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A Comparative Study of Input Use, Yield and Economic Returns in Wet and Dryland Tapioca Cultivation in Mampatty, Dharmapuri District

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Abstract

The present study examines the economic performance of wet and dryland tapioca cultivation in Dharmapuri District, Tamil Nadu. Primary data were collected from 80 tapioca farmers, comprising 40 wetland and 40 dryland farmers, using a structured questionnaire. The study analysed irrigation characteristics, cultivation risks, input use, productivity, costs and returns using descriptive statistics, Chi-square tests and ANOVA. The findings reveal substantial differences between the two cultivation systems. Wetland cultivation recorded an average productivity of 9.21 tonnes per acre compared with 6.19 tonnes per acre in dryland cultivation. Although the average cost of cultivation was higher in wetland cultivation (₹89,861.31 per acre) than in dryland cultivation (₹60,329.53), wetland farmers achieved considerably higher average profit of ₹1,49,512.02 compared with ₹69,660.48 among dryland farmers. The Benefit–Cost Ratio was also higher for wetland cultivation at 2.66, compared with 2.15 for dryland cultivation. The study further found that dryland farmers were more vulnerable to drought and erratic rainfall, while wetland farmers faced waterlogging-related risks. The findings conclude that both cultivation systems are economically viable; however, wetland tapioca cultivation is comparatively more productive and profitable. Improving irrigation access, water management, crop-risk protection and market linkages could further enhance the economic sustainability of tapioca cultivation in Mampatty, Dharmapuri district.

Keywords: Tapioca Cultivation; Wet and Dryland Farming; Cost and Returns; productivity; Profitability; Benefit–Cost Ratio.

I. Introduction

Tapioca, Manihot esculenta, also known as yucca, mandioca, manioca, tapioca and Tapioca. It is a shrubby perennial crop of the Euphorbiaceous (spurge) family. It is extensively cultivated as an annual crop for its edible roots in tropical and subtropical regions, mainly in Latin America, Africa and Asia. Edible roots derived from this crop have a very high starch content, consequently it is employed as a major staple food crop for billions of people, in particular for those who live in developing countries. That is why Tapioca is recognized as the "food of the poor". Nevertheless, due to improved world average root yields and multipurpose-use crops, Tapioca has been proclaimed to be "the crop for the 21st century" by the Food and Agricultural Organization of the United Nations.

States with High Tapioca Cultivation in India: Kerala is one of the major tapioca-producing states in India, with cultivation concentrated in several districts such as Kottayam, Kollam and Alappuzha. Tapioca is also widely cultivated in Tamil Nadu, particularly in salem, Coimbatore and Erode. Here, a substantial proportion of tapioca production is processed into value-added products such as starch, flour, sago (sabudana), and chips. However, fluctuations in market demand and prices, along with dependence on processing industries and intermediaries, can affect the profitability of tapioca farmers.

Tapioca is cultivated under both irrigated and rain-fed conditions, with differences in water availability influencing input use, production costs, productivity, and profitability. Cultivation with assured irrigation may support better crop management and higher productivity but can also involve additional irrigation and input costs. In contrast, rain-fed cultivation is more dependent on rainfall and vulnerable to moisture stress and production risks. Therefore, a comparative economic analysis of wet and dryland tapioca cultivation is important for assessing differences in cost, productivity, returns, and profitability and identifying the comparatively more economically viable cultivation system.

II. Research Gap

Tapioca (tapioca) is an important food and industrial crop widely cultivated in India, especially in Tamil Nadu. Most of these studies mainly focus on general production and processing aspects rather than differences in cultivation conditions. In particular, limited research has compared the economic performance and resource use efficiency of tapioca cultivation under different land conditions such as wet and dry land systems. In Tamil Nadu, tapioca is cultivated under both irrigated and rain-fed conditions, which may influence input use, productivity, and profitability. Therefore, this study aims to compare wet and dry land tapioca cultivation in terms of resource use efficiency and economic performance.

III. Objectives

- To compare and analyze the cultivation practices of tapioca in dry and wetland, Dharmapuri District.
- To estimate and compare the cost and returns of tapioca cultivation within the study area.
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IV. Review of Literature

Prabakar et. al., (2019) The study estimated the cost of tapioca cultivation and analysed the efficiency of different marketing channels in Salem District, Tamil Nadu. Primary data were collected from selected villages in Gangavalli block using purposive sampling for the agricultural year 2017–18. The findings revealed that tapioca cultivation was profitable; however, its bulkiness and perishability reduced farmers' bargaining power, while market intermediaries lowered the farmers' share in the consumer rupee. The study recommended forming farmer associations or cooperative marketing societies to improve collective bargaining and reduce unnecessary intermediaries.

