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Impact of rainfall and Rainy days on sugarcane production in Ahmednagar district of Maharashtra

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ABSTRACT

The aim of this study is to analyses the rainfall and rainy days. It Impact on sugarcane production in Ahmednagar district. Sugarcane is a cash crop in the Ahmednagar district. Cultivation and production dependent on the rainfall and water availability. Water availability directly depends on the rainy day and % of rainfall. It needs sufficient water and deep soil. Rainfall and crop distribution of sugarcane has finding the correlation. The annual rainfall, annually rainy days (2000 to 2014) and annually sugarcane production of the 15 years (2000-01 to 2014-15) are analyses by using collected data. Sugarcane productivity positively get affect with increasing rainfall, then area under sugarcane crop and production get increased. The study concluded that there are stronger correlations between the rainfall and sugarcane production in this study period.

1. Introduction

Two monsoon systems prevail over the Ahmednagar district namely, the summer or southwest monsoon and northeast monsoon. The southwest monsoon has been received more than 80% compared to the northeast monsoon less than 20%. These is a study carried out for understanding the sugarcane - rainfall and rainy day relationship over study region, and also the dependence of the district economy on sugarcane production and factories. These studies were mainly focus on the variation of the rainfall, rainy day and sugarcane production. Sugarcane requires water in all seasons for its growth. The occurrence of extreme dry, monsoon break, winter and summer not accessible water can cause damage to the sugarcane crop. In the drought conditions can also damage to the sugarcane crop.

Sugarcane cultivation is important than any other cash crop in the district. This crop provides direct and regular employment of rural area. It is a major source for income of farmers. Sugarcane industry provides employment to the rural area worker in the winter and summer season. After the producer of sugar it is a major food item for the peoples in rural and urban area. Refined sugar is used as raw material in soft drinks, food processing beverage manufacture, confectioneries and pharmaceutical industries etc.

