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Assessment of annual and monthly variation of rainfall and rainy days in Ahmednagar district

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Abstract
In this research work, the monsoon conditions of Ahmednagar district were studied. Rainfall data for all tehsils in the district was collected from respective stations. This long term rainfall data was used to asses rainfall and rainy days condition of Ahmednagar district. The daily rainfall data was used as input file for Weather cock-15 software which was used to analyze rainfall pattern of this region. The result of this study indicates that, the mean annual rainfall for Ahmednagar district was 562.69 mm. which was received during 34 mean rainy days. The Maximum monthly rainfall for Ahmednagar district was observed in September and minimum monthly rainfall observed in month of February.

Keywords: Rainfall, annual, monthly, rainy days

1. Introduction
In a developing country like India, most of the people depend upon primary activities like agriculture and its allied businesses for their livelihood. Agriculture contributes around 16 percent of its total gross domestic product. India gets around 70 percent of its annual rainfall during the monsoon season, which is one of the most important phenomena and the only source of water through precipitation for Indian agriculture. A good monsoon brings economic prosperity for the whole country and boosts the Indian economy. In a sense, it is the "true finance minister" of the Indian economy. The Indian peninsula receives rainfall from two types of monsoons: the south-west monsoon and the north-east monsoon; however, the south-west monsoon receives the majority of the rainfall for agricultural purposes. The south-west monsoon arrives in the Indian peninsula in May over the south Andaman Sea, then moves to the Indian subcontinent, first in Kerala and then elsewhere, and departs India on December 15. The total period of monsoon in India shows variations from 122 days in Kerala to 45 days in the western part of Rajasthan. But every year it might not appear on time and show a delay. which greatly affects the agriculture schedule of farmers in India.
According to India stat net irrigated area in country is goes on increasing day by day which is about 64.7 million hectares because of various government schemes like Pradhan Mantri Krishi sanchayee yojana and Per drop more crop etc. Even though most of the area in the southern scarcity region of India depends on monsoon rain to grow crops, in case of Maharashtra 80 per cent cultivable area is still rainfed. In this research work, the monsoon conditions of Ahmednagar district are studied. Rainfall data for 14 tehsils in the district was collected from respective stations. 61 years of rainfall data from 1961 to 2021 is available for 12 tehsils named Ahmedngar, Akole, Jamkhed, Karjat, Kopergaon, Newasa, Parner, Pathardi, Rahuri, Sangamner, Shrigonda, and Shrirampur, and 24 years of rainfall data from 1998 to 2021 is available for the two remaining tehsils named Rahata and Shevgaon. The rainfall throughout the Ahmednagar district is not uniformly distributed.
As According to NARP (National Agriculture Research Project), Ahmednagar district falls under the western Maharashtra scarcity zone, where rainfall is low which is main hinderance in crop production along with-it variation in distribution, long dry spell, early withdrawal, late onset like aberrant weather conditions can be seen which causes water stress in plants and ultimately yield losses. So, there is a need to study the frequency of occurrence of these contingency events so that a suitable cropping pattern can be suggested to the farmers of this region for sustainable production and to reduce crop losses as much as possible.

2. Materials and Methods

2.1 Study Area

Ahmednagar District is a district of Maharashtra state in west-central India. It is situated between the latitude 19º09'N and longitudinal of 74º74'East. It is bounded by Nashik and Aurangabad district to the North, Beed district to the East, Osmanabad and Solapur district to the South, Pune and Thane district to the West. There are 14 tehsils in Ahmednagar district *viz*, (1) Ahmednagar (2) Akole (3) Jamkhed (4) Karjat (5) Kopergaon (6) Newasa (7) Parner (8) Pathardi (9) Rahata (10) Rahuri (11) Sangamner (12) Shevgaon (13) Shrigonda and (14) Shrirampur.

