



Bridging the Knowledge Gap: Enhancing Awareness among Farmers about Millet Cultivation

M. GAYATHRI¹ and K. MANIMOZHI^{2*}

Department of Resource Management, School of Home Science, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore.

Abstract

Millet cultivation plays a crucial role in enhancing food security and promoting sustainable agriculture through its climate-resilient nature and nutrient-rich composition, contributing to both environmental and human well-being. However, the cultivation of millet has witnessed a decline in recent decades due to a lack of awareness among farmers about its benefits and importance, resulting in a knowledge and information gap. To address this issue, intervention programmes have been designed with specific methods like workshops, field demonstrations, and the distribution of educational materials to empower farmers with knowledge about the nutritional, economic, health, and environmental advantages of millets. This study was conducted in ten villages in Kodumudi blocks in Erode district, Tamil Nadu, to assess the reasons for farmers' hesitation in cultivating millets and to evaluate the impact of the intervention programme on their knowledge and attitudes towards millet cultivation and its health benefits. The results indicate significant correlations between age, education, farm size, farm experience and the reasons for not cultivating millets. The study investigated the impact of an intervention programme on farmers' knowledge and attitudes towards millet cultivation. Pre- and post-intervention data were collected from 477 farmers. The findings revealed significant improvements in farmers' knowledge levels after the programme, with a mean score increase from 48.57 to 52.26. Similarly, attitudes towards millet cultivation showed positive changes, with mean scores rising from 93.86 to 100.46. Results revealed the effectiveness of the programme in promoting informed and sustainable agricultural practices. The findings highlight the importance of enhancing awareness among farmers about the benefits and best practices of millet cultivation to foster its adoption and leverage its numerous advantages.



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CONTACT K. Manimozhi ✉ manidurai1962@gmail.com 📍 Department of Resource Management, School of Home Science, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore.



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Introduction

In the quest for sustainable agriculture and food security, millet cultivation has emerged as a promising solution. Millets are nutrient-dense grains that are high in protein, fibre, vitamins, and minerals, making them a beneficial supplement to a healthy diet, boosting overall health and well-being.¹ Furthermore, millets are high in essential nutrients like iron, calcium, zinc, magnesium, phosphorus, and potassium.² Millets exhibit remarkable adaptability to diverse agro-climatic conditions, making them well-suited for cultivation in a wide range of environments. They have proven to be more resilient to the impacts of climate change compared to traditional crops due to their unique physiological and morphological characteristics. Millets are renowned for their exceptional drought resistance. Their deep root systems enable them to access water from deeper soil layers, allowing them to withstand prolonged periods of water scarcity.³ They have a natural ability to withstand high temperatures, which is becoming increasingly crucial in the face of rising global temperatures.⁴

Millets have a relatively short growing cycle compared to traditional crops like rice and wheat. This short duration enables farmers to adapt their cropping patterns to changing weather conditions and optimise land use. Millets can be a valuable option for quick and stable yields under adverse conditions, making them a reliable crop in regions prone to drought.⁵ These climate-resilient and nutritionally rich crops offer immense benefits to both farmers and consumers. In spite of its potential, millet cultivation has witnessed a decline in recent decades in various regions around the world.⁶ This decline can be attributed to a significant lack of awareness among farmers regarding the benefits and importance of millet cultivation, resulting in a prevailing knowledge and information gap.⁷ To reverse this trend and harness the potential of millets, intervention programmes have been designed to empower farmers with knowledge about the nutritional, economic, and environmental benefits of millets.

Knowledge is the backbone of successful agriculture⁸. For millet cultivation to thrive, farmers need to be equipped with the latest techniques, best practices, and relevant information. Unfortunately,

many farmers remain unaware of the nutritional benefits of millet, their resilience to climate change, and the potential market opportunities they offer. This lack of awareness restricts the widespread adoption of millet cultivation, limiting its impact on food security and sustainable agriculture.⁹ Millet cultivation holds substantial promise in the study area of Erode district, Tamil Nadu, which offers a valuable opportunity to enhance agricultural diversity and improve food security. Enhancing awareness among farmers about the benefits and best practices of millet cultivation is crucial to promoting its adoption and leveraging its numerous advantages. By addressing challenges and providing solutions, these intervention programmes can inspire farmers to embrace millets as a vital component of sustainable agriculture.¹⁰ The objectives of this study were to identify and understand the reasons for their hesitation in cultivating millet; and to assess the changes in farmers' knowledge, attitudes, and practices toward millet cultivation after participating in the intervention programme.

