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An Economic Analysis of Vellore GI Spiny Brinjal in Organic and Inorganic Vegetable Farming

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

This study investigates the economic analysis of Vellore GI Spiny Brinjal cultivated through both organic and inorganic farming methods in Vellore district, Tamil Nadu. Organic farming systems have gained popularity due to their sustainability benefits and resource conservation, which can reduce output costs by 10% to 30% compared to conventional farming. Vellore GI Spiny Brinjal, recognized for its unique characteristics and recent Geographical Indication (GI) tag, serves as a focal point for this analysis. The study collected primary data from 25 organic and 25 inorganic farmers, as well as from various market participants. Cost and return analyses revealed that the total cultivation cost per acre is Rs. 90,482 for organic and Rs. 77,322 for inorganic methods. Despite higher cultivation costs, organic farming proved more profitable with a Benefit-Cost Ratio (BCR) of 1.59 compared to 1.35 for inorganic farming. Marketing channel analysis showed that the

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primary distribution pathways involved wholesalers and retailers, with organic brinjal channels displaying higher efficiency. Price spread and marketing efficiency calculations indicated that Channel II was the most efficient for both farming methods due to fewer intermediaries and lower consumer prices. Overall, the study underscores the economic viability of organic farming for Vellore GI Spiny Brinjal, highlighting its potential for higher profitability and marketing efficiency.

Keywords: Spiny brinjal; organic farming; inorganic farming; geographical indication.

1. INTRODUCTION

In recent years, organic farming systems have gained increasing popularity due to their perceived benefits within the agricultural sector. These systems offer potential advantages such as enhanced sustainability, the conservation of non-renewable resources, and a focus on environmental preservation [1]. Organic farming has several benefits over current agricultural methods, which attract farmers worldwide. By promoting and enhancing biological processes, organic farming replaces the use of artificial technologies like chemicals or genetically modified organisms. Organic farming may save output costs by 10% to 30% compared to conventional farming in irrigated areas. The higher costs of organic products may make up for the yield differences between conventional and organic farming, which were either negligible or comparable [2].

Worldwide, there is growing worry over environmental degradation and food safety as a result of chemical contamination. Consumers are thus demanding safer, healthier foods that are produced by more natural, ecological local systems. As a response to the need for creating sustainable agricultural alternatives, such organic farming, the Food and agricultural Organization (FAO) suggested "The World Food Summit Plan of Action (1999) Malla, Rosyara, Neupane & Sapkota, [3].

Brinjal is the most common tropical vegetable grown in India. In recent years, brinjal has become more common in gardens. The fruits are available practically throughout the year. India is the second-largest producer of brinjal after China [4]. Tamil Nadu ranks 8th in overall production of brinjal, contributing 2.77% of the total share. The estimated total world production of eggplants in 2021 was 58,646,098 metric tonnes, up by 2.2% from 57,378,561 tonnes in 2020 (FAOSTAT).

Vellore GI Spiny Brinjal is a prized brinjal variety cultivated in the Vellore district of Tamil Nadu. It possesses distinct physical characteristics, including small spines on the skin and a slightly bitter taste, which is a preferred attribute among local consumers. This particular variety of brinjal is mainly grown in Tamil Nadu, especially in the Vellore District region [5]. The Government of India has recognized officials from the Tamil Nadu Horticulture Department who have started the process of obtaining the much-desired Geographical Indication (GI) tag for the "spiny brinjal" known as "Ilavambadi Mullu Kathirikkai [6-8]." The Vellore Spiny Brinjal was conferred the GI tag on February 21, 2023. This study examines the economic implications of cultivating Vellore GI Spiny Brinjal using both organic and inorganic farming methods.

This study seeks to conduct an economic analysis comparing the cultivation of Vellore spiny brinjal through organic and inorganic farming methods. By examining key economic indicators such as production costs, yields, market prices, and profitability, this research aims to provide valuable insights into the financial viability and sustainability of both farming approaches.