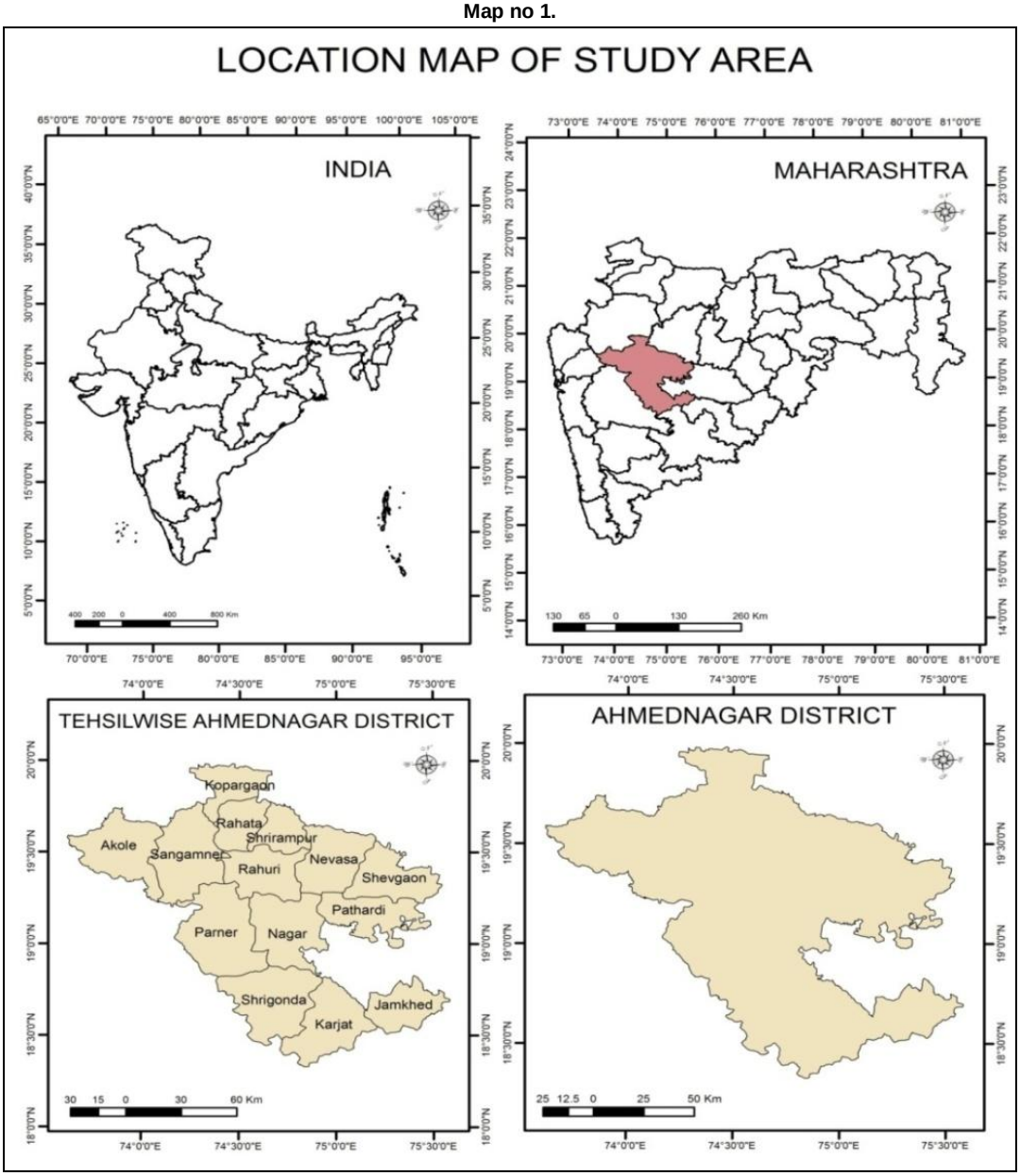
2. Study Area

Ahmednagar district is the largest districts of Maharashtra state. It is divided into 14 tehsils shown map no.1. Ahmednagar is situated in the central-west part of the state. Situated flanked by Nashik district in the north, Aurangabad district in the north and north-east, Beed district in the east, Osmanabad district in south-east, Solapur district in the south, Pune district in the south-west and west, Thane district in the northwest. It extends between 18° 20´ to 19° 59´ North latitudes and 73° 40´ to 75° 43´ East longitudes. The district headquarters is located at Ahmednagar Town. For administrative purpose the district is divided into four subdivisions, viz., 1) Ahmednagar 2) Karjat 3) Shrirampur and 4) Sangamner. Ahmednagar sub-division includes Nagar, Parner, Shevgaon, and Pathardi tehsils, Karjat sub-division includes Karjat, Shrigonda and Jamkhed tehsils, Shrirampur sub-division includes Shrirampur, Nevasa, Rahuri, and Rahata tehsils and Sangamner sub-division includes Sangamner, Kopargaon, and Akola tehsils. The total area under 17048 sq. km. of the district.

3. Objectives

1) To find out the relation between rainfall and rainy days of Ahmednagar district.
2) To investigate the relation between rainfall and sugarcane production of Ahmednagar district.

Map no 1.



Source - Computed by the researcher

4. Data Collection

This study and my research are depending on only secondary data sources, the rainfall, rainy day, Sugarcane area, production, and productivity data are collected. The collected data are divided into two categories or grouped i.e. climatic data and agricultural data.

4.1. Rainfall data-

This study used the climate data (rainfall data) collect from the website- department of Agriculture Maharashtra. The rainfall (mm) data obtained from 2000 to 2014 of Ahmednagar district.

4.2. Rainy day data-

This data obtained from 2000 to 2014 of Ahmednagar district, collect from the website- department of Agriculture Maharashtra.

4.3. Sugarcane crop data-

The data of sugarcane area, production and productivity of the Ahmednagar district are collected from the website - Maharashtra State of Agricultural Department (www.mahaagri.gov.in).

5. Research Methodology

The research methodology is used methods and techniques for analysis of rainfall data, rainy day and sugarcane data in Ahmednagar district. The collected data analyzed using various statistical tools and computer applications.

