



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

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ABSTRACT:

Parbhani district is an important district of 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, and 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% during 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, Production.

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, Parbhani 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 Parbhani 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 Parbhani has been studied for a period of 2000 to 2014 years.

STUDY AREA:

Parbhani district is located on the Deccan plateau the Eastern side of Maharashtra State. It is located between 18.45° and 20.01° North latitude and 76.13° to 77.29° East longitudes. It is bounded a North by Buldhana and Hingoli districts, while at west by Jalna district. To the South it is bounded by Beed and Latur districts and to the East by Nanded district. Parbhani district is divided into 9 tehsils. The total Geographical area of study region is 6511 km², which is 2.11 percent of the whole area of the state. The population in the study region is 1836086 populations in (2011 census) which is 1.63 % of the total population in Maharashtra of which 9.42 lakh are male, while the female population was 8.93 lakh. The sex ratio observed in the district is 947 females as against the 922. Females as states average. The rural population of the district is 10.43 lakh indicating rural dominance. SC population was found to be 2.47 lakhs, (13%) while the total population of scheduled Tribes was 40 lakhs i.e., 2.3% of the total population of the district Density of population in the district is 192 per sq.km area as against state average of 315 persons per sq. km. Pathri, Sailu, Manwat, Parbhani, Sompeth, Gangakhed, Palam and Purna tahsils are plain in topographically. The slope of the region is high to the western part whereas it becomes less to eastern part. The Ajanta hill ranges run through Jintur tehsil of the Parbhani district, and Balaghat hill ranges run through Gangakhed tehsil of the district. The district come Godavari and Dudhana river valley. The district is located about 457 meters above the sea level.

