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“An Analysis Of Rainfall Impacts On Area Under Maize Crop In Ahmednagar District, Maharashtra”

* Mr. Namdeo Subhash Ghule
Department of Geography,
Dr. B.A.M.U., Aurangabad,

** Dr. U. B. Pathre
Principal, Shri A.B. College,
Devgaon Rangari,
Tal. Kannad, Dist. A'bad

***Dr. M. V. Suryawanshi
Head, Dept. of Geography,
Dr. Babasaheb Ambedkar
Marathwada University,
Aurangabad (India)

ABSTRACT:

Ahmednagar district is the largest district in Maharashtra state. Various crops are grown in this district. These include cash crops, food crops, and fodder crops. Maize is included in all three crop category. Maize is cultivated in the district during the three seasons - kharif, rabbi, and summer. Generally the seeds of various types of maize seed companies are used for cultivation such as African tall, Karvir, Rajarshree, Vijay, Mahabiz, Digvijay, Virat. The Rain is changing every year, with each month and season varying. The average rainfall during the period 2000 to 2014 is 82.03% during the monsoon, 14.78% in the north-east monsoon and winter period, and 3.19% in the summer. The Pearson correlation is therefore investigated by the rainfall in the period 2000 to 2014 and area under maize crop for the period 2000-01 to 2014-15.

KEY WORDS: Agriculture, Area, Maize Crop, Rainfall, Season.

I. INTRODUCTION:

India is the leading agricultural country and on average more than 65% people depend on agriculture and agriculture related business. The State of Maharashtra is the leader in the country in agricultural production and its based business or industries. In Maharashtra, Ahmednagar district is the leader in agricultural production. The development of agriculture and co-operation in the district has been huge. It is especially famous in Co-operative Sugar Factories, Co-operative Dairy Businesses, Co-operative Credit Societies, etc. As a result of the agrarian business, horticultural farming has grown. Apart from cultivating horticulture, Inquisition cultivation is also widely practiced in which cash crops, food crops and fodder crops are taken. Maize is grown in many parts of the district and it is also grown in horticultural and dry farming. Production of maize crop is being done in the district for three seasons. The maize crop has been studied in the period from 2000-01 to 2014-15 years, has studied rainfall (mm) and area under maize crop in each season.

The effects of global warming and climate change are impacting agriculture. This results in a large number of countries where monsoon rainfall. India comes to the southwest monsoon rains, so it affects agriculture. Sometimes it rains early and sometimes it delays the annual planning of the farm. If the monsoon arrives late, the sowing in the monsoon is delayed, so the sowing of both the

next seasons is also delayed and there is a big loss in production. But if the monsoon rains or the monsoon arrives on time, then the agricultural work is done on time and sowing time is also increase. It takes a long period from 25 May to 15 July to reach monsoon winds all over India. In the meantime, if the arrival of the monsoon is late, it will have an effect on the rainfall day and extent. The arrival of monsoon in the state of Maharashtra is usually after 5 July. Sometimes it seems too late. But if the monsoon rains, then the entire field work and sowing can be done in a timely manner which increases the production. In Ahmednagar districts of Maharashtra state, sowing occurs only after monsoon rains. This is especially seen in non-irrigated areas. In the district, maize is grown in all three seasons - monsoon, winter, and summer. The effect of rainfall on the maize crop is shown in the research done in the period 2000-01 to 2014-15. Therefore, the rainfall in the district of Ahmednagar has been studied for a period of 2000 to 2014 years.

II. STUDY AREA:

Ahmednagar district is the largest district in Maharashtra and its location is in the center of the west. The total area under 17048 sq. km. which is 5.66% of area of Maharashtra State. It extends between $18^{\circ} 20'$ to $19^{\circ} 59'$ North latitudes and $73^{\circ} 40'$ to $75^{\circ} 43'$ East longitudes. The district headquarters is located at Ahmednagar Town. It is divided into 14 tehsils shown figure I

