RESEARCH ARTICLE

AREA, PRODUCTION OF COTTON AND RAINFALL VARIABILITY OF TAMIL NADU AND INDIA
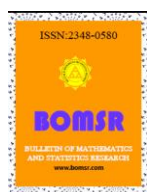
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ABSTRACT

The researcher has found the area, production of Cotton and actual rainfall of Tamil Nadu state and India. The objective of this work is to analyze the environmental parameters like Cultivated area, Annual Rainfall to establish a relationship among these parameters. The correlation result of this particular study production is depends upon the area with high positive and statistically significance at 1 per cent level.

Keywords: Cotton Crop, Rainfall, Area, Production, Correlation analysis.

1. INTRODUCTION

Cotton is one of the most important fiber and cash crop of India and plays a dominant role in the industrial and agricultural economy of the country. Cotton is the most important fibre crop not only of India but of the entire world. It provides the basic raw material (cotton) to cotton textile industry. Cotton in India provides direct livelihood to 6 million farmers and about 40-50 million people are employed in cotton trade and its processing. Cotton also known as 'White Gold' dominates India's cash crops, and makes up 65 per cent of the raw material requirements of the Indian textile. India is the major cotton producing nation with 27 million bales production which is approximately account for 24% of global cotton production (2014). India has tripled cotton production form 13 million bales to 40 million bales and has doubled its market share of global cotton production form 12% in 2002 to 25% in 2014, representing a quarter of total global cotton production. The major cotton growing states in India are Punjab, Haryana, Rajasthan, Madhya Pradesh, Gujarat, Maharashtra, Andhra Pradesh, Tamil Nadu and Karnataka.

Climate and Soil

Climate plays a dominant role in agriculture having a direct impact on the productivity of physical production factors, for example the soil's moisture and fertility. Adverse climate effects can

influence farming outputs at any stage from cultivation through the final harvest. Even if there is sufficient rain, its irregularity can affect yields adversely if rains fail to arrive during the crucial growing stage of the crops(Smith and Skinner, 2002; Molua and Lambi, 2007; Rudolf and Hemann, 2009).

Generally, there are many factors influencing crop production and these include soil, climate and diseases among others. In relation to climate, rainfall is the dominant controlling variable in tropical agriculture since it supplies soil moisture for crops and grasses for animals. According to Ayoade(1983), agriculture largely depends on climate to function. Hence, precipitation, solar radiation, wind, temperature, relative humidity and other climatic parameters affect and solely determine the global distribution of crops and livestock as well as their productivity.

Rainfall, among other factors, has always dictated how land is used in one way or another and it also affects the humidity condition of the atmosphere. Rainfall determines the vegetation cover a particular geological zone and crop distribution. Some of the attributes of rainfall that are important to crop production are the time of onset of the raining season, total amount of rainfall, distribution, number of rainy days and duration of rainfall as well as the time of its cessation(Akintola, 1995). Furthermore, rainfall determines the amount of moisture present in the soil which is ultimately made available to plants. According to Olaoye (1999), regular occurrence of drought as a result of erratic rainfall distribution and or cessation of rain during the growing season reduce Nigeria's capability for increased crop production. Sdoodee and Rongsawat(2012) concluded that high rainfall tended to decrease tapping days per year. From the results, it was suggested that climate change and climate variability in Songkhla province tends to reduce latex yield because of an increase of rainfall leading to a reduction of tapping days. With regard to rainfall (Kumar and Ashrit,2004) found strong positive correlation between grain crop production and monsoon rainfall. Increased production in rice is explained by increased in area under cultivation as well as improved farming technology.

Study Area

India is the country to growing cultivated cotton. Gossypiumhirsutum represents 88% of the hybrid cotton production in India and all the current hybrids are G.hirsutum. inindia, majority of the cotton production comes from nine major cotton growing states, which are grouped into three diverse agro-ecological zones, Northern zone, Central zone and Southern zone. Besides this, cotton is also grown in the states of Tamil Nadu. The agro climate is more suitable for cotton, especially with bimodal distribution of rainfall in parts of Karnataka, Southern Andhra/ Telangana and Tamil Nadu. The irrigated cotton in the zone yields about 2500-300 kg/ha seed cotton. Cotton is the only transgenic crop approved in the country for commercial cultivation.

2.MATERIAL AND METHODS

The correlation can be calculated as follows:

$$r = \frac{\sum xy - (\sum x)(\sum y)/n}{\sqrt{(\sum x^2 - (\sum x)^2/n)(\sum y^2 - (\sum y)^2/n)}}$$

x = values for the x-values $\bar{x}$ = mean of x

y =values for the y-values $\bar{y}$ = mean of y

3. RESULTS AND DISCUSSION

The result of the study deals with area, production of cotton and rainfall of Tamil Nadu state and India.

