

**“Assessing the Trends and Economic Viability of Tapioca Cultivation Using Profitability
Assessment in Salem District of Tamil Nadu”**

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Abstract

An important tuber crop that supports India's agro-based industry, rural livelihoods, and food security is tapioca (*Manihot esculenta*). Using profitability indicators, time-series analysis, and cost concepts, the current study evaluates the trends and economic viability of tapioca cultivation in Tamil Nadu's Salem district. Primary data was gathered from small, medium, and large farmers to estimate cultivation costs, returns, and benefit-cost ratios; secondary data was utilised to examine district-level trends in area, production, and productivity.

Time-series research revealed variations in the Salem district's tapioca production and area from 2013–2014 to 2023–2024. With an area decline of -2.6% and production of -4.6% , the compound growth rate showed a negative trend. Variations in productivity had an impact on changes in output levels. The findings showed that economies of scale were evident as the overall cost of cultivation (Cost C) decreased as farm size increased. The majority of the total cost was made up of variable costs, the most important of which was human labour. All farm sizes could profitably grow tapioca, according to profitability research, with medium and large farms showing superior benefit-cost ratios, lower production costs, and larger net returns. The survey also found that farmers faced a number of challenges, the most important of which was price volatility, which was followed by a lack of high-quality planting material, a manpower scarcity, and post-harvest losses. Production and profitability were further impacted by monsoon failure and high input costs. The study comes to the conclusion that growing tapioca is a lucrative business, especially for medium and big growers. Tapioca cultivation can be made more profitable and expand sustainably by increasing productivity through mechanisation, adoption of improved varieties, effective input management, and resolving important production and marketing restrictions.

Key Words: Economic viability, Benefit-cost ratio, Time-series analysis, Compound growth rate, Productivity trends.

Introduction

An important tuber crop, tapioca (*Manihot esculenta*) is grown extensively in tropical and subtropical areas, especially in developing nations where it is a significant source of food, revenue, and raw materials for industry. Tapioca is vital to India's rural livelihoods, food security, and supply of raw materials for starch-based businesses including bioethanol, sago, textiles, and paper. Tapioca is a durable crop under shifting climatic and economic situations due to its capacity to grow in marginal soils, adapt to a variety of agroclimatic conditions, and withstand drought.

.Due to changes in material costs, manpower availability, market prices, technological innovations, and regulatory support, tapioca cultivation has experienced significant changes in recent years. The necessity for a methodical assessment of the economic performance of tapioca farming is highlighted by the growing pressure on farmers to make well-informed choices about crop selection and resource allocation. To evaluate the sustainability and competitiveness of tapioca farming in relation to other crops, it is crucial to comprehend trends in area, production, and productivity as well as profitability indices.

By examining cost structures, returns, and benefit-cost relationships, profitability evaluation is an essential tool for determining whether agricultural businesses are economically viable. Researchers and policymakers can identify factors impacting farm income and limits affecting profitability by looking at metrics like profit margins, gross and net returns, and cost of cultivation. These assessments are especially pertinent to tuber crops, such as tapioca, which have unpredictable market dynamics and comparatively extended cropping periods.

In this regard, the current study is to analyse tapioca cultivation patterns and determine its economic feasibility using a thorough profitability analysis. It is anticipated that the research's conclusions will help farmers, extension organisations, and legislators develop plans to improve tapioca cultivation's profitability, productivity, and sustainable expansion.

Materials and Methods

Study Area

The current study was carried out in Tamil Nadu's Salem district, which is a significant tapioca-growing area. The Salem district is renowned for having a tropical

temperature, moderate rainfall, and well-drained soils that are ideal for tuber crops—all of which are favourable agroclimatic conditions for tapioca farming. The district's tapioca industry supports agro-based businesses including starch and sago processing facilities and makes a substantial contribution to farm income. The significant area under tapioca production and its economic significance in the district led to the purposeful selection of the research area.

Sampling Design

The Salem district was purposefully chosen as the study's universe because it is heavily involved in tapioca cultivation and has a sizable number of tapioca-based businesses that produce sago and starch. Sago Serve, which supports and organises tapioca processing operations in the area, is also connected to many of the district's processing facilities. As a result, the Salem district was deemed appropriate for carrying out the current study.

