ECONOMIC ANALYSIS OF AGRICULTURAL GROWTH AND CROP DIVERSIFICATION IN TAMILNADU

ABSTRACT

Tamil Nadu is one of the largest state with an area of 130.33 lakh ha and with the population of 6% of nation. Agriculture sector contributes 13% of state income. Nearly 56% of people depends on agriculture for their livelihood. In this scenario, the present study has been undertaken to analyse the agriculture growth as it determines the trend in terms of production, area and productivity. In this study, compound growth rate is used to measure the agricultural growth. The study was conducted based on secondary data. The data is analysed for the period of 50 years (1967-68 to 2017-18) for the important crops such as Rice, Maize, Cotton, Banana, Groundnut, Sorghum, Sugarcane, Oilseeds, Pulses, Vegetables, Fruits and Spices. The growth rates of the production of the major crops revealed that rice, maize, banana, pulses, vegetables and fruits were showing a positive growth rate. In contrast, crops such as cotton, groundnut, sorghum, oilseeds, and spices were showing negative trend. In recent decades, there is a vast change in the climate and other environmental factors which makes farmers to shift in their cropping pattern. Hence to analyse the changes crop diversification is calculated using the indices such as Herfindal Index and Modified Entropy Index (MEI). The estimates of indexes revealed that crop diversification is increased in over years.

INTRODUCTION

Tamil Nadu is the most important state in the southern peninsular India. Agriculture is an overriding sector in the state economy. The climate nature of the state is tropical. The state is covered with bountiful natural resources and better climate which makes the people to engage in agricultural activities all round the year. The two important monsoons are south west monsoon and north east monsoon which gives adequate precipitation to the state, among these north east monsoon showers huge precipitation. The main source of irrigation are canal and well. The soil resource of the state is wider range with different soil types. Nearly 93% of the farmers are small and marginal farmers. 56% of the state population depends on agriculture (Tamil Nadu Agriculture census, 2015-16). Hence, the welfare and well-being of the State's population mainly depend either directly or indirectly on agricultural sector. Agriculture is undergoing perceptible changes as it gets transformed from traditional

to a modern economy, which is an essential step towards economic growth and development. The state has total area of 4.7 million hectare under cultivation. The major cultivated crops are rice, cotton, groundnut, mung bean, urdbean and sugarcane (Tamil Nadu Agriculture census, 2015-16). During past two decades agriculture sector has faced major challenges such as water scarcity, unseasonal rainfall, scarcity of labour and unhealthy prices for agriculture produces in the market. All these factors collectively enforce the farmers to shift from monocropping to multiple cropping. Thus a broader perspective of crop diversification is willingly practiced by the farmers of the state. In this background, the present study examines the growth rate in terms of area, production, productivity and to estimate the diversification index.

METHODOLOGY

Data

Area, production and productivity of the following crops such as rice, maize, banana, cotton, groundnut, sorghum, sugarcane, total oilseeds, total pulses , total fruits , total pulses has been collected from official website of Indiastat for the period of 1967 to 2018.

Growth Rate Analysis

Compound growth rate

Compound growth rates of area, Production, productivity under major crops were estimated to capture agriculture growth in Tamil Nadu. The major crops considered for the analysis were rice, maize, banana, total pulses, total oilseeds, total fruits, total vegetables, total spices, sugarcane, cotton, groundnut, sorghum. Exponential function of following form was used to estimate the growth rate for the area under major crops (Gujarati 2012).

$$\mathbf{Y_{it}=A_i\ (1+r_i)^t} \text{ ——————————————— (1)}$$

where

Y_{it}= Area, production and productivity of i^{th} crops at time t (ha)

r = Compound growth rate

A_i - Initial year of area, production and productivity of i^{th} crops in time t(years)

By taking natural logarithm of (1),

$$\mathbf{Ln\ Y_{it} = Ln\ A_i + t\ Ln\ (1+r_i)} \text{ ——————————— (2)}$$

Now letting

$a_i = Ln\ A_i$

b_i = Ln (1+ri)

Equation (2) can be written as

Ln Y_{it} = a_i + β_{it} ——————————————————— (3)

Adding the disturbance term to (3), it can be written as

Ln Y_{it} = a_i + β_{it} + Ut

Y_{it}= Area, production and productivity of i^{th} crops at time t (ha)

t = time in years

a_i = constant term

bi = regression co-efficient

This log linear function was fitted by using ordinary least square (OLS) method. The compound growth rate (r) was obtained using the formula.

r_i = (Antilog β_i - 1) × 100

CROP DIVERSIFICATION

Herfindal Index:

Herfindal Index is the sum of the squares of the acreage proportion of each crop in the total cropped area.

$$HI = \sum_{i=1}^{i=N} P_i^2$$

Where,

N is the total number of crops

Pi represents area proportion of the i^{th} crop in total cropped area

Modified Entropy Index (MEI):

The Modified Entropy index shifting the base of the logarithm to the number of crops.

$$MEI = -\sum_{i=1}^{i=N} P_i * Log_N(Pi)$$

RESULTS AND DISCUSSION:

The main aim of this analysis is to know the agricultural growth in Tamil Nadu. This analysis helps us to know how much the agricultural growth are in par and its economic

status in our country. For estimating agriculture growth, analysed the compound growth rate of area, production, productivity of the past fifty years i.e. from 1968-69 to 2017-18 has been analyzed and has been given in Table 1.

