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An Analysis of Constraints Faced by Organic Farmers in the Cauvery Delta Zone of Tamil Nadu, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aim: This study examines the multifaceted challenges encountered by organic farmers operating within the Cauvery Delta Region of Tamil Nadu.
Study Design: Ex-post facto research design was used to investigate and reveal the challenges that organic farmers have encountered over the preceding years.

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Place and Duration of Study: The study was conducted in the Cauvery Delta Zone of Tamil Nadu. Five districts were selected for the study namely, Thanjavur, Thiruvarur, Nagapattinam, Mayiladuthurai and Tiruchirapalli. Respondents were interviewed during the period of June 2023 – July 2023.

Methodology: The study aimed to include 40 organic farmers from each district, resulting in a collective sample size of 200 respondents across these districts, facilitated through snowball sampling technique. A well – structured interview schedule which included the major constraints faced by organic farmers of the CDZ was developed based on review of past literatures and discussion with experts in the area of organic farming. Based on the ranks given by the respondents to the constraints, the data was analyzed and conclusive results were obtained using the Rank Based Quotient (RBQ) technique. Constraints were studied in 7 different dimensions namely, labour, technical, service and supply, credit and economic, environmental, cropping and marketing constraints.

Results: The prime constraints with a higher RBQ values identified in these dimensions were, Labour scarcity due to MGNREGA (93.13), Cumbersome (Slow and complicated) certification process (79.90), Lack of supportive institutions for organic farming (91.80), Inadequate subsidies for organic agriculture (92.75), Use of polluted river water for irrigation (93.90), Lack of inputs specifically for weed management (96.63), Challenge in finding proper marketing channel (90.38). In addition to this, some minor issues were also identified as constraints in the study area.

Conclusion: Through an in-depth exploration of these challenges, the study aims to provide insights that can guide policy makers, practitioners, and stakeholders in devising strategies to overcome the obstacles faced by organic farmers in the Cauvery Delta Zone which could have a threshold effect in boosting up the organic productivity of the state.

Keywords: Organic farming; constraints; environment; sustainability; productivity.

1. INTRODUCTION

Organic farming has gained immense importance as a guiding light for adopting responsible agricultural practices that prioritize the preservation of biodiversity, enhancement of soil health, conservation of the environment, and the achievement of long-term sustainability. It has several connections to climate change, as it can both mitigate its impacts and be influenced by changing climate conditions. It plays a crucial role in Carbon Sequestration, Reduced Emissions, Soil Water Conservation, Biodiversity conservation by reduced resource usage, reducing chemical load on soil and crops, aiming sustainability. The global organic area expanded to over 76 million hectares, accounting for 1.6 percent of the world's agricultural land, and is under the management of over three million producers [1]. As governments worldwide strive to align their policies with ecological well-being, the Indian government has taken substantial strides in promoting organic farming through various schemes. The state of Tamil Nadu has also unveiled its visionary 'Organic Farming Policy 2023'.

Cauvery Delta Region, the granary of Tamil Nadu is renowned for its rich agricultural heritage and plays a vital role in the state's economy through production of Paddy, the staple food of Southern part of India. The Cauvery Delta area experiences a monsoon climate characterized by two primary monsoon periods: the southwest monsoon (June to September) and the northeast monsoon (October to December). These monsoons are responsible for the majority of the region's annual rainfall, typically falling within the range of 800 to 1200 mm. The local climate is generally tropical, maintaining elevated temperatures year-round. In the cooler months, average temperatures can hover around 25°C (77°F), while during the summer, they can escalate to 35°C (95°F) or even higher. The presence of substantial humidity, particularly during the monsoon seasons, contributes to the fertile conditions for agriculture. The coastal portions of the Cauvery Delta can occasionally encounter tropical cyclones, resulting in substantial rainfall and strong winds. These events can lead to flooding and other weather-related challenges. Engaging in agricultural activities despite challenging environmental conditions, navigating through interstate Cauvery water disputes, and establishment of various large-scale non-agricultural projects in fertile plains, the farmers in the Cauvery Delta Zone encounter a multitude of extra challenges related to agriculture. Moreover, attempting to adopt organic farming practices in this area adds another layer of intricacy to the endeavour. The conflict between the two states regarding the sharing of Cauvery River waters escalated

