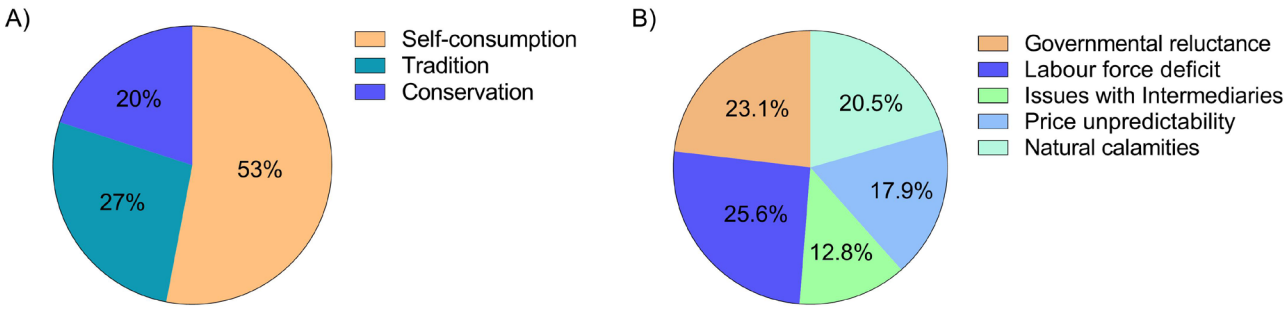

Fig 4: Problems of Farmers and Their Attitudes towards Traditional Rice Varieties. A) Reasons for cultivating traditional varieties; B) Problems of farmers in Wayanad

cultivate traditional rice varieties from a conservation point of view. These farmers recognised the importance of preserving the rich genetic diversity of rice strains that have been nurtured and refined over centuries. They were driven by an ecological consciousness, understanding that traditional rice varieties play a crucial role in maintaining agricultural biodiversity, which is vital for adapting to changing environmental conditions and ensuring food security in the long run.

In the agricultural landscape of Wayanad, farmers encountered several significant challenges, with the most prominent among them being the deficit in the labor force. This critical issue was flagged by over 25% of the participants in the survey, as depicted in Fig. 4B. The scarcity of available skilled laborers posed a serious hindrance to farming operations, as it resulted in delays in essential agricultural activities such as planting, harvesting, and tending to crops. The lack of labor force not only increased the workload for the already burdened farmers but also impacted the overall productivity and efficiency of their farming endeavors. Farmers in Wayanad encounter considerable difficulties due to attacks from wild animals. Therefore, the adoption of a comprehensive wildlife mitigation strategy is imperative, as also suggested by Ahaljith (2019). Another major obstacle faced by farmers in Wayanad was the unsupportive stance of the government towards agricultural practices, as noted by 23.1% of the survey respondents. The farmers expressed their frustration with the inadequate policies and lack of financial assistance or infrastructural support from the authorities. The absence of proper government backing hindered the growth of the agricultural sector and made it difficult for farmers to adopt modern farming techniques or access advanced technologies that could enhance their productivity and sustainability. Issues with intermediaries were also a pressing concern for 20.5% of the surveyed farmers. Middlemen, who act as intermediaries between the farmers and the market, often impose exploitative pricing and unfair trade practices. This exploitation left the farmers with meager profits, despite their hard work and dedication, contributing to their financial struggles and perpetuating the cycle of poverty. The volatility of prices in the market presented another significant challenge for farmers, affecting 17.9% of the respondents. Fluctuations in agricultural commodity prices made it difficult for farmers to anticipate and plan for their incomes, leading to uncertainties in financial stability and long-term investment decisions. Furthermore, the farmers in Wayanad faced the recurring threat of natural calamities, such as floods and droughts, which affected 12.8% of the participants (Fig. 4B). These unpredictable and extreme weather events could devastate crops, destroy farmlands, and disrupt livelihoods, pushing farmers into further distress and uncertainty.

According to a 2018 report by Kerala Agricultural University and the Department of Agriculture Development and Farmers' Welfare, there were 63 traditional rice varieties documented in Wayanad district. This finding provides a clear indication that many traditional rice varieties are either facing extinction or have already disappeared. The gradual displacement of indigenous rice landraces by non-conventional modern varieties (eg, Aiswarya, Athira, DRR Dhan 45, Jaya, Jyothi, MTU-1010, Swarna-Sub1, Jyoti) (Table 2) reflects policy-driven agricultural intensification wherein high-yield production, less climate-responsive risk and market-oriented production missions have been prioritised by research institutions like IARI-NBPGR, extension services, and farmers' socio-economic conditions. As the leading institution for sustainable agriculture in the state, Kerala Agricultural University should prioritise the conservation and promotion of these traditional rice varieties through its numerous stations located throughout the state. The State Agriculture Department, in collaboration with Kerala Agricultural University, ATMS, Self-Help Groups (SHGs), NGOs like MSSRF Wayanad, farmers' organisations, and Local Self-Government Institutions (LSGIs), is actively working towards the enhancement of traditional rice varieties in the state through the provision of financial aid, advisory services, and extension activities. A notable initiative, the Sugandha gramam-Sugandha vila prolsahana padhathi, has been launched in the Pulpally and Thirunelli Grama Panchayats of Wayanad district, resulting in a notable increase in both the area and yield of traditional rice varieties. Nevertheless, such programs are infrequent and not uniformly distributed throughout the state. The only government initiative that specifically addresses traditional rice is the Specialty Rice Promotion Programme, which provides a minimal financial support of Rs 4,500 per hectare.

Conclusion

This research study provides valuable insights into the rich tapestry of traditional rice cultivation practices in Wayanad. It underlines the importance of preserving traditional knowledge and practices while acknowledging the evolving nature of agricultural dynamics in the region. The challenges faced by farmers in Wayanad were multifaceted, ranging from labor force deficit to unsupportive government policies, intermediary exploitation, price unpredictability, and vulnerability to natural disasters. Addressing these issues would require a comprehensive approach, involving collaboration between the government, agricultural organisations, and local communities to implement effective solutions that can improve the overall well-being and resilience of the farmers in the region. These findings have significant implications for policymakers, agricultural experts, and local communities in promoting a balanced and sustainable agricultural landscape that embraces both tradition and progress. The data collected in this study serve as a valuable resource for further research and initiatives aimed at preserving traditional rice varieties and supporting the livelihoods of traditional farmers in the region. These traditional rice varieties should be registered with the Protection of Plant Varieties and Farmers' Rights Authority, New Delhi, which will protect them not only from intellectual property rice but also from farmers' rights.

Data Availability

Data that has been collected and analysed in this research is available from the corresponding author if requested.

Conflicts of Interest

The authors declare no conflicts of interest

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