Cost of cultivation in Radish crop in Dharmapuri District of Tamilnadu

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Abstract

The cultivation of radish (*Raphanus sativus*), a short-duration and high-value vegetable crop, offers considerable potential for income generation and crop diversification in Tamil Nadu. This study aims to analyze the cost of cultivation and marketing efficiency of radish production in the Dharmapuri district. Primary data were collected from selected radish growers using a structured interview schedule, and analytical tools such as standard cost concepts (A1 to C3), Benefit–Cost Ratio (BCR), and marketing efficiency indices (Acharya–Agarwal and Shepherd's methods) were employed. The empirical results indicate that the total cost of cultivation (Cost C3) per acre was Rs.72,820, with a gross income of Rs.94,000, resulting in a net return of Rs. 21,180. The estimated BCR of 1.29 confirms the economic viability of radish cultivation within a short duration of 30–45 days. Marketing analysis revealed that direct farmer-to-consumer channels minimized marketing costs (Rs. 4,000) and yielded a high Shepherd's efficiency value of Rs. 22.5. These findings demonstrate that radish cultivation in Dharmapuri district is both profitable and sustainable, with strong potential to enhance the income and livelihood security of small and marginal farmers.

Key words : Radish cultivation, Cost of cultivation, Benefit–Cost Ratio, Marketing efficiency, Dharmapuri district, Tamil Nadu.

$\mathbf{V}$egetable crops occupy an important place in Indian agriculture as they contribute significantly to nutritional security, income generation, and rural employment. India is the second-largest producer of vegetables in the world, and their short-duration nature enables farmers to earn quick and assured returns compared to traditional cereal crops. Among the various vegetables, radish (*Raphanus sativus*) stands out as a short-duration, high-value root crop. It matures within 30 to 45 days, requires relatively low investment, and enjoys

strong consumer demand due to its nutritional and medicinal properties. Owing to its economic advantages, radish is often considered a cash crop that can supplement farmer incomes between two major cropping seasons.

Dharmapuri district of Tamil Nadu provides highly favourable agro-climatic conditions for radish cultivation. The red loamy and lateritic soils, coupled with adequate irrigation facilities and moderate rainfall, create a conducive environment for its growth. Furthermore, the district's proximity to urban markets such as Bangalore, Salem, and Hosur ensures steady demand and better price realization. These factors collectively make radish cultivation a profitable and sustainable option for farmers in the region. For the preparation of the manuscript relevant literature[1-10] has been consulted.

Review of literature :

Nivethitha, *et al.*[5]. A Study on Cultivation and Marketing of Organic and Conventional Vegetables in the Nilgiris District, Tamil Nadu. As major inputs were prepared in the field, the cost of cultivation for organically grown carrot and potato is lower than for conventionally grown carrot and potato. They have high B:C ratios since organic produce fetches a higher price than conventional produce. The B:C ratio for conventional carrot indicates higher returns than potato. The channel – II in organic and conventional marketing of carrot and potato has higher marketing efficiency because they have less intermediaries.

Jansirani and Anjugam[2]. Comparative cost and returns of some vegetables grown organically in different agro-climatic zones of Tamil Nadu. The study was conducted across seven districts of Tamil Nadu, representing different agro-climatic zones, with 280 certified organic farmers selected via random sampling (40 farmers per district). Analysis of cost and returns revealed that bhendi was the most remunerative vegetable (BCR 1:2.88), followed by bitter gourd (1:2.55), tomato (1:2.52), and brinjal (1:2.45). The predominant marketing channel was Producer → Commission Agent → Wholesaler → Retailer → Consumer, used by 80 per cent of farmers, while the remaining 20 per cent participated in PKVY-PGS groups and operated their own marketing outlets for organic vegetables and other products. The results highlight both the profitability and marketing structures of organic vegetable farming in the region.

Objectives :

1. To analyse the cost of cultivation in radish crop in Dharmapuri District of Tamilnadu
2. To examine the marketing efficiency in Dharmapuri District of Tamilnadu.