Hypothesis

- There is no significant relationship between the demographic profile of the farmers and Millets cultivation
- There is no significant difference between knowledge and attitude toward Millet cultivation before and after the intervention program

Methodology

The study was conducted in ten villages in Kodumudi blocks in Erode District, Tamil Nadu in from Jan 2023 to March 2023. The study area was purposefully chosen for its level of agricultural production and easy access. The total population of the blocks is 31,317 (according to the 2011 census), primarily residing in rural areas, with most of the population engaged in unorganized sectors like agriculture and manual labour. The major crops cultivated in the selected areas were paddy, banana, turmeric, tapioca, sugarcane, maize, and other pulses. For the intervention programme, 50 farmers from each of the 10 panchayat villages, comprising ten farmers from each of the five categories (Marginal, Small, Medium, Semi-medium, and Large), resulting in a total of 500 farmers, were selected by stratified random sampling. Primary data for the study were collected through a field survey using a structured

questionnaire that included farmers' socio-economic factors, reasons for not cultivating millet, and their knowledge and attitude towards millet cultivation. After the assessment, an intervention program was employed, involving group discussions, expert lectures, and poster displays over a two-day period in each village's panchayat office. The program utilized various targeted approaches, such as interactive workshops, field demonstrations, and the distribution of educational materials. These initiatives were strategically designed to enhance farmers' understanding of millet cultivation techniques and benefits, developing practical skills and knowledge among participants. Post-assessment was done after a period of three months, and the significance of the difference was found by using paired sample t-test.¹¹

Results and Discussion

Based on the responses of farmers regarding the cultivation of millets and their knowledge and attitude towards millet cultivation, the results and discussions of the present study have been summarized. The study's findings indicate that within the last 24 months, 42 per cent of the respondents in the study area engaged in cultivating primary millets like sorghum, and pearl millet. Notably, these millets

were predominantly cultivated for livestock feeding rather than human consumption. These findings indicate a missed opportunity for utilizing these nutrient-dense grains for direct human consumption, which could contribute to enhanced nutrition and food security among the local population.

The major reasons cited by farmers for the reduction in millet cultivation were reduced market demand due to the change in food habits, the labour-intensive nature of millet cultivation, the perception of lower economic returns compared to other crops, and inadequate millet storage facilities. Post-harvest losses can significantly impact the economic viability of millet cultivation, ultimately discouraging farmers from engaging in it.¹² Therefore, addressing storage-related issues and promoting proper post-harvest practices can play a crucial role in revitalizing millet cultivation and enhancing its sustainability in the study area. The other reasons stated by farmers were challenges in marketing and value addition, which has led many farmers to opt for alternative crops that offer higher profits and better market opportunities. Additionally, the availability of modern agricultural machinery for other crops has also contributed to the decline in millet production.

Table 1: Relationship between the demographic profile of the farmers and Factors affecting millet cultivation

	Age	Gender	Education	Farm size	Farm experience	Income	Factors affecting millet cultivation
Age	1	0.01	.129*	0.001	.060*	.297*	.050*
		-0.626	000	-0.954	-0.003	000	-0.012
Gender		1	.303*	0.001	0.012	.221*	0.001
			0	-0.946	-0.548	0	-0.968
Education			1	0.001	-0.005	.079*	-.337*
				-0.972	-0.803	0	0
Farm size				1	0.004	.183*	.065*
					-0.846	0	-0.001
Farm experience					1	.076*	.030*
						0	-0.142
Income						1	0.011
							-0.588
Factors affecting millet cultivation							1

*Significant @0.05 level

Table 1 summarizes the correlations between different demographic factors (Age, Gender, Education, Farm Size, Farm Experience, and income) and the Factors affecting millet cultivation. The values in the table represent correlation coefficients and their associated significance levels.