The respondents were chosen using a multistage sampling process. Based on the area under cultivation, the district's main tapioca-growing blocks were determined in the first step. From each block, villages with substantial tapioca cultivation were chosen for the second stage. In order to get the necessary sample size for the study, tapioca growers were chosen at random from the chosen communities in the final step.

The current study examined the trends and economic feasibility of tapioca growing in Tamil Nadu's Salem area using both primary and secondary data. A carefully planned and pre-tested interview schedule was used to gather primary data from the chosen sample farmers. The Directorate of Economics and Statistics (DES), government reports, Department of Agriculture records, statistical handbooks, and research papers were among the published sources from which secondary data about the area, production, and productivity of tapioca over time were gathered. The cost and returns analysis, profitability evaluation, and growth trend analysis of tapioca cultivation in the research region were made possible by the integration of primary and secondary data.

Tools of Analysis

1. Growth Rate Analysis (Area and Production of Tapioca)

Compound growth rates of area and production of tapioca was estimated to capture the changes in trend over time. An exponential function of the following form was used to estimate the growth rates:

$$Y_t = Y_0(1+r)^t \text{-----}(1)$$

Where,

Y_t = Area / Production of Tapioca at time 't'

Y_0 = Initial year Area / Production of Tapioca

r = Compound growth rate

t = Time in years

By taking the natural logarithm of equation (1),

$$\ln Y_t = \ln Y_0 + t \ln (1+r) \text{-----}(2)$$

Now letting,

$$\beta_1 = \ln Y_0$$

$$\beta_2 = \ln (1+r)$$

Then equation (2) can be written as:

$$\ln Y_t = \beta_1 + \beta_2 t \text{-----}(3)$$

Adding the disturbance term, the model becomes:

$$\ln Y_t = \beta_1 + \beta_2 t + U_i$$

Y_t = Area / Production of Tapioca at time 't'

t = time in years

β_1 = constant term

β_2 = regression co-efficient

This log linear function was fitted by using Ordinary Least Square (OLS) method separately for area and production. The compound growth rate (r) was obtained using the formula.

$$r = (\text{Antilog of } \beta_2 - 1) \times 100$$

2. Costs and Returns

The cost concepts such as Cost A1, A2, B1, B2, C1, C2 and C3 are widely used in India for calculating the profitability of production in farm households.

Cost A1: It consists of all actual expenses in cash or kind incurred by the farmer. It includes cost of hired human labour, wages of bullock labour, value of machinery charges, market rate of manures and fertilizers, market rate of cuttings, market value of insecticides and pesticides, irrigation charges, land revenue, cess and other taxes, depreciation on farm implements, and interest on working capital.

Cost A2 = Cost A1 + Rent paid for leased-in land

Cost B1 = Cost A2 + Interest on owned fixed capital assets

Cost B2 = Cost B1 + Rental value of owned land excluding value of land

Cost C1 = Cost B1 + imputed value of family labour

Cost C2 = Cost B2 + imputed value of family labour.

Cost C3 = Cost C2 + 10 per cent of Cost C2 on account of managerial functions performed by the farmer.

Gross Return:

Gross return was obtained by arriving at the total value of crop, valued at harvest price in the reference period.

Gross return = Value of Main Product + Value of By Product

Net Return:

The Net return was worked out by deducting the total cost of cultivation from the gross returns.

Net Return = Gross Return – Cost of Cultivation

Returns per Rupee:

Returns per rupee was obtained by dividing the gross income by the total cost of cultivation per acre.

Returns per Rupee = (Gross income) / (Cost of Cultivation)

3. Garrett Ranking Technique

To study the constraints in production of tapioca in the study area, Garrett's ranking technique was employed (Garrett, 1969). The major constraints in the production of tapioca were identified and the growers were asked to rank the constraints in the order of their importance. The order thus given by the farmers were converted into ranks by using the following formula:

$$\text{Percent position} = \frac{100 (R_{ij} - 0.5)}{N_j}$$

Where,

R_{ij} = Ranking given to the i^{th} attribute by the j^{th} individual

N_j = Number of attributes ranked by the j^{th} individual.

The estimated percent positions were used to construct scores by consulting Garrett's table. As a result, the mean values were estimated by adding the scores of the various respondents for each factor. After then, each attribute's mean values were sorted in descending order. The qualities with the highest mean values were the most important, followed in that order.