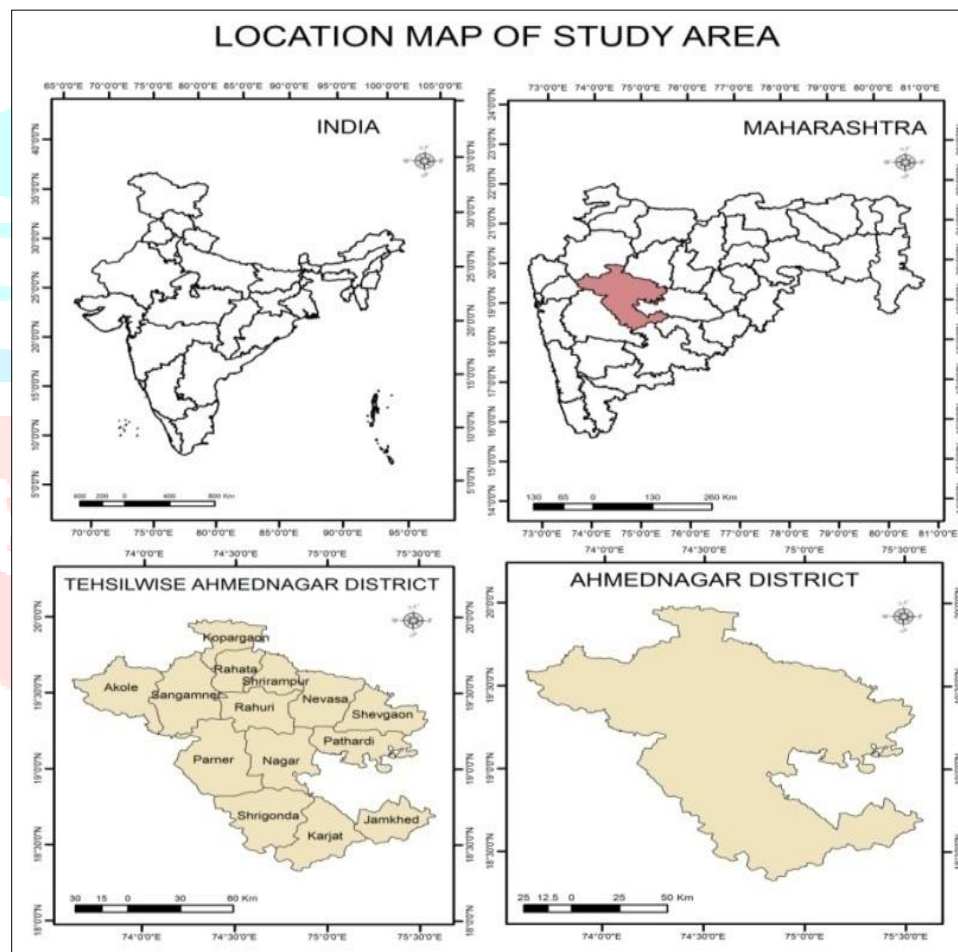


Fig- 1: Location map of study area.

III. OBJECTIVES:

- 1) To study the seasonal rainfall and area under maize of Ahmednagar.
- 2) To find out the relation of rainfall and area under maize crop.

IV. MATERIAL AND METHODS:

1. **Data-** The data set for present study is covering 15 years at Ahmednagar district during 2000 to 2014. For the present investigation used from Secondary data for the various web sites and government official web sites. The secondary data for maize crop area, production, and rainfall (MM) data are given accurate and reliable data from following sources. Rainfall data of district-
 - a. Rainfall data during 2000 to 2014 taken from agriculture department website of www.mahaagri.gov.in.
 - b. Agricultural Data of District- Maize crop area during 2000-01 to 2014-15 taken from agriculture department official website of www.mahaagri.gov.in.
 - c. District Gazetteers and Socio-Economic Review of Aurangabad district 2013.
2. **Data analysis techniques-** various techniques are used for data analysis.
 - a. **Mean-** the average rainfall, average production and productivity computed by using mean.
 - b. **Correlation analysis-** the Karl Pearson's correlation coefficient of relation is used for analysis of relationship between- Rainfall and maize production.
 - c. **Cartographic techniques:** map this research will be prepared by considering advanced techniques such as QGIS, and Arc GIS applied. Figure and table are computed by Microsoft word and Microsoft Excel.

V. RESULT AND DISCUSSION:

The agriculture industry is the backbone of the economy of Ahmednagar district. Various crops are grown in the district. In these, maize is an important crop. It is taken in three seasons and it has studied how it is related to area and rainfall during the study period. Maize is widely used for crop cultivation. After the maize crop is produced, the same uses are partly used in the maize based industry, some as food and some as crop feed again. Thus maize is widely used as fodder, food and animal feed in the crop district.