gradually, particularly following the finalization of the 1974 agreement [2]. According to, IPCC and the World Meteorological Organisation (WMO), coastal deltas and wetlands ecosystems are most vulnerable to direct and large-scale impacts of climate change [3]. A study spanning almost four decades revealed that climate change and anthropogenic factors are having a detrimental effect on the Cauvery delta region, [4]. Surpassing all these odds, organic farmers faced a lot of other constraints in the field level. Thus, there exists a critical necessity to examine the various limitations or constraints that organic farmers in the Cauvery Delta Region of Tamil Nadu used to confront. This research is designed in response to this imperative demand, aiming to delve into the constraints that these farmers grapple with. Hence, the study will ultimately contributing to a comprehensive understanding of the situation, which is crucial for developing strategies that can facilitate the growth of organic farming in the region while ensuring the sustainability of agricultural production and the well-being of local farming communities.

2. METHODOLOGY

This comprehensive study was conducted in the Cauvery Delta Zone (CDZ) of Tamil Nadu, encompassing eight districts. Among these districts, five districts namely, Thanjavur, Thiruvarur, Nagapattinam, Mayiladuthurai and Tiruchirapalli were selected purposively for the study considering the share of higher cultivable area under CDZ. These districts were selected due to their prominence in organic farming practices. Ex-post facto research design was used in this study. The study targeted a total of 40 organic farmers from each district, resulting in a total sample size of 200 participants across the five districts employing snowball sampling method. This approach involves identifying initial participants, who then refer additional participants, creating a network that reflects the organic farming landscape in the region. Through this method, the study aimed to gather insights and data directly from organic farmers in the Cauvery Delta region, providing a holistic understanding of the challenges and their experiences in overcoming obstacles. The Rank Based Quotient (RBQ) method developed by Sabarathanam (1988) was employed to analyze the data and derive conclusive findings on the most and least significant constraints. The formula for calculating RBQ is given below,

$$\text{RBQ} = \frac{\sum_{i=1}^{n}(Fi)(n+1-i)}{N \times n} \times 100$$

Where,
F_i = Frequency of respondents for i^{th} rank
N = Number of respondents
n = Number of ranks
$\sum_{i=1}^{n}$ = it directs to sum multiple factors.

$\sum_{i=1}^{n}(Fi)(n+1-i)$ = $F_1 \times n + F_2 \times n - 1 + F_3 \times n - 2$ …….$F_n \times 1$

3. FINDINGS AND DISCUSSION

A well-structured, pre-tested interview schedule was developed by listing out different dimensions of constraints faced by organic farmers pertaining to Cauvery Delta Zone. Respondents were asked to rank the constraints based on their perception. The results and discussions are as follows:

Labour constraints: From Table 1 it can be inferred that, the Labour scarcity due to MGNREGA is a prime constraint faced by organic farmers with RBQ value of 93.13. Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is a social welfare program in India that guarantees 100 days of wage employment per year to rural households to do unskilled manual work. A major drawback of the MGNREGA perceived by farming community is that it could result in shortage of labour for agricultural activities, particularly during peak seasons. The assurance of consistent employment and attractive wages through MGNREGA might entice certain agricultural workers to opt for MGNREGA work instead of traditional agricultural tasks, thereby affecting the accessibility of labour for vital farming activities. Due to the ongoing problem of labour shortage, the increasing cost of hiring laborers was felt by majority of respondents (75.75). Planning for the timely preparation of organic inputs coinciding different stages of crop growth is crucial. However, there is also a challenge when it comes to timely requirement of labour during application of inputs (53.00). Labour scarcity and higher labour cost issues was also highlighted by Mgbenka *et al.,* [5]. The availability of skilled labour for input preparation was also considered as a minor obstacle, with a relatively low RBQ value of 36.50. This is because many organic farmers are capable of preparing the inputs themselves, but some encounter difficulties when they need to supervise labour throughout the entire preparation process, requiring them to be present and oversee the work closely.

