

## Agriculture productivity trends in tamilnadu based on Major crops

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### Abstract

This research paper attempts to enhance the agricultural productivity trends of major crop yields in Tamilnadu. The state is one of the most urbanized and industrialized states in India. About 60 percent of the total population is directly engaged in agriculture and depends on this sector for their livelihood. Hence growth in agriculture is important not only to ensure food security but also for high living standards of the population. The secondary sources of database were collected from the Department of Economics and Statistics, for a period of ten years from 2002-03 to 2011-12. The data has been analyzed using statistical techniques. The findings reveal that there is some significant difference among the crop yield. The compound growth rate of yield for the selected crops in Tamilnadu state were estimated for the study period using growth model.

**Keywords:** Agriculture Productivity, Compound Growth Rate, Growth Model, ANOVA, Major Crops and Descriptive Statistics.

### 3. Introduction

India is an agricultural country and our economy is based on agriculture. About 70% of our population depends on agriculture. One-third of our National income comes from agriculture. The development of agriculture has much to do with the economic welfare of our country. The agriculture sector continues to be the backbone of Indian economy contributing approximately 27.4% to the gross domestic product (GDP), and accounts for about 18% share, of total value of country's export. The agricultural production has kept pace with the popular growth rate of 21 % per annum. Today, India is the second largest producer of wheat, rice, fruits, vegetables, and fresh water aquaculture; and largest exporter of spices and cashew.

Agriculture is the most predominant sector of the economy of Tamil Nadu, a state in India. 60 - 65% of the state's population is engaged in agriculture and other activities for their livelihood. The State has an area of 1.3 lakh square Km with a gross cropped area of around 48.92 lakh hectares ([www.agritech.tnau.ac.in](http://www.agritech.tnau.ac.in)). In this Gross Irrigated Area are 33.09 lakh hectares which is 57% and the balance 43% of the area are under rain fed cultivation. The major cultivation of crops in Tamil Nadu is Food Crops (Paddy, Maize, Cumbu, Cholan, Tapioca, Bengal gram, Horse gram, Red gram, Green gram, and Black gram), Cash crops (Groundnut, Gingili and Sugarcane) and Plantation Crops (Coconut). Tamil Nadu government has taken major efforts in order to increase the production of the crops and granted agricultural loans to the farmer's through banks and also supplying fertilizers, pesticides and different varieties of seasonal seeds and applying pricing policy for several main crops.

#### 4. Review of Literature

Arianna Di Paola et al. (2015) study identified the models to simulate crop growth and yield. In this modeling, a summary matrix with more than 70 crop models analyzed and found two main aspects of models in terms of reliable transferability to different conditions and the degree of complexity. Fasih ur rehman et al. (2011) study investigates the trends in area, production and yield of major crops (wheat, rice, sugarcane and cotton) of Pakistani agriculture by using component analysis model. In this study, yield growth rate comparison shows that wheat and cotton have better growth rates in period one while rice and sugarcane performed better in period two. However, the analysis for the overall study period for aggregate crops revealed that the area and yield effects had almost equal contribution to total change in output growth. Dr. A. Saravanadurai et al. (2010) study found that the compound growth rate of maize was found to be positive and records a highest growth rate among other cereal crops in terms of area of cultivation, production and yield in Tamil Nadu over the study period, also the study suggests that the farmers can also cultivate maize for the money-making purpose in the Tamil Nadu state that suits for the climatic conditions of the state.

E.A. Antia-obong et al. (2012) applied the log linear regression model and Decomposition analysis to determine the growth rates and sources of output growth. The findings reveal that the growth rate for groundnut output, yield and harvested area were increasing overtime except some period. Mohammad Taher et al. (2008) study examined the trends in area, production and yield of Iran's agricultural production especially food grains. By fitting component analysis model study identified performance of agricultural sector in pre-revolutionary period better than post-revolutionary period

J.N. Nmadu et al. (2014) studied the trend of sugar cane production and refined sugar imports for the period 1960-2010 were analyzed and forecasted to year 2020. The findings reveal that sugar cane output will rise to 2.8m tones from about 88 thousand hectares of land by year 2020. Gyan Prakash et al., (2006) study suggests that the area shrinks four times from pre-green revolution Period to the Green Revolution Period in the production of food grains and suggest the future efforts should be made to stabilize and to expand the area of food grains for increasing the yield level. Toor et al., (2006) study indicates the declining trend of growth rate in case of total food grains cereals pulses, wheat, sugarcane, oilseeds, milk, egg and fisheries during the year 1990-91 to 1995-96 and 1996-97 to 2003-04 .

