

Influence of Gross Area Under Irrigation on Foodgrains Production in Tamil Nadu

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ABSTRACT

Generally in Economics, the land, labour, capital and organisation are described as the main factors of production in all the production process. The foodgrains production in Tamil Nadu has been influenced by a number of determinants including gross area under irrigation. The state has only 4 per cent of the land area and 3 per cent of the water resources of the country. Of the total area under foodgrains, only 60 per cent of the area is irrigated. The present article analyses the trend and growth of gross area under irrigation and its influence on foodgrains production in Tamil Nadu during the thirty years of the study period from 1985-86 to 2014-15. Among the three periods of the study period, the trend values of gross area irrigated (-0.147 thousand hectares) was found to be lesser and negative during the second period than in the first and the third periods of the study. Similarly the percentage change of gross area under irrigated was negative and lesser during the second period. The compound growth rates of gross area irrigated (-3.3 per cent) was perceived as lesser during the second period than during the first and the third periods of the study in Tamil Nadu. The gross area irrigated influenced the foodgrains production more during the period-III in Tamil Nadu mainly due to the introduction of water resistant crops, new irrigation techniques, increasing the usage of fertilizer and the renovation of canals through MGNREGP by the Government. Therefore we will concentrate mainly on the water conservation methods which will increase the gross area under irrigation for greater foodgrains production in Tamil Nadu.

1. INTRODUCTION

Generally in Economics, the land, labour, capital and organisation are described as the main factors of production in all the production process. In the agriculture sector, the agricultural production requires a number of factors apart from the general major factors of production. Further, the factors of production are classified into tangible and intangible. The tangible factors are directly influenced the production and the intangible factors are indirectly influenced in the production.

The foodgrains production in Tamil Nadu has been influenced by a number of determinants. The factors of foodgrains production were classified into Institutional Factors: Area under cultivation, Agricultural Credit; Physical Factors: Gross area irrigated, Farm Mechanisation, Electricity Consumption, Agricultural Marketing, Rainfall; Technological Factors: HYV Seeds, Fertilizer Consumption, The use of Pesticides; d) Socio-Economic Factors: Population, Number of Cultivators, Availability of Agricultural Labourers, Poverty and Cost of Cultivation.

Tamil Nadu state is one among the 29 states in India. The state supports 7 per cent of the country's population, but it has only 4 per cent of the land area and 3 per cent of the water resources of the country. Of the total gross cropped area, only 50 per cent of the area is irrigated in Tamil Nadu.

Similarly, of the total area under foodgrains, only 60 per cent of the area is irrigated. Nearly 52 per cent of the area is under dry farming conditions in Tamil Nadu.

The present article analyses the trend and growth of gross area under irrigation and its influence on foodgrains production in Tamil Nadu during the thirty years of the study period from 1985-86 to 2014-15.

2. METHODOLOGY

The present study is a descriptive and analytical research purely based on the secondary data. The necessary secondary data for 30 years from 1985-86 to 2014-15 for Tamil Nadu state have been collected from the various survey reports published over the years by Ministry of Agriculture and Cooperation, Director of Economics and Statistics, Tamil Nadu, Handbook of Indian Economy published by RBI and Seasons and Crops Reports of Tamil Nadu Government. In order to have the apparent depiction in the effect of determinants of foodgrains production in Tamil Nadu over the 30 years of study period, the period was divided into three sub periods such as Period-I (1985-86 to 1994-95), Period-II (1995-96 to 2004-05) and Period-III (2005-06 to 2014-15). The trend and growth of gross area under irrigation and its influence on foodgrains production in Tamil Nadu was analysed by applying linear regression model and Semi-log Model.

3. RESULTS AND DISCUSSION

Irrigation is one of the major factors for agricultural production in generally and for foodgrains production in particularly in Tamil Nadu. The percentage share of gross area irrigated under foodgrains production during the study period from 1985-86 to 2014-15 in Tamil Nadu is presented in the table 1.

