



Influential Factors for the Spread of Mundu Chilli Cultivation in Tamil Nadu, India

I Brindha ^{a++}, L Nirmala ^{b#*}, J Pushpa ^{c†}, K Ramakrishnan ^{a‡}
and K Prabakaran ^{d^}

^a Department of Agricultural Extension and Rural Sociology, Agriculture College and Research Institute, TNAU, Madurai – 625 104, India.

^b ICAR- Krishi Vigyan Kendra, Madurai – 625 104, India.

^c Department of Extension Education and Communication Management, Community Science College and Research Institute, TNAU, Madurai – 625 104, India.

^d Department of Agricultural Statistics, Agriculture College and Research Institute, TNAU, Madurai – 625 104, India.

Authors' contributions

This work was carried out in collaboration among all authors. Author IB conceptualized the research idea, data analysis, writing (original draft), visualization, and final manuscript preparation. Author LN provided overall supervision and guidance throughout the research process, contributed to conceptualization and methodology, and critically reviewed and approved the final manuscript. Author JP provided critical feedback on the research design and methodology, assisted in data analysis, and contributed to writing and revising the manuscript. Author KR assisted in data collection and management, contributed to the literature review, and participated in manuscript editing and proofreading. Author KP provided expertise in statistical analysis, contributed to the interpretation of results, and assisted in writing the discussion section. All authors read and approved the final manuscript.

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⁺⁺ PG Scholar;

[#] Professor, Agricultural Extension (SMS);

[†] Professor (Agricultural Extension) and Head;

[‡] Professor;

[^] Professor (Agricultural Statistics);

*Corresponding author: E-mail: nirmala.l@tnau.ac.in;

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ABSTRACT

Mundu chilli is a popular variety of chilli grown in Tamil Nadu, India. One of the key factors driving the spread of Mundu chilli cultivation in the region is the favorable agro-climatic conditions. The study was conducted in the Ramanathapuram district, where the most cultivable Mundu chillies are grown. An ex-post-facto research design was used for this study. Using a proportionate random sampling method, data were collected from 150 respondents across a major Mundu chilli-growing district. The results showed that the majority (98.67 percent) of the cultivators spread the cultivation from growers to growers due to high market demand and profitability, favorable conditions, and strong community networks facilitating peer learning and support. Various factors perceived by Mundu chilli growers as influential in spreading the cultivation of Mundu chilli. The primary factor was the suitability of the chilli for local growing conditions, perceived by 96.67% of the growers. Factors like less manure requirement, income from by-products, reduced pest attacks, and reduction in labor costs were also noted but ranked lower in influence. The analysis of these factors has shed light on the complex interplay of agricultural, economic, and environmental dynamics. This study provides valuable insights for policymakers and stakeholders to enhance the spread of Mundu chilli cultivation, thereby contributing to the agricultural development and economic well-being of farmers in Tamil Nadu.

Keywords: Factors; mundu chilli; pathways; spread.

1. INTRODUCTION

Mundu chilli (*Capsicum annum*), also known as round chilli, is a popular variety of chilli grown in Tamil Nadu, India. The cultivation of Mundu chilli has been steadily increasing in the state over the past few years, with many farmers opting to grow this variety due to its high yield and market demand. The main regions for Mundu chilli farming in Tamil Nadu include Ramanathapuram (15,000-18,000 ha), Sivagangai (8500 ha), Thoothukudi (22,000 ha) and Viruthunagar districts [1]. Ramanathapuram district leads all other districts in terms of area, production, and yield of chillies [2]. The blocks of Kadaladi, Mudhukulathur, Paramakudi, Ramanathapuram, Bogalur, Nainarkovil, and Thiruppullani in the Ramanathapuram district are used to grow Mundu chilli, covering 15,000-18,000 hectares. Mundu chilli is renowned for its distinctive physical characteristics, like cherry-shaped rounded chilli, medium size, thick pericarp (0.25 mm), vibrant red color, and most vitally, "mild pungent." Eco-friendly technology in Mundu chilli cultivation emphasizes sustainable practices that reduce environmental impact while enhancing crop quality and yield. Techniques such as integrated pest management (IPM), organic fertilization, and water conservation methods, like