3.1   Model Estimation

The estimation of model parameters were estimated using SPSS version was used to estimate the results and presented in Tables.

3.2   Tables and Figures

Since 1993, the production under cotton has been increased from 3.00(Lakh/bales) to 7.20(Lakh/bales) till 2013 (Table 1). The average production under cotton being 5.23 (Lakh/bales). With a mere 0.85 (Lakh/Hec) of Area it has reached to2.72(Lakh/Hec) during the year 2013. The average area under cotton being 1.67(Lakh/Hec).Finally the Actual rainfall increased from 721.5(m/m) to 1304.1(m/m) till 2013 with the average being 972.59(m/m).

Table. 1: The results on Descriptive Statistics in Cotton crop Tamil Nadu State

Factors	Minimum	Maximum	Mean	Std. Deviation
Production	3.00	7.20	5.23	0.91
Area	0.85	2.72	1.67	0.65
Actual Rainfall	721.5	1304.1	972.59	173.76

**Growth trend of cotton cultivated area and production in Tamil Nadu**

Statistical analysis of the area, production and yield in Tamil Nadu during the period 1993-1994 to 2013-2014, the results that there is decrease in area with the decadal growth rate of negative -2.24 percent. The coefficient of variation (CV=Std/Mean) for agricultural area cultivated was 38.59. in terms of production there was also decrease in agricultural cotton production over the decade with -0.47 percent decreased. The coefficient of variation for production was 17.23 percent which is somehow more consistent and uniform than the series of area of agricultural land use.

Table. 1(a): Area, Actual Rainfall and Production level Correlation estimated in Tamil Nadu (1993-94 to 2013-14

		Production	Area	Actual Rainfall
Production	Pearson Correlation	1	0.626[**]	0.364
	Sig. (2-tailed)		0.002	0.104
	N	21	21	21
Area	Pearson Correlation	0.626[**]	1	0.057
	Sig. (2-tailed)	0.002		0.807

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

The correlations between production shows that (Table.1(a)) area (0.626) had strong (sig.) positive correlation with cotton production and rainfall (0.364) had weak positive correlation with cotton production (Ifabiyi and Omoyosoye, 2011).The charts of more than one decade area, production and actual rainfall in the study site were shown in Fig.1(a, b and c). By these charts, the following features were recognized.
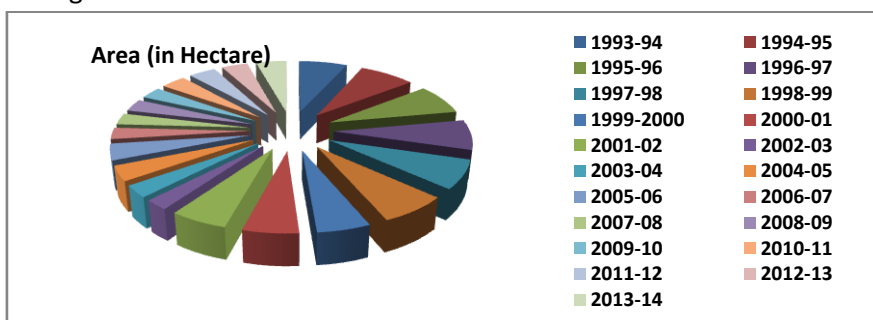
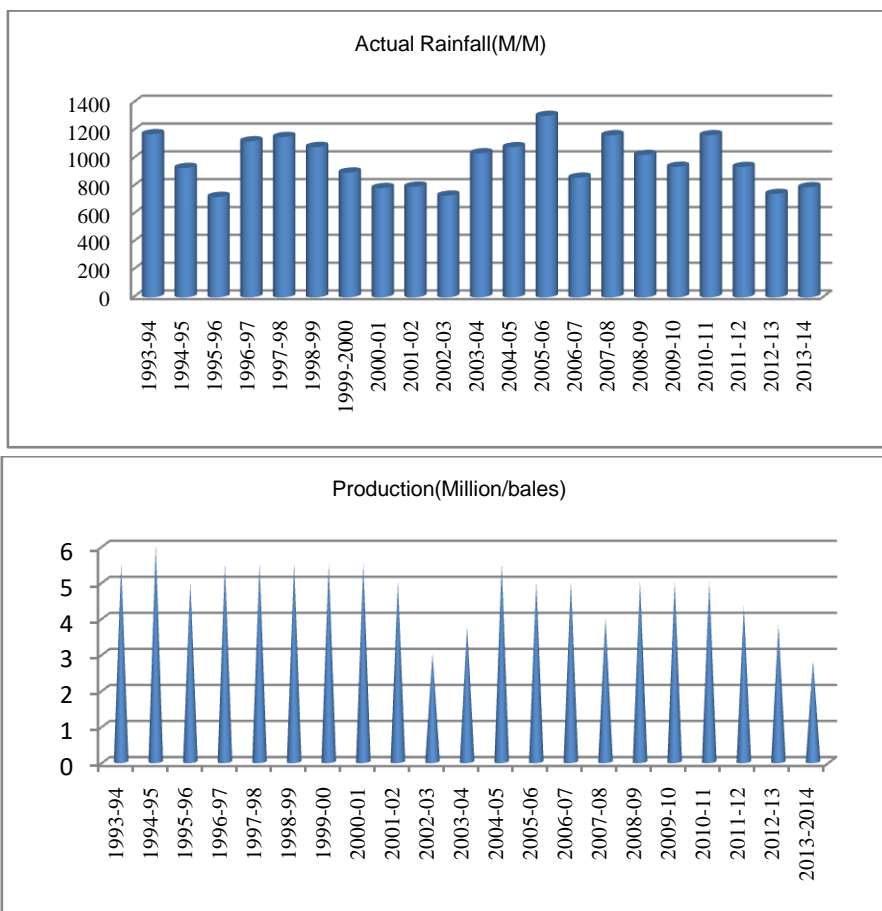**Figure.1** Area, Actual Rainfall and Production level in Tamil Nadu