TABLE 1 PERCENTAGE SHARE OF GROSS AREA IRRIGATED FOR FOODGRAINS PRODUCTION IN TAMIL NADU
(IN '000 HECTARES)

YEAR	GROSS AREA UNDER IRRIGATION		
	TOTAL CROPS	FOODGRAINS	% SHARE
1985-86	3240	2695	83.2
1986-87	2844	2378	83.6
1987-88	2945	2344	79.6
1988-89	2873	2343	81.6
1989-90	3045	2465	81.0
1990-91	2894	2328	80.4
1991-92	3257	2603	79.9
1992-93	3385	2665	78.7
1993-94	3544	2841	80.2
1994-95	3588	2849	79.4
1995-96	3183	2546	80.0
1996-97	3347	2690	80.4
1997-98	3519	2846	80.9
1998-99	3635	2919	80.3
1999-00	3585	2875	80.2
2000-01	3661	2909	79.5
2001-02	3660	2084	56.9

2002-03	3444	1513	43.9
2003-04	3508	1400	39.9
2004-05	3601	1874	52.0
2005-06	3186	2046	64.2
2006-07	3666	1921	52.4
2007-08	3717	1810	48.7
2008-09	3390	2014	59.4
2009-10	3238	1895	58.5
2010-11	3348	1976	59.0
2011-12	3519	1838	52.2
2012-13	2991	1583	52.9
2013-14	3311	2310	69.8
2014-15	5897	2890	49.0
Mean	3441	2302	67.7
SD	542	462	14.3

Source: Computed by the Researcher

From the table 1, it is inferred that the percentage share of gross area irrigated under foodgrains production to the gross area irrigated under agricultural cultivation in Tamil Nadu is higher during the year 1986-87 with 83.6 percent and lower during the year 2003-04 with 39.9 percent. It further indicated that the percentage share of gross area irrigated under foodgrains production to the gross area irrigated under agricultural cultivation in Tamil Nadu was above 68 percent (Mean area is 67.7%) in 16 years and remaining 14 years it was below 67 percent during the 30 years of study period.

The mean gross area irrigated under agriculture cultivation is 3441 thousand hectares and for foodgrains production is 2302 thousand hectares in Tamil Nadu. The mean percentage share of gross area irrigated under foodgrains cultivation to agriculture cultivation is 67 percent during the study period.

The Standard Deviation for gross area irrigated under agriculture cultivation is 542 thousand hectares and for foodgrains cultivation is 462 thousand hectares. The Standard Deviation for the percentage share of gross area irrigated under foodgrains cultivation to total agriculture cultivation is 14.3 percent in Tamil Nadu during the study period.

TREND ANALYSIS OF GROSS AREA UNDER IRRIGATION

To analyse the trend and growth patterns of gross area under irrigation for foodgrains production in Tamil Nadu, straight line equations both in linear and log-linear models have been fitted for the gross area under irrigation on foodgrains production assumed for the three periods of this study. The slope coefficients of the trend lines have been compared for the periods gross area under irrigation on foodgrains production considered in this study. The independent variable is time factor that is year and the dependent variable is gross area under irrigation. To fit the straight line the model of the following type has been used for each determinant.

$$Y = a + bt$$

Where, Y = Gross area under Irrigation,

t = Time trend variable taking values 1,2,3,..

'a' is the intercept term and 'b' is the regression coefficient showing the annual growth or decline in the gross area irrigated in Tamil Nadu during the period under study. The results of trend equations obtained for the gross area under irrigation on foodgrains production in Tamil Nadu. The portrays that during the first period (1985-86 to 1994-95) the trend coefficients for all the determinants of foodgrains production considered in the study during this period were found to be statistically significant. Gross area irrigated during this period has increased annually by 0.040 thousand hectares on an average in Tamil Nadu. During the II period (1995-96 to 2004-05) it decreased by 0.147 thousand hectares on an average whereas it has increased annually by 0.053 thousand hectares in the third period (2005-06 to 2014-15) in Tamil Nadu. The compound growth rate analysis shows that gross area irrigated has increased by 0.6 per cent during this first period. During the Second period it has shown a decreasing trend of -3.3 percent during this period. But it has shown an increasing trend of 3.9 percent in Tamil Nadu during the III period.

INFLUENCE OF GROSS AREA UNDER IRRIGATION ON FOODGRAINS PRODUCTION IN TAMIL NADU

Among the large number of determinants of production of foodgrains in Tamil Nadu, the variable such as gross area irrigated has been assumed as one of the factor that influencing the foodgrains production in Tamil Nadu. The effects of this factor on foodgrains production have been estimated by the least square regression method. The model used in this study is of the following form: The foodgrains production (Y) was postulated as the dependent variable and the factor gross area under irrigation (X) was taken as independent variable. In order to examine the determinants of foodgrains production in Tamil Nadu over the 30 years of study period, the period was divided into three sub periods that is Period-I (1985-86 to 1994-95), Period-II (1995-96 to 2004-05) and Period-III (2005-06 to 2014-15). The results of the analysis of gross area under irrigation on foodgrains production obtained for the three periods are presented in table 3.