The study was conducted in Dharmapuri district of Tamil Nadu with primary data collected from selected only 25 per cent of radish farmers using a structured interview schedule. Cost of cultivation was estimated using standard cost concepts (A1, A2, B1, B2, C1, C2, and C3). Profitability was measured through the Benefit-Cost Ratio (BCR), while price spread analysis determined the farmer's share in the consumer's rupee. Marketing efficiency was calculated using Acharya–Agarwal and Shepherd's methods to evaluate the effectiveness of marketing channels. Descriptive and cost-return analyses were

employed to assess the economic viability of radish cultivation.

Tools of analysis :

1. *Cost and Return :*

The Benefit-Cost Ratio (BCR) is calculated for finding the success of the farm business. It is the ratio of gross return and cost of cultivation. It can be expressed as under

$$\text{Benefit Cost Ratio (BCR)} = \frac{Gross\ Return}{Cost\ of\ Cultivation}$$

For used analysis

Benefit-Cost Ratio (BCR)	=	Gross Income / Cost of Cultivation
	=	Rs.94,000 / Rs.72,820
	=	Rs.1.29
Net Return per Acre	=	Rs. 21,180
Return over Cost C2	=	Rs. 27,800
Payback Period	=	Within 45 days (short-duration vegetable)

The total cost of cultivation for radish in Dharmapuri district was estimated at Rs. 72,820 per acre. The gross income realized was Rs. 94,000 per acre, leading to a net return of Rs. 21,180 per acre. The Benefit–Cost Ratio (BCR) was calculated as Rs. 1.29, indicating that every rupee invested returned Rs. 1.29. The return over Cost C, was Rs.27,800, showing positive profitability even after including imputed land and labour costs. The payback period was within 45 days, confirming radish as a short-duration and quick-return crop. The findings highlight that radish cultivation is economically viable, low-risk, and suitable for small and marginal farmers in Dharmapuri district. The crop's short maturity and low input requirement contribute to steady cash flow and income stability in the horticultural sector.

2. *Price Spread :*

Price spread is an important tool to analyze how the consumer's rupee is shared among different participants in the marketing channel. It measures the difference between the price paid by the consumer and the price received by the farmer. A lower price spread implies that farmers obtain a higher share of the consumer's expenditure, while a higher spread indicates inefficiency and greater intermediary margins.

Price Spread (PS) = Consumer's Price (V) - Producer's Price (FP)

PS = Price Spread

V = Value of the product paid by the consumer

FP = Price received by the farmer

Calculate the data

PS = MC + MM

Where:

MC	= Total Marketing Cost
MM	= Net Marketing Margin of intermediaries

From the study data:

Consumer's Price (V) = Rs.94,000 per acre

Marketing Cost (MC) = Rs.4,000 (Packing and transport Rs.2,000 + Miscellaneous / overheads Rs.2,000)

Net Marketing Margin (MM) = Rs.0

(direct farmer-to-consumer sale assumed)
Used data

PS   = MC + MM
       = Rs.4,000+ 0   = Rs.4,000

FP   = V - PS
       = Rs.94,000 – Rs.4,000 = Rs.90,000

PS   = V – FP
       = Rs.94,000- Rs.4,000   = Rs.90,000

Price spread measures the difference between the consumer price and the producer's share, indicating how much of the consumer's expenditure reaches the farmer. In this study, the consumer price of radish was Rs.94,000 per acre, with marketing costs of Rs.4,000 and no intermediary margin due to direct sales. The resulting price spread was Rs.4,000, giving the farmer a net price of Rs.90,000 per acre. The low spread reflects efficient marketing, allowing farmers to retain over 95 per cent of the consumer's expenditure, thereby enhancing overall farm profitability.

3. *Marketing Efficiency :*

Acharyas- Agarwal's method :

The Marketing efficiency by Acharyas-Agarwal's approach is calculated by

$$ME = FP/ (MC+MM)$$

where,

    ME = Marketing efficiency

    FP = Price received by the farmer

    MC = Total marketing cost

    MM = Net marketing margin

For used analysis

    FP = Rs. 90,000

    MC= Rs.4,000 (Packing and transport Rs.2,000 + Miscellaneous / overheads Rs.2,000)

MM=Rs.0 (direct farmer-to-consumer sale assumed)

$$ME \quad = \frac{Rs.90,000}{Rs.4,000+0} = Rs.\,22.5$$

Marketing efficiency (ME) evaluates how effectively the marketing system transfers produce from farmer to consumer. In this study, the farmer received Rs.90,000 per acre, with marketing costs of Rs.4,000 and no intermediary margin due to direct sales. Using Acharya- Agarwal's formula, the ME was calculated as 22.5. The high value indicates an efficient marketing system, enabling farmers to retain the maximum share of the consumer's expenditure.