The positive correlation between age and factors affecting millet cultivation ($r = 0.050$, $p < 0.005$) suggests that older individuals might encounter specific challenges in adopting millet cultivation. Planting, weeding, and harvesting of millets are often done manually, making it more physically demanding, which might impact certain groups, particularly older individuals, and influence their decision to adopt these practices. This finding indicates the importance of designing interventions that address the concerns of older farmers and provide them with relevant information and resources to overcome these barriers. This is consistent with previous research indicating that traditional farming methods may be more entrenched among elder farmers.¹³

However, the strong negative correlation between education and factors affecting millet cultivation ($r = -0.337$, $p < 0.001$) underscores the critical role of knowledge in mitigating barriers. Farmers with higher education levels are more likely to explore and adopt as they have the knowledge to understand the benefits and implementation of millet. This highlights the need for educational programs that equip farmers with information and skills related to millet cultivation practices. The study conducted by Ibrahim *et al.*, (2019)¹⁴ also concluded that education promotes the adoption of innovative agricultural practices.

Interestingly, farm size ($r = .065$, $p < 0.005$) and farm experience ($r = 0.030$, $p < 0.005$) exhibited a significant positive correlation, which was similar to the results of the study conducted by Nagaraju *et al.*, (2020),¹⁵ indicating a positive relationship between experience and the adoption of improved agricultural practices. Farmers who have more land might find it easier to try growing millets alongside their usual crops. This way, they can experiment without risking their main harvest and can see if millets work well for them at the same time farmers with high experience understand the uncertainties of farming and might see millet cultivation as an opportunity to diversify their income sources. This indicates that

interventions should focus on extension services for different farm sizes and should address the specific needs of farmers who were less experienced to encourage their participation in millet cultivation. Hence, the hypothesis framed was rejected and there is a significant relationship between age, education, farm size, and farm experience with factors affecting millet cultivation.

There is no significant relationship between Gender and factors influencing millet cultivation ($r = 0.001$, $p > 0.005$) suggesting that gender differences might not have a big impact on decisions about growing millets and income and factors related to millet cultivation ($r = 0.011$, $p > 0.005$) also has no significant relationship, indicating that having enough money may not be a major barrier in cultivating millet. This lack of significant correlation aligns with the findings of other studies conducted by Smith *et al.*, (2019)¹⁶ and Rahman *et al.*, (2020)¹⁷, suggesting that these demographic factors might not be strong determinants of farmers' decisions to cultivate millets. Hence, the hypothesis gender and income have a significant relationship with factors affecting millet cultivation was accepted.

The study analyzed farmers' knowledge of millet cultivation before (BF) and after (AF) the intervention program. Seven key factors were assessed, and categorized into Low, Moderate, and High levels (Table 2).

Results indicate notable improvements in farmers' knowledge after the intervention across several factors. After the intervention programme (AF), farmers displayed enhanced knowledge in managing the environment and resource constraints, with a substantial increase in the High category (68 percent) compared to the Low category (11 percent). This suggests that the intervention remarkably enhanced farmers' awareness about improving resource utilization for millet cultivation. Similarly, farmers' understanding of labour and input management significantly improved, as evidenced by the shift from the Low category (26 per cent) to the High category (60 per cent). This change underscores the effectiveness of the intervention in conveying efficient techniques for managing labour and input management in millet farming practices.

Table 2: Knowledge Inventory of the farmers on the status of Millet Cultivation N=477

Factors	Knowledge level (in percentage)					
	Low		Moderate		High	
	BF	AF	BF	AF	BF	AF
Environment and resource constraints	44	21	46	11	10	68
Labor and input management	26	13	53	27	14	60
Market and economic factors	54	20	43	18	3	62
Policy and institutional factors	51	23	46	5	3	72
Risk perception and management	33	16	62	12	5	72
Social and cultural influences	36	17	52	21	12	62
Technical and agronomic factors	36	18	53	17	12	65

* N – Number of participants

* BF – before the intervention programme

* AF – after the intervention programme

Moreover, the intervention programme positively impacted farmers' knowledge of the market and economic factors, policy and institutional aspects, risk perception and management, social and cultural influences, and technical and agronomic factors, as demonstrated by increased percentages in the High category after the programme. These findings indicate that the intervention contributed to farmers' improved understanding of various critical aspects of millet cultivation. The study by Smith and Jones (2019)¹⁸ aligns with the findings, which state

that targeted interventions can lead to improved knowledge and practices, contributing to increased food security and sustainability, and the study showcases the potential for interventions to positively impact multiple aspects of agricultural practices, which resonates with the improvements observed in farmers' knowledge across various factors in the present study. Table 3 explains the difference in knowledge about millet cultivation before and after the intervention programme.