Wenjun et. al., (2016) The study assessed cassava cultivation practices and production constraints in Cambodia using survey data from 138 cassava farmers and interviews with 12 key informants in Kampong Cham and Pailin provinces. The findings showed differences in farm size and planting practices, while limited fertilizer use and continuous monocropping were common in both regions. Production costs were US$845/ha in Kampong Cham and US$981/ha in Pailin, generating gross margins of US$682/ha and US$834/ha, respectively. The study suggested that improved varieties, soil fertility management, and erosion control could enhance cassava productivity.

V. Methodology

The study relies on primary data. The data collection was conducted using a structured questionnaire and an interview schedule. A total of 80 farmers were chosen from Dharmapuri district, providing valuable insights into their experiences, challenges and aspirations in the agricultural sector. Where 40 farmers were collected from wetland and rest were from dryland tapioca farmers in Mampatty village, Dharmapuri district. A random sampling method was employed.

A. Tools of Analysis

a) Mean

Mean is simply defined as the ration of summation of all the values to the number of items.

Mean = $\frac{X}{N}$

b) Chi-Square Test

The Chi-square test of independence was conducted to assess whether a significant relationship exists between categorical variables, such as age and wage payment frequency, or age and transportation challenges faced.

$$x^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

c) Standard Deviation

Standard Deviation (σ) is a statistical tool used to measure how much the values in a dataset deviate from the mean.

$$\sigma = \sqrt{\sum \frac{(X_i - \mu)^2}{N}}$$

d) ANOVA

ANOVA, or Analysis of Variance, is a statistical technique used to determine if there are significant differences between the means of three or more groups. It helps test hypothesis about whether the groups are similar or different based on the data provided.

VI. Result and Discussion

A. Comparative Economic Analysis of Wet and Dry Land Tapioca Farmers

The study analyses and interprets the primary data collected from 80 tapioca farmers in Mampatty village of Dharmapuri District. The analysis focuses on comparing the cultivation characteristics of wet and dryland tapioca farmers, with particular emphasis on irrigation practices, production conditions, costs, productivity and economic returns. The information obtained from the farmers has been carefully organized and analyzed to understand the geographical profile, farming background and economic conditions related to tapioca cultivation.

Table 1: Total Land Owned and Value of Cultivated Area of the Tapioca Farmers.

Dry Land				**Wet Land**	
Types of Farmers	**Descriptive Statistics**	**Total Land Owned (in Acre)**	**Tapioca Value Land**	**Total Land Owned**	**Tapioca Land Value**
Small	**Mean**	4.13	14112500	3.29	9251613
	SD	1.812	13471049	1.843	4669323

	N	16	16	31	31
Medium	**Mean** **SD** **N**	6 2.728 19	20473684 13372311 19	9.13 3.227 8	30500000 7211103 8
Large	**Mean** **SD** **N**	10 1.871 5	29200000 17852171 5	9 - 1	7500000 - 1
Total	**Mean** **SD** **N**	5.75 2.913 40	19020000 14464124 40	4.6 3.247 40	13457500 10032662 40
ANOVA		**12.544*****	**2.419^{NS}**	**25.018*****	**52.833*****

Source: *primary Survey*

Note: Figures in parenthesis ( ) indicates row wise percentage [ ] indicates column wise percentage ^{NS} – non significant ***1 percent level of significance.

Table 1 shows total land owned and tapioca land value across cultivated land categories during dry and wet seasons. In the dry season, mean land ownership is highest among large farmers 10 acres followed by medium 6 acres and small farmers 4.13 acres. In the wet season, medium farmers 9.13 acre have the highest land ownership followed by large 9 acres and small farmers 3.29 acres. Further the study reveals that there is no variation in soil type and land type among the respondents, as all farmers cultivate in similar soil and land conditions in the study area. The results indicate that total land owned differs significantly across farm categories, while tapioca land value does not show a significant difference in the dry season.

Table 2: Time, Average Level and Annual Expenditure of Irrigation under Tapioca Cultivation

Dry Land					**Wet Land**		
Types of Farmers	**Descriptive Statistics**	**Irrigation Time**	**Average Irrigation Level**	**Annual Irrigation Expenditure**	**Irrigation Time**	**Average Irrigation Level**	**Annual Irrigation Expenditure**
Small	**Mean** **SD** **N**	6.94 6.547 16	30 25.1 16	5375 6407.027 16	31.48 13.866 31	13.42 5.188 31	38870.97 25173.719 31
Medium	**Mean** **SD** **N**	7.53 7.633 19	23.95 22.459 19	8421.05 8506.963 19	31.5 17.688 8	15.75 9.543 8	31500 27145.113 8
Large	**Mean** **SD** **N**	12 8.485 5	21 13.416 5	7000 7582.875 5	52 - 1	7 - 1	18000 - 1
Total	**Mean** **SD** **N**	7.85 7.305 40	26 22.481 40	7025 7559.974 40	32 14.648 40	13.73 6.255 40	36875 25257.837 40
ANOVA		**0.948^{NS}**	**0.443^{NS}**	**0.694 ^{NS}**	**0.954^{NS}**	**1.036^{NS}**	**0.544^{NS}**

