Analysis of adoption and constraints in little millet (*Panicum miliare* Lam) cultivation in Jammunamathur block, Tiruvannamalai district, Tamil Nadu

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 Received: 25.02.2025/Accepted: 03.04.2025

ABSTRACT

The study assessed the adoption of recommended little millet cultivation practices and identified constraints faced by farmers in Jammunamathur block, Tiruvannamalai district, Tamil Nadu. Data collected from 120 farmers revealed a medium overall adoption rate (48.33%), with significant variability across specific practices. While basic practices like sowing season and field preparation were widely adopted, the use of improved inputs, such as quality seeds, fertilizers and irrigation, was low. Farmers reported significant constraints, including lack of irrigation, high labour costs, limited access to credit and exploitative marketing practices. The findings highlighted the need for targeted interventions to improve little millet production, focusing on enhancing farmers' access to resources, trainings and fair market linkages.

Keywords: Little millet; adoption; constraints; cultivation practices; farmers

INTRODUCTION

Little millet (*Panicum miliare* L), originating in the Eastern Ghats of India, is a resilient crop vital to tribal diets and now cultivated in Sri Lanka, Nepal and Myanmar (de Wet et al 1983). Its ability to withstand both drought and moderate waterlogging makes it valuable in regions with unpredictable rainfall. Despite its potential, little millet yields in India remain low, indicating significant room for improvement. The cultivation of little millet spans across several Indian states, including Karnataka, Tamil Nadu, Odisha and others, where low productivity is attributed to poor soil fertility and traditional farming practices (Patel et al 2018).

In Tamil Nadu, little millet is grown in numerous districts, adapted to both tropical and subtropical conditions, even at high altitudes (Sundararaj and Thulasidas 1993). Its short growth cycle and drought tolerance make it a crucial crop for dryland, hill and tribal farmers, often serving as the first harvest after the monsoon (Haider 1997, Doggett 1989). Recent interest in little millet has surged due to its climate resilience and nutritional richness compared to other cereals (Vetriventhan et al 2020).

Globally, little millet cultivation covers 0.26 million hectares, yielding 0.12 million tonnes (Bhat et al 2018). India contributes significantly, with 2.34 lakh hectares under cultivation, producing 1.27 lakh tonnes at 544 kg per ha (Venkataratnam et al 2019).

Farmers in the Tiruvannamalai district, including Jammunamathur block, primarily cultivate indigenous varieties like Cittan Samai, Perun Samai, Kalman Samai and Kolluthanan Samai, with Cittan Samai being the most popular. The shift from longer-duration varieties to the shorter-duration Cittan Samai reflects adaptation to rainfall uncertainty and the desire to cultivate subsequent crops like horse gram and niger. Traditionally organic, little millet cultivation has seen increased chemical fertilizer use due to limited organic manure availability (Karthikeyan and Ramesh 2014).

This study investigates the adoption of recommended cultivation practices and the challenges faced by little millet farmers in Jammunamathur block, Tiruvannamalai district, Tamil Nadu, with the objectives of assessing the adoption of recommended cultivation practices and identifying the constraints experienced by little millet growers.

METHODOLOGY

This study focused on Tiruvannamalai district, Tamil Nadu, due to its significant little millet cultivation. From the district's eighteen blocks, Jammunamathur block, which had the largest little millet cultivation area, was purposively selected. Within this block, four villages – Koviloor, Nimmyampattu, Palamarathur and Pulliyur were randomly chosen. Using proportionate random sampling, 30 farmers from each village were selected as respondents, resulting in a total sample size of 120. Data on little millet cultivation practices and farmer-reported constraints were collected using a pre-tested questionnaire, subsequently coded, tabulated and converted to percentages.

RESULTS and DISCUSSION

Adoption of recommended cultivation practices in little millet

Overall adoption level: Table 1 presents the overall adoption level of recommended little millet cultivation practices. The data reveal that a significant proportion of respondents (48.33%) demonstrated medium adoption level, while 26.67 per cent showed low adoption and 25.00 per cent exhibited high adoption. The medium and high adoption rates appear to correlate with moderate farming experience, material possession, innovativeness and information-seeking behaviour among the respondents. Conversely, the low adoption level can be attributed to the conservative nature of some farmers, leading them to disregard newer technologies promoted by the state department of agriculture.