PARBHANI DISTRICT LOCATION MAP

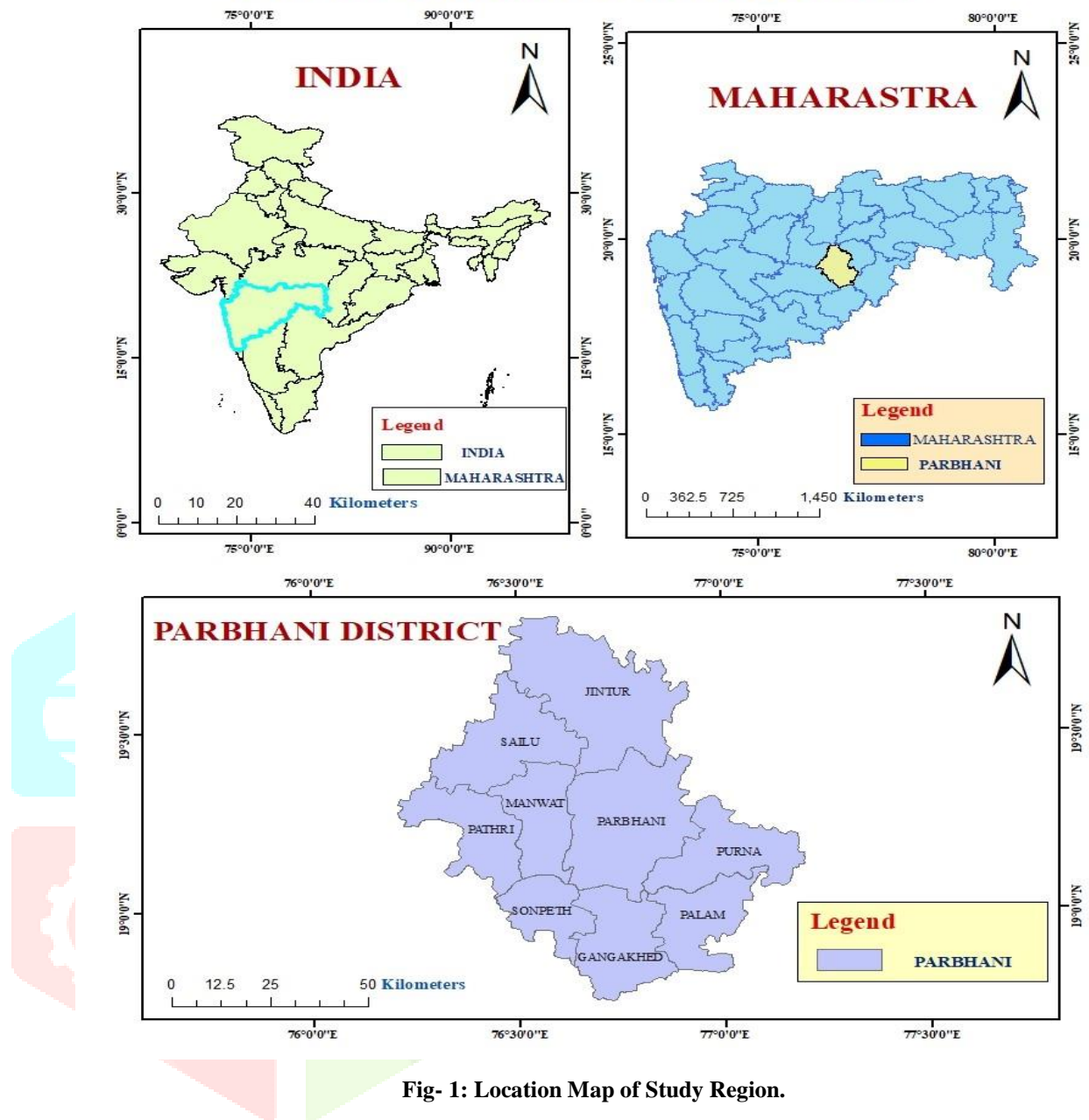


Fig- 1: Location Map of Study Region.

The district as a whole belongs to the Godavari peninsular drainage. The direct drainage of the Godavari is a narrow belt of about 16.09 kms, with on either side. The Jintur range is water divided between this drainage and that of the southern tributaries of Godavari. The north-western and central portion of the district is drained by the Purna and its tributaries and Kapra and Dudhana. Purna then flows almost due south for about 24.13 km. before its junction at kareshwar with the Godavari. The Godavari, with its entrenched and meandering course flows through the district to enrich its economic resources. The river drainage the district from east to west for about 152.90 km. from Pathari, Sonpeth, Gangakhed, Parbhani, Palam and Purna and then enters in Nanded district. This district is home to trees such as Neem, Teak, Acacia, Dhavada, and Haldu. Mango, Chinch, Bor, Amla, Peru, Locust, and Custard apple trees can also be found in the Parbhani district.

OBJECTIVES:

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

MATERIAL AND METHODS:

1. **Data-** The data a set for present study is covering 15 years at Parbhani 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.

RESULT AND DISCUSSION:

The agriculture sector is the backbone of the Parbhani district's economy. The district grows a variety of crops. Maize is a major crop in these areas. It was obtained in 3 seasons, and the relationship between region and rainfall throughout the period of study was investigated. Maize is a common crop in the United States. After the maize crop is harvested, it is used in maize-based economy for a variety of purposes, including food and crop feed. As a result, maize is widely used in the crop district as fodder, food and animal feed.