TABLE 3 RESULTS OF REGRESSION ANALYSIS OF GROSS AREA IRRIGATED ON FOODGRAINS PRODUCTION IN TAMIL NADU

	PERIOD-I	PERIOD-II	PERIOD-III
Intercept (a)	-12.244	-43.998	-5.658
Coefficients			
Slope	2.392	-1.991	1.879
Standard Error	0.985	5.669	0.220
t Stat	2.430*	-0.351	8.556
P-value	0.249	0.785	0.074
R²	0.996	0.976	0.999
F Value	16.294	2.567	109.57

Source: Computed by the Researcher, *Significance at 5 per cent level

Table 3 shows the results obtained from the model for the gross area under irrigation on foodgrains production in Tamil Nadu during the first period (1985-86 to 1994-95) of the study. R² value obtained in this model is 0.996 which implies that about 99 per cent of the total variations found in foodgrains production have been explained by the independent variables taken for this study. Keeping all the independent variables constant, if the gross area under irrigated is increased by one thousand hectare, the foodgrains production will increase by 2.392 million tonnes in Tamil Nadu

during the first period of the study. The calculated 't' value 2.430 for gross area irrigated is greater than the critical value ($d_9=2.262$) which indicates that above determinant influenced the foodgrains production more during the first period of this study. During the second period (1995-96 to 2004-05) of the study period, R^2 value obtained in this model is 0.976 which implies that about 97 per cent of the total variations found in foodgrains production have been explained by the independent variable taken for this study. Keeping all other variables constant, a decrease of gross area under irrigated by one thousand hectare has led to a decrease of -1.991 million tonnes in foodgrains production in Tamil Nadu. The calculated 't' value -0.351 for gross area irrigated is less than the critical value ($d_9=2.262$) which indicates that the foodgrains production in Tamil Nadu was less influenced by the gross area under irrigation during the second period (1995-96 to 2004-05) of the study. R^2 value obtained in this model is 0.999 which implies that about 99 per cent of the total variations found in foodgrains production have been explained by the independent variable taken for this study during the third period (2005-06 to 2014-15) of the study. Keeping all other variables constant, if the gross area under irrigated is increased by one thousand hectare, the foodgrains production will increase by 1.879 million tonnes.

4. SUMMARY

Among the three periods of the study period from 1985-86 to 2014-15, the trend values of gross area irrigated (-0.147 thousand hectares) was found to be lesser and negative during the second period than in the first and the third periods of the study. Similarly the percentage change of gross area under irrigated was -27.45 percent which showed that the percentage change of above said was negative and lesser during the second period than the first and the third periods. The compound growth rates of gross area irrigated (-3.3 per cent) was perceived as lesser during the second period than during the first and the third periods of the study in Tamil Nadu

The calculated 't' value 8.556 for gross area irrigated is greater than the critical value ($d_9=2.262$) which indicates that above determinant influenced the foodgrains production more during the period-III in Tamil Nadu. Among the three periods of the study period from 1985-86 to 2014-15, the trend value gross area irrigated (-1.991) has less influence on foodgrains production during the second period when compared to that of first and third periods of the study. This is mainly due to the introduction of water resistant crops, new irrigation techniques, increasing the usage of fertilizer and the renovation of canals through MGNREGP by the Government.

5. SUGGESTIONS

- It should be adopt the drip irrigation as early as possible
- The government policy makers should accelerate the integration of rivers in Tamil Nadu
- Each every person should plant a tree to get adequate rainfall
- It should be increase the rainwater harvesting methods for foodgrains production
- The people should come forward to invest in the irrigation sector which is the need of the hour

6. CONCLUSION

From the present study it is clear that gross area under irrigation is greatly influence the foodgrains production because its importance as the one of the major factor for agricultural production as a whole and foodgrains production in particular. The gross area irrigated is primarily depending upon rainfall and secondarily depending upon various water conservation methods including rainwater

harvesting. Therefore we will concentrate mainly on the water conservation methods which will increase the gross area under irrigation for greater foodgrains production in Tamil Nadu.

7. REFERENCES

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