Result and Discussion

1. Growth Rate Analysis

Significant variations can be seen in the growth trend analysis of area and production during the study period (2013–2014 to 2023–2024). The area planted to tapioca exhibits a general downward tendency in the early years, peaking in 2017–2018, and then gradually increasing in the subsequent years. Even with this rebound, the rise in area is still uneven, suggesting that cultivation choices vary and that external factors like market conditions and resource availability may have an impact.

Table 2. Growth rate for area and production of tapioca in Salem district

S. No	Particulars	CAGR (%)
1	Area	-2.6%
2	Production	-4.6%

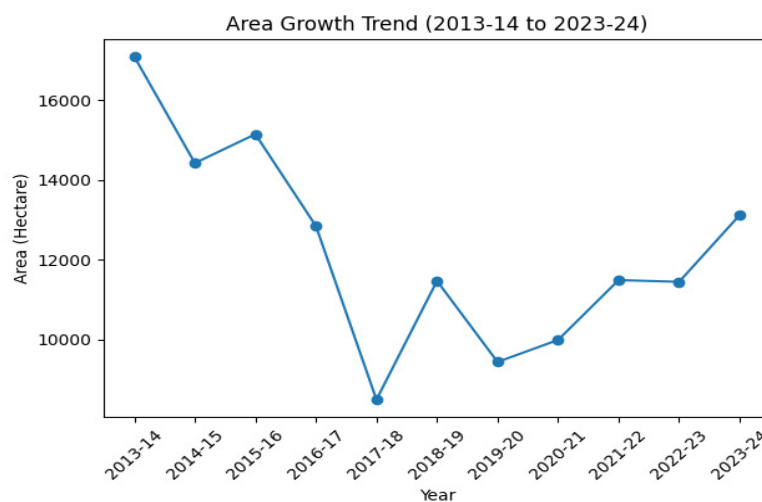
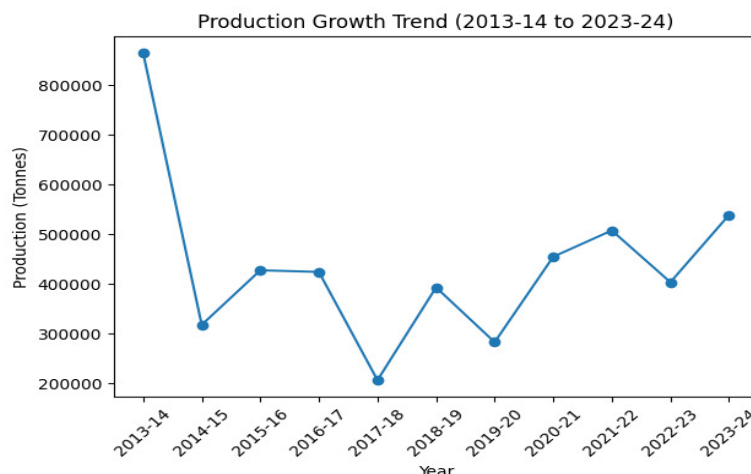


Figure 1. Trend line for tapioca area in Salem district**Figure 2. Trend line for production of tapioca in Salem district**

In a similar vein, production shows a variable pattern, declining sharply after the base year and then rising and falling sporadically during the research period. Despite changes in cultivated area, production has been trending upward in recent years, showing an improvement in productivity.

According to the compound growth rate study, both area (-2.6%) and production (-4.6%) have experienced negative growth throughout the course of the time. This implies that the long-term trend shows a deterioration even when there are some years with short-term improvements. Nonetheless, a good change is shown by the recent rebound in both area and production, which may be the result of improved management techniques, the adoption of new technologies, or advantageous market conditions. Overall, the findings show that in order to attain long-term growth, cultivation methods must be stabilised and productivity must be increased.

2. Cost of Cultivation of Tapioca across Farm Sizes

The table provides a thorough examination of the expenses and profits associated with growing tapioca for small, medium, and big producers. It shows the percentage contribution of each cost component, including labour, inputs, and fixed costs, as well as how they are distributed per hectare. Additionally, the table offers information on yield levels, gross and

net income, returns per rupee invested, and total cost concepts, making it possible to compare the economic effectiveness of various farm sizes.

