

## FACTORS AFFECTING THE PROCESS OF SUGARCANE CULTIVATION AND PRODUCTIVITY IN DARMAPURI DISTRICT (An exploratory among the sugar cane growers)

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### ABSTRACT

Sugarcane cultivation plays a significant role in the agricultural economy of Tamil Nadu, particularly in districts where climatic and soil conditions support commercial crop production. This study examines the factors affecting the process of sugarcane cultivation and productivity in Dharmapuri District. The research was conducted as an exploratory study among sugarcane growers to identify the various factors such as economic, technical, institutional, production and environmental factors influencing the process of sugarcane cultivation and productivity. For this study, a total of **187 sugarcane growers** were selected using convenient sapling method and distributed a structured interview schedule to collect primary data regarding landholding size, irrigation practices, input usage, labor availability, and access to credit, government support, and adoption of modern farming technologies. Secondary data were also reviewed to understand regional cultivation trends. The study employed descriptive statistical analysis to interpret the data and assess the level of influence of the various factors on the productivity of sugarcane outcomes. The findings indicate that several factors significantly influence sugarcane productivity in Dharmapuri District. It is obvious that increasing sugarcane productivity in Dharmapuri district requires a multifaceted approach. Adoption of modern farming techniques, timely access to machinery and inputs, improved extension services, organized irrigation systems, supportive financial, institutional mechanisms are key strategies. By addressing these areas, sugarcane farmers can achieve higher yields, improved sugar recovery rates. This study also suggested that improving irrigation infrastructure, strengthening extension services, promoting high-yielding varieties and facilitating easier access to credit and subsidies can increase sugarcane productivity and uninterrupted process of sugarcane cultivation, policy interventions and farmer training programs are essential to support sustainable sugarcane cultivation and improve the standard of living of sugarcane farmers in Dharmapuri District.

**Key Words:** Sugarcane Growers, Cultivation, Sugar mill, Problems, Productivity, Perception, Sugarcane cultivation, agricultural productivity, irrigation, farmer practices, Dharmapuri District, exploratory study

### 1. INTRODUCTION

The success of any nation depends upon its economic growth and standard of living of the people. There different sectors contributing for the economic development of a country, the India economy is divided in to three major sectors such as primary sectors, secondary sectors and territory sectors. Where the primary sector includes industries extract and produced raw materials such as framing, logging and mining, the agriculture sector contributing more than 18.2 percent at current prices to the India's GDP in 2023-2024 and creating largest employer in India provides a livelihood for about 42.3 percent of the population. India is developing country; the present challenge of India is fast growing population in the country and agriculture challenge to producing foods that based the agriculture on that population if agriculture is so good the population will increase.

### 2. REVIEW OF LITERATURE

**Velusamy and Prabhakaran (2021)** examined the awareness and adoption of improved sugarcane technologies among farmers in Tamil Nadu. The study reported that farmers who participated in technology demonstration programmes adopted practices such as transplanting young seedlings, wider spacing, and drip irrigation. However, some recommended methods like the pit method of cultivation were not adopted because farmers perceived them as complicated and labor-intensive. The study concluded that knowledge, training, and exposure to extension programmes strongly influence the adoption of improved sugarcane cultivation practices.

**Extension Education Studies (2022)** Research conducted under agricultural extension programmes reported that **training programmes, farmer field schools, and demonstration activities** significantly improve farmers' knowledge and adoption of improved sugarcane cultivation practices. Farmers with higher extension contact were more likely to adopt drip irrigation, improved seed varieties, and integrated nutrient management.

**Yudhvir Singh and Archana Singh (2023)** analyzed **policy and legislative frameworks affecting sugarcane cultivation in India**. The study found that government policies, pricing mechanisms, and sugar industry regulations play a critical role in ensuring sustainability and profitability of sugarcane farming. Policy support such as minimum support price and ethanol blending initiatives significantly influence farmers' decisions to cultivate sugarcane.

**Singh et al. (2024)** examined the knowledge and adoption levels of scientific sugarcane production practices among farmers in Bareilly district. The study found that many farmers had only moderate knowledge of improved technologies such as recommended seed varieties, fertilizer application, and pest management. The level of adoption was significantly influenced by education, extension contact, and farming experience.