Shepherd's method :

The Shepherd's method of calculating marketing efficiency is

$$ME = (V/I – 1)$$

Where,

  ME = Marketing efficiency

  V = Price paid by the consumer (value of goods purchased)

  I = Total Marketing Cost

For used analysis

$$ME = \left(\frac{Rs.\,90,000}{Rs.\,4,000} - 1\right) = Rs.\,22.5$$

  V = Rs.94,000

  I = Rs.4,000

  ME= Rs.22.5

Shepherd's method measures marketing

efficiency by comparing the consumer price with total marketing costs. In this study, the consumer price was Rs.94,000 per acre, with marketing costs of Rs.4,000. Using the formula $ME=V/I-1$, the marketing efficiency was calculated as 22.5. This high value indicates an efficient marketing system, allowing farmers to retain the majority of the consumer's expenditure

4. *Cost concepts :*

The cost of cultivation in agriculture is estimated using different cost concepts to capture various components of farm expenditure.

- ❖ Cost A1: All actual expenses incurred by the farmer, such as seeds, fertilizers, chemicals, irrigation, hired labour, and machinery.
- ❖ Cost A2: Cost A1 plus rent paid for leased-in land.
- ❖ Cost B1: Cost A1 plus interest on owned working capital.
- ❖ Cost B2: Cost B1 plus rental value of owned land.
- ❖ Cost C1: Cost B1 plus imputed value of family labour.
- ❖ Cost C2: Cost B2 plus imputed family labour.
- ❖ Cost C3: Cost C2 plus 10 percent of Cost C2 to cover managerial charges.

Limitation :

- ❖ Primary data collected from only 360 respondents.
- ❖ Small and Marginal size of land farmers has been selected.
- ❖ Calculates the average amount from the total Cultivation amount for maximum average profit.
- ❖ The study only selected radish cultivation farmers randomly.

Cost and returns in cultivation of Radish vegetable crop :

A clear understanding about the economics of Radish crops production in Dharmapuri district is needed and the cost and return in production of Radish crops was estimated and conferred in this unit. Cost of cultivation was calculated on per Acre and offered in Table-1.

Table-1. Yield analysis of Radish vegetable crop

Yield	Radish vegetable cultivation
a. Economic product (tonnes)	7- 8
b. Value (Rs)	94,000
c. Days in cultivating	30- 45 Days

The table shows that economic yield of radish was 7–8 tonnes per acre. At a farm-gate price of Rs.12/kg, the total value of produce amounted to Rs.94,000 per acre. The crop required a short cultivation period of 30–45 days, indicating a quick-return, high-value vegetable crop.

Table-2. Cost and returns in cultivation of Radish vegetable crop

S. No.	Particulars	Unit / quantity	Rate (Rs.)	Total cost (Rs./acre)	Remarks
1	Land preparation	2 ploughings + levelling	3,000 per operation	6,000	Tractor or animal drawn
2	Human labour	20 labour days	625 per day	12,500	For sowing, weeding, irrigation, harvesting
3	Seed and sowing	3- 4 kg radish seed	300 per kg	1,200	Local or improved variety
4	FYM (Farm Yard Manure)	2 tons	1,500 per ton	3,000	For soil enrichment
5	Fertilizer	NPK mixture (Urea, DAP, MOP)	–	3,000	Based on TNAU dose (kg/acre)
6	Fertilizer application & intercultural	Labour cost	–	1,500	Mixing, spreading, weeding
7	Irrigation	4–5 watering	1,500 per watering	6,000	Diesel/electric pump cost
8	Plant protection chemicals	Pesticides, fungicides	Lump sum	1,500	For pest/disease control
9	Harvesting and cleaning	Labour cost	–	3,000	Pulling, trimming, bundling
10	Packing and transport	Gunny bags + market transport	–	2,000	To Dharmapuri/ Local markets
11	Miscellaneous / overheads	Tools, interest, rent	–	2,000	General farm management cost
I	Total cost A1			41,700	Operational cost, actual expenditure
	Rent paid for leased in land			7,000	Seasonal land lease, local rate
II	Cost A2= cost A1 + Rent paid for leased in land			48,700	Includes rental charge
	interest on owned capital			4,500	10-12 per cent annual rate