2. MATERIALS AND METHODS

This deals with the materials and research methodology used in the current study, detailing the selection of the study area, data collection, and analytical techniques. The research methodology is outlined under the following subheadings: Study Area, Data Collection, and Analytical Procedures.

2.1 Study Area

The current study focused on the Anaicut, K.V. Kuppam, and Gudiyatham blocks in Vellore, which were deliberately chosen because they have large areas dedicated to cultivating spiny brinjal. This selection was made to gather detailed information about the spiny brinjal specific to the Vellore district.

2.2 Collection of Data

This study will conduct a comparative economic analysis to evaluate the profitability of cultivating Vellore GI Spiny Brinjal both using organic and inorganic farming methods. Primary data will be obtained from interviews with 25 organic farmers and 25 inorganic farmers within the designated study area. Additionally, Marketing data will be collected from 10 wholesalers, 20 retailers, and 20 consumers in both organic and inorganic markets. Secondary data will be sourced from government reports, agricultural publications, and market data on Vellore GI Spiny Brinjal prices.

2.3 Analytical Procedure

2.3.1 Cost and return analysis

To reveal the profitability in farming activity cost and return analysis was carried out. Cost of cultivation of crops includes both fixed and variable costs. The fixed cost includes land revenue and taxes, rental value of the land, depreciation and interest on fixed capital and insurance. The variable costs include the cost of labour, seeds, manures, fertilizer, plant protection chemicals, irrigation charges and interest on working capital to be used [9,10,11,12].

2.4 Price Spread Analysis

Price spread is the difference between price paid by consumers and net price received by producer for an equivalent quantity of farm produce. It expressed as percentage of consumer's price [13,14, 15].

Farmer's share in consumer rupee= Net price received by the producer / Consumers price X 100

2.5 Marketing Channels

In the research area, it was discovered that the marketing of spiny brinjal primarily occurs through the following channels:

2.5.1 Organic brinjal

Channel – I Producer → Wholesaler → Retailer → Consumer
Channel – II Producer → Retailer → Consumer

2.5.2 Inorganic brinjal

Channel – I Producer → Village Trader→ Wholesaler → Retailer → Consumer
Channel – II Producer → Wholesaler → Retailer → Consumer

2.6 Marketing Efficiency

Marketing efficiency was calculated using Shepherd's approach [16]. It can be given as,

M.E. = CP /(PC + C + Ami)

Where,

M.E. = Market efficiency
CP = Consumer's purchase price
PC = Marketing cost of producer
C = Marketing cost of all the intermediaries involved in the channel
Ami = Market margin of the intermediaries involved in the channel

3. RESULTS AND DISCUSSION

3.1 Cost and Returns of Vellore GI Spiny Brinjal Cultivation

The cost of cultivation of Vellore Spiny Brinjal is presented in Table 1 and yield and returns are presented in Table 2.

Brinjal is a labour-intensive crop. The labour cost for one acre is Rs. 25,029 for organic farming, and for inorganic farming, the labour cost was Rs. 22,443. The variable cost includes costs of human labour, machine labour, seeds, irrigation, organic manures (FYM), organic pest control, inorganic fertilizers, plant protection chemicals, and interest on working capital at 7%. The total variable cost is Rs. 66,517 for organic farming and Rs. 57,071 for inorganic farming.

The fixed cost includes the rental value of land, land revenue, the inflated value of family labour, interest on owned capital at 10%, depreciation on fixed capital, and interest on fixed capital at 10%. The total fixed cost is Rs. 23,965 for organic farming and Rs. 20,251 for inorganic farming.

The total cost of cultivation is the sum of the total variable cost and the total fixed cost. The total cost of cultivating organic farming on one acre is Rs. 90,482. Inorganic farming has a cultivation cost of Rs. 77,322.