**Kumar et al. (2025)** examined the level of adoption of improved sugarcane production technologies and the factors influencing their adoption among farmers. The study was conducted in Lakhimpur Kheri district of Uttar Pradesh during 2022–23 using a stratified random sampling technique, in which 120 sugarcane growers were selected for data collection. The results revealed that the majority of farmers (46.6%) had a medium level of adoption of improved sugarcane technologies, followed by 40% with high adoption and 13.3% with low adoption. Among the recommended practices, the highest adoption was observed for recommended seed rate and rationing practices, whereas intercropping and seed treatment were comparatively less adopted.

### 3. SUGARCANE VARIETIES IN TAMILNADU

In **Tamil Nadu**, sugarcane cultivation is dominated by several high yielding and disease-resistant varieties, primarily developed by the **Tamil Nadu Agricultural University (TNAU)**. Among these, **Co 86032** is the most popular, covering nearly half of the cultivated area due to its high yield potential and excellent rationing ability. Other widely grown varieties include **CoV 09356**, known for its high sugar recovery and productivity, **Co 11015 (Atulya)**, which is a short-duration variety maturing in 8–10 months, and **Co 0212**, which is drought-tolerant and suitable for regions with erratic rainfall. Additionally, newer varieties such as **CoC 13339**, **CoG 6**, **CoG 7**, and **Co 18009 (Punnagai)** are promoted for better yield and adaptability, and are usually supplied through government nurseries and local sugar mills. Special-purpose varieties like **COG 93076** and **COG 94077** are recommended for drought-prone areas and jaggery production, while **CO 95076** performs well in salt-affected soils. The main planting seasons in Tamil Nadu are from December to January (early season), February to March (mid-season), and April to May (late season), with some districts also planting during June–July. Farmers are generally advised to choose varieties based on their district, soil type, and irrigation facilities, with Co 86032, CoV 09356, Co 11015, and Co 0212 being the most widely recommended for current cultivation.

### 4. STATEMENT OF PROBLEM

In India sugarcane is second largest agro-based industry next to the textile the sugar industry is giving employment opportunity in rural area and direct and industry way it 50 million farmers and their dependents in the cultivation of sugarcane it is 0.5 million skilled and unskilled workers the developing socio economic in rural area it enhancing farm income. Sugarcane price suddenly increase and decrease depend upon the market price profit and loss in the sugar product although sugar losses are higher due to processing of Gur and Khandsari there is no state control over price and distribution. The sugarcane farmers facing many problems in current market situation and the sugar industry gain market price depends the gain the profits or loss sugar market is global level market place sugarcane the to implement the new technology the improving the profits the increasing growth level the sugar industry. In order to achieve high yield and recovery of sugarcane, the sugarcane growers facing

problems the most of suffer in financial based problem living to the farming priority maintain sugar crop it's to develop the sugarcane farming they want more scheme to develop the farming activities price, market, opportunity to developing sugarcane farming in the sugarcane plants growing is ten months to one year plant Tamil Nadu in the main season planting seed is (December to May) in entire state in part of state. Hence, "Problems and prospects of sugarcane growers in Dharmapuri District" taken to address the various problems faced by sugarcane growers during the season of cultivation to harvest of sugarcane.

**5. OBJECTIVES OF STUDY**

- To investigate the personal and socio economic profile of sugarcane growers in Dharmapuri District.
- To measure the perception towards the various factors determining the sugarcane cultivation process in Dharmapuri district.
- To analyze the impact of the factors towards the sugarcane productivity in Darmapurin district.

In view of the above objectives, this study attempts to summarize the research findings to offer valuable suggestions to increase the yield of sugar cane in Darmapuri district.

**6. SCOPE OF STUDY**

The Present study becomes important to address the various factors that determining sugarcane cultivation in Dharmapuri district. It is appropriate to achieve the study objectives and their findings with respect to factors influencing the sugarcane cultivation. Based the on the findings of the present study, suitable suggestions and recommendations have given to the sugar cane growers in general and in particular to the sugar cane growers of Darmapuri district.