**Table 1 Cost of Cultivation of Tapioca in Different Size of Farm Groups
(Rs. Per hectare)**

S.No	Particulars	Small Farmers		Medium Farmers		Large Farmers	
		Amount (₹/ha)	Per cent	Amount (₹/ha)	Per cent	Amount (₹/ha)	Per cent
1	Human labour (hired)	35687.26	29.62	30258.29	25.66	25489.17	21.75
2	Machine labour	10235.28	8.50	12536.12	10.63	15698.25	13.40
3	Planting material (setts)	15523.70	12.89	15236.76	12.92	14589.18	12.45
4	Manures & fertilizers	11235.90	9.33	10538.91	8.94	10259.15	8.76
5	Plant protection chemicals	4123.16	3.42	4215.29	3.57	3856.25	3.29
6	Irrigation charges	6189.27	5.14	6358.95	5.39	6589.28	5.62
7	Interest on working capital	2856.27	2.37	2916.27	2.47	3158.24	2.70
8	Depreciation on implements	3125.64	2.59	3214.81	2.73	3528.95	3.01
9	Land revenue & taxes	311.28	0.26	325.00	0.28	332.65	0.28
10	Interest on working capital @ 7 per cent	1351.23	1.12	1469.85	1.25	1578.25	1.35
11	Interest on Fixed capital @ 9 per cent	3529.81	2.93	3785.29	3.21	3968.27	3.39
	Cost A1	94168.80	78.17	90855.54	77.04	89046.89	76.00
12	Rent paid for leased in land	2156.21	1.79	2358.65	2.00	2789.35	2.38
	Cost A2	96325.01	79.96	93214.19	79.04	91836.24	78.38
13	Interest on owned fixed capital	2568.30	2.13	2865.62	2.43	2965.84	2.53
	Cost B1	98893.31	82.09	96079.81	81.47	94802.08	80.91
14	Rental value of owned land	3356.95	2.79	3568.29	3.03	3856.28	3.29
	Cost B2	102250.26	84.88	99648.10	84.49	98658.36	84.20
15	Imputed value of family labour	7265.32	6.03	7569.81	6.42	7856.21	6.71
	Cost C1	106158.63	88.12	103649.62	87.88	102658.29	87.62
	Cost C2	109515.58	90.91	107217.91	90.91	106514.57	90.91
	Cost C3 (C2+10% of C2)	120467.13	100.00	117939.70	100.00	117166.02	100.00
	Average yield (Kg/ha)	30879.27		32998.64		35678.61	
	Average price (Rs/Kg)	6		6		6	
	Gross Income	185275.62		197991.84		214071.66	
	Net Income	64808.48		80052.14		96905.63	
	Returns per Rupee	1.54		1.68		1.83	

Significant differences in input utilisation and overall cost structure are revealed by the cost of cultivation analysis across various farm sizes. Out of all the categories, paid human labour accounted for the biggest portion of overall costs (29.62 percent in small farms

and 21.75 percent in large farms). This suggests that small farms rely more on manual labour, whereas larger farmers often maximise labour use.

The percentage of machine labour increased with farm size, going from 8.50 percent in small farms to 13.40 percent in large farms. This indicates that medium-sized and large farms are adopting mechanisation more frequently, which improves operational efficiency. Agronomic methods were consistent across all farm sizes, as seen by the relative stability of other input costs such planting material, manures and fertilisers, and plant protection chemicals.

Larger farms may have greater investment capacity and better access to resources, as seen by the small increase in irrigation costs and interest on working capital. Depreciation, land revenue, and interest on fixed capital were examples of fixed cost components that made up a smaller but crucial portion of the overall cost, with a slight increase noted as farm size increased.

Cost A1 accounted for 78.17 percent, 77.04 percent, and 76.00 percent of the overall cost for small, medium, and big farmers, respectively, according to the cost concepts study. Indicating the existence of economies of scale in larger farms, the total cost of cultivation (Cost C3) was lowest for large farmers (₹1,17,166.02/ha) and highest for small farmers (₹1,20,467.13/ha).

Large farmers outperformed medium and small farmers in productivity (35,678.61 kg/ha), according to the yield and profitability analysis. As a result, large farmers had the highest net and gross revenue per hectare, at ₹96,905.63 and ₹2,14,071.66, respectively. Due to improved resource use and cost control, larger farms are more economically viable and efficient, as seen by the returns per rupee invested rising from 1.54 in small farms to 1.83 in large ones.

3. Constraints Faced by the Producers

The limitations/constraints faced by the stakeholders were identified, ranked and the results are presented in Table 2.