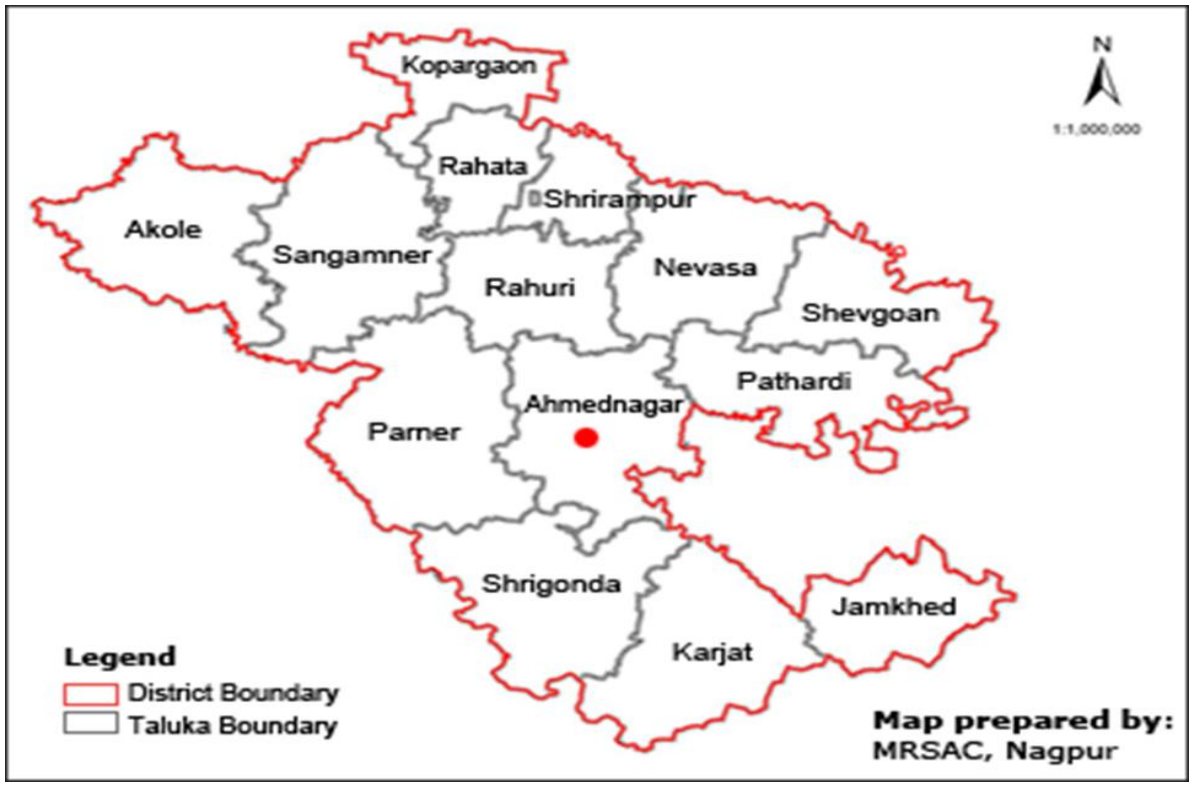

Fig 1: Map of Tehsils of Ahmednagar district

2.2 Climate and Rainfall

The climate of the Ahmednagar district is hot and dry. During the year there is little rainfall. The winter is pleasant from December to February. The summer season starts from mid-February to the end of May. June to September are the months of the rainy season. The district receives rain mostly from the South-West monsoons. The rainfall in the western part of the district near the Western Ghats is higher than in the rest of the district. The rainfall is comparatively less as we go from the Western Ghats to the eastern part of the district.

2.3 Data Acquisition

The daily rainfall data of all tahsils in Ahmednagar district was collected from

1. Department of Agricultural Meteorology, College of Agriculture, Pune
2. India Meteorological Department, Pune
3. Downloaded from www.maharain.gov.in (www.krishi.maharashtra.gov.in) from January to December. Rain gauges are located at the headquarters of tahsils.