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

Years	Kharif area	Rabbi area	Summer area	Total annual area	Season	Southwest monsoon	Post Monsoon and winter Rainfall	Summer	Sum annual rainfall
					Year				
2000-01	1400	500	400	2300	2000	699.1	112.1	12.3	823.5
2001-02	1300	500	300	2100	2001	897.1	422.5	0	1319.6
2002-03	1300	600	200	2100	2002	844.9	99.8	46.5	991.2
2003-04	1600	400	100	2100	2003	824.8	47	22	893.8
2004-05	1700	600	0	2300	2004	546.3	91.5	0	637.8
2005-06	1200	500	300	2000	2005	1459.7	220	83.2	1762.9
2006-07	1700	800	300	2800	2006	1058.1	52.5	93.4	1204
2007-08	1500	800	200	2500	2007	944.4	0	0	944.4
2008-09	1500	900	200	2600	2008	492.5	30	2	524.5
2009-10	1400	900	0	2300	2009	405	96	20	521
2010-11	1400	400	800	2900	2010	930.9	80.7	0	1011.6
2011-12	1900	800	200	2900	2011	524.9	9.5	33.4	567.8
2012-13	1900	400	1800	4100	2012	559	36.2	0	595.2
2013-14	1900	200	800	2900	2013	696.5	73.2	0	769.7
2014-15	1500	00	400	1900	2014	302	29.4	66.1	397.5

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

Rainfall and Maize Crop:

In the Parbhani district, monsoon rainfall is the principal source of water for agriculture. As a result, after the monsoon season, ground water storage and ground water on varied terrains meet the water requirement for agriculture. Kharif crops are harvested during the monsoon, although irrigation must be used if the monsoon fails. Throughout the rabbi and summer, return irrigation and premature rains, as well as irrigation, are employed to harvest the crops. According to studies conducted from 2000-01 to 2014-15, rainfall has an impact on maize crops. There is a lot of maize planted when there is a lot of rain. The area under maize crops reduces when rainfall is limited. That is, there appears to be a link between rainfall as well as the area planted with maize.

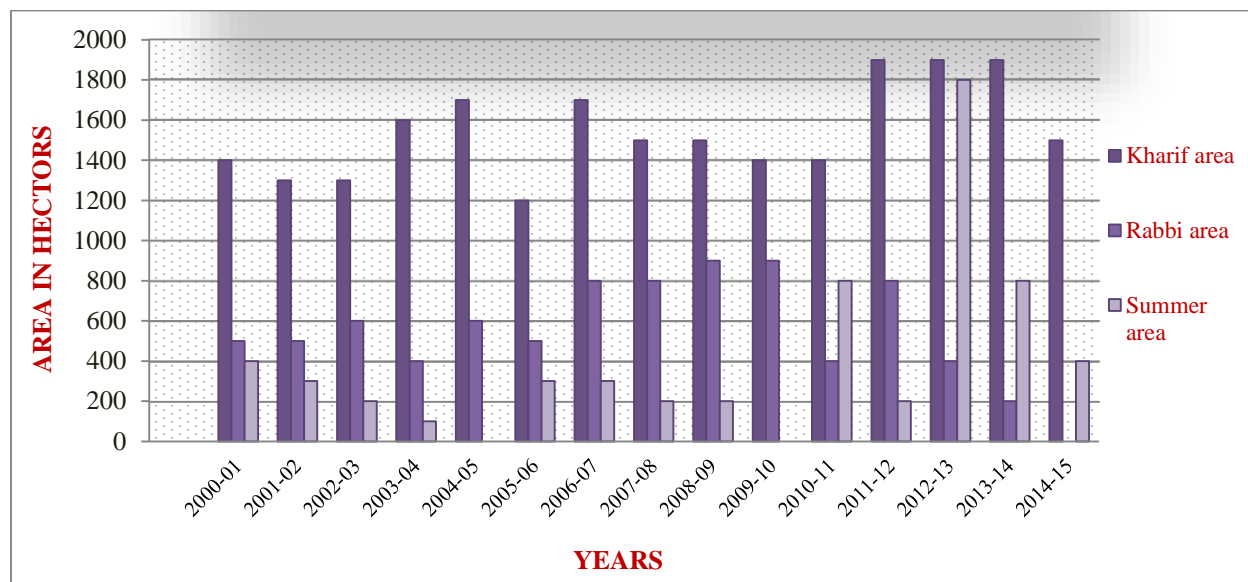


Fig. 2: Final estimates of area in hectares of maize crop during 2000-01 to 2014-15 in Parbhani district (M.S).