Table 1. Cost of Vellore spiny brinjal cultivation

(Rs. /ac)

		Organic Brinjal farming		Inorganic Brinjal farming	
S.No.	**Particulars**	**Cost (Rs.)**	**Per cent to total**	**Cost (Rs.)**	**Per cent to total**
I	Variable cost				
1	Human labour	21090	23	19006	25
2	Machine Labour	3939	4	3437	4
3	Seeds	2010	2	2000	3
4	Irrigation	4000	4	1184	2
5	Organic manures(FYM)	4250	5	3325	4
6	Organic pest control	28916	32	-	
7	Inorganic fertilizers	-		11420	15
8	Plant protection chemicals	-		13210	17
9	Interest on working capital @7%	2312	3	3489	5
	Total Variable cost	66517	74	57071	74
II	Fixed cost				
1	Rental value of land	8010	9	6512	8
2	Land revenue	390	0	350	0
3	Imputed value of family labour	3200	4	3050	4
4	Interest on owned capital@10%	2300	3	2100	3
5	Depreciation on fixed capital	1840	2	1210	2
6	Interest on fixed capital@10%	8225	9	7029	9
	Total fixed cost	23965	26	20251	26
III	Total cost (I+II)	90482	100	77322	100

(Figures in parentheses denotes the per cent to total)
Source: Primary data, 2023-2024

Table 2. Yield and returns of Vellore spiny brinjal cultivation

Particulars	**Organic brinjal (Rs./ac)**	**Inorganic brinjal (Rs./ac)**
Yield (Kg)	3600	5500
Average price (Rs./Kg)	40	19
Gross income	144000	104500
Net return	61743	34208
Benefit- Cost Ratio (BCR)	1.59	1.35

Source: Primary data, 2023-2024

The average yield of Vellore spiny brinjal per acre is 3600 kg for organic brinjal and 5500 kg for inorganic brinjal, with an average price per kg of Rs. 40 for organic brinjal and Rs. 19 for inorganic brinjal. The gross return and net return of organic brinjal per acre are Rs. 1,44,000 and Rs. 61,743, respectively, while for inorganic brinjal, they are Rs. 1,04,500 and Rs. 34,208, respectively. The Benefit-Cost ratio indicates the return of each rupee investment in Spiny Brinjal cultivation. The BC ratio is 1.59 for organic brinjal and 1.35 for inorganic brinjal, indicating that the cultivation of organic spiny brinjal is more profitable compared to inorganic brinjal. These finding are similar in line with the results of Tomar, Kumar & Singh, [11] where returns from organic farming were much higher than inorganic farming. This finding is supported by Hoq, Raha, & Sultana, [17] which showed that the benefit-cost ratio (BCR) of bitter gourd is more profitable.

3.2 Marketing Channel of Vellore Spiny Brinjal

Following important channels of distribution have been observed while studying the marketing of Vellore spiny brinjal.

Organic Brinjal

Channel – I Producer → Wholesaler → Retailer → Consumer
Channel – II Producer → Retailer → Consumer

Inorganic Brinjal

Channel – I Producer → Village Trader→ Wholesaler → Retailer → Consumer

Channel – II Producer → Wholesaler → Retailer → Consumer

The proportion of quantity sold through Channel I was 63 per cent, followed by Channel II at 37 per cent, respectively, for organic brinjal. For inorganic brinjal, Channel I accounted for 74 per cent, followed by Channel II at 26 per cent. During the course of the investigation, it was observed that Channel I was the major distribution channel, followed by Channel II, for both organic and inorganic spiny brinjal. The studies by Dastagiri et al., [18] also confirmed that the Producer-Wholesaler-Retailer-Consumer is the predominant marketing channel for most crops. They found the highest marketing efficiency in the direct producer-to-consumer channel.

3.3 Price spread of Vellore Spiny Brinjal

3.3.1 Spiny organic brinjal

In Channel-I, the marketing cost incurred by the producer was Rs. 240. The wholesaler incurred a marketing cost of Rs. 260 and received a margin of Rs. 18,260. The retailer incurred a marketing cost of Rs. 280, while the margin was Rs. 25,480. The total marketing cost and marketing margin of this channel were Rs. 780 and Rs. 43,740, respectively.