Table 1: The location of rain gauge station, Geographical area, location and availability of data

Sr. No.	Name of tehsils	Geographical Area (Km^2)	latitude	longitude	Period of year	No. of years
1	Ahmednagar	1605.74	19.09ºN	73.74ºE	1961-2021	61
2	Akole	1505.08	19.85ºN	74.0ºE	1961-2021	61
3	Jamkhed	878.62	19.69ºN	73.56ºE	1961-2021	61
4	Karjat	1503.61	19.56ºN	73.32ºE	1961-2021	61
5	Kopergaon	725.16	20.08ºN	74.11ºE	1961-2021	61
6	Newasa	1343.43	20.04ºN	74.48ºE	1961-2021	61
7	Parner	1930.28	18.93ºN	73.92ºE	1961-2021	61
8	Pathardi	1214.1	20.20ºN	73.83ºE	1961-2021	61
9	Rahata	759.19	20.32ºN	74.25ºE	1998-2021	24
10	Rahuri	1035.11	20.58ºN	74.22ºE	1961-2021	61
11	Sangamner	1705.06	20.46ºN	74.18ºE	1961-2021	61
12	Shevgaon	1031.85	20.47ºN	74.02ºE	1998-2021	24
13	Shrigonda	1605.61	20.54ºN	74.32ºE	1961-2021	61
14	Shrirampur	569.87	20.30ºN	74.65ºE	1961-2021	61

2.4 Software Used for Study
Microsoft office sub-module Microsoft-Excel-2010 is used for data analysis. The formulation and conditional statements were also executed in MS-excel. The Weather Cock-15 software developed by CRIDA, Hyderabad is used for the analysis of annual, seasonal, monthly and weekly rainfall, mean, standard deviation, coefficient of variation of rainfall.

2.5 Statistical Characteristics of Climatological Data and methodology
The statistical behaviour or characteristics of series of any climatological variables can be described on the basis of several parameters. These parameters are mean, standard deviation, coefficient of variation. All these parameters were used to describe the variability of climatological variables (rainfall) in this study. The statistical characteristics of rainfall of stations will be determined on a weekly, monthly, seasonal and annual basis. *Viz* Ahmednagar, Akole, Jamkhed, Karjat, Kopergaon, Newasa, Parner, Pathardi, Rahata, Rahuri, Sangamner, Shevgaon, Shrigonda and Shrirampur. (www.maharain.gov.in).

2.5.1 Mean
Mean represents the measure of central tendency. It is the average of given values and given by,

$$X = \frac{\sum_{(i=1)}^{n} Xi}{n} \quad \ldots (3.1)$$

Where,
X = Mean
i = Variables
n = Total number of variables

2.5.2 Standard Deviation
Standard deviation is the best measure of dispersion. It gives more weight to extreme items and less to those which are near the mean. It is defined as the positive square root of the arithmetic mean of the squares of the deviations of the given values from the arithmetic mean.

$$\sigma = \sqrt{\frac{(\Sigma x_i - x)^2}{n-1}} \quad \ldots (3.2)$$

Where,
σ = Standard deviation
X_i= Variables
X= Mean
n= Total number of variables

2.5.3 Coefficient of Variation
The coefficient of variation is the percentage of variation in the mean, the standard deviation being treated as the total variation in the mean. The coefficient of variation (CV) is a statistical measure of how the individual data points vary about the mean value.

$$CV = \frac{\sigma}{x} 100 \quad \ldots (3.3)$$

Where,
CV = Coefficient of variation
X = Mean
σ= Standard deviation
This measure is indicative of dependability of variable expressed in percentage. The threshold levels for CV for any interpretation are <25, <50, <100, <150 and <250 per cent for yearly, seasonal, monthly, weekly and daily rainfall respectively Manorama *et al.*, (2007) [7]. For this analysis daily rainfall data CSV file is used as input files to run in to Weather cock-15 software which gives result regarding Annual rainfall, monthly rainfall, annual rainy days and monthly rainy days.

3. Results and Discussion
3.1 Annual rainfall variation
The data with respect to annual rainfall in all tehsils of Ahmednagar district was used for studying rainfall variation. Table 2 gives data regarding the statistical analysis of annual rainfall. Table 2 showed that the average annual rainfall of Ahmednagar district was 562.69 mm. It was varied from 455.7 mm at Sangamner to 709.3 mm at Jamkhed. The highest standard deviation was observed at Akole (261.5 mm) with 39.98 per cent variation, whereas the lowest was observed at Sangamner (129.2 mm) with 28.35 per cent variation.