Figure.1 Area, Actual Rainfall and Production level in Tamil Nadu

Table. 2: The results on Descriptive Statistics in Cotton crop India

	Minimum	Maximum	Mean	Std. Deviation
Production	8.62	35.90	18.7624	9.28176
Area	7.32	12.96	9.4238	1.60073
Actual Rainfall	953.7	1295.3	1142.067	88.6490

Since 1993, the production under cotton has been increased from 8.62(Lakh/bales) to 35.90 (Lakh/bales) till 2013 (Table.2). The average production under cotton being 18.7624 (Lakh/bales).With a mere 7.32 (Lakh/Hec) of Area it has reached to 12.96 (Lakh/Hec) during the year 2013. The average area under cotton being 9.4238 (Lakh/Hec).Finally the Actual rainfall increased from 953.7(m/m) to 1295.3(m/m) till 2013 with the average being 1142.067(m/m).

**Growth trend of cotton cultivated area and production in India**

Statistical analysis of the area, production and yield in India during the period 1993-1994 to 2014-15, the results that there is decrease in area with the decadal growth rate of positive 2.71 percent. The coefficient of variation (CV=Std/Mean) for agricultural area cultivated was 0.75 and in terms of production there was also increase in agricultural cotton production over the decade with 5.76 percent increased. The coefficient of variation for production was 2.26 percent which is somehow more consistent and uniform than the series of area of agricultural land use.

Table. 2 (a) Area, Actual Rainfall and Production level Correlation estimated in India

		Production	Area	Rainfall
Production	Pearson Correlation	1	.907[**]	-.230
	Sig. (2-tailed)		.000	.302
Area	Pearson Correlation	.907[**]	1	-.338
	Sig. (2-tailed)	.000		.124
	N	22	22	22