Kakali Manjumdar et al., (2006) study results that the grain productions are found to be varying across the districts as per different growth functions are concerned based on simple form of the linear, exponential, log quadratic, parabolic and logistic functions. Ranjit Kumar et al., (2005) study found that Bihar registered high growth rate in maize yield among the six states under the study and Punjab followed next with nearly 76 % of the maize area recording higher yield but with slow growth rate.

### 3. Materials and Methods

#### 3.1. Data collection:

The present study based on Secondary data of area of cultivation and agricultural productivity of Tamil Nadu was collected from Department of Economics and Statistics, Chennai for the 10 years i.e., 2002-03 to 2011-12.

#### 3.2. Selection of Crops:

Among the crops cultivated in TN, 15 major crops cultivated in the districts were selected to assess the performance of agriculture productivity. The crops include Millets like Paddy, Cholam, Cumbu, Ragi, Maize and Pulses like Bengal gram, Red gram, Green gram, Black gram, Horse gram and Tapioca, Ground nut, Gingili, Coconut and Sugarcane.

### 3.3. Selection of Districts:

The data were collected for all the 28 districts of TN and at present it has been divided in to 31 districts. However, the number of districts was considered as 28 for the entire study to attain the uniformity. The data for the 3 new districts were included as per their previous status.

### 4. Analysis of Data

In the present study, Compound growth rates of yield for the 15 crops for each period were estimated to study the growth rate in Tamil Nadu State. The data were analyzed using ANOVA and Growth Trend Analysis using SPSS 17.0 and Minitab17. The obtained data are presented in the tables and discussed.

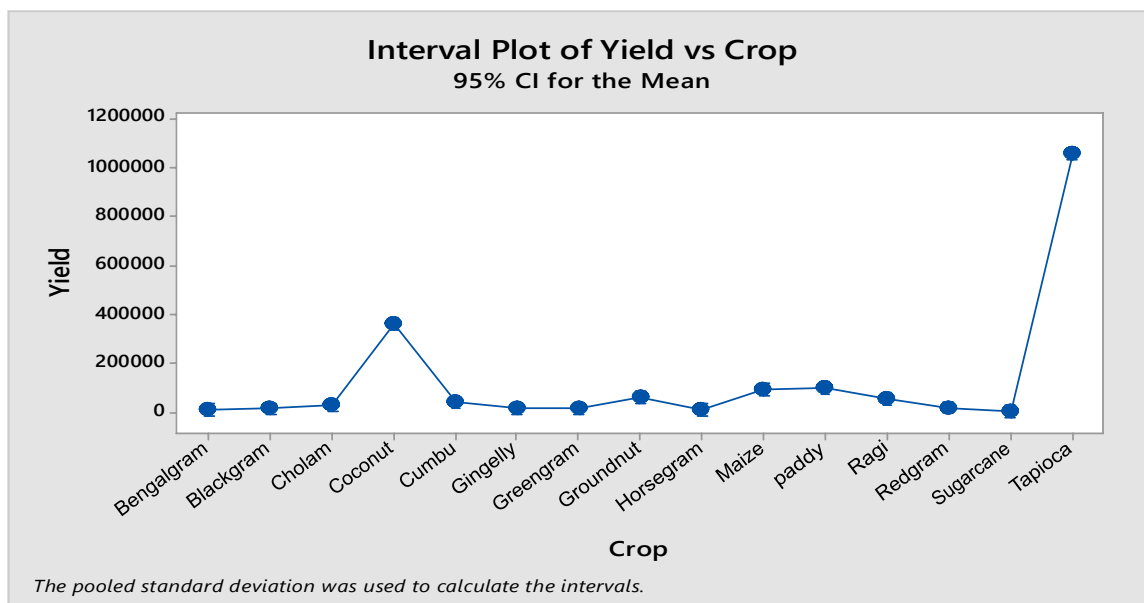
### 4.1 Results and Discussion:

The collected data were analyzed and interpreted as follows.