Table 2: Tehsil wise annual rainfall variation in Ahmednagar district

Tehsil	Maximum Rainfall		Minimum Rainfall		Mean Rainfall (mm)	S.D.	CV (%)
	Rainfall (mm)	Year	Rainfall (mm)	Year			
Ahmednagar District							
Ahmednagar	1077	1990	205.3	1972	593.31	196.97	33.2
Akole	1354	2004	205.3	1972	654.03	261.51	39.98
Jamkhed	1338.6	1983/1988	218	1972	709.31	248.17	34.99
Karjat	983	1998	224	1968	558.13	188.51	33.77
Kopergaon	801.1	2020	180.6	1972	467.15	134.23	28.73
Newasa	1134.5	2020	278	2003	550.44	161.59	29.36
Parner	852	2006	203	1972	518.79	160.48	30.93
Pathardi	1056	1998	179	1993	600.66	201.66	33.57
Rahata	926	2010	303.4	2018	534.41	161.01	30.13
Rahuri	1141.5	1974	145	1972	547.32	195.73	35.76
Sangamner	692	2010	114.5	1972	455.77	129.2	28.35
Shevgaon	1134.5	2020	276	2012	612.15	207	33.82
Shrigonda	955	1998	152	2003	528.73	171.3	32.4
Shrirampur	1289.5	1987	205.7	1972	547.48	208.26	38.04
District average					562.69	187.54	33.07