5.1. Data Analysis Software-

The collected data will be analyzed by using MS Office Excel, MINITAB software. Computer tools and various statistical methods will be used for the proper analysis-

5.2. Mean-

The average rainfall, rainy days, average production and productivity computed by using mean.

5.3. Correlation analysis-

The Karl Pearson's coefficient of relation are used for analysis of relationship between rainfall, rainy days, sugarcane area, production productivity data.

5.4. Rainy day-

According to the Indian Meteorological Department, Pune the rainfall amount realized in a day is 2.5 millimeter or more is considered the rainy day.

5.5. Cartographic Software-

All maps and diagrams of this research will be prepared by considering advanced techniques such as Auto Desk map, QGIS, and Global Mapper. Different types of cartography techniques will be applied.

6. Result and Discussion

India is an agricultural country. The agricultural business of India has been famous since ancient times. Various farms are taken and some products are exported. The cash crop is huge in Maharashtra's agricultural income. More than 65% of the people are involved in this business. The rural economy depends on agricultural production. Many businesses depend on agricultural production. In Ahmednagar district, sugarcane is large and production is high. Sugarcane crop is dependent on many businesses, including sugar factories, jute industries, raswanti, wine production, etc. Transport and communication have also evolved. More than half of the sugar production in the state of Maharashtra is in Ahmednagar district. In the year 2017 finally, there are 19 sugar factories operating in the district.

Table-1

Ahmednagar district Annual Rainfall (in m.m.) and rainy day (2000-2014)

Year	Actual Rainfall	Rainy Days	Average rainfall per rainy days
2000	556.6	42	13.25
2001	526.5	39	13.5
2002	439.5	30	14.65
2003	336	32	10.5
2004	703.2	59	11.92
2005	556.4	49	11.35
2006	835.6	61	13.70
2007	575.7	46	12.52
2008	594.8	44	13.52
2009	644.8	51	12.64
2010	844.9	74	11.42
2011	502.9	48	10.48
2012	383.4	36	10.65
2013	623.5	48	12.99
2014	453.3	44	10.30

Source - Computed by the researcher (www.mahaagri.gov.in).

Figure no. 1.