drip irrigation, promote resource efficiency and soil health. One of the key factors driving the spread of Mundu chilli cultivation in Tamil Nadu is the favorable agro-climatic conditions in the region [3]. Tamil Nadu has a tropical climate with ample sunshine and moderate rainfall, which are ideal for the cultivation of chillies. The soil in Tamil Nadu is also well-suited for chilli cultivation, providing the necessary nutrients for the growth of the crop. As soil has moderate to high alkalinity (soil pH 7.5–9.0) and less annual rainfall (460.0 mm), favorable conditions [kumar] have encouraged many farmers to switch to Mundu chilli cultivation, leading to an increase in its production in the state. Black soil is suitable for the cultivation of rainfed Mundu chilli, as black soil retains moisture. Another factor influencing the spread of mundu chilli cultivation in Tamil Nadu is the high market demand for this variety. Mundu chilli is known for its unique round shape and spicy flavor, making it a popular choice among consumers [4]. The demand for mundu chilli is not only high in the domestic market but also in the international market, with many countries importing this variety from Tamil Nadu. The high demand for Mundu chili has likely boosted farmers' incomes in the state, contributing to rural economic growth. Further, agricultural enterprises may have stimulated

related industries and job creation, potentially increasing the state's overall economic output. This high market demand has incentivized farmers to grow Mundu chilli, as it offers a lucrative income opportunity. In this paper, we will analyze the factors influencing the spread of Mundu chilli cultivation in Tamil Nadu. This study was carried out to observe the following objectives were:

- 1) To study the socio-economic characteristics of Mundu chilli growers
- 2) To investigate the pathways for the spread of Mundu chilli cultivation
- 3) To identify the factors that influence the spread of Mundu chilli cultivation

2. MATERIALS AND METHODS

The study was conducted from November 2023 to May 2023 in the Ramanathapuram district of Tamil Nadu, where Mundu chilli is grown the most. In Ramanathapuram district area under Mundu chilli cultivation was 12670.40 hectares during 2022-2023 [5]. The blocks of Mudukulathur, Nainarkoil, Paramakudi, Kadaladi, and Kamuthi were selected purposefully for the study. Mudukulathur block is located at a latitude of 9.3585° N and a longitude of 78.4876° E. Nainarkoil block is situated at 9.4112° N latitude and 78.7001° E longitude. Paramakudi block can be found at 9.5440° N latitude and 78.5900° E longitude. Kadaladi block is positioned at 9.2357° N latitude and 78.4092° E longitude. Finally, Kamuthi block is located at a latitude of 9.4078° N and a longitude of 78.3687° E. Totally 15 villages, were chosen using a purposive random sampling technique. These areas were selected based on their significant contribution to Mundu chilli production and their varying agro-climatic conditions, like temperature, rainfall, soil types, and humidity. Using the proportional random sampling (PRS) technique, 150 Mundu chilli growers were selected in the blocks of Mudukulathur (38), Nainarkoil (27), Paramakudi (21), Kadaladi (40), and Kamuthi (24). The data was collected through a face-to-face personal interview at the field level with the help of a pre-tested and well-structured interview schedule that was designed in accordance with the investigation's objectives. Before full-scale implementation, the interview schedule underwent pilot testing. The primary data were analyzed and tabulated using frequency, percentage, and ranking methods. In factor influencing, the factors were ranked based on their percentage values, with the highest

percentage receiving the highest ranking. Data were analyzed with the help of SPSS software.

3. RESULTS AND DISCUSSION

Finding obtained through data analysis were interpreted below.

3.1 Socio-economic Characteristics of the Mundu Chilli Growers

This study aims to explore and document the socio-economic characteristics of Mundu chilli growers, focusing on aspects such as age, education, occupation, farm size, and farming experience. By doing so, it seeks to provide insights into the challenges and opportunities faced by these farmers, thereby contributing to the overall understanding of Mundu chilli cultivation and its impact on rural economies.