**7. HYPOTHESIS**

H<sub>0</sub>: The demographic profile of the sugarcane growers do not influence perception level of factors associated with sugarcane cultivation.

H<sub>0</sub>: The land profile of the sugarcane growers do not influence perception level of factors associated with sugarcane cultivation.

**8. METHODOLOGY**

**8.1. Research Design:**

The main purpose of the present study is to analyze the various factors determining sugar cane cultivation and the level of perception of growers. Thus, the descriptive research designs adopted to achieve the objectives of the research.

**8.2. Sampling**

The research focus on the factors determining the process of sugar cane cultivation and the perception of sugarcane growers associated with factors, in order to collect the primary data from the respondents convenience sampling method has been applied and 200 respondents were surveyed from Dharmapuri.

**8.3. Data Collection**

The data collection for the study is both primary data and secondary data. The secondary data collect by articles, journal, book; internet etc. The primary data collect by the interview schedule 200 were distributed to the farmers and ask to respond, 195 were returned by conversely, only 187 are fully completed by the respondents and considered as potential number of samples for conducting the present study.

**8.4. Data Analysis**

This study contains both the qualitative and quantitative method of research, after collecting the data from the respondents the data have been analyzed by the researcher through following statistical tool have been used the Frequency, mean score perception and Chi-Square test have been adopted to measure the perception of sugar cane growers towards the various factors associated with sugarcane cultivation process growers.

**9. RESULT AND DISCUSSION**

**9.1. Demographic Profile of the Respondents**

**Table -1: Demographic Profile of the Respondents**

S.No	Demographic Profiles	Categories of Variables	N	%
1	Age of the Respondents	Upto 25 Years	6	3.2
		26-35 Years	37	19.8
		36-45 Years	80	42.8
		46-55 Years	38	20.3
		above 55 Years	26	13.9
		<b>Total</b>	<b>187</b>	<b>100</b>
2	Gender of the Respondents	Male	146	78.1
		Female	41	21.9
		<b>Total</b>	<b>187</b>	<b>100.0</b>
3	Marital Status	Married	176	94.1
		Unmarried	7	3.7
		Destitute/widow	4	2.1
		<b>Total</b>	<b>187</b>	<b>100</b>
4	Educational Qualification	Upto Primary Level	36	19.3
		SSLC/HSC	106	56.7
		Degree/Diploma	11	5.9
		Post-Graduates	4	2.1
		Professional	17	9.1
		Others	13	7.0
<b>Total</b>	<b>187</b>	<b>100</b>		
5	Employment Status	Unemployment	19	10.2
		Part-Time	29	15.5
		Full-Part	61	32.6
		Others	78	41.7
		<b>Total</b>	<b>187</b>	<b>100</b>
6	Family Structure	Nuclear Family	77	41.2
		Joint Family	76	40.6
		Extended Family	34	18.2
		<b>Total</b>	<b>187</b>	<b>100</b>
7	Size of Family	Less than 3 Members	31	16.6
		4-6 Members	111	59.4
		More than 6 Members	45	24.1
		<b>Total</b>	<b>187</b>	<b>100</b>
8	Number of dependents	Less than 3 Members	14	7.5
		4-5 Members	28	15.0
		5- 6 Members	65	34.8
		Above 6 Members	80	42.8
		<b>Total</b>	<b>187</b>	<b>100</b>

The largest Age group is 41-50 years, accounts for more than two fifth (45.90%, N=79) of the respondents and the very low percent is oldest group those who are above 60 years makes up only 16 percent of the respondents. The data shows that out of 172 respondents, majority are male (80.2%, N=138) while only 19.8 percent are female.

Further the data reveals that out of total respondents, majority are married (83.1%, N=143), this indicates that most participants are in a stable marital relationship and smaller proportion of the respondents 11 percent are destitute or widower, while 5.8 percent (N=10) respondents are unmarried. The educational qualification of the respondents, it is evident that the majority of respondents have SSLC and Higher secondary/diploma qualifications (63.3%, N= 109). Meanwhile, 14.5% of the respondents are graduates, and only 3.5% possesses post-graduate, it showing a relatively small proportion of highly educated participants. Additionally, 18.6% of respondents fall under the others category, which may include those with vocational, non-conventional form of education and including illiterate also.