Rainfall and the area planted with maize- Table 1 illustrates the seasonal and yearly rainfall in the study area, while tables 2 and 2 provide the seasonal and annual area under maize cultivation, respectively. During the study period of 2000-2014, rainfall during the monsoon season was observed, with the greatest rainfall during the southwest monsoon being 1459.7 mm in the year 2005. With 302 mm of rain, the year 2014 was the driest of the period (Figure 4). During the same time period, the maximum area under maize cultivation was 1900 hectares in 2011-12, 2012-13, and 2013-14. The area under the lowest maize crop is 1200 hectares in 2005-06.

During the study period, rainfall in the southwest monsoon increased or decreased every year. Also, the area of maize crop is seen more or less in every year, the highest 1900 hectare area is visible in the study period in 2012, 2013 and 2014. Therefore, in the Pearson correlation test, the rainfalls in the southwest monsoon season and the area under kharif crop of correlation have been positive 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 seen to correlation.

During the rabbis' seasons of 2008-09 and 2009-10, the largest area under maize cultivation was 900 hectares, while the lowest was 200 hectares in 2013-14. During the research period, the northeast monsoon and winter rainfall are scarce and irregular. In the Rabi season, irregularities are also developing in the maize crop area. The area under north - east monsoon and winter rainfall, as well as maize crop, exhibit negative 0.204 (p-value 0.465) associations in the Pearson correlation test.

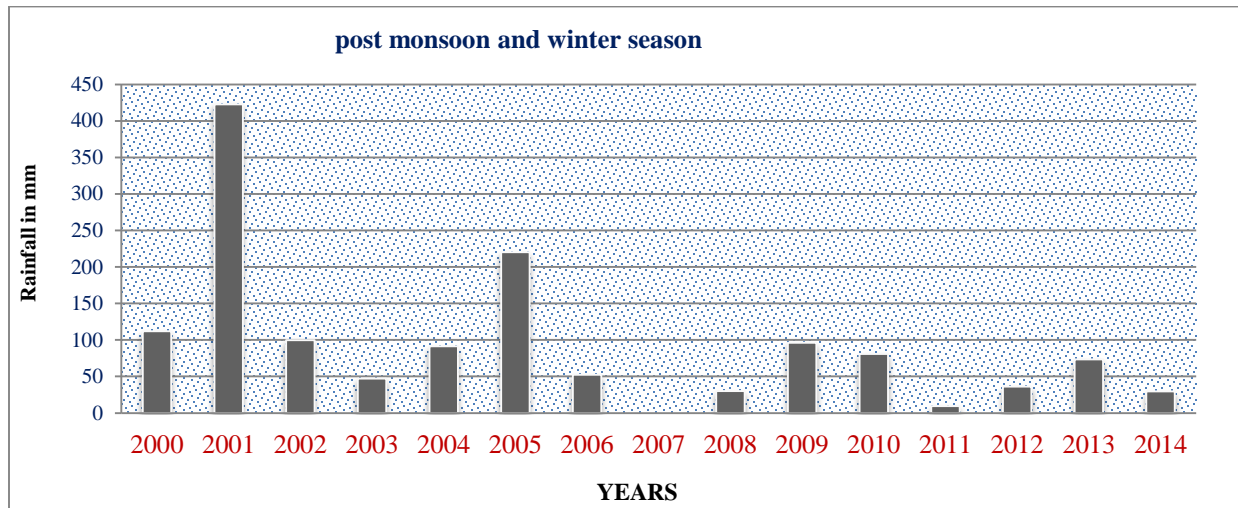


Fig. - 3: North East monsoon season and winter rainfall in mm (2000 to 2014) of Parbhani district.