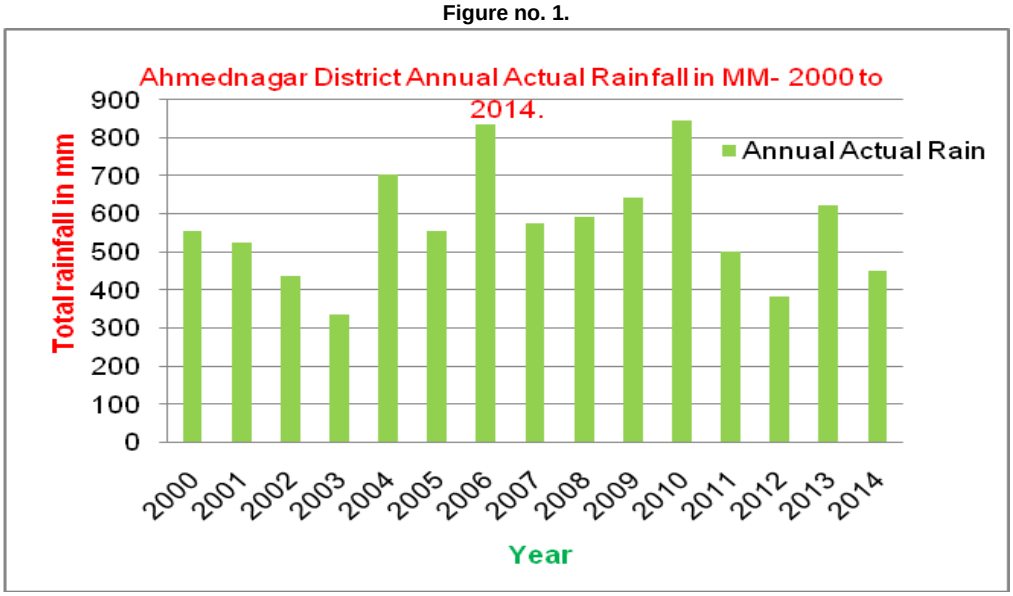
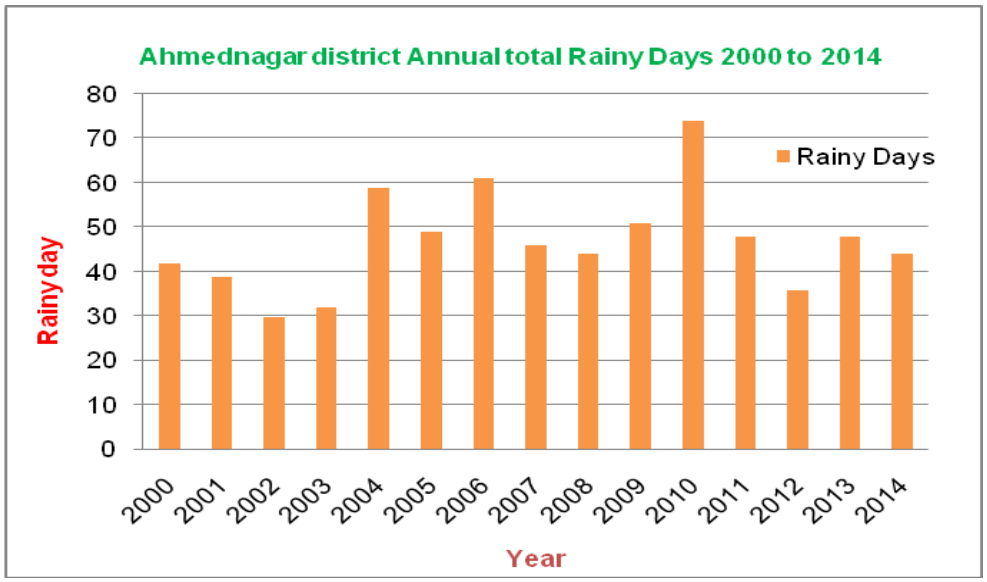


Figure no. 2.



6.1.Rainfall and rainy days-

Data of actual rainfall and rainy days of 15 year shown in table no.1.and figure no.1 & 2. Pearson correlation between actual rainfall and rainy days is 0.915. It seen that if a rainy days increases then actual rainfall (mm) also increases and if rainy day decreases then rainfall (mm) also decreased. In this study period we have seen that in 2010 there are 74 rainy days and 844.9 mm rainfall that is highest. In this period lowest rainfall is in 2003 it has 32 rainy days and 336 mm rainfall. Figure no. 1 shows that rainfall decreases in 2000 to 2003, after that in 2004 to 2014 sometime rainfall decrease or increase.

TABLE – II

AREA, PRODUCTION AND PRODUCTIVITY OF SUGARCANE IN AHMEDNAGAR DISTRICT (2000-01 TO 2014-15)

Year	Area in hector	Production in tones	Productivity in tones/ hector
2000-01	67100	5163900	76.95
2001-02	52000	3596300	69.15
2002-03	49400	3303000	66.86
2003-04	31200	1486800	47.65
2004-05	17000	1001800	58.92
2005-06	56600	4395300	77.65
2006-07	93500	6137800	65.65
2007-08	133300	10432000	78.25
2008-09	77500	5564800	71.80
2009-10	75600	6339000	83.85
2010-11	126000	11516400	91.4
2011-12	129500	11879200	91.73
2012-13	115500	8235700	71.30
2013-14	110800	9643600	87.04
2014-15	122000	11761000	96.40

Source - Computed by the researcher (www.mahaagri.gov.in).

6.2.Rainfall and sugarcane area-

Data of area under sugarcane crop in period 15 year shown in table no. 2.and figure no. 3, Pearson correlation between actual rainfall and area under sugarcane is 0.276. Lowest area under sugarcane recorded 17000 hectors during 2004-05 and 2007-08 shown that 133300 is highest area. Area under sugarcane was continuous decreases During 2000-01 to 2004-05 and after that sometimes it increases or decreases.

