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Impact of rainfall on sugarcane production in Kolhapur district of Maharashtra State

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Abstract:-

The aim of this study is to analyses the rainfall and rainy days. The changing rainfall and rainy days effects on sugarcane production in Kolhapur district.Sugarcane is a cash crop in the Kolhapur district. Cultivation andsugarcane production is dependent on rainfall and water availability. Water availability directly depends on the rainy day and percentage of rainfall. It needs sufficient water and deep soil. Rainfall and crop distribution of sugarcane have to find 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, the area under sugarcane crop and production get increased. The study concluded that there are stronger correlations between rainfall and sugarcane production in this study period.

Keywords: - Rainfall,Production, Sugarcane, Rainy days.

Introduction:

Maharashtra is one of the largest sugarcane production state in India. Sugarcane yield of Maharashtrain 2014-15 was 915.38 lakh tonnes, was much higher as compared to the yield of 89 kg /hector and the second highest sugar producing state was Uttar Pradesh. In Maharashtra Kolhapur district is one of the largest sugar producing district. Sugarcane is the main cash crop of district. Both cooperative and private 21 sugar mills are crushing. In 2013-14 sugarcane production of 116.29 lakh tonnes of sugar has produced 14.88 lakh metric tonnes of sugar. The term 'Productivity' is regarded as, "A ratio of the output to input in relation to land, labour, capital and overall resources employed in agriculture." Rao and Jasbir Singh (1981) considered "Productivity as the degree at which the economic, cultural, technical and organizational variables are able to exploit the biotic resources of the area for agricultural production". Bhatia (1967) defined agricultural efficiency as, "The aggregate performance of various crops in regard to their output per acre". Singh (1979) defined agricultural productivity as, "The quantity of returns from arable land. A large number of factors influence the agricultural productivity of a region. These factors include the physical, socio-economic, technological and organizational. But rainfall is factors which more influence the agricultural productivity in Kolhapur district. In the period 2014-15 years the Actual Rainfall is 1355.9 mm and the Rate of Sugarcane production was 102.74 tonnes/hector.There is need of the hour that to study of correlation between rainfall and yield responses of sugarcane crop and suggest measures and strategies to sustain agricultural productivity under these rainfall variations.

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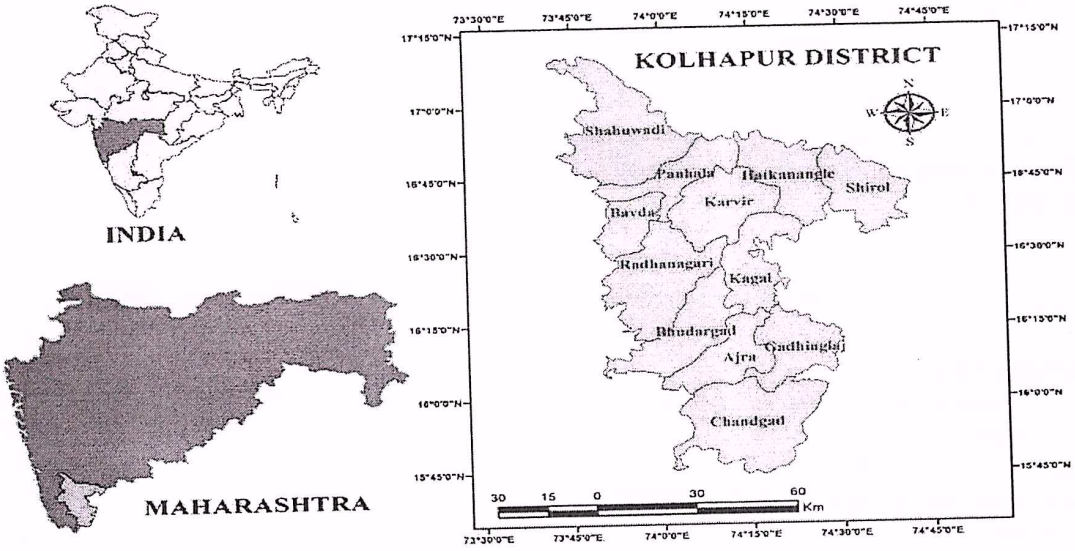
Study Area:

The district of Kolhapur lies in the south-west of Maharashtra between **15°43'**to **17° 17'North** latitude and **73°40'**to **74° 42'East** longitude and spreads across the Deccan Plateau in the rain shadow region of the Sahyadri mountain ranges on the southernmost tip of the state of Maharashtra. The Sangli district lies to the north, the Belgaum district of Karnataka State is to the east and south, Ratnangiri and Sindhudurg districts of Maharashtra are to the West. To the west, we have the Sahyadri ranges and the river Warana is to the north which forms the natural boundaries to the district. It has an area of 7685.00 sq.kms. Which about 2.5 per cent is of total area of the state and it ranks 24th in the state as far as area is concerned.