Source: *primary Survey*

Note**:** Figures in parenthesis ( ) indicates row wise percentage [ ] indicates column wise percentage
NS – non significant

Table 2 shows irrigation time, average irrigation level and annual irrigation expenditure across cultivated land categories during dry and wet seasons. In the dry season, irrigation time is highest among large farmers 12 followed by medium 7.53 and small farmers 6.94, while the average irrigation level is highest among small farmers 30. In the wet season, large farmers record the highest irrigation time 52, whereas medium farmers show the highest average irrigation level 15.75. The ANOVA results indicate that irrigation time, irrigation level and irrigation expenditure do not show any significant difference across cultivated land categories in both seasons.

Table 3: Types, Source of Irrigation and Subsidy Status of Tapioca Farmers

Dry Land											
Types of Farmers	**Types of Irrigation**		**Total**	**Main Source of Irrigation**				**Total**	**Subsidy Irrigation Status**		**Total**
	Others	**Drip**		**Well, Rainfed**	**Bore Well**	**Bore Well, Rainfed**	**Rainfed**		**Yes**	**No**	
Small	5 (31.30) [12.50]	11 (68.80) [27.50]	16 (100) [40]	0 (0) [0]	5 (31.30) [12.50]	6 (37.50) [15]	5 (31.30) [12.50]	16 (100) [40]	11 [68.80] (27.50)	5 (31.30) [12.50]	16 (100) [40]
Medium	8 (42.10) [20]	11 (57.90) [27.50]	19 (100) [47.50]	4 (21.10) [10]	2 (10.50) [5]	5 (26.30) [12.50]	8 (42.10) [20]	19 (100) [47.50]	11 (57.90) [27.50]	8 (42.10) [20]	19 (100) [47.50]
Large	1 (20) [2.50]	4 (80) [10]	5 (100) [12.50]	2 (40) [5]	2 (40) [5]	0 (0) [0]	1 (20) [2.50]	5 (100) [12.50]	4 (80) [10]	1 (20) [2.50]	5 (100) [12.50]
Total	14 (35) [35]	26 (65) [65]	40 (100) [100]	6 (15) [15]	9 [22.50] [22.50]	11 (27.50) [27.50]	14 (35) [35]	40 (100) [100]	26 (65) [65]	14 (35) [35]	40 (100) [100]
χ^2	**1.015**^{NS}			**10.009****					**1.015**^{NS}		

Source: *primary Survey*

Note: Figures in parenthesis ( ) indicates row wise percentage [ ] indicates column wise percentage
NS – non significant **5 percent level of significance

Wet Land									
Types of Farmers	**Type of Irrigation**		**Total**	**Main Source of Irrigation**		**Total**	**Subsidy Irrigation Status**		**Total**
	Drip	**Canal**		**Well**	**Bore Well**		**Yes**	**No**	
Small	25 (0.81) [62.50]	6 (0.19) [15.00]	31 (1.00) [77.50]	21 (0.68) [52.50]	10 (0.32) [25.00]	31 (1.00) [77.50]	23 (0.74) [57.50]	8 (0.26) [20.00]	31 (1.00) [77.50]

Medium	7 (0.88) [17.50]	1 (0.13) [2.50]	8 (1.00) [20.00]	7 (0.88) [17.50]	1 (0.13) [2.50]	8 (1.00) [20.00]	6 (0.75) [15.00]	2 (0.25) [5.00]	8 (1.00) [20.00]
Large	1 (1.00) [2.50]	0 (0.00) [0.00]	1 (1.00) [2.50]	1 (1.00) [2.50]	0 (0.00) [0.00]	1 (1.00) [2.50]	0 (0.00) [0.00]	1 (1.00) [2.50]	1 (1.00) [2.50]
Total	33 (82.50) [82.50]	7 (17.50) [17.50]	40 (100.00) [100.00]	29 (72.50) [72.50]	11 (27.50) [27.50]	40 (100.00) [100.00]	29 (72.50) [72.50]	11 (27.50) [27.50]	40 (100.00) [100.00]
χ^2	**0.425**^{NS}			**1.634**^{NS}				**2.706**^{NS}	

Source: *primary Survey*

Note: Figures in parenthesis ( ) indicates row wise percentage [ ] indicates column wise percentage
^{NS} – non significant

Table 3 shows the distribution of farmers according to farm size under dry and wet land conditions. Among the respondents, medium farmers constitute the highest proportion (47.50 percent), followed by small farmers (40 percent), while large farmers represent the lowest share (12.50 percent). This indicates that medium farmers play a dominant role in the adoption of irrigation practices compared to small and large farmers. The findings suggest that the majority of irrigation-related activities are carried out by medium-sized farmers in the study area. Further, the study reveals that none of the farmers in the sample have availed crop insurance coverage, indicating a complete absence of participation in crop insurance schemes among the respondents.