**Table 1: Descriptive Statistics of Yield of Crops**

**Means**

Crop	N	Mean	StDev
Bengalgram	10	9599	1893
Blackgram	10	13019	3370
Cholam	10	26265	6505
Coconut	10	359072	81281
Cumbu	10	38130	9859
Gingelly	10	12611	2597
Greengram	10	12383	2791
Groundnut	10	59839	13729
Horsegram	10	10388	2952
Maize	10	92603	48217
paddy	10	97525	16818
Ragi	10	52763	8707
Redgram	10	17231	2862
Sugarcane	10	3093	522
Tapioca	10	1053285	110225



From the graph, we observe that the average yield of Tapioca and Coconut are much higher than other crops for the year 2002 to 2011. The average yield of plantation crop sugarcane is very less as compared to other crops. There is a constant or moderate average yield are reflecting for Pulses crops.

**Analysis of Variance for Yield of 15 Crops:**

**Table 2:**

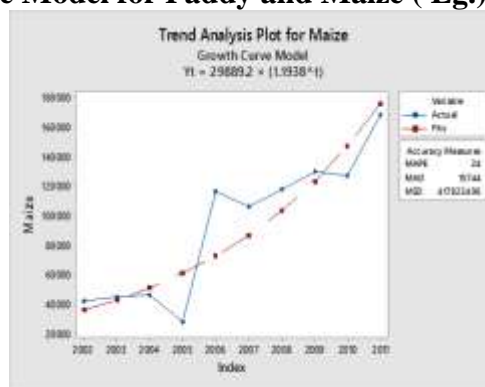
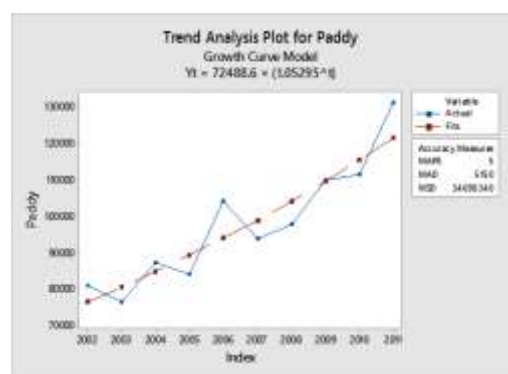
Source	DF	Adj SS	Adj MS	F-Value	P-Value
Crop	14	1.03583E+13	7.39878E+11	508.75	0.000
Error	135	1.96330E+11	1454293492		
Total	149	1.05546E+13			

From table 2, since  $p < 0.05$ , there is a significant difference among yield of different varieties of crops.

**Table 3: Yield and Compound Growth Rate of Food Crops:**

Year	Paddy	Cholam	Cumbu	Ragi	Maize	Bengal gram	Red gram	Black gram	Green gram	Horse gram	Tapioca
2002	80778	17628	25236	40967	41902	7396	12851	11404	11099	6040	852011
2003	76187	18301	26920	48621	44719	8245	15614	11137	11014	6302	948006
2004	86972	19587	37057	45176	46225	8490	16369	11111	11152	7548	1174771
2005	83981	21927	33019	44182	27740	8045	15279	11302	10596	9444	1031880
2006	103979	29057	38067	51273	116604	11225	18603	18006	16529	14620	1130751
2007	93785	26760	40607	51763	106109	10813	18223	11124	11711	11644	1215829
2008	97542	29569	42176	54421	117445	10224	15125	9910	8364	11112	1080820
2009	109700	34759	41642	65655	129640	12733	18500	11751	11964	11368	1035313
2010	111317	30312	35754	59485	127133	11346	18435	14545	13990	12529	968082
2011	131006	34746	60826	66085	168513	7470	23313	19904	17414	13270	1095386
Growth Rate	4.631	8.9	5.42	4.99	19.38	6.33	3.34	1.49	1.49	1.17	9.91

**Trend Analysis Plot for Growth Curve Model for Paddy and Maize ( Eg.)**



Growth in yield of Food Crops is the main source of the growth in production of agricultural crops. From Table 3, we observe the yield of Food crops during the year 2002 to 2011. Based on the data reflected in this table the yield of Millet Crops like Paddy, Cholan, Cumbu, Ragi and maize increased from 80778, 17628, 25236, 40967 and 41902 kg per hectare in the beginning of 2002 to 131006, 34746, 60826, 66085 and 168513 kg per hectare in the ending 2011 at the annual growth rate of 4.63%, 8.9%, 5.42%, 4.99% and 19.38% respectively. Also the yield of Pulses Crops like Bengal gram, Red gram, Black gram, Green gram and Horse gram reveals that the annual growth rates shows a consistent or steady trend with growth rate of 3.34%, 1.49%, 1.49% and 1.17% respectively. While Tapioca yield the second highest annual growth rate of 9.91% per annum. Table 3 results shows that, among Food crops, maize recorded the highest growth rate of 19.38% per annum. Trend analysis plot for Growth curve of Paddy and Maize shows the increasing trend line with annual growth rate of 4.63% and 19.38%.