**9.2. Income Details of the Respondent**

**Table -2; Income Details of the Respondent**

S.No	Income Details	Categories of Variables	N	%
9	Total Annual Income of the Family	Less than Rs 2,00,000	75	40.1
		Rs.2,00,001 – 4,00,000	68	36.4
		Rs.4,00,001 – 6,00,000	16	8.6
		Rs.6,00,001 – 8,00,000	9	4.8
		Rs.8,00,001 – 10,00,000	11	5.9
		Above Rs.10,00,000	8	4.3
		<b>Total</b>	<b>187</b>	<b>100</b>
10	Gender of the Respondents	Male	146	78.1
		Female	41	21.9
		<b>Total</b>	<b>187</b>	<b>100.0</b>
11	Monthly family Expenses	Less than Rs 10,000	55	29.4
		Rs.10,001 – 20,000	74	39.6
		Rs.20,001 – 30,000	35	18.7
		Above Rs.30,000	23	12.3
		<b>Total</b>	<b>187</b>	<b>100</b>
12	Total annual saving percentage of income	Less than 10% of monthly income	53	28.3
		11 – 20 %	67	35.8
		21-30 %	32	17.1
		31 – 40%	19	10.2
		Above 40%	16	8.6
		<b>Total</b>	<b>187</b>	<b>100</b>

Annual income reveals a clear concentration in the lower income categories. Nearly half of the respondents 46.5 percent earn less than Rs. 1, 00,000 per annum, while an additional 41.3% fall with the income bracket of Rs 1, 00,001-Rs.2, 00,000. This indicates that a substantial 87.8 percent of the respondents earns below Rs. 2, 00,000 annually.

According to the type of family of the respondents, it is observed that a slightly majority, constituting 53.5% belong to nuclear families, while 46.5% living in the joint families. It is also evident that more than two fifth 45.3% belong to families with more than six members, indicating the prevalence of large family structures, while only 11.6% of respondents live in smaller families with 2-3 members.

**9.3. Income Details of the Respondent**

**Table -3: Income Details of the Respondent**

S.No	Cultivation Land Profiles	Categories of Variables	N	%
10	Ownership of Land	Own land	110	58.8
		leased	32	17.1
		others	45	24.1
		<b>Total</b>	<b>187</b>	<b>100</b>
11	Type of Farmers	Small size	19	10.2
		Semi medium	80	42.8
		Medium size	61	32.6
		Large size	27	14.4
		<b>Total</b>	<b>187</b>	<b>100</b>
12	Size of Land	1 Acre to 3 Acres	19	10.2
		3 Acres to 5 Acres	81	43.3
		5 Acres to 10 Acres	60	32.1
		Above 10 Acres	27	14.4
		<b>Total</b>	<b>187</b>	<b>100</b>
13	source finance used to cultivate the sugarcane	Own fund with 50% loan	87	46.5
		fully loan	100	53.5
		<b>Total</b>	<b>187</b>	<b>100</b>
14	Type of Loan	Small Finance (NBFC)	19	10.2
		Commercial bank loan	81	43.3
		Agriculture loan	60	32.1
		Gold loan	27	14.4
		<b>Total</b>	<b>187</b>	<b>100</b>
15	Monthly spending on the sugar cane farming	Less than 3000	14	7.5
		3000 to 5000	28	15.0
		5000 to 10000	65	34.8
		Above 10000	80	42.8
16	Percentage of Profit on the cultivation Expenses	Loss	19	10.2
		Less than 10%	84	44.9
		20% to 30%	58	31.0
		More than 30%	26	13.9
		<b>Total</b>	<b>187</b>	<b>100</b>

The classification of the respondents based on the size of their farming operations, majority accounting for 41.3% are medium sized farmers, followed by 33.7% are small sized farmers and 25% who fall under the large sized farmer category. The majority of respondents (57% (N=98) own their land, while 17.4% lease land and 25.6% fall into other categories perhaps communal, inherited, or borrowed land.