3.3.2 Price spread inorganic brinjal

Price spread includes the expenses incurred, losses during transit, and the margins of various intermediaries, all of which ultimately influence the overall efficiency of the marketing system. This has been calculated for spiny brinjal and is shown in Table 4.

In Channel-I, the producer incurred marketing costs of Rs. 240. The village trader incurred marketing costs of Rs. 240 and received a margin of Rs. 16,485. The wholesaler incurred marketing costs of Rs. 280 and received a margin of Rs. 22,280. The retailer incurred marketing costs of Rs. 300, while the margin was Rs. 27,800. The total marketing costs and marketing margin of this channel were Rs. 1,080 and Rs. 66,568, respectively. A similar Producer's share was found in Manjunatha, Reddy, Hiremath, Patil, & Patil, [19] at 50.47%. Retailers and commission agents had higher margins than their marketing costs.

3.4 Marketing Efficiency

In this study marketing efficiency was calculated by using Shepherd’s approach [20,21].

Table 3. Price spread organic brinjal

S. No.	Particulars	Channel I	channel II
1	Producer		
	Producer Sale Price	144000	144000
	Transport Cost	240	
	Marketing Cost	240	
2	Wholesaler		
	Purchase Price	144000	
	Transport Cost	260	
	Marketing Cost	260	
	Sale Price	162000	
	Marketing Margin	18260	
	Retailer		
	Purchase Price	187200	176400
	Transport Cost	280	260
	Marketing Cost	280	260
	Sale Price	216000	198000
	Marketing Margin	29080	39860
3	Consumer Purchase Price	216000	198000
	Price Spread	72000	54000
	Farmer’s Share In Consumer Rupee (%)	66.7%	72.7%

Source: Primary data, 2023-2024

Table 4. Price spread for Inorganic brinjal

S. No.	Particulars	Channel I	channel II
1	Producer		
	Producer Sale Price	104500	115500
	Transport Cost	240	
	Marketing Cost	240	
2	Village Trader		
	Purchase Price	104500	
	Commission Charges	5225	
	Transport Cost	260	
	Marketing Cost	260	
	Sale Price	115500	
	Marketing Margin	16485	
3	Wholesaler		
	Purchase Price	115500	115500
	Transport Cost	280	260
	Marketing Cost	280	260
	Sale Price	137500	137500
	Marketing Margin	22280	22260
4	Retailer		
	Purchase Price	137500	137500
	Transport Cost	300	280
	Marketing Cost	300	280
	Sale Price	165000	165000
	Marketing Margin	27800	27780
5	Consumer Purchase Price	165000	165000
	Price Spread	60500	49500
	Farmer's Share in Consumer Rupee (%)	63%	70%

Source: Primary data, 2023-2024

Table 5. Marketing efficiency of Organic and Inorganic spiny brinjal

	Organic spiny Brinjal	Inorganic spiny brinjal
Shepherd's approach		
Channel- I	4.48	2.44
Channel- II	8.95	3.26

Source: Primary data, 2023-2024

In both methods, Channel II showed higher marketing efficiency due to the absence of intermediaries and lower consumer prices, making it more remunerative. Similar direct marketing approach is practiced among the Garlic Producers who turned into producer cum traders also and earn higher share from the consumers' rupee [3].

4. CONCLUSION

The study examines the economic implications and marketing channels of cultivating Vellore GI Spiny Brinjal using organic and inorganic farming methods. It finds that organic farming offers greater profitability due to higher market prices and consumer preference for organic produce. The Benefit-Cost ratio is more favourable for organic farming (1.59) compared to inorganic farming (1.35), indicating its economic viability. The study identifies two main distribution channels for each farming method, with Channel I being the most prevalent. However, Channel II (Producer → Retailer → Consumer) demonstrates higher marketing efficiency, particularly for organic brinjal, due to reduced intermediaries and lower costs. The price spread analysis shows that organic brinjal has a higher

farmer's share in the consumer rupee, reflecting better returns for producers compared to inorganic brinjal. The study concludes that the cultivation of Vellore GI Spiny Brinjal presents a lucrative opportunity for farmers in the Vellore district.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

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

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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