Table- 1: final estimates of area (hectares) under maize crop during 2000-01 to 2014-15 and seasonal and annual rainfall (in MM) during 2000 to 2014 in Ahmednagar district (M.S).

Years	Kharif area	Rabbi area	Summer area	total annual area	Season	southwest monsoon	Post monsoon and winter Rainfall	Sum mer	Sum annual rainfall
					Year				
2000-01	7000	12600	1400	21000	2000	478.6	55.7	22.3	556.6
2001-02	6400	12300	1500	20200	2001	360.6	162.2	3.7	526.5
2002-03	7000	11700	1100	19800	2002	394.2	32.9	12.4	439.5
2003-04	6700	8500	2000	17200	2003	277.4	31.5	27.1	336
2004-05	11400	10900	3100	25400	2004	561	82.7	59.5	703.2
2005-06	15400	11700	1400	28500	2005	478	77.7	0.7	556.4
2006-07	17900	15300	1200	34400	2006	670.9	75.3	89.4	835.6
2007-08	23600	12500	1100	37200	2007	551.6	18.2	5.9	575.7
2008-09	22100	10200	1800	34100	2008	521.1	55.8	17.9	594.8
2009-10	38500	11600	3500	53600	2009	448.7	196.1	0	644.8
2010-11	45300	13200	2300	60800	2010	714.3	130.6	0	844.9
2011-12	46300	9200	-	55500	2011	462.5	40.4	0	502.9
2012-13	45000	14700	200	59900	2012	283.9	99.5	0	383.4
2013-14	61000	20900	1000	82900	2013	474.8	122.2	26.5	623.5
2014-15	68100	29400	200	97700	2014	358.2	87.5	7.6	453.3

Source- Computed by Researcher (www.mahaagri.gov.in)

Rainfall and Maize crop-

In Ahmednagar district, the main source of water for agriculture is the monsoon rainfall. So, after the monsoon season, the water requirement for agriculture is met by the storage of ground water and ground water on different terrain. During the monsoon, kharif crops are harvested, but if the monsoon breaks, irrigation has to be used. In rabbi and summer, the crops are harvested using return irrigation and premature rainfall as well as irrigation. Studies of maize crop in the period 2000-01 to 2014-15 show that the effect of rainfall is on maize crop. When rainfall is high, area under maize crop is high. When rainfall is low, areas under maize crop is found to decrease. That is, there seems to be a correlation between rainfall and area under maize crop.

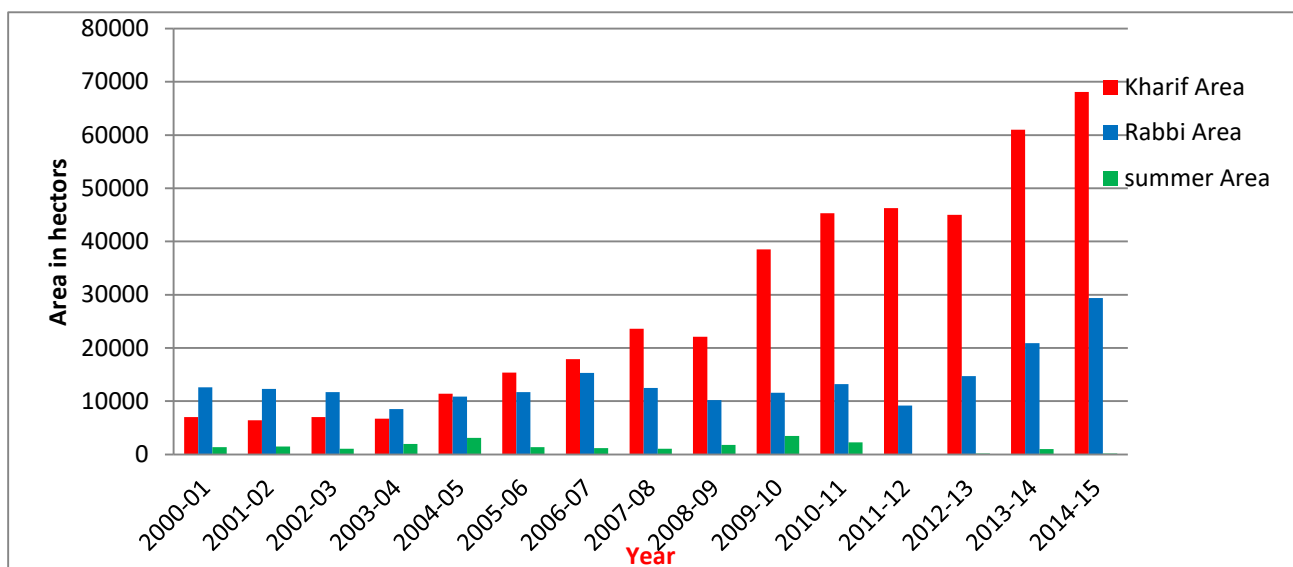


Fig. 2: Final estimates of area in hectares of maize crop during 2000-01 to 2014-15 in Ahmednagar district (M.S).