From the Table 1, it could be inferred that less than half (47.30%) of the respondents were of old aged category, followed by middle (34.70%) and young (18.00%) aged groups. In educational status, less than one third (32.00%) of the respondents were educated upto secondary education level, followed by collegiate education (25.30%), middle education (14.00%), functionally literate (10.70%), illiterate (09.30%), and (08.70%) of the respondents were primary education level. In occupational status, two-third (60.00%) of the respondents belonged to farming alone category, followed by (18.70%) farming + business category, (15.30%) farming + wage owner and (06.00%) farming + services. In farm size, two-fifth (45.30%) of respondents were medium farmers with farm size of above 2.5 to 5 acres, along with (38.00%) were big farmers with the farm size of more than 5.00 acres, and (16.70%) were small farmers with the farm size up to 1.25 acres. In farming experience, less than half (47.30%) of the respondents had more than 10 years of farming experience, whereas (34.70%) of farmers had 5 to 10 years of experience, and the remaining (18.00%) of them had up to 5 years of experience as respondents.

The majority of Mundu chilli growers are old aged growers with substantial farming experience (47.3% aged 'Old' and 47.3% with 'More than 10 years' experience) [6], primarily engaged in farming alone (60%), and predominantly possess medium-sized farms (45.3%) [7]. Additionally, a significant portion of the Mundu chilli growers have secondary (32.0%) and collegiate education (25.3%) [8], suggesting a relatively

educated farming community. However, reliance on farming as the sole occupation may present risks, underscoring the importance of support for diversification and adaptation to changing agricultural landscapes.

3.2 Pathways used for spread the Mundu chilli

The dissemination of Mundu chilli cultivation predominantly occurred through interpersonal

networks among growers. According to Table 2, the majority (98.67 per cent) of the enterprise of Mundu chilli growing spread from growers to growers, followed by (38.67 per cent) KVK to growers, (18.67 per cent) NGO to growers, and Co-operative Society to growers. Mundu chilli cultivation spreads among growers due to high market demand and profitability, favourable agro-climatic conditions, and strong community networks facilitating peer learning and support [9].

Table 1. Socio-economic characteristics of the respondents (n=150)

S.No.	Socio-economic characteristics	Frequency	Per cent
A)	Age		
	Young	27	18.00
	Middle	52	34.70
	Old	71	47.30
B)	Educational status		
	Illiterate	14	09.30
	Functionally literate	16	10.70
	Primary education	13	08.70
	Middle education	21	14.00
	Secondary education	48	32.00
	Collegiate education	38	25.30
C)	Occupational status		
	Farming alone	90	60.00
	Farming + Wage earner	23	15.30
	Farming + Business	28	18.70
	Farming + Services	09	06.00
D)	Farm size		
	Small farmers	25	16.70
	Medium farmers	68	45.30
	Big farmers	57	38.00
E)	Farming experience		
	Up to 5 years	27	18.00
	5 to 10 years	52	34.70
	More than 10 years	71	47.30

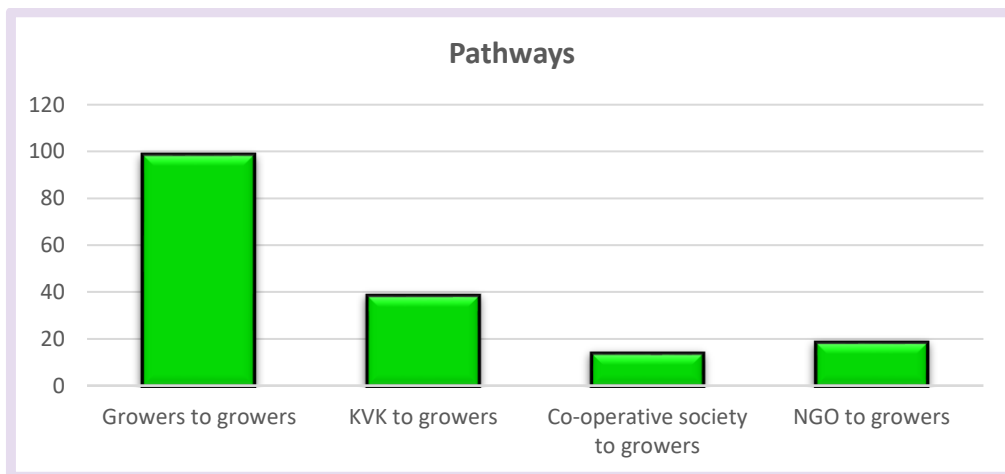


Fig. 1. Pathways used for spread of the enterprise of Mundu chilli cultivation

Table 2. Pathways used for spread the Mundu chilli

Pathways	Frequency	Per cent
Growers to growers	148	98.67
KVK to growers	58	38.67
Co-operative society to growers	21	14.00
NGO to growers	28	18.67