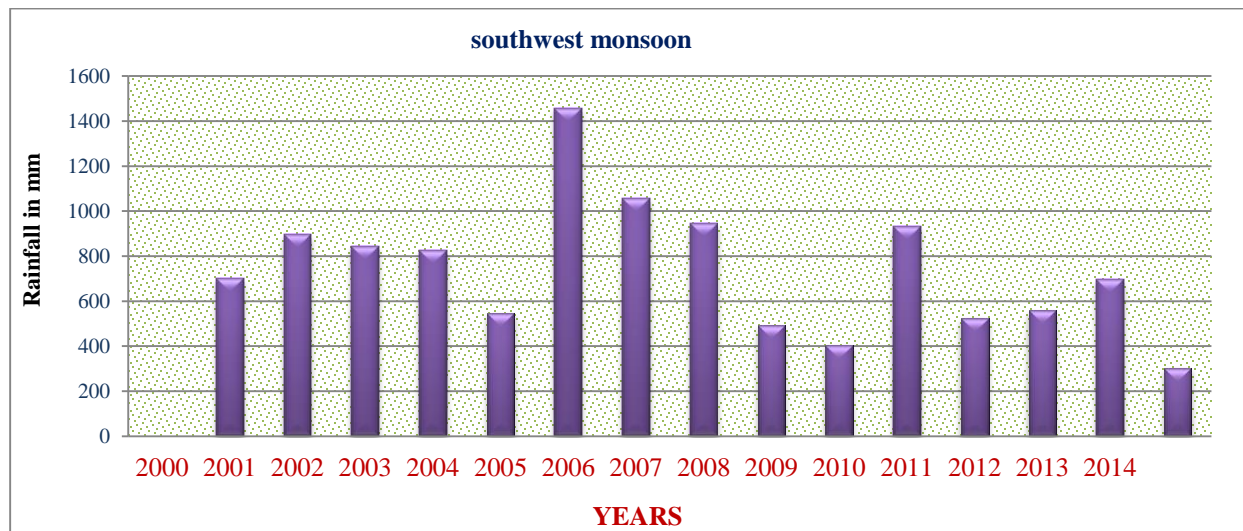


Fig.-4: South west monsoon season rainfall in mm (2000 to 2014) of Parbhani district.

The area under maize crop is highest in summer in 1800 hectares in 2012-13, lowest in 200 hectares in 2002-03, 2008-09, 2007-08, and 2011-12. Hence the figures for 2004-05 and 2009-10 are not available. In summer, maize is cultivated on irrigation. In the Pearson correlation test, there are positive 0.062 (p-value 0.826) correlations between summer rainfall and area under maize crop.