LOCATION MAP



OBJECTIVES:

1) To study the correlation between rainfall and Rainy days of study Region.
2) To find out the changing pattern of rainfall and sugarcane Production in Kolhapur District.

Database and Methodology:

The present research paper is depending upon secondary sources data. The data of rainfall, crop area, Sugarcane production, and productivity are used. The fifteen years of data for the period 2000-2001 to 2014-2015 are being assessed. The annual rainfall data of Kolhapur district for the period 2000 to 2014 obtained from the Indian meteorological department and Data regarding sugarcane crop for the same period are collected from the Agricultural Department of Maharashtra State. The various statistical methods have been used for statistical analysis like mean. Standard Deviation, coefficient of Variation

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and Karl Pearson's method correlation is used for measuring the relationship between rainfall and crop area, production, and productivity.

Rainfall & Rainy Days:-

Table no.1 and figure no.1 & 2 shows the rainfall and rainy days for the period 2000-2014. Pearson correlation between actual rainfall and rainy days is 0.637. It seen that if a rainy days increases then actual rainfall (mm) also increases and if rainy day decreases then rainfall (mm) also decreases. During this period highest rainfall recorded is 2893.2mm in the year 2005 and the minimum rainfall was 1353.9 mm is recorded in the 2013 maximum rainy days are recorded in 2010 (119 Rainy days) and minimum rainy days are recorded in 2013 and 2014 (79 Rainy days). It shows that rainfall decrease from 2000 to 2003 after that it increases from 2004 to 2007, again rainfall decreases from 2008 to 2010 and again in 2010 to 2011 rainfall increases and after that rainfall decreases from 2012 to 2013. It shows that this district experience fluctuation in rainfall and rainy days.

Table no.-1

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

Year	Actual Rainfall	Rainy Days	Average rainfall per rainy days
2000	1744.1	104	16.77
2001	1534.7	104	14.75
2002	1650.7	98	16.84
2003	1455.1	104	13.99
2004	1892.2	107	17.68
2005	2893.2	114	25.37
2006	2821.1	118	23.9
2007	2301.4	104	22.12
2008	2024.8	105	19.28
2009	2036.1	111	18.34
2010	2004.3	119	16.84
2011	2142.9	95	19.3
2012	1729.4	94	15.72
2013	1353.9	79	14.25
2014	1355.9	79	14.42

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

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Figure no. 1

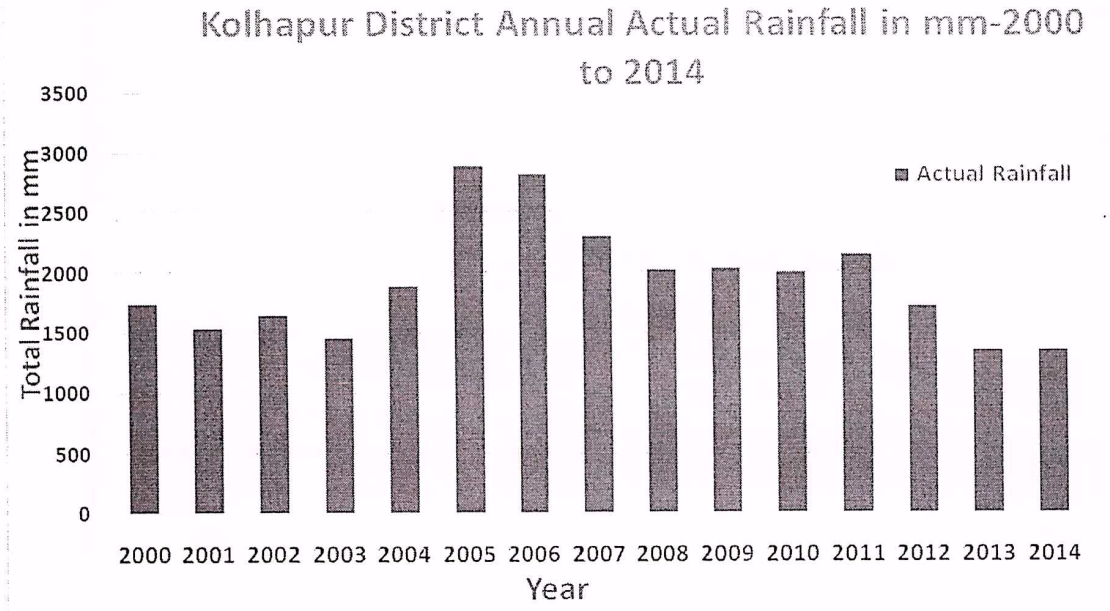
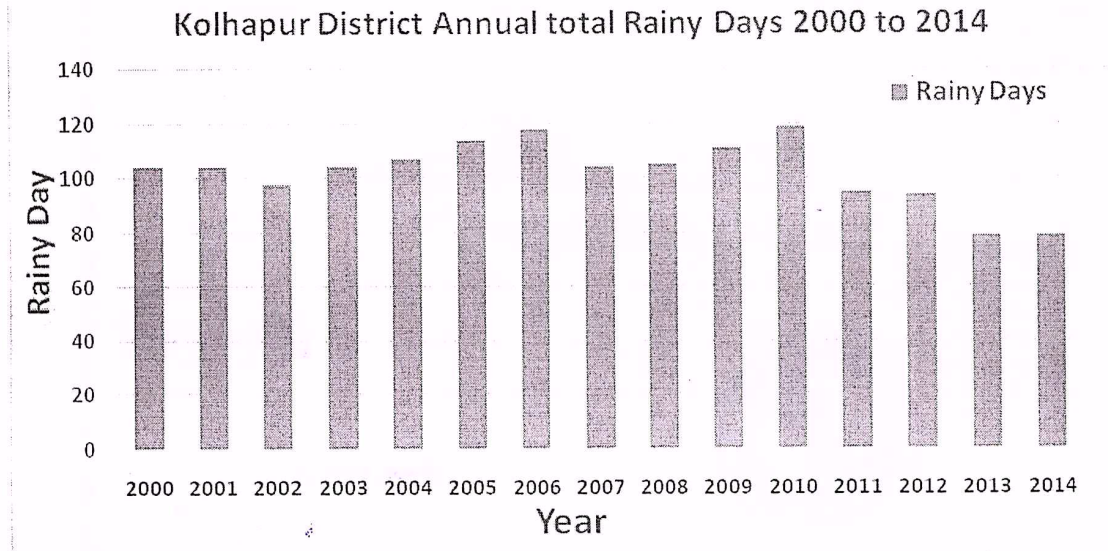