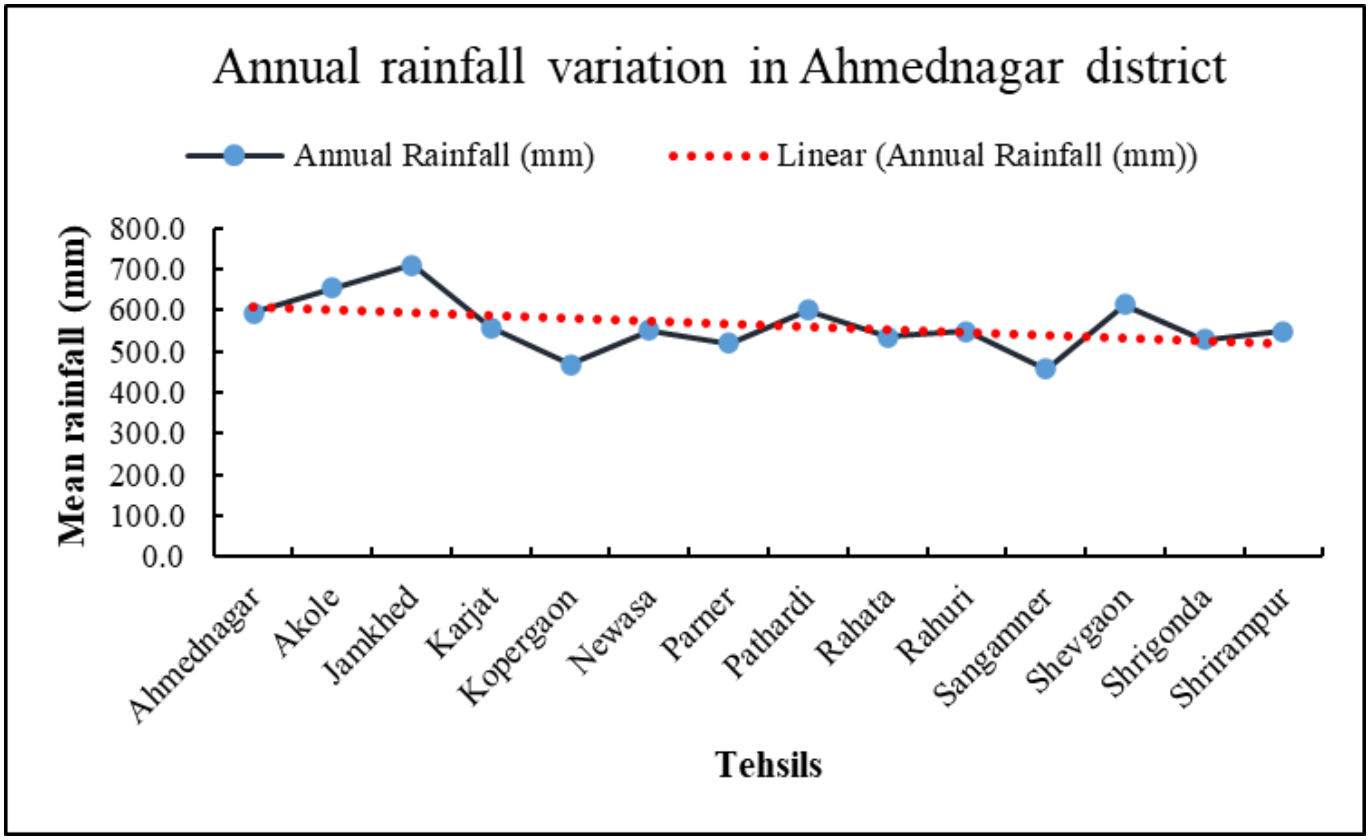

Fig 2: Tehsil wise annual rainfall variation in Ahmednagar district

3.2 Annual rainy days variation

By analyzing the distribution of annual rainfall, the number of rainy days acts as a good indicator. It will be useful for location-specific crop planning. When rainfall received in a day is more than 2.5 mm, it is called a rainy day. Table 3 displayed the analysis of the annual rainy days and their variability. For the calculation of the variation of rainy days, data regarding the annual rainy days for different years in the fourteen tehsils of Ahmednagar district was used. From Table 1, it was observed that the average annual rainfall of Ahmednagar district was 562.69 mm, which was received in 37 mean rainy days. The highest number of rainy days (83) was observed during 2021 in Akole tehsil and the lowest number of rainy days (8) was observed during 1993 in Rahuri tehsil (Table 3).

There was wide disparity among the tehsils with respect to number of rainy days during the period under study. The average number of rainy days ranged from 30 rainy days in Shrirampur to 40 rainy days in Akole. The highest standard deviation was 14.7 at Akole with 36.7 per cent variation whereas; the lowest was 8 at Sangamner tehsil with 25.6 per cent variation. All the above observations showed that the total number of rainy days varied across Ahmednagar district.

Table 3: Tehsil wise annual rainy days variation in Ahmednagar district

Tehsil	Maximum Rainy days		Minimum Rainy days		Mean Rainy Days	S.D.	C.V. (%)
	Rainy Days	Year	Rainy days	Year			
Ahmednagar District							
Ahmednagar	67	2020	12	1972	35	10.32	29.45
Akole	83	2021	12	1972	40	14.71	36.75
Jamkhed	71	2021	11	1972	39	10.8	27.64
Karjat	59	2020	16	1968/2003/2012	33	9.68	28.93
Kopergaon	64	2020	11	1993	31	9.16	29.56
Newasa	64	2020	21	1982/2002	33	8.66	26.28
Parner	62	2020	14	1987	35	10.15	29.02
Pathardi	64	2020/21	11	1993	34	9.9	29.34
Rahata	57	2020	18	2002/2018	32	10.25	31.62
Rahuri	64	2020	8	1993	30	9.84	33.09
Sangamner	55	2021	13	1972	31	8.06	25.68
Shevgaon	64	2020	17	2018	34	12.1	35.17
Shrigonda	58	2020	13	2003	33	9.1	27.62
Srirampur	64	2020	13	1972	30	8.78	28.87
Average	64		13.6		34	10.1	29.9