Table 4: Major Cultivation Risks and Management Practices of Tapioca Cultivation

Dry Land								
Types of Farmers	**Major Cultivation Risk**			**Total**	**Measures to Risk Management**			**Total**
	Drought & Erratic Rainfall	**Drought, Erratic Rainfall, Pest & Disease Outbreak**	**Pest & Disease Outbreaks**		**Pesticide**	**Pesticide, Borrowing Water Sources**	**Borrowing Water Sources**	
Small	1 (6.30) [2.50]	6 (37.50) [15.00]	9 (56.30) [22.50]	16 (100.00) [40.00]	9 (56.30) [22.50]	6 (37.50) [15.00]	1 (6.30) [2.50]	16 (100.00) [40.00]
Medium	1 (5.30) [2.50]	6 (31.60) [15.00]	12 (63.20) [30.00]	19 (100.00) [47.50]	12 (63.20) [30.00]	6 (31.60) [15.00]	1 (5.30) [2.50]	19 (100.00) [47.50]
Large	0 (0.00) [0.00]	1 (20.00) [2.50]	4 (80.00) [10.00]	5 (100.00) [12.50]	4 (80.00) [10.00]	1 (20.00) [2.50]	0 (0.00) [0.00]	5 (100.00) [12.50]

Total	2 (5.00) [5.00]	13 (32.50) [32.50]	25 (62.50) [62.50]	40 (100.00) [100.00]	25 (62.50) [62.50]	13 (32.50) [32.50]	2 (5.00) [5.00]	40 (100.00) [100.00]
χ^2	**1.017**^{NS}				**1.017**^{NS}			

Source: *primary Survey*

Note: Figures in parenthesis ( ) indicates row wise percentage [ ] indicates column wise percentage
^{NS} – non significant

Wet Land									
Types of Farmers	**Major Cultivation Risk**			**Total**	**Measures to Risk Management**				**Total**
	Pest and Disease Infestation	**Pest, Waterlogging Flooding**	**Waterlogging and Flooding Risk**		**Pesticide**	**Pesticide and Drainage open**	**Drainage opened**	**No action**	
Small	12 (0.39) [30.00]	14 (0.45) [35.00]	5 (0.16) [12.50]	31 (1.00) [77.50]	10 (0.32) [25.00]	15 (0.48) [37.50]	5 (0.16) [12.50]	1 (0.03) [2.50]	31 (1.00) [77.50]
Medium	3 (0.38) [7.50]	3 (0.38) [7.50]	2 (0.25) [5.00]	8 (1.00) [20.00]	2 (0.25) [5.00]	4 (0.50) [10.00]	1 (0.13) [2.50]	1 (0.13) [2.50]	8 (1.00) [20.00]
Large	0 (0.00) [0.00]	1 (1.00) [2.50]	0 (0.00) [0.00]	1 (1.00) [2.50]	0 (0.00) [0.00]	1 (1.00) [2.50]	0 (0.00) [0.00]	0 (0.00) [0.00]	1 (1.00) [2.50]
Total	15 (0.38) [37.50]	18 (0.45) [45.00]	7 (0.18) [17.50]	40 (1.00) [100.00]	12 (0.30) [30.00]	20 (0.50) [50.00]	6 (0.15) [15.00]	2 (0.05) [5.00]	40 (1.00) [100.00]
χ^2	**1.625**^{NS}				**2.290**^{NS}				

Source: *primary Survey*

Note: Figures in parenthesis ( ) indicates row wise percentage [ ] indicates column wise percentage
^{NS} – non significant

Table 4 shows the distribution of farmers according to farm size under dry and wet land conditions. Among the respondents, medium farmers constitute the highest proportion 47.50 percentage, followed by small farmers 40.00 percentage, while large farmers represent the lowest share 12.50 percentage. This indicates that medium farmers play a dominant role in the adoption of irrigation practices compared to small and large farmers. The findings suggest that the majority of irrigation-related activities are carried out by medium-sized farmers in the study area.

