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A Study on Area, Production and Productivity of Sesame in Kallakurichi District of Tamil Nadu – Trend Analysis

J. Jeevamathi * and G. Srinivasan
Department of Agricultural Economics, Faculty of Agriculture,
Annamalai University, Annamalai Nagar 608 002
*Email: jeevamathi1702@gmail.com

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Abstract

Sesame is a major edible oilseed crop in India and Tamilnadu ranked sixth in area and production among the states. The current research examines the area, production and productivity of sesame in the state of Tamilnadu and the Kallakurichi district with the following specific objectives: i) To examine the trends in the area, production and productivity of sesame in the Tamilnadu state and Kallakurichi district and ii) To offer policy suggestions based on the results of the study. The Season and Crop Report of Tamilnadu over the years served as the source for secondary data. From the collected data, Trend analysis were done using Statistical Package for Social Sciences (SPSS). The result of the study indicated that in the Tamilnadu state, the productivity of the sesame crop (CAGR: 1.9 per cent) has increased and in the kallakurichi district, both the production (CAGR: 4.2 per cent) and productivity (CAGR: 3.8 per cent) have increased over the past twenty years. There has been a significant decrease in both area (CAGR: -3.2 per cent) and production (CAGR: -1.4 per cent) in Tamilnadu and area (CAGR: -0.5 per cent) in the Kallakurichi district. Even though the productivity of the sesame crop has increased significantly in both the Tamilnadu state and Kallakurichi district, the area of sesame cultivation has not increased by farmers due to production and marketing constraints faced by them. The Agricultural Department and State and Central Government may provide institutional support for solving their constraints will have a long-term benefit for sesame farmers.

Keywords: Sesame Area, Trend analysis, CAGR.

Introduction

Sesame is one of the oldest cultivated plants and also a famous oilseed crop in the world. It is the major edible oilseed crop in India and it is economically significant for export as well as for the production of edible oil. Due to the high quality of its oil, it is sometimes referred to as the “Queen of oilseed crops”. It requires little watering needs and low prevalence of disease and pests; it may make a good summer crop. Additionally, the low management expense may encourage small and marginal farmers to grow this crop. The current research examines the area, production and productivity of sesame in the state of Tamilnadu and the Kallakurichi district with the following specific objectives: i) To examine the trends in the area, production and productivity of sesame in the Tamilnadu state and Kallakurichi district and ii) To offer policy suggestions based on the results of the study.

Methodology

i) Sampling:

The state of Tamilnadu and the Kallakurichi district were selected for the present study. The Season and crop report, published by the Department of Statistics and Economics of the Government of Tamilnadu, Chennai, was used to gather long-term statistics on the area, production, and productivity of sesame in the state of Tamilnadu and the Kallakurichi district during the kharif and rabi seasons. A twenty-year data series was used to derive trends in the area, production, and productivity using an orthogonal polynomial technique (2001-2002 to 2020-2021). Statistical Package for Social Sciences (SPSS) was used for data analysis and processing and the tabular values were taken from the statistical data for the required number of observations (N=20).

ii) Tools of Analysis:

Compound Growth Rate

Growth rates were used to measure the past performance of the economic variables. The growth in the area, production and productivity of Sesame for the period 2001-2002 to 2020-2021 was analysed by using the exponential growth function.

Compound growth rate analysis was done using the following formula,

$$Y_t = ab^t U_t$$

Where,

Y_t = Dependent variable for which growth rate was estimated (Area, production, yield in year "t");

a = intercept;

b = Regression coefficient;

t = Year which takes values 1, 2....n;

U_t = Distribution term in the year "t".

The equation was transformed into log-linear and written as

$$\text{Log } Y_t = \log a + t \log b + \log U_t$$

The equation was estimated by using the Ordinary Least Square (OLS) technique.

The compound growth rate (g) was then estimated by the identity given in the equation.

$$g = (b-1) \times 100$$

Where,

g = Estimated compound growth rate per annum in per cent,

b= Antilog of log b.

The statistical significance was tested by using the "t" test.

Results and Discussion

I. Estimation of Growth Rate of Area, Production and Productivity of Sesame in Tamilnadu state:

According to data from the last 20 years, the area, production, and productivity of sesame in Tamil Nadu State increased considerably between 2001 and 2021. The findings are shown in Table 1. The biggest sesame area (83,848 hectares) was reported in 2001-2002, while the smallest would have been in 2016-2017, (28,231 in ha). The highest production (45,990 tonnes) and productivity (697 kg/ha) were obtained in the years 2001–2002 and 2014–2015, respectively. Productivity has been on the rise over the last 20 years.