Table 1. Labour Constraints

Sl. No.	Constraints	RBQ	RANK
1	Labour scarcity due to MGNREGA	93.13	I
2	Non availability of skilled labour for input preparation	36.50	IV
3	Higher labour cost due to higher labour requirement	75.75	II
4	Timely requirement of labour during application of inputs	53.00	III

Technical constraints: Table 2 allows us to interpret that, it becomes evident that organic growers perceive the organic certification process as a significant challenge due to its complexity and it was ranked as first and foremost constraint in technical aspect, with RBQ value of 79.90. Hence farmers go for third party certification as highlighted by Mgbenka *et al.,* [5]. In the absence of a standardized guidelines, research-backed recommendations and package of practices for preparing/utilising organic inputs, organic farmers often resort to trial-and-error methods. This approach can result in wastage of resources, including time, labour, and organic materials (73.70). Reddy *et al.,* [6] and Muttalageri & Mokshapathy [7] also emphasized the significance of location-specific strategies in comparison to blanket recommendation and lack of literature on package of practices respectively. Organic farmers are restricted in their capacity to address challenges and make well-informed choices due to the lack of support from the extension agency and Government Institutions. A persistent challenge faced by organic farmers is the lack of technical assistance and guidance which was highlighted by many farmers (60.10). Organic farmers often grapple with the constraint of insufficient research on organic farming technologies. The absence of robust research as emphasized by Mgbenka *et al.,* [5] results in a lack of in-depth understanding of organic farming practices, such as optimal soil management, pest control, and crop management strategies. This knowledge gap hinders farmers from adopting effective techniques (44.00). Further, Slower nutrient release when compared to inorganic fertilisers is considered the least constraint with RBQ value of 24.60. It is a well-known fact that organic inputs inherently exhibit a slower mode of action compared to their inorganic counterparts.

Service and supply Constraints: Table 3 indicates that, Lack of supportive institutions for organic farming is the primary constraint with RBQ value of 91.80. This aligns with the findings of Mgbenka *et al.,* [5]. Supportive institutions are pivotal in providing technical guidance tailored to organic farming practices. However, a significant challenge faced by organic farmers is the lack of supportive institutions dedicated to this specialized form of agriculture. Subsequent to this is the challenge of transporting inputs (79.40). Due to the relatively bulky nature of organic inputs and the considerable distance between farms and homes, the transportation of these inputs during application becomes an inevitable limitation. A crucial constraint faced by organic farmers is the inadequate availability of quality inputs (61.40) such as seeds and planting materials essential for successful organic cultivation. Followed by, Adulteration of organic inputs (43.80) is pressing concern within the realm of organic farming. Adulterated organic inputs undermine the quality and authenticity of organic farming. The least ranked constraint is non availability of organic inputs in commercial scale (26.30). This is contradictory with findings of Sivaraj *et al*., [8] because, the respondents of this study typically did not view this as an issue, as they used to prepare inputs on their own.

Credit and economic constraints: From Table 4, it could be depicted that the most prominent constraint, ranked at the top with an RBQ value of 92.75, is the inadequate of subsidies for organic agriculture. This is primarily due to the fact, that conventional farmers using non-organic methods receive greater subsidies for their use of inorganic fertilizers and other inputs. In certain instances, subsidies even extend to herbicides. Paradoxically, organic farmers, who play a pivotal role in minimizing chemical impact on land and water, do not receive even minimal incentives in this context. The challenge of initial yield loss (75.25) is a recognized aspect of organic farming, as farmers often encounter a significant reduction in yield during the early stages. Which was also highlighted by Reddy *et al.,* [6] who indicated that organic farmers attained yields that were 12-18 percent lower compared to those adopting conventional farming techniques. The absence of supportive policies for organic farming (55.50) stands out as a significant constraint. The lack of policy frameworks tailored to strengthen organic practices hampers the growth, adoption, and success of organic agriculture in the region.