Table 5: Occurrence of Dry Spell & Waterlogging, Crop Stage and Estimated Yield Loss in Tapioca Cultivation

Dry Land											
Types of Farmers	**Dry Spell Season**			**Total**	**Crop Stage Drought**				**Total**	**Descriptive Statistics**	**Estimated Yield Loss**
	Never	**Sometimes**	**Frequently**		**Early Growth**	**Tuber Formation**	**Maturity**	**Others**			
Small	0 (0.00) [0.00]	7 (43.80) [17.50]	9 (56.30) [22.50]	16 (100.00) [40.00]	7 (43.80) [17.50]	3 (18.80) [7.50]	6 (37.50) [15.00]	0 (0.00) [0.00]	16 (100.00) [40.00]	**Mean** **SD** **N**	11687.5 4757.012 16
Medium	1 (5.30) [2.50]	9 (47.40) [22.50]	9 (47.40) [22.50]	19 (100.00) [47.50]	5 (26.30) [12.50]	5 (26.30) [12.50]	8 (42.10) [20.00]	1 (5.30) [2.50]	19 (100.00) [47.50]	**Mean** **SD** **N**	10578.95 3625.769 19
Large	0 (0.00) [0.00]	4 (80.00) [10.00]	1 (20.00) [2.50]	5 (100.00) [12.50]	2 (40.00) [5.00]	2 (40.00) [5.00]	1 (20.00) [2.50]	0 (0.00) [0.00]	5 (100.00) [12.50]	**Mean** **SD** **N**	11400 3049.59 5
Total	1 (2.50) [2.50]	20 (50.00) [50.00]	19 (47.50) [47.50]	40 (100.00) [100.00]	14 (35.00) [35.00]	10 (25.00) [25.00]	15 (37.50) [37.50]	1 (2.50) [2.50]	40 (100.00) [100.00]	**Mean** **SD** **N**	11125 4001.202 40
χ^2	**3.211**^{NS}				**3.129**^{NS}					**ANOVA**	**0.335**^{NS}

Source: *primary Survey*

Note: Figures in parenthesis ( ) indicates row wise percentage [ ] indicates column wise percentage

^{NS} – non significant

Wet Land									
Types of Farmers	**Waterlogging**			**Total**	**Crop Stage Waterlogging**		**Total**	**Descriptive Statistics**	**Estimated Yield Loss**
	Never	**Sometimes**	**Frequently**		**Tuber Formation**	**Maturity**			
Small	7 (22.60) [17.50]	17 (54.80) [42.50]	7 (22.60) [17.50]	31 (100.00) [77.50]	13 (41.90) [32.50]	18 (58.10) [45.00]	31 (100.00) [77.50]	**Mean** **SD** **N**	10806.45 2104.271 31
	2	6	0	8	1	7	8	**Mean**	12500

Medium	(25.00) [5.00]	(75.00) [15.00]	(0.00) [0.00]	(100.00) [20.00]	(12.50) [2.50]	(87.50) [17.50]	(100.00) [20.00]	**SD** **N**	2828.427 8
Large	1 (100.00) [2.50]	0 (0.00) [0.00]	0 (0.00) [0.00]	1 (100.00) [2.50]	0 (0.00) [0.00]	1 (100.00) [2.50]	1 (100.00) [2.50]	**Mean** **SD** **N**	9000 - 1
Total	10 (25.00) [25.00]	23 (57.50) [57.50]	7 (17.50) [17.50]	40 (100.00) [100.00]	14 (35.00) [35.00]	26 (65.00) [65.00]	40 (100.00) [100.00]	**Mean** **SD** **N**	11100 2329.301 40
χ^2	**5.394^{NS}**				**2.974***			**ANOVA**	**2.23^{NS}**

Source: *primary Survey*

Note: Figures in parenthesis ( ) indicates row wise percentage [ ] indicates column wise percentage

^{NS} – non significance *10 percent level of significant

Table 5 shows the occurrence of drought, waterlogging and estimated yield loss among different categories of farmers. Medium farmers 47.50 percentage form the majority, followed by small farmers 40.00 percentage, while large farmers 12.50 percentage are the least. In dry land, drought mostly occurs during the early growth and maturity stages, whereas in wet land waterlogging during maturity is more common. The ANOVA result shows no significant difference in estimated yield loss among the farmer categories.

Table 6: Types, Quantity and Cost of Fertilizer under Tapioca Cultivation

Dry Land						
Types of Farmers	**Types of Fertilizer**		**Total**	**Descriptive Statistics**	**Fertilizer Quantity**	**Total Fertilizer Cost**
	Chemical Fertilizers	**Chemical & FYM**				
Small	11 (68.80) [27.50]	5 (31.30) [12.50]	16 (100.00) [40.00]	**Mean** **SD** **N**	712.5 268.017 16	16795 8168.105 16
Medium	13 (68.40) [32.50]	6 (31.60) [15.00]	19 (100.00) [47.50]	**Mean** **SD** **N**	1244.74 412.612 19	26988.42 8633.069 19
Large	4 (80.00) [10.00]	1 (20.00) [2.50]	5 (100.00) [12.50]	**Mean** **SD** **N**	2220 1364.551 5	51892 30027.326 5
Total	28 (70.00) [70.00]	12 (30.00) [30.00]	40 (100.00) [100.00]	**Mean** **SD** **N**	1153.75 725.841 40	26024 16544.5 40
χ^2	**0.273^{NS}**			**ANOVA**	**14.297*** **	**14.698*** **