Figure no. 2



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Tables no. – 2

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

Year	Area in Hector	Production in tones	Productivity in tones/ hector
2000-01	89700	8158300	90.95
2001-02	101900	9196600	90.25
2002-03	98400	8421000	85.57
2003-04	86900	4918400	56.59
2004-05	76300	6529400	85.57
2005-06	94500	7229300	76.5
2006-07	106300	8573300	80.65
2007-08	113900	9742600	85.53
2008-09	102500	8461300	82.54
2009-10	112700	9810000	87.04
2010-11	139900	12591000	90
2011-12	146100	12847200	87.93
2012-13	142000	13739100	96.75
2013-14	135200	13580200	100.44
2014-15	146300	15031600	102.74

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

Rainfall and sugarcane area:

Data of area under sugarcane crop for 15 year period shown in table no. 2.and figure no. 3, Pearson correlation between actual rainfall and area under sugarcane is -0.171. Lowest area under sugarcane recorded in 2004-05 is 76300 hector at that time the rate of rainfall 1892mm and highest area under sugarcane recorded in 2014-15 is 146300 hector that time actual rainfall 1355mm. Area under sugarcane was decreases during 2002-03 to 2004-05 and after that it increases from 2005-06 to 2007-08. After that is indicates very few fluctuations in the production of sugarcane in Kolhapur district.

Figureno. 3

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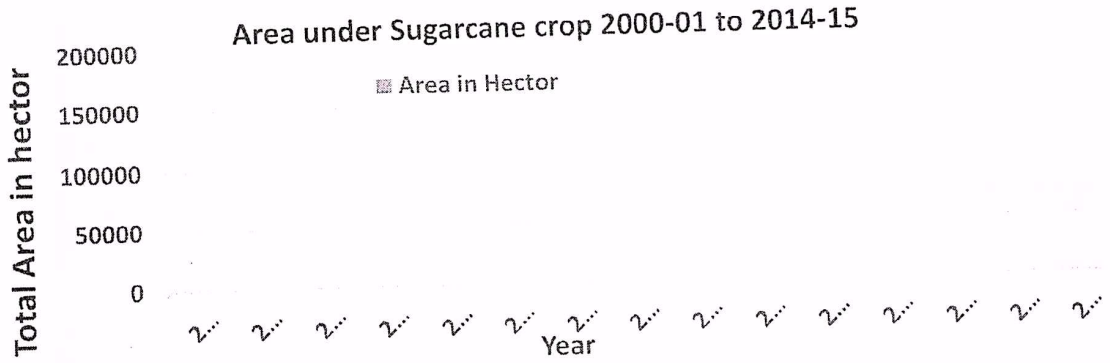

Rainfall and production:-

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 negative -0.277. In this study period highest rainfall recorded in 2005 is 2893.2 mm. Sugarcane production in 2005-06 was 7229300 tonnes, but the highest production of sugarcane was recorded in 2014-15 i.e. 15031600 tones. In 2013 lowest rainfall was recorded i.e. 1353.9 mm. In the period 2003-04 was recorded lowest production 4918400 tonnes. It means that in which year rainfall is less in that proportion there is no decrease in the production in same 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 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. 4