Ranked as the least constraint is the insufficient availability of credit (45.75), primarily because organic farmers predominantly rely on their own resources, which concurred with findings of Jangid et al., [9].

Environmental constraints: Based on the insights provided by Table 5, Organic certification serves as a hallmark of sustainable and environmentally conscious agricultural practices. Over a period of two years, researchers from the Indian Institute of Technology Madras discovered that the Cauvery River water is contaminated by diverse substances, including pharmaceutical compounds, personal care items, plastics, flame retardants, heavy metals, and pesticides, among numerous others [4]. The discharge of effluents from dyeing units in Tiruppur into the Noyyal River, which eventually flows into the Cauvery in Karur, has been burning issue [10]. This is a formidable challenge for organic farmers. And hence, this constraint is categorized as the foremost and significant one with RBQ value of 93.90. The contamination of water sources and soil by these pollutants jeopardizes the eligibility of farms for organic certification. In various parts of the river, water quality has worsened due to inadequate sanitation, the release of pesticides and agrochemicals, sewage dumping, and other human actions [11]. This primary hindrance is acutely felt by the majority of farmers in the Cauvery Delta region. Furthermore, given that the Cauvery Delta region is frequently beset by severe disasters like intense cyclones and prolonged droughts, the farmers in this area encounter numerous challenges due to adverse weather conditions (74.20). Additionally, pest and disease outbreaks (60.90) represent a notable restraint in organic farming, as preventive measures are the only viable means of managing them in organic practices. This finding is in line with findings of Chandran & Podikunju [12]. The foul odour emitted by some organic inputs (47.30) serves as a constraint for certain farm laborers and family members. Similarly, the use of fish-based inputs like Fish Amino Acid, which involves fish pieces in preparation, is found to be repulsive by certain laborers during both preparation and application. While the bulkiness of organic inputs renders runoff a less significant constraint, in specific regions of the Cauvery Delta where flooding is prevalent, organic nutrients are susceptible to leaching and erosion due to increased water levels. The Cauvery delta area experiences seasonal rainfall exceeding 500 mm and with higher surface runoff potential due to fine clayey soils, this region it susceptible to a significant flood risk (George *et al.,* 2022). Nagapattinam is most vulnerable with 70% of its area being prone to flood [3].

Table 2. Technical constraints

Sl. No.	Constraints	RBQ	RANK
1	Cumbersome (Slow and complicated) certification process	79.90	I
2	Lack of technical assistance and guidance	60.10	III
3	Lack of standard package of practices for preparing/utilising organic inputs	73.70	II
4	Slower nutrient release when compared to inorganic fertilisers	24.60	V
5	Lack of research on organic farming technologies	44.00	IV

Table 3. Service and supply constraints

Sl. No.	Constraints	RBQ	RANK
1	Transporting challenges of inputs	79.40	II
2	Inadequate availability of quality seeds and planting materials	61.40	III
3	Lack of supportive institutions for organic farming	91.80	I
4	Non availability of organic inputs in commercial scale	26.30	V
5	Adulteration of organic inputs	43.80	IV

Table 4. Credit and economic constraints

Sl. No.	Constraints	RBQ	RANK
1	Inadequate availability of credit	45.75	IV
2	Inadequate subsidies for organic agriculture	92.75	I
3	Initial yield loss	75.25	II
4	Absence of supportive policy	55.5	III

Table 5. Environmental constraints

Sl. No.	Constraints	RBQ	RANK
1	Use of polluted river water for irrigation	93.90	I
2	Foul odour during preparation of organic inputs	47.30	IV
3	Unfavourable weather condition	74.20	II
4	Pest and diseases outbreak is higher	60.90	III
5	Runoff and leaching of nutrients due to erosion	27.70	V

Table 6. Cropping constraints

Sl. No.	Constraints	RBQ	RANK
1	Effects from surrounding fields	72.25	II
2	Drifting of chemicals	53.88	III
3	Lack of inputs specifically for weed management	96.63	I
4	Lack of cooperation among neighbouring fields	41.38	IV