**Table 4: Yield and Compound Growth Rate of Cash Crops and Plantation Crops:**

year	Groundnut	Gingili	Coconut	Sugarcane
2002	42275	11355	230103	2777
2003	42277	9796	217890	2501
2004	50619	11019	317976	2937
2005	53495	11187	341492	2872
2006	58399	13340	400892	3304
2007	71765	11609	384768	2906
2008	56906	12616	402644	2958
2009	65710	11711	432733	3006
2010	72441	14469	450900	3231
2011	84498	19003	411323	4438
<b>Growth Rate</b>	<b>1.3</b>	<b>3.07</b>	<b>9.31</b>	<b>1.99</b>

**Trend Analysis Plot for Growth Curve Model for Groundnut (Cash Crop) and Coconut (Plantation Crop) (Eg.)**

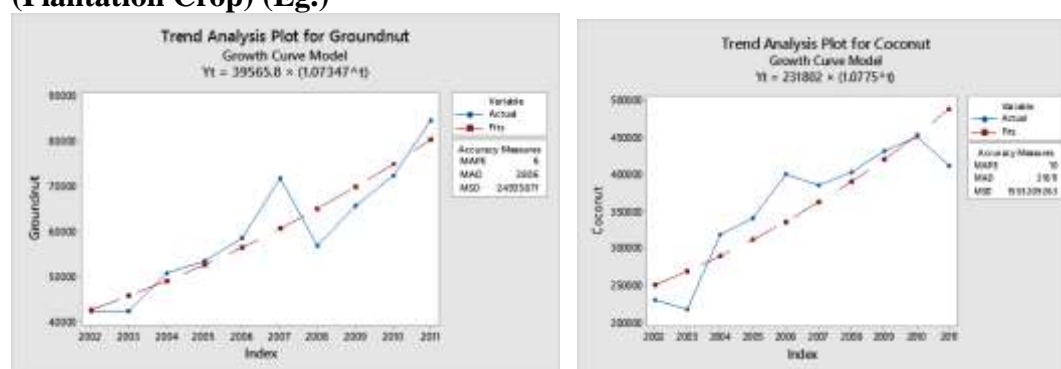


Table 4 shows the yield of Cash Crops and Plantation Crop during 2002 to 2011. Among the non-food grains, under cash crops, largest growth has been recorded by oilseed gingili, which was the highest growth rate of 3.07 % per annum, followed by groundnut and sugarcane at the rate of 1.3% and 1.99% per annum from the year 2002 to 2011. The yield of plantation Crop Coconut has recorded highest growth rate at the rate of 9.31% per annum. Trend analysis plot for Growth curve of Groundnut shows Moderate increasing trend line with annual growth rate of 1.3% and Coconut shows the increasing trend

line with annual growth rate of 9.31% per annum under non-food grains and the yield also shows the highest growth rate.

## 5. Conclusion:

The findings of this data give more scope to improvement of agricultural sectors for various districts of Tamil Nadu State. Based on the data, Compound Growth Rate for yield of 15 crops was estimated for the year 2002-03 to 2012-13 to study the growth rate. The findings reveal that the maize was found to be highest growth rate among other cereal crops in terms of yield in Tamil Nadu over the study period 2002-2011. Also, Tapioca yields the second highest annual growth rate among other Crops. Based on the study, there is some significant differences among yield of different varieties of crops. Now a days the annual yield of crops is steadily declining due to industrialization and real estate business.

To increase the agriculture productivity in Tamilnadu the emphasis should be laid on reform measures, technological changes, infrastructure development, application of new agricultural technology brought with high yielding varieties which may suit to the agro climatic zone will be of great help. Now the State and Central Government is trying to educate the farmers. Agriculture colleges and universities have been set up and they give all type of knowledge regarding agricultural science to the young farm students. These colleges and universities organize orientation courses for the farmers. These courses train the people in modern techniques and methods of farming. The Government is trying to help the farmers in many ways. It has set up agencies like the Food Corporation of India to purchase the products produced directly from the farmers at Government rates so that the farmers may not be fleeced by the middlemen. Thus we see that every effort is being made to develop our agriculture and boost the agriculture production and also continue our efforts to develop our agriculture still further.

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