Rainfall and Area under maize crop- Seasonal and total annual rainfall in the study area is table number 1, the seasonal and the total annual area under maize crop table 2 and figure 2 are shown respectively. According to the seasonal rains in the study period of 2000- 2014 years, the rainfall during the monsoon season was seen, while the maximum rainfall during the southwest monsoon was 714.3 mm in the year 2010. The lowest rainfall during the period was 277.4 mm in the year 2003 (Figure 4). In the same period, the area under maize crop was maximum 2014-15 to 68100 hectares. The area under the lowest maize crop is 2003-04 to 6700 hectares. The southwest monsoon rainfall during the study period is seen to increase or decrease every year. But if the area under maize crop is seen for first four years and with the exception of 2012-13, the area under maize crop is increasing every year (Figure 2). Therefore, in the Pearson correlation test, the rainfalls in the southwest monsoon season and the area under kharif crop of correlation have been negative at 0.001 (P- value 0.996). The rainfall in the southwest monsoon season and in the kharif season cultivation area of maize crop does not seem to correlation.

From the northeast monsoon and winter rains and rabbi season during the above study period, you can see from the statistics of maize crop. That the rainfall in this season was the highest in 196.1 mm in the 2009 and the minimum in 2007 is 18.2mm (Figure 3). The area under maize cultivation during Rabbi Season maximum 2014-15 is 29400 hectares and the lowest 2003-04 is 8500 hectares. The northeast monsoon and winter rainfall are extremely short and are irregular in the study period. There is also irregularity in the cultivation area of maize crop during Rabi season. In the Pearson correlation test, the northeast monsoon and winter rainfall and the area under maize crop are positive 0.204 (P-Value 0.465) correlations.

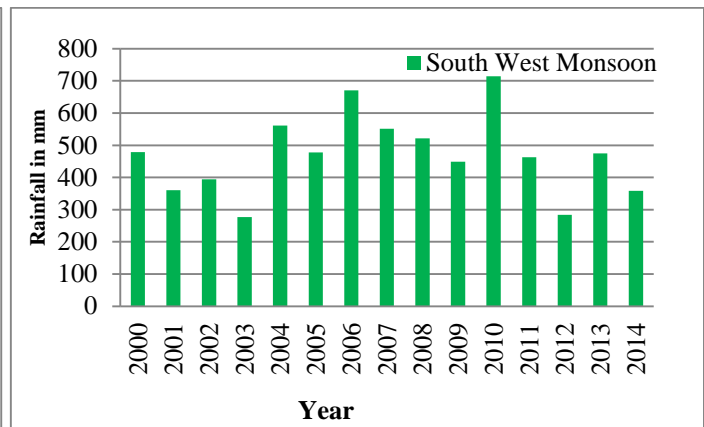
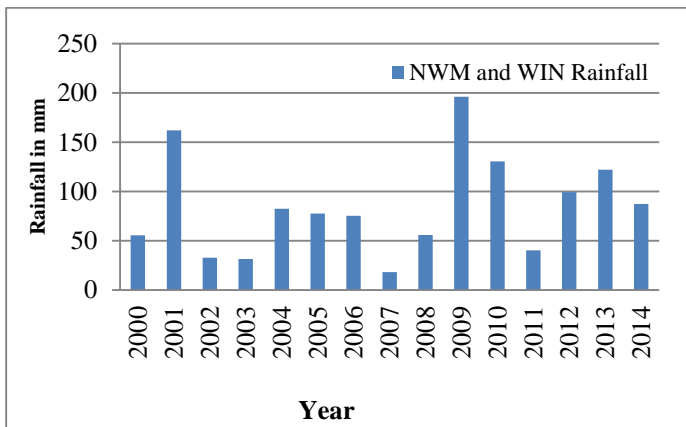


Fig.- 3: North East monsoon season and Winter rainfall in mm (2000 to 2014) of Ahmednagar district.