Table 7. Marketing constraints

Sl. No.	Constraints	RBQ	RANK
1	Challenge in finding proper marketing channel	90.38	I
2	Adulteration in organic markets	59.00	III
3	Lack of organic market outlets	32.75	IV
4	No premium price for non-certified organic farmers	74.63	II

Cropping constraints: Based on the insights gleaned from Table 6, it could be deduced that the absence of dedicated weed management inputs for organic farming, particularly in wetland crops like paddy, stands as a primary constraint with a substantial RBQ value of 96.63. In such scenarios, farmers are compelled to resort to labour-intensive hand weeding or mechanized weeding, which incurs significant costs. This issue was brought to light in findings of Mgbenka *et al.,* [5]. Following this, the impact from neighbouring fields (72.25) emerges as another prominent constraint. This arises when water containing chemical residues from adjacent fields drains into organic farms, disturbing the organic ecosystem. Similarly, the practice of neighbouring farmers applying chemicals in their fields negatively affects organic farms, further complicating the organic ecosystem. Chemical drift occurring from neighbouring fields (53.88) is felt as constraint by many farmers, particularly when drones are employed for chemical application. Although labelled as a lesser constraint with a value of 41.38, the lack of cooperation assumes to be a significant constraint, particularly in regions where marginal farmers engage in organic cultivation with fragmented land holdings as highlighted by Devi *et al*., [13]. In such contexts, the constraint arises from the necessity for aligned operations across multiple fields, limiting the autonomy of individual farmers in choosing crops to grow organically and synchronizing activities in line with other farmers' seasonal practices.

Marketing constraints: Table 7 reveals that, the primary constraint with reference to marketing is challenge in finding proper marketing channel, with RBQ value of (90.38). This is in line with the findings of Haneef *et al.,* [14]. Organic produce requires consumers who are well-informed about organic agriculture and are willing to pay premium prices. The absence of premium prices for non-certified organic farmers (74.63) is a notable constraint since certification process is complicated and many farmers denied certification due to usage of river water for irrigation, resulting in noon receipt of premium prices for their organically grown produce. This is in line with findings of Devi *et al*., [13]. And a notable challenge encountered by organic farmers is Adulteration in organic markets (59.00). This issue poses a significant challenge to the integrity of organic farming, impacting the credibility of organic products and the overall trust in the organic agriculture system. Numerous sellers acquire goods at lower costs from conventional farmers and market them as organic products, exploiting the vulnerability of organic farmers as highlighted by Devi *et al*., [13]. Furthermore, as a significant number of organic farmers tend to sell their harvest to acquaintances, the lack of organic market outlets (32.75) is regarded as a minor constraint.

However, this has to be addressed when organic farmers aim for increased production.

And other constraints faced by organic farmers of CDZ is interference of non-insects pests such as wild boars, peacocks etc., as highlighted by Devi *et al*., [13], theft of organic produce, especially higher in case of horticultural crops, theft of inputs such as solar light traps, distance in reaching processing units for value addition of the produce and lack of awareness of organic farming and organically grown produce in consumer side, insisted by Tashi & Wangchuk [15] were also felt as additional constraints [16].

4. CONCLUSION

Addressing the multifaceted challenges faced by organic farmers in the Cauvery Delta region of Tamil Nadu requires a holistic and collaborative approach. The collective impact of these constraints underscores the need for strategic interventions, policy reforms, and collaborative efforts from various stakeholders. Addressing labour scarcity through innovative approaches, streamlining the certification process, providing equitable subsidies, fostering supportive institutions, establishment of specialized centres, fostering collaboration, and advocating for favourable policies, consistent support prices for organic produce and advocating for cleaner water sources with immediate intervention of the state Government are pivotal steps toward empowering organic farmers in the Cauvery Delta region. Furthermore, developing tailored solutions for effective weed management in organic cultivation is essential to ensure reduced cost of cultivation. By recognizing and addressing the above-mentioned constraints, policymakers, agricultural experts, and farming collectives can collectively pave the way for a more conducive environment that promotes organic farming, enhances farmer livelihoods, and contributes to the larger goal of sustainable agriculture in the Cauvery Delta region of Tamil Nadu.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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