In terms of area, the crops such as maize, banana, sugarcane, pulses, vegetables, and fruits have registered a positive growth rate between 1967-68 to 2017-18. However, crops such as rice, cotton, groundnut, sorghum, oilseeds, and spices have recorded a negative growth rate during the same period.

As far as production is concerned the following growth rate, is obtained. The crops such as rice, maize, banana, pulses, vegetables and fruits where showing a positive growth rate. In contrast, crops such as cotton, groundnut, sorghum, oilseeds, and spices were showing negative trend. This negative trend is may be due to the fact that the crop profitability of those crops is comparatively lesser.

In productivity, except banana, sugarcane, fruits, and vegetables, the rest of the crops were registered positive growth rate during the period of 1969-70 to 2017-18. Further, it was observed that maize had registered the highest growth (9.91) in crop productivity, and it was followed by spices (7.77), groundnut (5.55), sorghum (4.58), oilseeds (4.29), pulses (2.33), and rice (1.03).

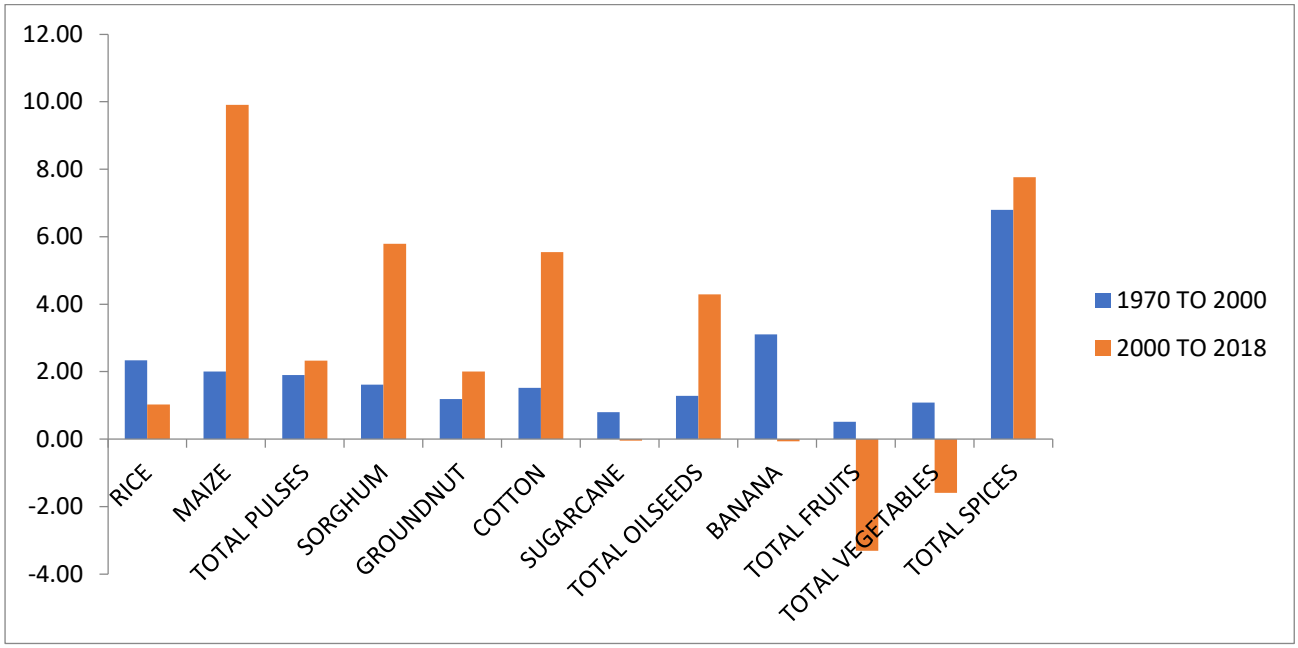
Table 1. CGR OF MAJOR CROPS FROM THE PERIOD 1967-68 TO 2017 -18

CROPS	AREA	PRODUCTION	PRODUCITIVITY
Rice	-0.88	0.35	1.03
Maize	8.08	11.60	9.91
Banana	2.11	4.48	-0.07
Cotton	-2.10	-0.32	5.55
Groundnut	-2.27	-0.38	2.01
Sorghum	-2,44	-1.91	4.58
Sugarcane	2.00	2.41	-0.04
Oilseeds	-2.13	-0.01	4.29
Pulses	0.86	2.12	2.33

Vegetables	1.80	4.06	-1.59
Fruits	2.84	3.47	-3.31

The Compound growth rate of production for major crops in Tamil Nadu has been shown in Fig1. The analysis was carried out by splitting the entire period into two parts viz., 1970 to 2000 and 2000 to 2018.