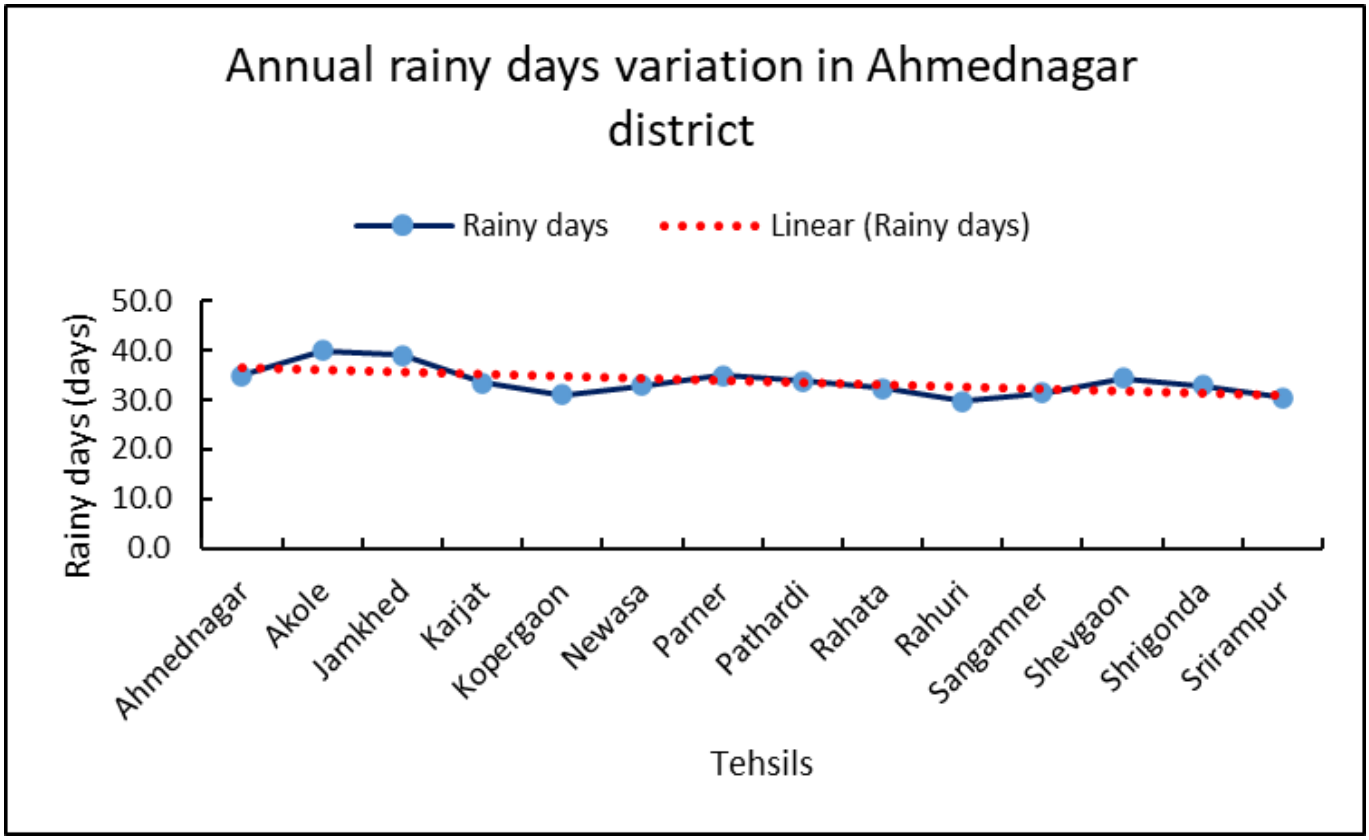

Fig 3: Tehsil wise annual rainy days variation in Ahmednagar district

3.3 Monthly rainfall variation

The data regarding the statistical analysis of rainfall in the Ahmednagar district was presented in Table 4. It showed that the mean annual rainfall of Ahmednagar district was 562.69 mm, in which the September month contributed the highest amount of mean rainfall, with 143.2 mm, with a 68.5 percent variation and the lowest amount of mean rainfall is observed in the month of February, one mm with 506.3 per cent variation. From the coefficient of variation, which was given in Table 4, we can conclude that the rainfall from June to October showed less variation as compared to the rainfall received during the rest of the month. The variation in average monthly rainfall was in the range of 66 per cent to 506.3 per cent in July and February months, respectively. In all the tehsils of Ahmednagar district, it was observed that tehsils received more rainfall in the month of September. The highest monthly rainfall was observed at Jamkhed (188.5 mm) in the month of September followed by Ahmednagar, Shevgaon, Pathardi, Rahuri, Shrigonda, Shrirampur, Sangamner, Rahata, Parner, Newasa, Kopergaon, Karjat, and Akole respectively.

In a given study period, the lowest rainfall was received in the month of February for all tehsils. As compared to other months, Rahuri received the highest rainfall (3.0 mm) with a 502.7 per cent variation in the month of February and Rahata tehsils received the lowest (0.2 mm) of rainfall with a 372.1 per cent variation.