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

The correlations between production shows that area (0.907) had strong (sig.) and positive correlation with cotton production and rainfall (-0.230) had weak negative correlation with cotton production, respectively(Table.2(a)).
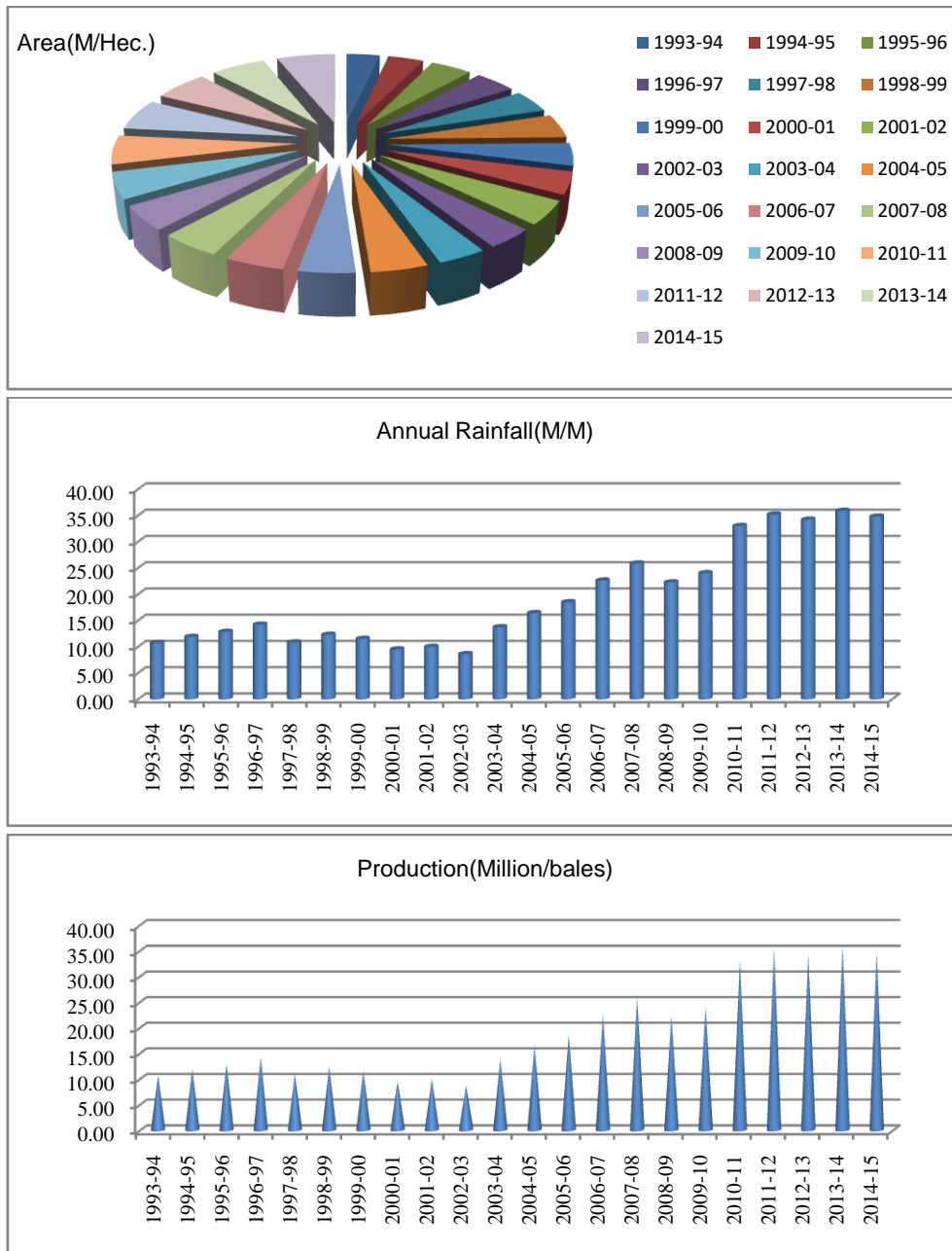
Figure.2 Area, Actual Rainfall and Production level in India

3.3   Correlation Analysis

Here, Table 1(a) and 2(a) showed this portrays the correlation between the production, area and actual monsoon of Tamil Nadu and India. Here production depends upon the area cultivated at the same time it also depends on the monsoon level. Whereas, area is an independent variable, hence the relationship between the variables area tested in order to find out the significance. The results in the table shows that production is significantly depend upon the area cultivated. Thus, it conveys, higher the area cultivated higher will be the production. The correlation result show, that production is depend upon the area with high positive significance at 1 percent level. At the same time the result of the correlation analysis showed that rainfall is inversely correlated with cotton cultivated area and production. This result is line with Perera and Ranasinghe (2013) that recorded an inverse relationship between rainfall and cotton production.

4.   CONCLUSION

The study has revealed that there was high variability and different season for decreasing and previous year increasing on Tamil Nadu and India trend of rainfall during the period(1993-2014). High cotton production of 5.5(lakh/bales) was recorded in 1993while the lowest production of 2.8(lakh/bales) was recorded in 2013-14 in Tamil Nadu cotton production. And India cotton production was 34.8 (lakh/bales) was recorded in 2014 and the lowest production of 8.62(lakh/bales) was recorded in the year 2000 to 2002 in India cotton production.

According, the Tamil Nadu rainfall was 743(m/m) was recorded lowest in year 2012-13, while the highest was 1146(m/m) recorded in previous year on 1993-94. And then India rainfall was 1207.8(m/m) was recorded the highest rainfall in 1993-94 after 1045.2(m/m) was recorded lowest rainfall in the year 2014-15. Cotton production is inversely correlated with rainfall. The study therefore recommends that protective waster proof containers should be used for collection of latex during raining season so as to prevent washing away of latex by rain.Hence production is not reaching the highest level. Once these facilities are provided more and more farmers from these areas would start doing their cotton cultivation and thus boost the state's economy.

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