Most of the sugarcane farmers operate on small to medium sized land holdings, nearly two thirds (65.1%) cultivating between 2 and 5 acres, a smaller proportion 23.8% cultivating larger farms exceeding 5 acres, while 11 percent cultivate just 1 acres of land.

More than half 51.7% of the respondents relied on borrowed loan and funds to spend towards cultivation expenditure, while 48.3% used their personal savings or resources. Indicating that slightly majority of the respondents depending loans, it is implied that external financing plays a slightly larger role than self-financing. Out of total respondents surveyed regarding their registration with the sugar mill, more than half (57%, N=98) reported being registered with mill for cultivating the sugarcane and the rest of them are not registered with sugar mill.

**9.4. Analysis of the farmers’ perception towards the factors associated with process of sugar cane cultivation**

The following table presents the descriptive statistics of the factors influencing sugarcane cultivation and productivity based on responses collected from 187 respondents. There are 23 variables identified and grouped into major categories such as economic, technological, institutional, production and environmental factors, beside with indicators of sugarcane productivity. The table reveals the mean and standard deviation values for each variables, which help to understand the average perceptions of respondents and the level of variation in their perception towards the above five dimensions.

**Table -4; Measurement of mean score Perception of Sugarcane growers towards the factors associated with sugar cane cultivation process (Arithmetic Mean)**

Factor Variable	Descriptive Statistics			
	Variables	Mean	Std. Deviation	Analysis N
1	High cost of cultivation	3.3155	.92859	187
2	High cost of production	3.0321	1.18187	187
3	High labour cost	3.0588	1.05329	187
4	High input cost	3.0909	1.12988	187
5	Lack of finance / loan facility	2.7005	1.18510	187
6	High transportation cost	3.0160	1.18900	187
<b>Economic Factors –Total Mean Score</b>		<b>18.2138</b>		
7	Lack of modern technology	3.0642	1.22963	187
8	Lack of agricultural machinery	2.9893	1.12637	187
9	Lack of machinery training	2.9626	1.17028	187
10	Poor maintenance of machinery	2.8128	1.02771	187
<b>Technological Factors –Total Mean Score</b>		<b>11.8289</b>		
10	Irregular electricity supply	2.8930	.98336	187
11	Lack of storage facilities	2.8717	1.22457	187
12	Lack of services for sugarcane farmers	2.9412	.97923	187
13	Small and uneconomic size of mill	2.9465	1.13466	187
<b>Institutional Factors –Total Mean Score</b>		<b>11.6524</b>		
14	Low rate of recovery	2.8182	1.12598	187
15	High production risk	2.9893	1.13587	187
<b>Production Factors</b>		<b>5.8075</b>		
16	Rain-fed cultivation dependency	2.9251	.79970	187
17	Unsuitable temperature and altitude	2.8128	1.22354	187
18	Heavy rainfall during cultivation	1.3743	.87313	187
<b>Environmental Factors –Total Mean Score</b>		<b>7.1122</b>		
21	Yield per hectare	3.0053	1.14768	187
22	Sugar recovery rate	2.8021	1.00984	187
23	Farmer performance	2.8342	1.26547	187
<b>Sugarcane Productivity –Total Mean Score</b>		<b>8.6416</b>		

The above table reveals that mean score perception of the various factors associated with sugarcane cultivation.

- A mean score perception (importance or severity)
  - A standard deviation (variability in perception among the sugar cane growers)
- Higher mean values indicate greater perceived impact

**Economic Factors**

The mean values of the variables associated with economic factors range from 2.70 to 3.31, among these variables, high cost of cultivation ( $\mu=3.31$ ) recorded the highest mean value, indicating that it is the most significant economic problem faced by sugarcane growers, followed by high input cost ( $\mu=3.09$ ) and high labor cost ( $\mu=3.05$ ). The lowest mean score was observed for lack of finance and loan facilities ( $\mu=2.70$ ), it implies that financial access issues are relatively less severe compared to other cost related factors. The total means score for economic factors is  $\sum\mu= 18.2138$ ), which indicates that economic factors play a foremost role in affecting sugar cane cultivation and productivity.