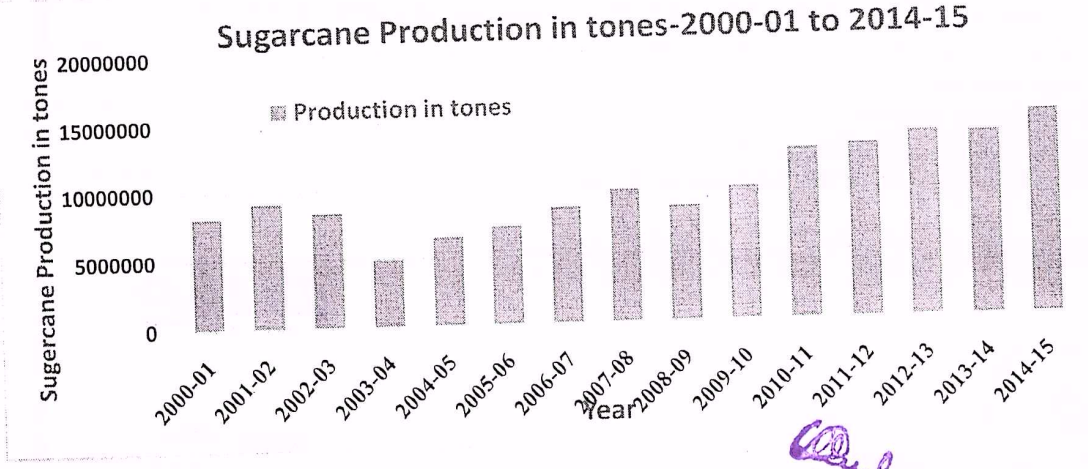

Figure no.5

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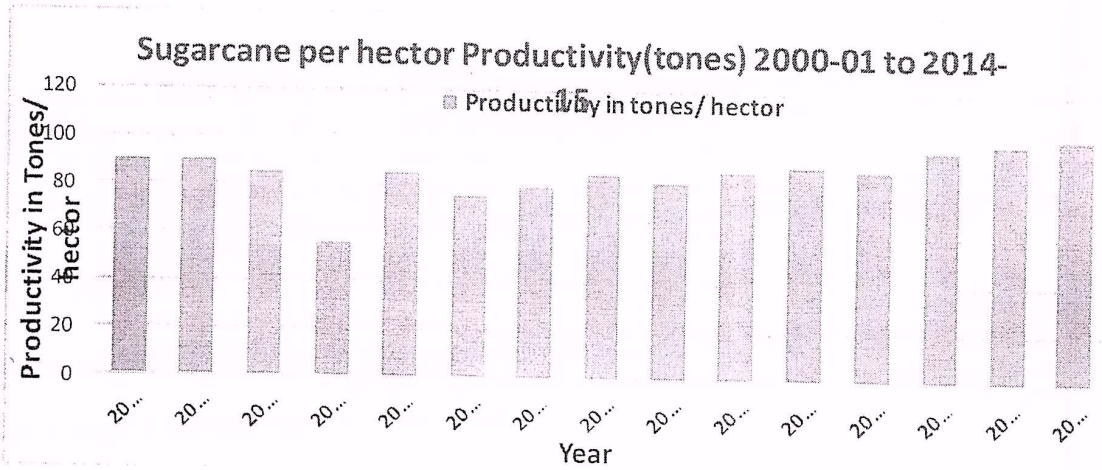

Rainfall and per hector production:-

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 negative -0.307. Above figure and table shows that lowest rainfall recorded in 2013 that is 1353.9 mm. but the lowest per hector production is in 2003-04 that is 56.59 tones. The highest rainfall is recorded in 2005 i.e. 2893.2 mm. but highest per hector production was recorded in 2014-15 that is 102.74 tones. After 2005-06 per hector sugarcane production was increased more due to the introduction of new varieties of sugarcane, more use of chemical fertilizers, new techniques of cultivation and the use of technologies.

Conclusions :-

I have concluded that the annual rainfall and rainy dayaffects on rate of sugarcane production and productivity Kolhapur district. -

1. Kolhapur district has a positive relationship between rainfall and rainy days.
2. As the rainy days increase, the rainfall is increases and vice versa.
3. Rainfall is a key factor which affects on sugarcane production after increasing rainfall in that year production also increased.
4. Rainfall affects on per hector production of sugarcane, when rainfall is increase per hector production also increased and rainfall is decrease per hector production also decreased.
6. After 2005-06 per hector production is increases as well as production in tones are also increases. This increasing sugarcane production is not only depend 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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