3.4 Monthly rainy days variation

The statistical analysis of the monthly rainy days in Ahmednagar district was presented in Table 5. It represented that the mean annual rainy days of Ahmednagar district was 33.7 days in which September month contributes the highest amount of mean rainy days (eight days) with 22.5 per cent variation and lowest number of mean rainy days in the month of February 0.2 day with 486.1 per cent variation. The average monthly rainy days variation was in the range of 51.6 per cent to 486.1 per cent in July and February months, respectively. In all the tehsils of Ahmednagar district, it was observed that tehsils received more rainy days in the month of September. The highest monthly rainy days was observed at Jamkhed (8.8 days) in the month of September.

Monthly variability in rainy days of different tehsils was observed as, Jamkhed, Ahmednagar, Shevgaon, Pathardi, Parner, Karjat, Akole, Newasa, Shrigonda, Rahuri, Rahata, Sangamner, Kopergaon and Shrirampur tehsils received the highest number of rainy days in the month of September. The lowest rainfall was received in the month of February for all tehsils in the study period

Table 4: Tehsil wise monthly rainfall (mm) variation in Ahmednagar district

Tehsil Name	Parameter	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Ahmednagar	Mean	0.4	2.2	4.2	3.9	15.2	115.1	90.7	94.5	172.1	70.6	16.6	7.8
	S.D.	1.2	14.4	8.8	9.5	27.5	93.3	59.1	66.3	110.0	77.0	32.3	25.3
	C.V.	347.2	661.2	208.0	242.7	180.6	81.0	65.2	70.1	63.9	109.1	194.3	323.1
Akole	Mean	1.4	1.1	2.8	4.2	20.1	107.1	161.2	124.4	139.1	63.1	24.1	5.5
	S.D.	7.0	7.7	10.1	12.4	48.3	87.3	111.0	96.6	90.6	66.4	54.7	19.5
	C.V.	496.6	725.8	367.3	291.8	240.4	81.5	68.8	77.7	65.1	105.3	226.9	356.2
Jamkhed	Mean	0.3	1.3	1.8	3.7	26.0	124.3	125.3	134.7	188.5	75.1	23.4	5.1
	S.D.	1.5	5.8	6.1	8.2	71.8	79.9	77.5	92.2	158.1	63.5	54.6	19.7
	C.V.	485.9	453.2	340.0	222.7	276.5	64.3	61.8	68.5	83.9	84.6	233.3	382.5
Karjat	Mean	0.8	0.7	4.2	5.2	16.2	100.7	95.6	84.3	145.6	82.7	17.0	5.1
	S.D.	2.9	2.2	10.1	11.5	29.0	80.0	70.5	67.2	102.5	68.0	34.0	17.5
	C.V.	359.6	292.2	241.1	219.2	178.7	79.5	73.7	79.7	70.4	82.2	200.7	343.4
Kopergaon	Mean	0.5	0.4	5.3	2.8	9.9	87.4	91.4	77.7	112.6	58.9	15.8	4.5
	S.D.	1.8	1.6	22.9	11.9	20.4	56.6	57.8	55.6	82.8	56.4	30.7	15.7
	C.V.	374.8	401.4	435.3	431.2	205.9	64.7	63.3	71.6	73.5	95.8	193.9	349.7
Newasa	Mean	1.2	0.3	2.8	2.2	13.4	102.4	101.8	101.3	139.9	63.5	16.1	5.7
	S.D.	4.5	1.6	7.6	8.3	27.5	62.3	67.5	72.5	93.8	64.4	32.9	20.0