III	Cost B1= cost A1+ interest on owned capital			46,200	Capital cost inclusion
	rental value of owned capital			20,000	Imputed land value
IV	Cost B2= cost B1+ rental value of owned capital			66,200	Full cost including land
	imputed value of family labour			-	Nil (not included)
V	Cost C1= cost B1+ imputed value of family labour			46,200	Same as B1
VI	Cost C2= cost B2+ imputed value of family labour			66,200	Comprehensive cost
VII	Cost C3= cost C2+ 10 percent of cost C2			72,820	Management cost added
VIII	Gross income			94,000	Yield 7–8 t/acre × Rs.12/kg
IX	Net income			21,180	Profitability indicator

The table shows that Operational Costs (A1): Total actual expenditure for cultivation including land preparation, labour, seeds, fertilizers, irrigation, plant protection, harvesting, packing, transport, and overheads amounted to Rs.41,700. Total Cost with Land Rent (A2): Including seasonal lease rent of Rs.7,000, the cost increased to Rs.48,700. Capital Costs (B1 & B2): Interest on owned capital (Rs.4,500) raised B1 to Rs.46,200, and adding the imputed rental value of owned land (Rs.20,000) gave B2 = Rs.66,200. Comprehensive Costs (C1–C3): Inclusion of family labour (not applicable) and management cost (10per cent of C2) resulted in C3 = Rs.72,820.

Gross and Net Income: With a yield of 7–8 t/acre at Rs.12/kg, gross income was Rs.94,000, giving a net income of Rs.21,180 and indicating a profitable cultivation system. The Benefit-Cost Ratio (BCR = Gross Income / Total Cost C3) is 1.29, showing economically viable radish production under the studied conditions.

The present analysis provides a comprehensive economic assessment of radish cultivation in Dharmapuri district, highlighting its profitability, input structure, and marketing performance. The cost of cultivation, estimated at Rs.72,820 per acre (Cost C3), was largely determined by human labour, irrigation, and land

preparation costs, which together accounted for a substantial portion of total expenditure. Despite these input costs, the gross return of Rs.94,000 per acre indicates a favourable return over investment, supported by a Benefit–Cost Ratio (BCR) of 1.29. This ratio reflects a sound economic proposition, particularly when compared to traditional field crops of similar duration.

The short crop cycle of 30- 45 days offers farmers a rapid capital turnover, enabling multiple cropping opportunities within a single agricultural year. Furthermore, marketing analysis based on Shepherd's method revealed a high efficiency index (ME = 22.5), underscoring the effectiveness of direct marketing channels in reducing intermediary margins and transaction costs. The absence of multiple intermediaries significantly improved the farmer's share in the consumer's price, thus strengthening the economic position of primary producers.

Overall, the results suggest that radish cultivation represents an economically viable enterprise in the region. However, challenges such as seasonal price fluctuations, lack of organized market linkages, and inadequate post-harvest infrastructure still constrain potential gains. Addressing these issues through institutional support, improved value chain integration, and farmer training programs could further enhance the profitability and sustainability of radish production.

The study concludes that radish cultivation in Dharmapuri district is a profitable, short-duration, and resource-efficient farming option with substantial economic potential. The Benefit–Cost Ratio of 1.29 and the short payback period demonstrate the viability of the enterprise under prevailing agro-economic conditions. Efficient direct marketing channels, as reflected by the high marketing efficiency ratio, further enhance producer margins and reduce marketing costs. Given these outcomes, radish cultivation can serve as a promising component of crop diversification and income stabilization strategies for small and marginal farmers in Tamil Nadu.

To sustain and enhance profitability, policymakers should prioritize the development of local collection centres, cooperative marketing systems, and input supply chains that reduce production and transaction costs. Moreover, promoting farmer awareness of best agronomic practices, post-harvest handling, and market intelligence will be essential to strengthen the long-term economic resilience of the horticultural sector.

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