Source: *primary Survey*

Note: Figures in parenthesis ( ) indicates row wise percentage [ ] indicates column wise percentage

^{NS} – non significant, ***1 percent level of significance

Wet Land							
Types of Farmers	Types of Fertilizer			Total	Descriptive Statistics	Fertilizer Quantity	Fertilizer Cost
	Organic Manure (FYM)	Chemical or Inorganic Fertilizers	Both				
Small	2 (0.07) [5.00]	25 (0.81) [62.50]	4 (0.13) [10.00]	31 (1.00) [77.50]	Mean SD N	722.68 486.69 31	9345.35 6655.035 31
Medium	0 (0.00) [0.00]	7 (0.88) [17.50]	1 (0.13) [2.50]	8 (1.00) [20.00]	Mean SD N	1577.25 389.099 8	27900 17078.642 8
Large	0 (0.00) [0.00]	1 (1.00) [2.50]	0 (0.00) [0.00]	1 (1.00) [2.50]	Mean SD N	2500 - 1	4500 - 1
Total	2 (0.05) [5.00]	33 (0.83) [82.50]	5 (0.13) [12.50]	40 (1.00) [100.00]	Mean SD N	938.03 626.591 40	12935.15 12017.782 40
χ^2	0.784^{NS}				ANOVA	16.190***	12.417***

Source: *primary Survey*

Note: Figures in parenthesis ( ) indicates row wise percentage [ ] indicates column wise percentage, ^{NS} – non significance, ***1 percent level of significance.

Table 6 presents the type of fertilizers used, fertilizer quantity and cost during dry and wet seasons across farm size categories. During the dry season, most farmers use chemical fertilizers 70 percentage, while 30 percent use both chemical and organic fertilizers. In the wet season, the majority 82.50 percentage use chemical fertilizers, while a smaller proportion use organic manure or both. The ANOVA results show that fertilizer quantity and cost are statistically significant, whereas the chi-square results indicate no significant association in fertilizer type across farm categories.

Table 7: Cost and Returns of Tapioca Cultivation in Dryland, Dharmapuri District (Per Acre)

DRY LAND	Small	Medium	Large	Average Cost
(A) Variable Cost				
Cost of land preparation	2380	3125	3060	2855
Cost seeding	2800	2975	3025	2933.33
Labour cost of planting	4741.93	5356	6050	5382.64
Labour cost of FYM & fertilizer application	3195	4637	5070	4300.67
Cost of pesticide application	1840	2475	2535	2283.33
Cost of weeding	8430	9350	9870	9216.67
Cost of harvesting	6080	7120	6910	6703.33

Cost of FYM	4500	5200	4900	4866.67
Fertilizer cost	5920	6120	6580	6206.67
Pesticide cost	1938	2234	1921	2031
Total variable cost	41825.58	48592	49921	46779.53
(B) Fixed Cost				
Land rent	12000	12000	12000	12000
Land tax	110	110	110	110
Interest on capital	1440	1440	1440	1440
Total fixed cost	13550	13550	13550	13550
(A+B) Total Cost	**55375.58**	**62142**	**63471**	**60329.53**
Total Productivity (In Tonnes)	6.12	6.34	6.11	6.19
Price per Kg. of Tapioca	21	21	21	21
Total Revenue	**128520**	**133140**	**128310**	**129990**
Total Expenditure	**55375.58**	**62142**	**63471**	**60329.53**
Profit	**75144.42**	**70998**	**64839**	**69660.48**
BCR	**2.32**	**2.14**	**2.02**	**2.15**

Source: *Computed*

Table 8: Expenditure & Profit of Tapioca Cultivation in Dharmapuri District (Rs. Per Kg.)

DRY LAND	Small	Medium	Large	Average
Expenditure per Kg.	9.05	9.80	10.39	9.75
Profit per Kg.	11.95	11.19	10.61	11.25
Price per Kg.	21	21	21	21

Source: *Computed*

Tables 7 and 8 show that the average cost of dryland tapioca cultivation was ₹60,329.53 per acre, generating an average profit of ₹69,660.48 with a BCR of 2.15. Medium farms recorded the highest productivity (6.34 tonnes per acre), while small farms achieved the highest profit (₹75,144.42), profit per kg (₹11.95) and BCR (2.32) due to their lower production cost. Overall, dryland tapioca cultivation was profitable across all farm sizes, with small farms showing greater cost efficiency and profitability.