Technology-wise adoption: To examine technology-specific adoption, 12 recommended little millet cultivation practices were analyzed. The data given in Table 2 depict that notably, all farmers adhered to the recommended sowing season, thorough field preparation (2-3 ploughings) and harvesting methods of its production. High adoption rates were also observed for critical practices such as weeding at 15 and 40 days after sowing (DAS) (95.83%), thinning soon after weeding or before 20 DAS (90.00%) and the use of recommended varieties (CO 3, CO (Samai) 4, ATL-1 and ATL-2) (81.66%).

Table 1. Distribution of respondents based on the overall adoption level of recommended cultivation practices in little millet

Level	Respondents (n = 120)	
	Number	Percentage
Low	32	26.67
Medium	58	48.33
High	30	25.00

However, the adoption of other recommended practices was considerably lower. For instance, basal application of farmyard manure (FYM) at 12.5 tonnes per ha, recommended NPK fertilizer application (40:20:20 kg/ha), soil application of TNAU millet micronutrient mixture (5 kg/ha) and the use of recommended seed rate and sowing method (10 kg/ha for line planting, 12.5 kg/ha for Gorru or seed drill) were followed by only 36.66 and 35.00 per cent of the respondents respectively. The lowest adoption rates were observed for broadcasting of seed and spacing recommendations (30 cm × 10 cm) (12.50%), irrigation management (20.83%) and seed treatment with *Pseudomonas fluorescens* (10 g/kg) and biofertilizers (*Azospirillum* and *Phosphobacteria*, 25 g/kg each) (22.50%).

Constraints faced by the farmers in little millet cultivation

The study identified specific constraints faced by little millet farmers, categorized as technical, labour, economic and marketing challenges (Table 3). Regarding technical challenges, the most significant issue was the lack of irrigation at critical growth stages, reported by 100 per cent of the farmers. This was followed by yield loss due to inconsistent climatic conditions, experienced by 74.17 per cent of respondents. The primary reason for irrigation difficulties likely stemmed from the absence of well or borewell facilities on most farms, leading to water scarcity. Additionally, 29.17 per cent of the farmers cited lack of good quality seed and 18.33 per cent reported lack of adequate trainings as constraints. Under labour constraints, for all the farmers high cost of labour was the main issue followed by 35.00 per cent who reported non-availability of labour as the constraint. In case of economic constraints, 55 per cent

Table 2. Distribution of respondents according to technology-wise adoption of recommended little millet cultivation practices

Cultivation practice	Respondents (n = 120)	
	f	%
Sowing season (July-August)	120	100.00
Varieties: CO 3, CO (Samai) 4, ATL-1 and ATL-2	98	81.66
Ploughing the field thoroughly 2 or 3 times using a small iron plough or country plough to fine tilth	120	100.00
Seed rate and sowing method: for line planting 10 kg/ha; for use of Gorru or seed drill 12.5 kg/ha	42	35.00
Broadcasting of seed and spacing of 30 cm × 10 cm	15	12.50
Seed treatment with *Pseudomonas fluorescens* @ 10 g/kg of seed followed by biofertilizers, *Azospirillum* and *Phosphobacteria* each @ 25 g/kg of seed	27	22.50
Irrigation management	25	20.83
Basal application of FYM @ 12.5 tonnes/ha; recommended dose of NPK @ 40:20:20 kg/ha; soil application of TNAU millet micronutrient mixture @ 5 kg/ha	44	36.66
First weeding at 15 DAS and the second at 40 DAS	115	95.83
Thinning soon after weeding or before 20 DAS	108	90.00
Plant protection measures applied	-	-
Harvesting	120	100.00