Figure no. 3.

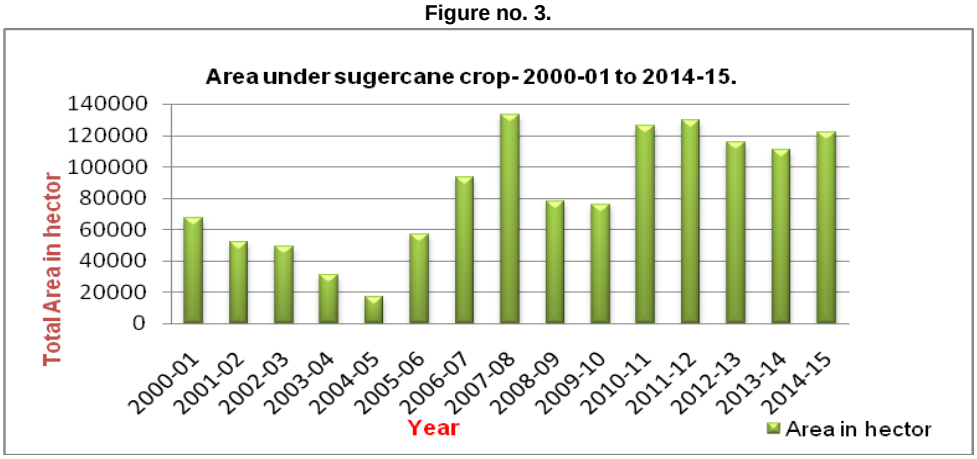
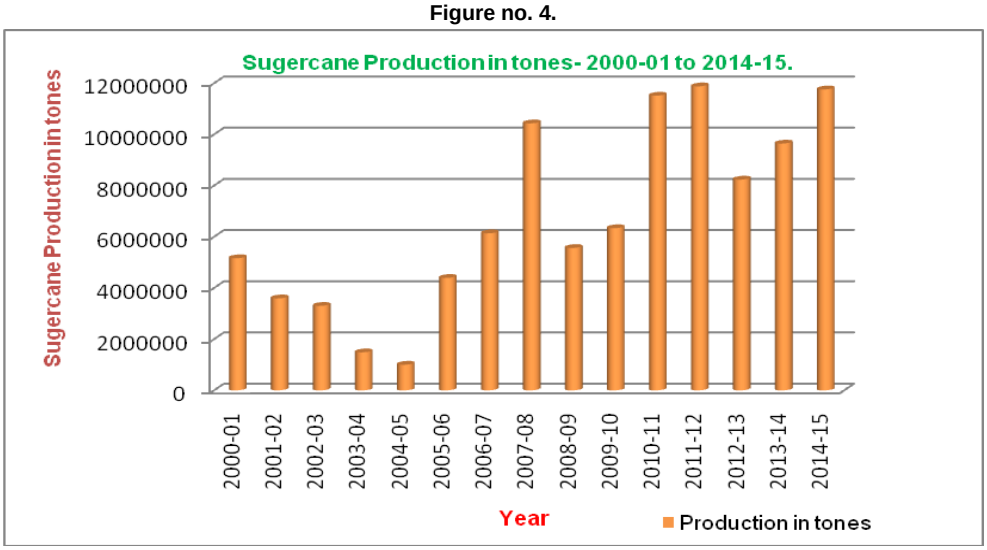