Table 3. Factors influencing for spread of the enterprise of Mundu chilli cultivation

S. No.	Factors	Frequency	Per cent	Rank
1.	High Yield	80	53.33	VII
2.	Drought tolerance	141	94.00	II
3.	Eco-Friendly Technology	86	57.33	VI
4.	Less manure requirement	42	28.00	XII
5.	Reduction in labour cost	12	10.00	XV
6.	Low crop failure	69	46.00	X
7.	Good market price	105	70.00	IV
8.	Sufficient of water	75	50.00	IX
9.	Ready to market	65	43.33	XI
10.	Income from by-product	34	22.67	XIII
11.	Suitability for local growing conditions	145	96.67	I
12.	Less pest attack	27	18.00	XIV
13.	Mild pungent flavour	78	52.00	VIII
14.	Physical characteristics	119	79.33	III
15.	Buyer preference	95	63.33	V

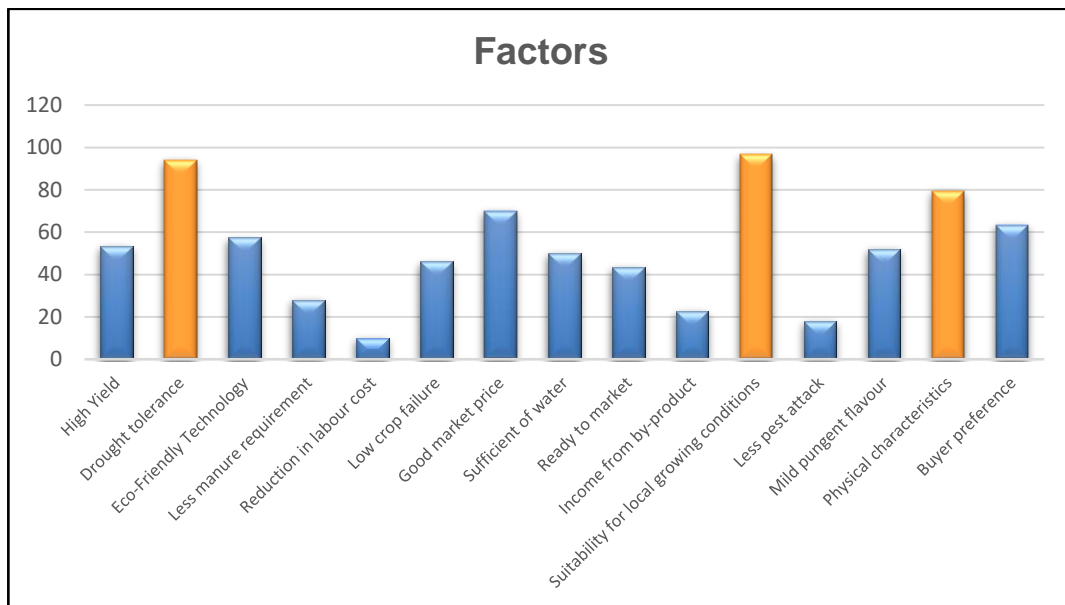


Fig. 2. Factors influencing for spread of the enterprise of Mundu chilli cultivation

3.3 Factors Influencing for Spread of the Enterprise of Mundu Chilli Cultivation

Table 3 lists the many factors influencing the spread of the enterprise of Mundu chilli cultivation. The majority of Mundu chilli growers

perceived the factors, i.e., suitability for local growing conditions (96.67%) - Ranked I: Mundu chilli growers know that adapting to local environmental conditions, such as soil type, climate, and weather patterns, is essential for ensuring crop success and sustainability [10], followed by drought tolerance (94.00%) - Ranked