Table 1. Area, Production, and Productivity of Sesame in Tamil Nadu State (2001 to 2021)

Year	Area (in ha)	Production (in tonnes)	Productivity (in Kg/ha)
2001-2002	83,848	45,990	548
2002-2003	64,481	28,047	435
2003-2004	83,835	29,004	346
2004-2005	72,725	33,840	465
2005-2006	65,118	30,772	469
2006-2007	52,624	27,328	519
2007-2008	74,376	32,201	433
2008-2009	63,691	32,242	506
2009-2010	62,677	29,021	463
2010-2011	48,189	25,387	527
2011-2012	43,175	26,447	613
2012-2013	33,181	17,179	518
2013-2014	56,591	33,708	596
2014-2015	64,242	44,748	697
2015-2016	46,017	29,369	638
2016-2017	28,231	10,837	384
2017-2018	41,582	23,054	555
2018-2019	44,610	24,422	548
2019-2020	53,108	36,481	688
2020-2021	52,686	34,449	654
Mean	**56749.35**	**29726.3**	**530.1**
SD	**15336.37**	**8047.91**	**97.14**
CV	**27.02**	**27.07**	**18.33**

Source: Season and crop report, Department of Statistics and Economics, Government of Tamilnadu, Chennai.

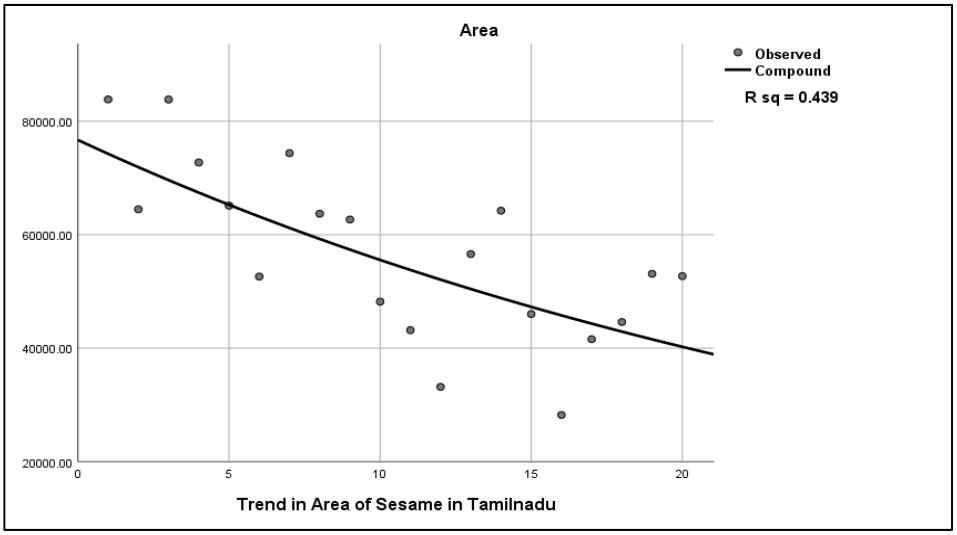
i) Trends in Area:

The area's overall compound annual growth rate has shown a negative trend during a twenty-year span (2001-2002 to 2020-2021). At the 1% level of significance, the area's compound annual growth is -3.2 per cent (table 2), which is statistically significant. It shows that sesame's area has decreased during the last twenty years.

Table 2 Compound Growth Rate of Area of Sesame in Tamilnadu

'F' value	14.073
R^2	0.439
CAGR	-3.2*

(CAGR – Compound annual growth rate per cent per annum. * - Significant at 1% level of significance)



Graph 1 Trendline of Area of Sesame in Tamilnadu

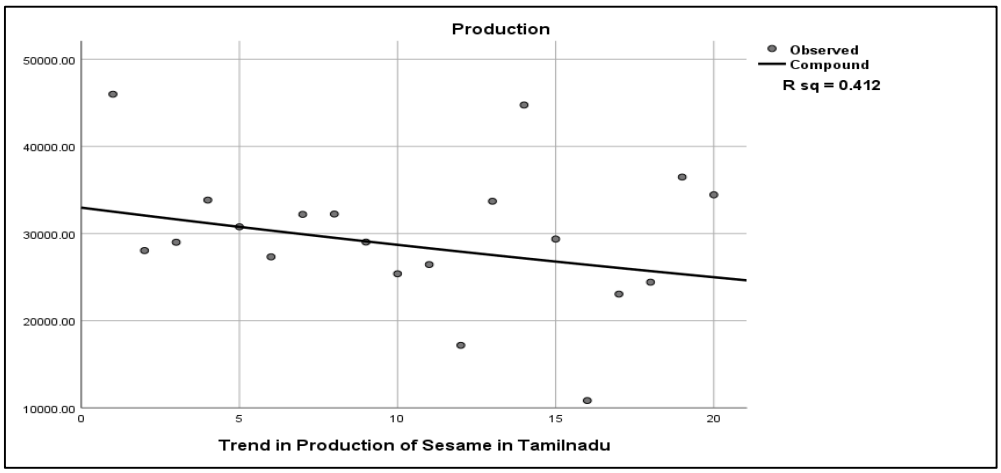
ii) Trends in Production:

The overall compound annual growth rate of production has shown a negative trend during a twenty-year period (2001-2002 to 2020-2021). Production has shown a compound annual growth rate of -1.4 per cent (table 3), which is also statistically significant at the 1% level of significance. It shows that during the past twenty years, the production of sesame has decreased.

Table 3. Compound Growth Rate of Production of Sesame in Tamilnadu

'F' value	1.292
R^2	0.412
CAGR	-1.4*

(CAGR – Compound annual growth rate per cent per annum. * - Significant at 1% level of significance)



Graph 2 Trendline of Production of Sesame in Tamilnadu

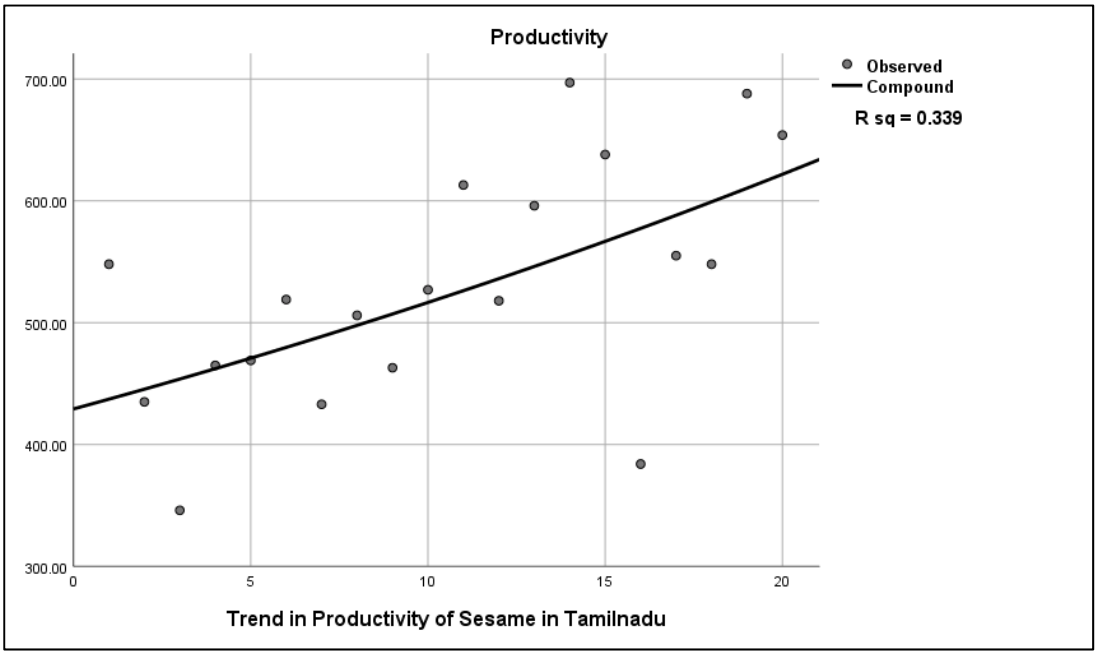
iii) Trends in Productivity:

The overall compound annual growth rate of productivity has shown a positive trend throughout a twenty-year period (2001-2002 to 2020-2021). The productivity growth rate over the past year has been 1.9 per cent (table 4), which is statistically significant at the 1% level of significance. It shows that over the past twenty years, sesame productivity has increased.