Fig1. CGR of production for the major crops in Tamil Nadu (1970 to 2000) & (2000 to 2018)



The figure reveals that the growth rate of production for the crops such as maize, sorghum, cotton, oilseeds has been increased enormously in the period from 2000 to 2018 compare to 1970 to 2000. And, the production of horticulture crops like banana, fruits and vegetables has been decreased after 2000. Production of rice also decreased after 2000. The growth rate of production of other crops such as pulses, groundnut is equally distributed in the both periods.

CROP DIVERSIFICATION

The crop diversification indices *viz.*,herfindahl index, and modified entropy index for Tamil Nadu were estimated and presented in below table 2. It could be seen from the table that the estimates of the herfindahl index were declined from 0.19 to 0.15 during 1970-71 to 2015-16, which implies that crop diversification of Tamil Nadu has increased over the years.

Similar results were observed while considering modified entropy index, ranging from 0.70 to 0.78 from 1970-71 to 2010-11. These results revealed that moving towards diversification of crops has been considered a resilience mechanism followed by farmers in different regions of the state to mitigate drought and other natural calamities.

Table 2. Herfindahl index and Modified entropy index for Tamil Nadu

Period	Herfindahl index (HI)	Modified entropy index (MEI)
1970-71	0.19	0.70
1975-76	0.18	0.72
1980-81	0.17	0.74
1985-86	0.18	0.79
1990-91	0.16	0.79
1995-96	0.17	0.80
2000-01	0.16	0.78
2005-06	0.16	0.80
2010-11	0.15	0.79
2015-16	0.15	0.78

CONCLUSION

It is concluded from the study that the share of major crops like paddy, sugarcane and sorghum has increased to little extent over the years in the state as compared to minor crops such as maize, banana, total oilseeds, total vegetables, groundnut and total spices. This shows that state is moving towards crop diversification rather than specialization. Based on the compound annual growth rate of area of crops, it is evident that major crops like paddy, sugarcane and sorghum have grown negatively and least share crops like maize, total fruits, banana and sugarcane have grown positively over the years. Hence, it is concluded from the study that crop diversification has been taking place in the state over the years. Thus, the technology has a dominant role to play and as such adequate measures should be taken for propagating their innovative technologies in agriculture to the farmers. Govt. should initiate the steps for expansion in irrigation facilities, availability of production technology especially for small farms. The transport, communication, market infrastructure and processing facility

for high value, crops should be strengthened in the state. Besides, diversification of enterprises should also be encouraged as a measure of minimizing the risk via resilience mechanism which will help to minimize the crop failure and income loss including employment to the rural people.

REFERENCES

Acharya, S.P., Basavaraja, H., Kunnal, L.B., Mahajanashetti, S.B. and Bhat, A.R.S. (2012). Growth in area, production and productivity of major crops in Karnataka. Karnataka J. of Agril. Sci., 25(4): 431-436.

Basavaraj, N. D., Gajanana, T. M., &Satishkumar, M. (2016). Crop Diversification in Gadag District of Karnataka §. Agricultural Economics Research Review, 29(1), 151-158. Kalaiselvi, V. (2012). An economic analysis of crop diversification in Tamil Nadu. International Journal of Current Research and Review, 4(8): 147-154.

Konar, A., and Dey,G. (2018).A study on compound growth of area, production and productivity of rapeseed and mustard crop in burdwan district, west Bengal.International Journal of Agriculture Sciences, 10(8): 5867-5871.

Amrithalingam et al .2018. An economic analysis of crop diversification and of changes in cropping pattern in Villupuram District of Tamil Nadu.

Palanisami, K., Ranganathan, C. R., Senthilnathan, S., and Umetsu, C. (2009). Diversification of agriculture in coastal districts of Tamil Nadu: A spatio-temporal analysis. Inter-University Research Institute Corporation, National Institute for the Humanities. Research Institute for Humanity and Nature, Japan, pages: 130, 137.

Ganjeer,P. K., Kaushik, D. and Lakhera, M.L. (2017). A Review on Trend in Area, Production and Productivity of Wheat Crop in different Districts of Northern Hills of Chhattisgarh State. Bulletin of Environment, Pharmacology and Life Sciences. Vol 6 Special issue (1): 302-304.

Prasher, R. S., and Bahl, S. K. (1998). Growth and instability in Himachal Pradesh agriculture: a decomposition analysis, Bihar J. Agric.Marketing. 6(1): 43-49.

Sihmar, R., and Meena, M. K. (2013). Agricultural Growth and Crop Diversification in Haryana An Analysis of Pre and Post Economic Reforms; *International Journal of Trends in Commerce & Economics, Vol 2. ISSN: 2279-0386. Pp 184-220.*

Shanker, G., Shrivastava, A. and Saxena, R. R. (2010). Growth and Instability: An Inter-Zonal Analysis of Kharif and Rabi Crops in Chhattisgarh. Research J. Engineering and Tech., 1 (1): 18-23.

Velavan, C., and Balji, P. (2012). Crop Diversification in Tamil Nadu – A Temporal Analysis. Tamil Nadu Agricultural University Coimbatore. 655-657