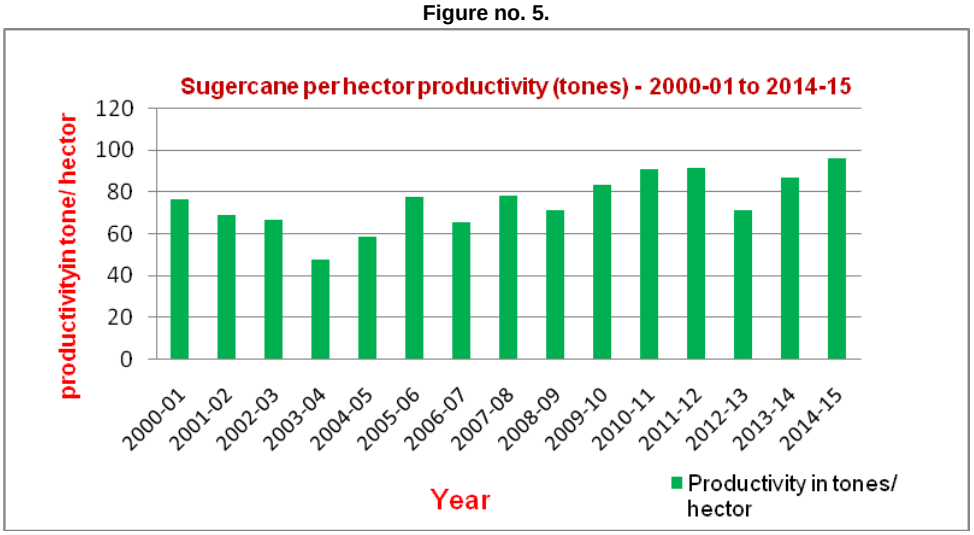
Figure no. 4.



6.3. Rainfall and production-

Rainfall is shown in table no.1 and figure no.1. Sugarcane production in tone is shown in figure no. 4 and table no. 2. Pearson correlation between actual rainfall and sugarcane production in tones is positive 0.154. In this study period highest rainfall in 2010 is 844.9 mm. Sugarcane production in 2010-11 is 11516400 tones but in 2011-12 it is highest that is 11879200 tones. In 2003 lowest rainfall is recorded that is 336 mm. Sugarcane production in 2003-04 is 1486800 tones but in 2004-05 it has recorded lowest that is 1001800 tones. It means that in which year rainfall is less in that proportion is not decrease in that year but it effects on production of next year. Similarly when rainfall is increase in that proportion production is not increase in that year but it in increase in the next year. It means that sugarcane production is not only depending on rainfall but also depends on viability of surface or ground water.

Figure no. 5.



6.4. Rainfall and per hector production-

Total rainfall is shown in figure no. 1 and table no. 1. Per hector sugarcane production in tones shown in figure no. 5 and table no. 2. Pearson correlation between rainfall and per hector sugarcane production in tones is positive 0.216. Above figure and table shows that lowest rainfall is in 2003 that is 336 mm. the lowest pre hector production is in 2003-04 that is 47.65 tones. The highest rainfall is recorded in 2010 but highest pre hector production is recorded in 2014-15that is 96.40 tones. After 2008-09 pre hector sugarcane production is increase more and reasons for that is new varieties of sugarcane, more use of chemical fertilizers, new techniques of cultivation and use of technologies.

7. Conclusions

I have analyzed the annual rainfall and rainy day adversely affects on sugarcane production and productivity changes in Ahmednagar district. In this analysis of-

1. Ahmednagar district has a positive relationship between rainfall and rainy days.
2. As the rainy days increase, the rainfall is increasing as well as the rainfall decreases as the rainy days decrease.
3. Rainfall affects on sugarcane cultivated area, in which year rainfall is increased in that year cultivated area also increased.
4. Rainfall also affects on sugarcane production after increasing rainfall in that year production also increased.
5. Rainfall affects on per hector production of sugarcane, when rainfall is increase per hector production also increased and if rainfall is decrease per hector production also decreased.
6. After 2008-09 per hector production is increase but some time it is less or more. This increasing sugarcane production is not only depends on rainfall but also depends on availability of water, new varieties of sugarcane, cultivated techniques, irrigation techniques, increasing use of chemical fertilizers etc.
7. It can uptake more excess of water the most critical factor for sugarcane production is not only rainfall but also rainy day. If maximum rainy days with minimum rainfall then it affects negatively. If rainfall is maximum with minimum number of rainy days it affects positively. Maximum production needs maximum rainfall with rainy days

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