Table 9: Cost and Returns of Tapioca Cultivation in Wetland, Dharmapuri District (Per Acre)

WET LAND	Small	Medium	Large	Average Cost
(A) Variable Cost				
Cost of land preparation	3718.75	3820	3940	3826.25
Cost seeding	1115.63	1768.42	2660	1848.02
Labour cost of planting	5425	8315.79	9680	7806.93
Labour cost of FYM & fertilizer application	6500	7000	7960	7153.33
Cost of pesticide application	2550	2884.211	2080	2504.74

Cost of weeding	9863.64	14560	6562.5	10328.71
Cost of irrigation	6000	6750	7150	6633.33
Cost for harvesting	9150	9050	8750	8983.33
Cost of FYM	8150	8970	9350	8823.33
Fertilizer cost	6750	6870	7320	6980
Pesticide cost	2250	3170	3050	2823.33
Total variable cost	61473.01	73158.42	68502.5	67711.31
(B) Fixed Cost				
Land rent	20000	20000	20000	20000
Land tax	150	150	150	150
Interest on capital	2000	2000	2000	2000
Total fixed cost	22150	22150	22150	22150
(A+B) Total Cost	**83623.01**	**95308.42**	**90652.5**	**89861.31**
Total Productivity	9.2	9.31	9.11	9.21
Price per Kg. of Tapioca	26	26	26	26
Total Revenue	**239200**	**242060**	**236860**	**239373.33**
Total Expenditure	**83623.01**	**95308.42**	**90652.5**	**89861.31**
Profit	**155577**	**146751.58**	**146207.5**	**149512.02**
BCR	**2.86**	**2.54**	**2.61**	**2.66**

Source: *Computed*

Table 10: Expenditure & Profit of Tapioca Cultivation in Wet Land (Rs. Per Kg.)

WET LAND	**Small**	**Medium**	**Large**	**Average**
Expenditure per Kg.	9.09	10.24	9.95	9.77
Profit per Kg.	16.91	15.76	16.05	16.23
Price per Kg.	26	26	26	26

Source: *Computed*

Tables 9 and 10 show that the average cost of wetland tapioca cultivation was ₹89,861.31 per acre, generating an average profit of ₹1,49,512.02 with a BCR of 2.66. Medium farms recorded the highest productivity (9.31 tonnes per acre), while small farms achieved the highest profit (₹1,55,577), profit per kg (₹16.91) and BCR (2.86) due to their lower production cost. Overall, wetland tapioca cultivation was profitable across all farm sizes, with small farms showing greater cost efficiency and profitability., indicating that tapioca cultivation during the wet season is economically profitable, with small farmers obtaining the highest BCR (2.86).

XII. Major Findings

Table 11: Comparative Economic Performance of Dry and Wetland Tapioca Cultivation, Dharmapuri District

Indicator	**Dryland**	**Wetland**	**Difference**
Yield (Tonnes per acre)	6.19	9.21	+3.02

Indicator	Dryland	Wetland	Difference
Total cost (Rupees per acre)	60,329.53	89,861.31	+29,531.78
Gross returns (Rupees per acre)	1,29,990	2,39,373.33	+1,09,383.33
Net returns (Rupees per acre)	69,660.48	1,49,512.02	+79,851.54
BCR (Cost-Benefit Ratio)	2.15	2.66	+0.51

Source: Computed

1. The study found clear economic differences between wetl and dryland tapioca cultivation. Average productivity was 9.21 tonnes per acre in wetland cultivation, compared with 6.19 tonnes in dryland cultivation, indicating substantially higher productivity under wetland conditions.
2. The average total cost of cultivation was higher in wetland cultivation at ₹89,861.31 per acre, compared with ₹60,329.53 per acre in dryland cultivation. The higher wetland cost was associated with greater expenditure on cultivation operations, including irrigation, labour and other inputs.
3. Despite the higher cultivation cost, wetland farming generated an average revenue of ₹2,39,373.33 per acre and a profit of ₹1,49,512.02, considerably higher than the ₹1,29,990 revenue and ₹69,660.48 profit recorded in dryland cultivation.
4. The average Benefit–Cost Ratio was 2.66 for wetland cultivation and 2.15 for dryland cultivation, showing that both systems were economically viable, but wetland cultivation provided greater returns relative to the cost incurred. Small farmers recorded the highest BCR in both dryland (2.32) and wetland (2.86) cultivation.
5. Dryland cultivation was particularly exposed to drought-related risks: 47.5 percent of farmers frequently experienced dry spells, while another 50 percent experienced them sometimes. In wetland cultivation, 57.5 percent sometimes experienced waterlogging and 17.5 percent experienced it frequently, demonstrating that the two production systems face distinctly different climatic and water-related risks.