Multiple responses

Table 3. Constraints faced by little millet (Samai) cultivating farmers

Constraint	Respondents (n = 120)	
	Number	Percentage
Technical		
Lack of availability of good quality seed	35	29.17
Yield loss due to inconsistent climatic conditions	89	74.17
Lack of availability of specific plant protection recommendations	-	-
Irrigation at critical stages	120	100.00
Lack of adequate trainings	22	18.33
Labour		
Non- availability of labour	42	35.00
High cost of labour	120	100.00
Economic		
High cost of fertilizers	45	37.50
Non-availability of loans	66	55.00
Lack of price policy	58	48.33
Marketing		
Lack of proper marketing channels	44	36.66
Involvement of middlemen in marketing	117	97.50
Lack of export facility	8	6.67

Multiple responses

of farmers faced difficulties accessing loans followed by 48.33 per cent who cited the absence of a supportive price policy. These economic issues were attributed to the lack of credit or crop loan facilities and limited awareness of credit institutions and loan application procedures. Marketing challenges were also prevalent, with 97.50 per cent of farmers reporting excessive involvement of middlemen as a major problem. This was followed by 36.66 per cent who cited the lack of proper marketing channels. Due to their remote locations in hilly areas, farmers lacked access to market information and were compelled to sell their produce to wholesalers.

Vasanthapriya and Asokhan (2019) found varying adoption rates of little millet practices among Tamil Nadu hill farmers. While most followed sowing and field preparation, overall adoption was medium (63.70%), with significant variations in seed use (22.50%), planting (50.80%), seed treatment (negligible), nutrient management (6.70%) and irrigation (2.50%). Weed management and harvesting were highly adopted.

Ali et al (2018) found varied millet practice adoption in Nigeria. While 97.9 per cent adopted post-harvest handling and 85.1 per cent crop rotation, only 51.1 per cent used inorganic fertilizers, 29.8 per cent used improved varieties and 25.5 per cent used pest/ disease management. Pest/disease management positively influenced adoption, while inorganic fertilizer adoption had a negative effect.

Gyawali (2021) reported that lack of domain-specific high-yielding varieties, high preference towards major cereals and poor marketing infrastructure particularly in marginal areas were the constraints mainly considered for unexpected production of millet in Nepal.

Prasanth and Murugan (2021) found that finger millet farmers in Tamil Nadu's Krishnagiri district faced limited awareness, soil testing difficulties, bulky organic inputs and high fertilizer/labour costs as key constraints.

Anusha et al (2024) found that finger millet adoption in Andhra Pradesh's north coastal region was hindered by poor market information access, inadequate farming knowledge and limited institutional support. Farmers faced challenges due to market uncertainty and lacked pest/disease management expertise. Key constraints were pest/disease infestation (96.67%) and the gap between minimum support price and actual price (96.67%).

Vihari et al (2024) reported that lack of availability of good quality seed, lack of processing units and less awareness were the major constraints faced by millet farmers of Parvathipuram Manyam district, Andhra Pradesh.

CONCLUSION

This study, conducted in the Jammunamathur block of Tiruvannamalai district, Tamil Nadu, revealed a moderate adoption rate of recommended little millet cultivation practices among farmers, with significant variations across specific technologies. While farmers generally adhered to fundamental practices like sowing season, field preparation and harvesting, the adoption of crucial inputs such as improved seeds, fertilizers, and irrigation management was notably low. This disparity highlights a gap between recommended practices and farmers' actual implementation, likely influenced by factors such as limited access to resources, inadequate training and conservative farming approaches.

The study further identified critical constraints impacting little millet production, encompassing technical, labour, economic and marketing challenges. Notably, the lack of irrigation facilities, high labour costs, limited access to loans and exploitative marketing practices involving middlemen significantly hindered farmers' productivity and profitability. These findings align with similar studies on millet cultivation in other regions, which consistently report challenges related to access to quality inputs, market information and institutional support.

The findings underscore the necessity for targeted interventions to improve little millet production. These interventions should focus on enhancing farmers' access to irrigation facilities, quality seeds and affordable credit, alongside providing comprehensive training on recommended cultivation practices. Strengthening market linkages and ensuring fair pricing mechanisms are also crucial for empowering farmers and promoting sustainable little millet cultivation. Addressing these constraints will not only enhance productivity but also contribute to the food security and economic well-being of the region's farming communities.

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