**Technological Factors**

The mean score for technological attributes range between 2.8128 and 3.0642. Lack of modern technology ( $\mu=3.06$ ) has the highest mean score, it implies that the farmers perceive technological inadequacy as a major challenge. This is followed by lack of agricultural machinery ( $\mu=2.9893$ ) and lack of machinery training ( $\mu=2.9626$ ). The lowest mean score was recorded for poor maintenance of machinery ( $\mu=2.8128$ ). The total mean score for technological factor is  $\sum\mu= 11.8289$ ), indicating that technological factors are moderately influence the sugar cane cultivation.

**Institutional factors**

The institutional factors recorded mean scores ranging from 2.8717 to 2.9465. Among these variables, small and uneconomic size of sugar mill ( $\mu=2.9465$ ) has the highest mean score, indicating that the size and capacity of sugar mills influence productivity. This is followed by lack of service for sugarcane farmers ( $\mu=2.9412$ ) also shows a relatively high concern among farmers. The lowest mean score was observed

for lack of storage facilities ( $\mu=2.8717$ ). The total means score for institutional factors is ( $\Sigma\mu= 11.6524$ ), it implies that institution support (Sugar mill) systems are moderately influence sugarcane cultivation and productivity.

**Production Factors**

Production Factors show mean scores between 2.8182 and 2.9893. High production risk ( $\mu=2.9893$ ) has a higher mean compared to low rate of recovery ( $\mu=2.8182$ ), suggesting that sugar cane farmers perceive production risks as a major issue. The overall mean score for production factors is ( $\Sigma\mu= 5.8075$ ), indicating that production related issues also contributes to the sugar cane cultivation process and productivity.

**Environmental Factors**

The sugar cane cultivation depends upon the environment and climatic conditions therefore, these variables have mean scores ranging from 1.3743 to 2.9251. Rain-fed cultivation dependency ( $\mu=2.9251$ ) has the highest mean score, indicating that dependency on rainfall significantly affects sugar cane cultivation and productivity. Unsuitable temperature and altitude ( $\mu=2.8728$ ) also show notable influence. However, heavy rainfall during cultivation ( $\mu=1.3743$ ) has the lowest mean score, indicating that it is not considered a major issue by most farmers. The total mean for environmental factor is ( $\Sigma\mu= 7.1122$ ), suggesting that environmental conditions moderately influence sugarcane cultivation process, harvest and productivity.

**Sugarcane Productivity**

Among the productivity indicators, yield per hectare ( $\mu=3.0053$ ) recorded the highest mean score, indicating its strong influence on overall sugarcane cultivation process and productivity. This is followed by sugarcane farmer performance ( $\mu=2.8342$ ) and sugar recovery (sucrose content) rate ( $\mu=2.8021$ ). The total mean score for sugarcane productivity is ( $\Sigma\mu= 8.6416$ ), reflecting moderate productivity performance among the sugarcane cultivators.

**9.5. Analysis of the impact of factors (independent variables) towards sugarcane cultivation and productivity.**

Correlation analysis was conducted to examine the impact of the independent variables and the dependent variable identified in the study. The independent variables include Economic Factors (F1), Technological Factors (F2), Institutional Factors (F3), Product Factors (F4) and Environmental Factors (F5), whereas Sugarcane cultivation and Productivity is considered as the dependent variables. The Pearson correlation coefficient was used to measure the strength and direction of the linear relationship between these variables. The correlation values range from -1 to +1, where positive values indicate a positive relationship and negative values indicate an inverse relationship. The analysis is based on the sample size of 187 respondents (Sugarcane Farmers), and the results are presented in the form of correlation matrix table below.