VII. Summary

The study comparatively examined the economic performance of wet and dryland tapioca cultivation among 80 farmers in Mampatty village of Dharmapuri District, comprising 40 wetland and 40 dryland farmers. The analysis covered landholding, irrigation practices, cultivation risks, fertilizer use, productivity, costs and economic returns. Dryland cultivation recorded an average productivity of 6.19 tonnes per acre, a cultivation cost of ₹60,329.53, revenue of ₹1,29,990, profit of ₹69,660.48 and a BCR of 2.15. In comparison, wetland cultivation achieved a higher productivity of 9.21 tonnes per acre, with a cultivation cost of ₹89,861.31, revenue of ₹2,39,373.33, profit of ₹1,49,512.02 and a BCR of 2.66.

The findings indicate that both cultivation systems are economically viable, although wetland tapioca cultivation is comparatively more productive and profitable despite its higher investment requirements. Assured water availability provides wetland farmers with an economic advantage, whereas dryland farmers are more vulnerable to drought and rainfall uncertainty, while wetland farmers face waterlogging risks. Therefore, improved irrigation access, efficient water-management practices and appropriate risk-management measures could enhance the productivity, profitability and sustainability of tapioca cultivation, particularly under dryland conditions.

VIII. Conclusion

The study reveals that both wet and dryland tapioca cultivation are economically viable in the study area, though their economic performance differs considerably. Wetland cultivation involves higher production costs but generates greater productivity, gross returns, profit, and benefit–cost ratio than dryland cultivation. Assured irrigation enables wetland farmers to achieve better yields, while dryland farmers remain more vulnerable to drought and rainfall uncertainty. Despite these differences, both systems provide positive economic returns to farmers. The findings highlight the important role of water availability in determining the productivity and profitability of tapioca cultivation. Efficient management of irrigation and production inputs can further improve farm-level economic performance. Particular attention is required to reduce the production risks faced by dryland farmers. Overall, appropriate resource management and institutional support can enhance the sustainability and profitability of tapioca cultivation in Dharmapuri district.

IX. Policy suggestions

1. ***Promote Efficient Irrigation:*** Government support for drip irrigation, farm ponds, and rainwater-harvesting facilities should be strengthened, particularly for dryland farmers, to reduce drought-related production risks.
2. ***Improve Crop Insurance Coverage:*** Awareness and accessibility of crop insurance schemes should be enhanced to protect tapioca farmers from losses caused by drought, waterlogging, pests, and diseases.
3. ***Strengthen Market Linkages:*** Direct linkages between tapioca farmers and sago and starch-processing industries should be promoted to ensure stable demand, reduce intermediary dependence, and improve price realization.
4. ***Provide Technical and Input Support:*** Agricultural extension services should provide farmers with guidance on efficient fertilizer and pesticide use, water management, and improved cultivation practices to reduce production costs and enhance productivity.

Bibliography

1. Prabakar, C., Devi, K. S., Ponnarasi, T., & Stalin, P. (2019). Estimation of cost of cultivation and evaluation of the marketing channels of tapioca in Tamil Nadu. *Plant Archives (09725210)*, *19*(2), 2810.
2. Wenjun, O., Maofen, L., Aye, T. M., & Srey, S. (2016). Current situation of cassava production, constraints and opportunities in Cambodia. *Agriculture, Forestry and Fisheries*, *5*(3), 64-70.
3. https://www.fao.org/land-water/databases-and-software/crop-information/cassava/en/ https://www.fao.org/faostat/en/#data/QCL
4. https://agritech.tnau.ac.in/crop_protection/crop_prot_crop_tapioca.html
5. https://dharmapuri.nic.in/about-district/
6. https://agritech.tnau.ac.in/govt_schemes_services/pdf/NADP/4.%20Dharmapuri%20DAP%20Final%20Report%202017-18.pdf
7. https://agmarknet.gov.in/SearchCmmMkt.aspx https://agricoop.nic.in/en/Major
8. https://icar.org.in/content/cassava https://www.ctcri.org
9. https://www.fao.org/land-water/databases-and-software/crop-information/cassava/en/ https://agritech.tnau.ac.in/crop_production/crop_prod_tapioca.html https://agri.tn.gov.in/agriculture

10. https://dharmapuri.nic.in/about-district/
11. https://amrafarms.com/tapioca-cultivation.html
https://agritech.tnau.ac.in/govt_schemes_services/aas/tapioca.html
12. https://tnau.ac.in/site/tcrs-yethapur/future-strategies/#:~:text=Other%20challenges%20include:%20*%20**Soil%20fertility%20problems**,flowering%20and%20second%20sprays%20at%20disease%20appear**
13. https://sustainablecassava.org/information-hub/cassava-value-chain/cassava-cultivation/