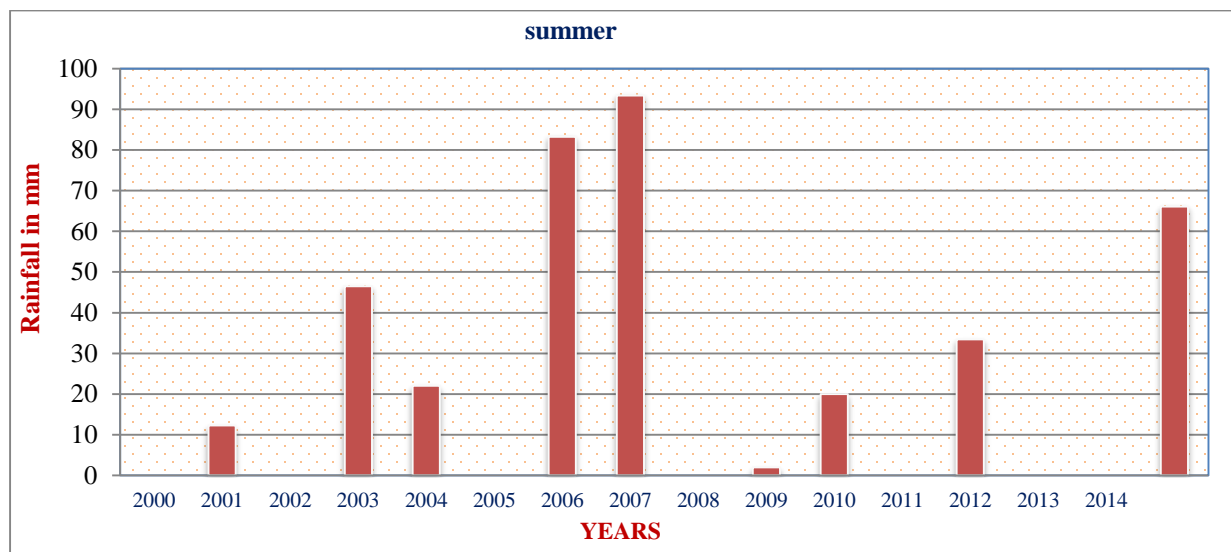


Fig.-5: Summer season rainfall in mm (2000 to 2014) of Parbhani district.

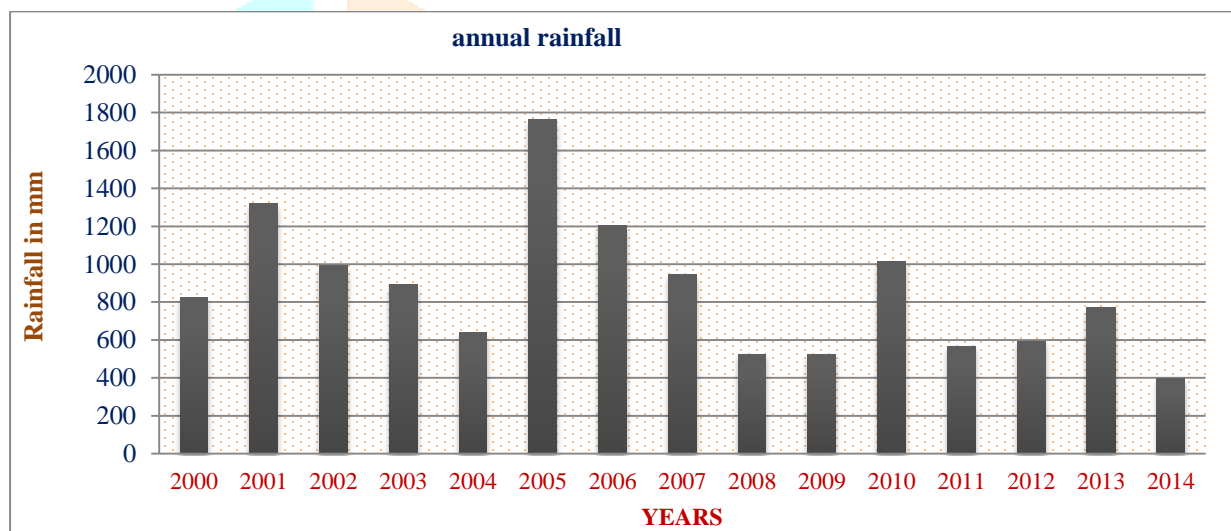


Fig.-6: Annual rainfall in mm (2000 to 2014) of Parbhani district.

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).

CONCLUSION:

The purpose of this study is to evaluate rainfall on a monthly and seasonal basis, as well as its link with maize crop productivity in the Parbhani district. In the Parbhani district, this study gives essential information for understanding seasonal and yearly rainfall variation, as well as the area under maize crop relationship. Rainfall has a different influence on the area under this crop according on the season and year. The amount of rain that falls during the rabbi and summer seasons, as well as the area planted in maize, varies. The southwest monsoon and yearly rainfall distribution patterns are similar. Rainfall has a little effect on the area under maize crops,

according to our findings. During the study period of kharif, one and two years of exemption were granted, and the annual area under maize cultivation continued to rise throughout the study period.

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