Fig.-4: South west monsoon season rainfall in mm (2000 to 2014) of Ahmednagar district.

In Ahmednagar district the area under summer rainfall and maize crop is very small. Because in India, there is almost no rainfall this season. Even if it is prematurely and cyclonic or stormy, it is not used for agriculture. During the study period in the summer is highest in 89.4 mm in the 2006, it was not recorded in 2009, 2010, 2011, 2012 and the minimum in 2005 is 0.7 mm is so low (Figure 5). The area under maize crop is the highest in the summer at 2009-10 in 3500 hectares, the lowest in 2012-13 and in the 2014-15 in 200 hectares. So 2011-12 statistics is not available. In summer, maize is grown on irrigation. In the Pearson correlation test, between summer rainfall and area under maize crop are positive 0.062 (P-Value 0.826) correlations.

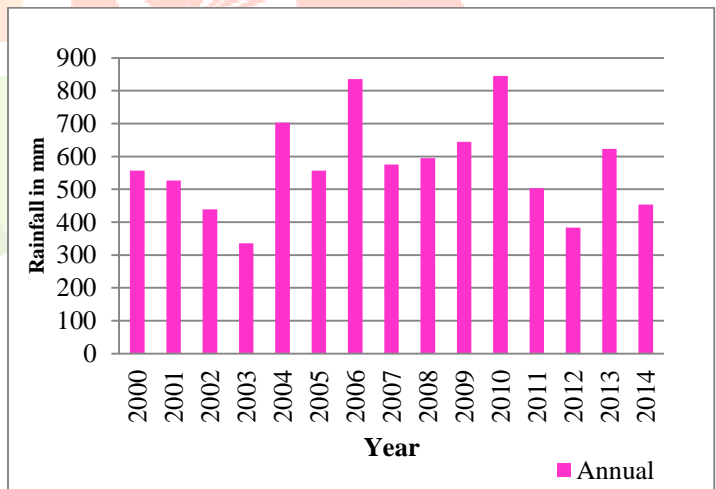
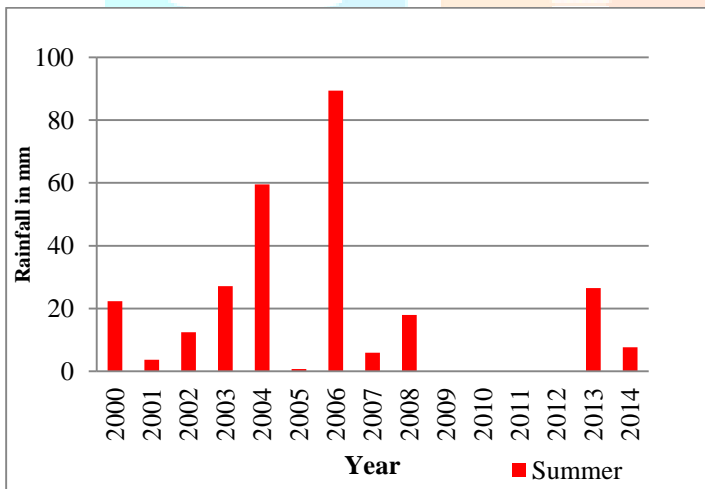


Fig.-5: Summer season rainfall in mm (2000 to 2014) of Ahmednagar district.

Fig.-6: Annual rainfall in mm (2000 to 2014) of Ahmednagar district.

The total area of rainfall for each year falling in the study area is 2000 to 2014 years and the total area under maize crop in the period of 2000-01 to 2014-15 years (Table 1). Upon verifying the Pearson correlation of these, the positive correlation between them appears to be 0.062 (P- value 0.826).

VI. CONCLUSIONS:

In this study an attempt has been made to assess rainfall monthly and seasonal and its relationship with maize crop production in the district of Ahmednagar. This study provides basic information for understanding the seasonal and annual rainfall variation and area under maize crop relationship in the Ahmednagar district. The effect of rainfall on area under this crop differs by season and annual. The rainfall in the rabbi and summer seasons and the area under maize crop fluctuate. Rainfall distribution pattern of southwest monsoon and annual is observed same. We find that rainfall has a negligible correlation on area under maize crop. Exemption one and two year during study period kharif and annual area under maize crops continuously growth in the study period.

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