II: drought-tolerant varieties can significantly reduce the risk of crop failure in regions with inconsistent rainfall patterns [11], physical characteristics (79.33%) - Ranked III: physical characteristics such as size, shape, and color can lead to better market acceptance and higher economic returns for Mundu chilli growers [12], good market price (70.00%) Ranked IV: Mundu chilli growers can be incentivized to invest more in quality inputs and sustainable practices at a good market price, buyer preference (63.33%) Ranked V: Mundu chilli growers to understanding and meeting buyer preferences ensures that the produce is sold efficiently and at favorable prices [13], eco-friendly technology (57.33%) Ranked VI: growing awareness among Mundu chilli growers of sustainable farming practices not only protects the environment but also enhances long-term soil health and productivity, high Yield (53.33%) Ranked VII: high yields are a key concern for Mundu chilli growers, as they directly translate to higher production volumes and potential income [14], mild pungent flavour (52.00%) Ranked VIII: the flavor profile of Mundu chilli is important for both local consumption and export markets; flavor attributes can affect consumer satisfaction and repeat purchases [15], sufficient of water (50.00%) Ranked IX: it's crucial for maintaining plant health and achieving optimal yields. Effective water management practices, such as drip irrigation, are essential, particularly in regions prone to water scarcity [16], low crop failure (46.00%) Ranked X: low crop failure emphasize the importance of reducing the risk of crop losses due to pests, diseases, and adverse weather conditions. Integrated pest management and disease-resistant varieties are strategies that can help mitigate these risks, ready to market (43.33%) Ranked XI: The ability to market produce quickly can reduce post-harvest losses; efficient supply chains and market access are critical for timely sales and maintaining product quality [17], less manure requirement (28.00%) Ranked XII, efficient nutrient management practices can achieve optimal growth with minimal input costs [18], income from by-product (22.67%) Ranked XIII: Mundu chilli growers are looking to diversify their income streams. Utilizing by-products can add value and provide additional revenue, which is a strategy supported by studies on agricultural value chains, less pest attack (18.00%) Ranked XIV: managing pest attacks is crucial for Mundu chilli crop health and suggests that integrated pest management practices can effectively reduce the incidence of pests without relying heavily on chemical pesticides [19], and

reduction in labour cost (10.00%) Ranked XV: mechanization and efficient labor practices can help lower production costs and improve profitability [20].

4. CONCLUSION

The study reveals that Mundu chilli growers are predominantly old-aged (47.30%), have farming experience (47.30%), have a secondary education level (32%), and are engaged in farming as their primary occupation (60%), with significant support for medium farm sizes (45.30%) in the socioeconomic characteristics.

The study also finds that grower-to-grower networks, which account for 98.67% of the spread, are the primary channel of spread for Mundu chilli cultivation. This highlights the importance that influence from peers and community-based information sharing have on farming practices. To a certain extent, institutional channels such as cooperative societies (14.00%), NGOs (18.67%), and KVKs (38.67%) are also helpful in the spread. The results indicate that, although formal extension services and organizational support are crucial, developing and utilizing farmer interpersonal networks may be a crucial tactic for developing agricultural innovations and practices.

This study highlights that the key factors influencing the spread of the enterprise of Mundu chilli cultivation are predominantly. The top factors include suitability for local growing conditions (96.67%), drought tolerance (94.00%), and physical characteristics (79.33%). According to these results, Mundu chilli growers prioritize adaptability to local conditions and market appeal to ensure crop success and profitability. The significance of eco-friendly technology (57.33%) also indicates a shift towards sustainable farming practices. The findings underscore the need for support in implementing resilient farming practices and efficient market strategies to enhance the sustainability and economic viability of Mundu chilli cultivation.

In conclusion, understanding these socio-economic characteristics provides valuable insights into the challenges and opportunities faced by Mundu chilli growers. As our understanding of these factors evolves, it becomes increasingly crucial to consider sustainable practices and equitable access to resources in the cultivation and distribution of Mundu chillies. Moving forward, it is imperative for policymakers, researchers, and farmers to

collaborate in implementing strategies that support the responsible growth of Mundu chilli cultivation, ensuring its continued prosperity while safeguarding the well-being of local communities and the environment. To further promote the cultivation of Mundu chilli, it is essential to enhance extension services, improve market access, and continue supportive government policies. By addressing these factors, the sustainability and profitability of Mundu chilli farming can be ensured, contributing to the overall agricultural development of the region.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during the writing or editing of manuscripts.

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COMPETING INTERESTS

The authors have declared that no competing interests exist.

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