Table 4. Compound Growth Rate of Productivity of Sesame in Tamilnadu

'F' value	9.211
R^2	0.339
CAGR	1.9*

(CAGR – Compound annual growth rate per cent per annum. * - Significant at 1% level of significance)



Graph 3. Trendline of Productivity of Sesame in Tamilnadu

Estimation of Growth Rate of Area, Production and Productivity of Sesame in Kallakurichi district:

Table 5. Area, Production and Productivity of Sesame in Kallakurichi District (2001 to 2021)

Year	Area (in ha)	Production (in tonnes)	Productivity (in Kg/ha)
2001-2002	5,248	2,467	470
2002-2003	5,603	2,415	431
2003-2004	10,986	3,977	362
2004-2005	4,691	1,862	397

Year	Area (in ha)	Production (in tonnes)	Productivity (in Kg/ha)
2005-2006	5,118	2,411	471
2006-2007	3,923	1,726	440
2007-2008	3,740	1,915	512
2008-2009	2,827	1,490	527
2009-2010	2,709	1,379	509
2010-2011	1,806	1,105	612
2011-2012	1,253	9,172	732
2012-2013	1,017	6,224	612
2013-2014	6,607	4,836	732
2014-2015	6,476	6,165	952
2015-2016	5,070	3,899	769
2016-2017	2,702	1,637	606
2017-2018	4,291	2,373	553
2018-2019	4,962	3,394	684
2019-2020	7,056	6,034	855
2020-2021	5,915	4,633	783
Mean	**4600**	**3455.7**	**600.45**
SD	**2312.51**	**2143.91**	**162.60**
CV	**50.27**	**62.04**	**27.08**

Source: Season and crop report, Department of Statistics and Economics, Government of Tamilnadu, Chennai.

The trend pattern of sesame area, production and productivity in the Kallakurichi district were analysed and the result were given in Table - 5. The largest sesame area was observed between 2003 and 2004 (10,986 hectares), whereas the smallest area was achieved between 2012 and 2013, (1,017 in ha). The highest production (9,172 tonnes), as well as productivity (952 kg/ha), were recorded in the years 2011–2012 and 2014–2015, respectively. The past 20 years have seen an increase in both production and productivity.

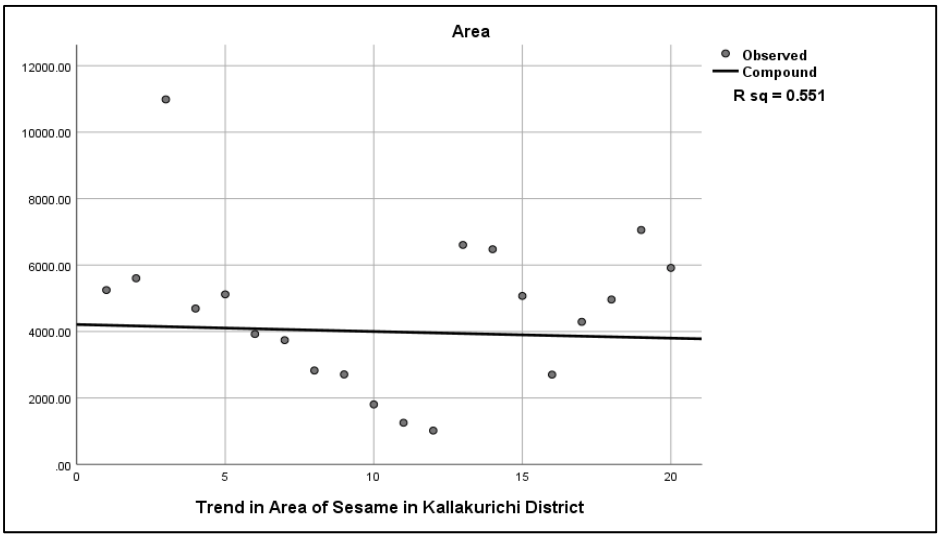
i) Trends in Area:

The results of the compound annual growth rates of sesame area for twenty years (2001-2002 to 2020-2021) were given in table 6. The results showed that the area's compound annual growth at the 1% level of significance is -0.5 per cent, which is also statistically significant. It reveals that the area of sesame has declined during the past twenty years.

Table 6. Compound Growth Rate of Area of Sesame in Kallakurichi District

'F' value	0.048
R^2	0.551
CAGR	-0.5*

(CAGR – Compound annual growth rate per cent per annum. * - Significant at 1% level of significance)