Table 2. Problems Faced by the Producers

S.No	Constraints	Meanscore	Rank
1.	Price fluctuation	88	I
2.	Non availability of good planting material	81	II
3.	Shortage of labor availability	77	III

S.No	Constraints	Meanscore	Rank
4.	Wastage of tubers during harvest	75	IV
5.	Non availability of goodplanting material	70	V
6.	Monsoon failure	55	VI
7.	Highinput cost	48	VI

With a mean score of 88, the results shown in Table 2 show that price fluctuation was the primary limitation affecting tapioca farmers. The income of producers is greatly impacted by the lack of a consistent pricing structure. The next significant obstacles that affected crop establishment and timely farm operations were the lack of high-quality planting material (mean score 81) and personnel shortages (77).

Productivity was further decreased by tuber waste during harvest (75) and ongoing problems obtaining quality planting material (70). Although they were ranked lower, monsoon failure (55) and high input costs (48) were also mentioned as limitations. Overall, the main issues limiting tapioca production were found to be climate conditions, input restrictions, and economic instability.

Summary and Conclusion

The current study looked at the economic feasibility, growth patterns, and limitations of tapioca farming in Tamil Nadu's Salem area. A falling long-term trend was reflected in the growth rate analysis, which showed a negative compound growth rate for both area (-2.6%) and production (-4.6%) during the study period. Recent advancements, however, point to a comeback in cultivation and output, perhaps as a result of improved management techniques and advantageous circumstances. The cost and returns analysis showed that as farm size increased, the overall cost of cultivation dropped, suggesting the existence of economies of scale. Particularly for small farms, human labour accounted for the majority of the total cost, while machine labour usage rose with farm size. Tapioca farming is economically feasible for all types of farmers, according to profitability study, with medium and large farmers achieving greater net returns and better returns per rupee.

The survey also determined the main obstacles that farmers must overcome. Price volatility was found to be the biggest problem, followed by a lack of high-quality planting

material, a manpower scarcity, and post-harvest losses. Production and profitability were also impacted by monsoon failure and high input costs.

Overall, the study finds that growing tapioca is still a successful business, particularly for medium-sized and big producers. Improving profitability and maintaining the expansion of tapioca farming in the area depend on increasing productivity through mechanisation, guaranteeing the supply of high-quality planting materials, stabilising market pricing, and lowering input costs.

References:

Janaki Rani, A., & Palanisamy, V. (2025). Awareness and adoption of recommended technologies by cassava growers. *Journal of Agricultural Extension Management*, 10(2).

Radhakrishnan, S., Srinivasan, G., & Ramanathan, G. (2025). Comparative analysis on cost of cultivation of tapioca farmers in Salem District of Tamil Nadu. *Indian Journal of Applied & Pure Biology*, 40(1), 479–485.

Bharathi, V. P. N., Muthuswamy, K., Natarajan, B., Vasudevan, B., Appavu, S., Marimuthu, R., & Rajaram, D. (2024). Insights into expansion: A SWOT analysis & need assessment of tapioca micro food processing industries in Salem District, Tamil Nadu. *ShodhKosh: Journal of Visual and Performing Arts*, 5(6), 479–485.

Odekina, F. O., Olushola Jamiu, S., Obe Christopher, A., Emmanuel, A. P., & Ojone, S. (2024). A comparative analysis of the economics of cassava production and processing by IFAD VCDP participants and non-participants in Nigeria. *World Journal of Advanced Research and Reviews*, 21(2), 692–704.

Velmurugan, M., Anand, M., Kamalkumaran, P. R., Krishnakumar, T., & Pugalandhi, L. (2024). Performance of cassava mosaic-resistant accessions for tuber yield and starch content. *International Journal of Research in Agronomy*, 7(8), 11–14.

Prakash, P., Jaganathan, D., & Immanuel, S. (2023). Economic impact of high-yielding cassava (*Manihot esculenta*) varieties in Tamil Nadu: Insights on farmer adoption and preferences. *The Indian Journal of Agricultural Sciences*.

Kavina, E., Ratnaparkhe, A. N., Acharekar, S. J., & Yadav, J. P. (2019). Financial analysis (costs and returns) of tapioca processing units in Salem District of Tamil Nadu. *International Journal of Chemical Studies*.

Anantharaman, M., Kharlyndoh, A., Shanpru, E., & Naziri, D. (2018). Cassava production, marketing, and utilization in Meghalaya. *Agro-Economic Research Centre*, Visva-Bharati.