Table 3: Difference in the knowledge and attitude towards Millet cultivation before and after the intervention program

Variables	n	Mean	Std.Dev.	t Value	Sig. (2 tailed)
Knowledge level before intervention	477	48.57	7.648	24.51	.000*
Knowledge level after intervention	477	52.26	8.181		
Attitudes before intervention	477	93.86	12.225	29.629	.000*
Attitude after intervention	477	100.46	16.951		

* Significant @0.05 level

Before the intervention programme, farmers had a mean knowledge score of 48.57 (SD = 7.648), while after the intervention, the mean knowledge score increased to 52.26 (SD = 8.181). The paired-

sample t-test indicated a significant difference in knowledge levels before and after the intervention ($t = 24.510$, $p < .001$). The intervention program was designed to raise awareness and provide practical

insights about millet cultivation. Through interactive workshops, field demonstrations, and the distribution of educational materials, participants gained a better understanding of various aspects related to millet cultivation, such as its benefits, techniques, and potential economic advantages. This increased exposure to information likely led to an enhanced understanding and appreciation of millet cultivation, resulting in improved knowledge levels.

Regarding the attitude towards millet cultivation, before the training programme, farmers had a mean attitude score of 93.86 (SD = 12.225), which increased to 100.46 (SD = 16.951) after the training. The paired-sample t-test revealed a significant difference in attitude levels before and after the training ($t = 29.629$, $p < .001$). By showcasing the positive outcomes of millet cultivation and highlighting its importance for food security and sustainable agriculture, the program aimed to shift participants' perceptions and attitudes. As participants gained a better understanding of the benefits and potential of millet cultivation, their attitudes likely became more positive and receptive, leading to the observed increase in attitude scores after the intervention. Hence the hypothesis framed is rejected and there is a significant difference between knowledge and attitude toward Millet cultivation before and after the intervention program. These findings are in parallel with the study conducted by Kumar *et al.* (2020)¹⁹ on farmer training programmes, which found that interventions significantly enhanced participants' knowledge and practices related to sustainable farming techniques.

Conclusion

In conclusion, this study provides valuable insights into the relationship between demographic factors and the factors influencing millet cultivation while also considering the impact of an intervention programme. The findings revealed the significance of demographic factors in shaping farmers' perspectives on millet cultivation, offering valuable insights for targeted interventions. While factors like gender and income showed weaker correlations, age, education, farm size, and farm experience emerged as key influencers, emphasizing the crucial role of awareness-building and knowledge-

enhancement programmes. Remarkably, the study's intervention programme played a significant role in enhancing farmers' knowledge and attitudes towards millet cultivation, effectively addressing challenges and bridging gaps in awareness. Based on the understanding from the intervention program, practical steps to promote millet cultivation could involve conducting educational workshops and expert talks to highlight its benefits, providing hands-on training for a better understanding, distributing informative materials, offering support for newcomers, introducing financial incentives, organizing community events to share success stories, and encouraging collaboration with local agricultural organizations and authorities. These efforts aim to enhance awareness, knowledge, and positive attitudes towards millet cultivation among farmers, ultimately promoting its adoption and contributing to sustainable agricultural practices.

As 2023 marks the Year of Millets, these findings carry even more significance, presenting a timely opportunity to advocate for the adoption of this nutritious and resilient crop. By addressing the challenges posed by the farmers policymakers and agricultural leaders can create better ways to improve food security and develop a stronger and more adaptable farming environment. This research contributes to a broader understanding of factors shaping farmers' choices in crop cultivation, offering valuable guidance for sustainable and future-oriented agricultural practices. It helps achieve the SDGs of healthy living.

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Conflict of Interest

There is no conflict of interest.

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