Graph 4. Trendline of Area of Sesame in Kallakurichi district

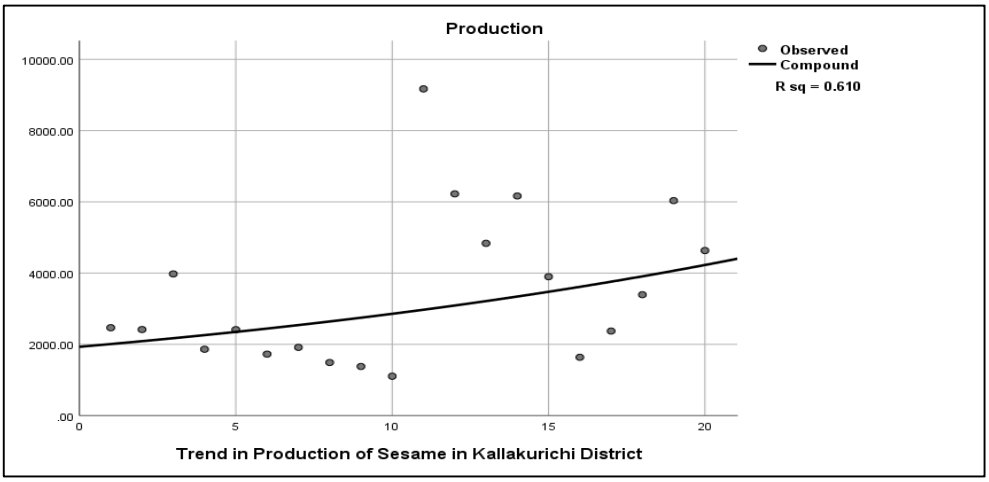
ii) Trends in Production:

Over a twenty-year period, the total compound annual growth rate of production has shown a positive trend (2001-2002 to 2020-2021). At the 1% level of significance, the production has indicated a compound annual growth rate of 4.2 per cent (table 7), which is also statistically significant. It displays that sesame output has risen during the last twenty years.

Table 7 Compound Growth Rate of Production of Sesame in Kallakurichi District

'F' value	3.215
R^2	0.610
CAGR	4.2*

(CAGR – Compound annual growth rate per cent per annum. * - Significant at 1% level of significance)



Graph 5. Trendline of Production of Sesame in Kallakurichi district

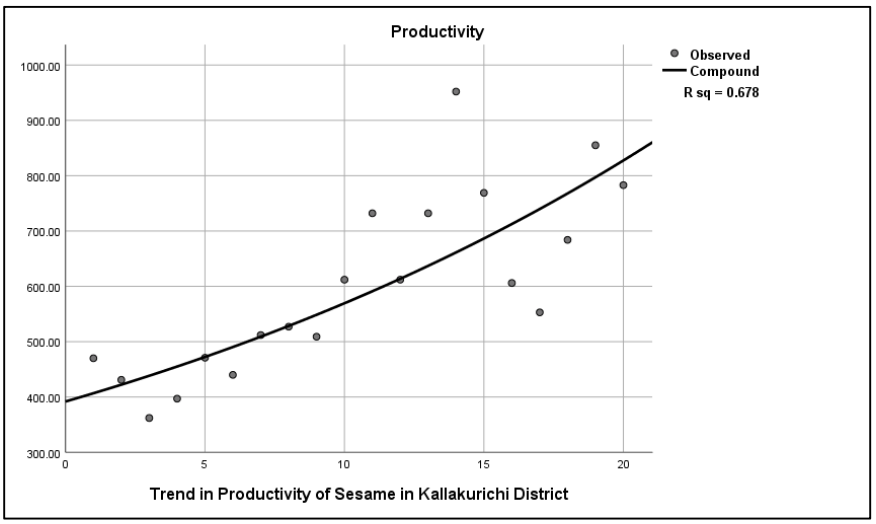
iii) Trends in Productivity:

Over a twenty-year period, the average compound annual growth rate of productivity has shown a positive trend (2001-2002 to 2020-2021). The productivity growth rate over the past year was 3.8 per cent (table 8), at the 1% level of significance which is statistically significant. It exhibits the increase in sesame productivity during the last twenty years.

Table 8. Compound Growth Rate of Productivity of Sesame in Kallakurichi District

'F' value	37.824
R^2	0.678
CAGR	3.8*

(CAGR – Compound annual growth rate per cent per annum. * - Significant at 1% level of significance)



Graph 6 Trendline of Productivity of Sesame in Kallakurichi district

Conclusions

The result of the study concluded that in the Tamilnadu state, the productivity of the sesame crop has increased and in the kallakurichi district, both the production and productivity have increased over the past twenty years. There has been a significant decrease in both area and production in Tamilnadu state and area in the Kallakurichi district. Even though the productivity of the sesame crop has increased significantly in both the Tamilnadu state and Kallakurichi district, the area of sesame cultivation has not increased by farmers due to production and marketing constraints faced by them. The Agricultural Department and State and Central Government may provide institutional support for solving their constraints will have a long-term benefit for sesame farmers.

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