**Table -5:Correlations between factors (independent variables) and productivity  
 Karlpearson Correlation co-efficient**

		Correlations					
		F1	F2	F3	F4	F5	Dependent Variable
<b>Economic Factors F1</b>	Pearson Correlation	1					
	Sig. (2-tailed)						
	N	187					
<b>Technological Factors F2</b>	Pearson Correlation	.144*	1				
	Sig. (2-tailed)	.050					
	N	187	187				
<b>Institutional Factors F3</b>	Pearson Correlation	-.013	-.003	1			
	Sig. (2-tailed)	.862	.965				
	N	187	187	187			
<b>Production Factors F4</b>	Pearson Correlation	.132	-.003	-.091	1		
	Sig. (2-tailed)	.071	.972	.217			
	N	187	187	187	187		
<b>Environmental Factors F5</b>	Pearson Correlation	.071	-.058	.401**	.120	1	
	Sig. (2-tailed)	.332	.432	.000	.101		
	N	187	187	187	187	187	
<b>Sugar cane Productivity</b>	Pearson Correlation	.056	-.032	.576**	.240**	-.003	1
	Sig. (2-tailed)	.448	.663	.000	.001	.968	
	N	187	187	187	187	187	187

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\*. Correlation is significant at the 0.01 level (2-tailed).

**Table -6: Correlation Matrix Hypothesis Test Result  
 Karlpearson Correlation co-efficient**

Independent Variables	Dependent Variable	Hypothesis	Hypothesis Test Result
<b>Economic Factors</b>	<b>Sugarcane Cultivation and Productivity</b>	<b>H<sub>0</sub></b> : The <i>Economic</i> factors do not influence the sugarcane productivity	<i>Not Significant (Accepted H<sub>0</sub>)</i>
<b>Technological Factors</b>		<b>H<sub>0</sub></b> : The <i>Technological</i> factors do not influence the sugarcane productivity	<i>Not Significant (Accepted H<sub>0</sub>)</i>
<b>Institutional Factors</b>		<b>H<sub>0</sub></b> : The <i>Institutional</i> factors do not influence the sugarcane productivity	<i>Significant (Rejected H<sub>0</sub>)</i>
<b>Production Factors</b>		<b>H<sub>0</sub></b> : The <i>Production</i> factors do not influence the sugarcane productivity	<i>Significant (Rejected H<sub>0</sub>)</i>
<b>Environmental Factors</b>		<b>H<sub>0</sub></b> : The <i>Environmental</i> factors do not influence the sugarcane productivity	<i>Not Significant (Accepted H<sub>0</sub>)</i>

**Economic Factors\* Sugarcane Productivity:**

The correlation coefficient between economic factors and sugarcane productivity is  $r=0.056$ ,  $p=0.448$  indicating a very weak positive relationship between two variables, but it is not statistically significant. Therefore, the economic factors such as price support, credit or income do not show a considerable influence on the productivity of sugarcane and cultivation in Darmapuri district.

**Technological Factors\*Sugarcane Productivity:** The correlation technological factors and sugarcane productivity is  $r= -0.032$ ,  $p=0.663$  which is greater than 0.05 level of significant, indicating a very weak negative relationship between the two variables. Therefore, it implies that technological factors such as the adoption of modern farming techniques, improved machinery and advanced cultivation practices do not have a significant influence on the sugarcane productivity in the present study.

**Institutional Factors\* Sugarcane Productivity:** The coefficient of correlation between Institutional Factors and sugarcane productivity is  $r=0.576$ ,  $p=0.000$  which is less than 0.01 level of significance indicating a strong positive relationship between two variables. Therefore, it can be concluded that institutional factors such as extension service, government schemes, cooperative supports, training programs and institutional assistance play a crucial role in increasing sugarcane productivity.

**Production Factors \* Sugarcane Productivity:** The correlation coefficient between production factors and sugarcane productivity is  $r=0.240$ ,  $p=0.001$ , which is less than the 0.01 level of significance demonstrating a moderate positive correlation between the two variables. Therefore, it can be concluded that production factors such as the use of agricultural inputs, effective farm management practices, irrigation facilities and improved cultivation techniques have a positive influence on sugarcane productivity.

**Environmental Factors\*Sugarcane Productivity:** The correlation coefficient for the environmental factors and sugarcane productivity is  $r=-0.003$ ,  $p=0.968$  which is greater than the standard significance level of 0.05 indicating no associations between the two variables. Therefore, it can be inferred that environmental factors such as climatic conditions, rainfall patterns, soil conditions and other natural environmental aspects do not show a significant influence on the sugarcane productivity in Dharmapuri district.

## 10. FINDING OF STUDY

### 10.1. Findings related to perception of factor associated with sugarcane cultivation

- The economic factors are the foremost constraints affecting sugarcane cultivation and productivity, predominantly due to the high cost of cultivation, input costs, and labour costs. Whereas, the factors relating to financial access such as lack of finance and loan facilities are comparatively less severe for sugarcane farmers.
- The inadequacies in technologies play a moderate role in influential sugarcane productivity with lack of modern technology and agricultural machinery being major concern. Moreover, lack of training in the use of agricultural machinery also affects the efficient embracement of technology by the sugarcane growers.
- Institutional factors also moderately influence sugarcane cultivation and productivity, in particular issues related to the small and uneconomic size of sugar mills and insufficient services provide to farmers, production related challenges i.e. high production risk and lower recovery (Sucrose Content) rates influence the cultivation process and productivity.
- Environmental conditions also affect sugar cane cultivation, mainly the dependency on rainfall and unsuitable climatic conditions. Conversely, heavy rainfall during the cultivation is not considered a major issue by the sugarcane growers.
- Productivity of sugarcane cultivation is mainly influenced by yield per hectare, the sugarcane growers' performance and the sugar recovery rates.

### 10.2. Findings related to correlation coefficient

- Economic factors such as price support, credit availability and farmers' income do not significantly influence on sugarcane productivity in Dharmapuri district.
- Technological factors including the embracement of modern farming techniques, improved machinery and advanced cultivation practice do not have a significant impact on the process of sugarcane cultivation and productivity in Dharmapuri District.
- Institutional factors such as extension services, government schemes, cooperative support, training programs and institutional assistance play a crucial role in increasing sugarcane productivity.
- Production factors including the use of agricultural inputs, effective farm management practices, irrigation facilities and improved cultivation techniques positively influence sugarcane cultivation process and productivity.
- Environmental factors i.e. climatic conditions, rainfall patterns and soil conditions do not significantly influence on sugarcane productivity in Dharmapuri district.

## 11. SUGGESTIONS

- The sugarcane farmer should adopt modern cultivation techniques and improvised machinery to enhance sugarcane cultivation and to increase productivity.
- The government should provide subsidies, training programs and strengthen extensive services to support sugarcane farmers.
- Sugar mills should ensure timely procurement of seed cane, fertilizers, pesticide, and arrangement of loan and prompt payments to the farmers to improve recovery rates through modernization.
- Financial institutions should provide easy and timely credit facilities for farmers to meet sugarcane cultivation expenses.
- Agricultural department should promote well-organized irrigation methods, better farm management practices to facilitate uninterrupted cultivation process and increased productivity.

## 12. CONCLUSION

The study on factors affecting the process of sugarcane cultivation and productivity in Dharmapuri District, Tamilnadu reveals that the sugarcane cultivation is influenced by a permutation of economic, technological, institutional, production and environmental factors. Whereas, high cultivation cost and lack of modern technology pose challenges, institutional support and effective production practices play a vital role in increasing productivity. Economic and environmental factors were found to have a limited direct impact, at the same time structured support, training, improved farm management and modern machinery significantly contribute to better yields and higher sugar recovery rates. In Dharmapuri district, the sugar recovery rate generally ranges between 10 percent and 10.65 percent, which is among the highest recovery levels recorded in Tamilnadu sugar mills. The correlation analysis indicates that while economic and technological factor do not significantly influence sugarcane productivity, institutional and production factors have a strong positive effect, highlighting the importance of structured support and practical cultivation process. Based on these findings, it is obvious that increasing sugarcane productivity in Dharmapuri district requires a multifaceted approach. Adoption of modern farming techniques, timely access to machinery and inputs, improved extension services, organized irrigation systems, supportive financial, institutional mechanisms are key strategies. By addressing these areas, sugarcane farmers can achieve higher yields, improved sugar recovery rates.

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