	C.V.	386.6	545.3	271.6	386.9	206.3	60.8	66.3	71.5	67.1	101.4	204.2	352.2
Parner	Mean	0.5	0.5	1.1	3.0	17.8	101.6	86.8	78	130.3	68.8	22.5	7.9
	S.D.	1.8	3.2	5.5	6.9	31.5	68.2	50.5	61.5	85.3	52.9	38.1	23.3
	C.V.	348.3	694.3	492.0	229	176.6	67.1	58.2	78.8	65.4	77.0	169.2	294.2
Pathardi	Mean	2.2	1.7	2.3	4.5	13.7	110.1	106.5	105.0	155.9	76.7	18.3	3.7
	S.D.	7.8	5.7	9.5	10.2	24.3	68.3	70.7	79.0	118.3	78.8	34.2	17.6
	C.V.	355.6	339.4	407.1	226.6	177.1	62	66.3	75.2	75.9	102.6	186.8	479.8
Rahata	Mean	1.6	0.2	3.5	0.1	8.9	122.3	83.7	104.3	135.3	57.4	16.2	1.0
	S.D.	4.3	0.7	16.0	0.6	17.9	76.3	47.8	53.6	78.4	51.4	33.4	4.0
	C.V.	279.5	372.1	457.9	411.2	201.9	62.4	57.1	51.4	58.0	89.5	206.6	409.5
Rahuri	Mean	0.9	3.0	2.1	3.6	10.6	101.2	97.6	85.0	153.2	71.1	15.5	3.5
	S.D.	4.2	15.2	8.0	8.6	20.7	76.1	65.4	70.6	114.5	84.2	34.9	9.3
	C.V.	447.4	502.7	372.5	239.2	195.4	75.1	67.0	83.1	74.8	118.4	225.8	262.9
Sangamner	Mean	1.8	1.4	2.2	3.1	12.3	86.1	75.5	75.2	115.9	55.2	24.2	3.1
	S.D.	7.7	7.8	10.5	8.7	25.4	68.8	44.8	51.1	67.9	49.5	37.7	8.6
	C.V.	433.9	580.4	469.7	281.8	207.0	79.9	59.4	68.0	58.6	89.7	155.9	273.8
Shevgaon	Mean	0.9	0.6	4.9	2.3	9.7	117.5	102.6	120.8	160.5	81.1	10.7	0.7
	S.D.	3.6	2.3	12.8	5.5	21.2	62.8	77.3	84.3	87.3	64.6	22.9	2.4
	C.V.	379.2	374.3	262.7	244.0	218.9	53.5	75.4	69.8	54.4	79.7	213.9	329.5
Shrigonda	Mean	2.2	0.3	1.5	3.7	21.1	103.0	75.5	70.0	147.2	83.3	16.9	4.0
	S.D.	10.4	1.3	5.9	9.0	30.3	64.5	54.4	57.0	109.2	68.9	30.9	12.4
	C.V.	468.8	407.9	407.9	239.5	143.8	62.6	72.1	81.5	74.2	82.7	183.0	307.5
Shrirampur	Mean	0.9	1.8	4.6	0.5	13.8	108.8	102.6	106.1	112.3	68.7	23.3	4.1
	S.D.	2.5	13.6	17.9	1.8	26.6	96.0	70.6	86.7	83.1	77.0	62.7	11.7
	C.V.	267.5	737.8	393.3	381.5	193.3	88.2	68.8	81.8	74.0	112.1	269.0	283.9
Ahmednagar District	Mean	1.1	1.0	3.1	3.0	14.8	106.0	99.9	97.5	143.2	69.3	18.4	4.5
	S.D.	4.4	5.9	10.8	8.1	30.2	74.3	66.1	71.0	98.7	65.9	38.1	14.8
	C.V.	387.9	506.3	366.2	289.1	200.2	70.2	66.0	73.5	68.5	95.0	204.5	339.2

Table 5: Tehsil wise monthly rainy days variation in Ahmednagar district

Tehsil Name	Para meter	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Ahmednagar	Mean	0.0	0.1	0.4	0.4	1.0	7.1	6.3	5.9	8.4	4.0	1.1	0.4
	S.D.	0.2	0.4	0.7	0.9	2.0	3.5	3.5	3.0	4.3	3.3	1.7	1.1
	C.V.	547.7	461.6	182.8	216.1	195.5	49.7	55.2	51.8	51.2	81.1	160.6	308.1
Akole	Mean	0.2	0.0	0.2	0.3	0.8	6.2	10.6	8.8	7.7	3.8	1.2	0.3
	S.D.	0.8	0.1	0.6	0.8	1.6	4.0	6.3	5.6	3.8	3.1	1.8	1.0
	C.V.	500.3	781.0	290.8	253.5	191.0	64.5	59.0	63.6	49.2	82.0	157.4	329.4
Jamkhed	Mean	0.1	0.1	0.1	0.4	1.2	7.1	7.8	7.4	8.8	4.5	1.2	0.3
	S.D.	0.3	0.4	0.5	0.9	2.1	3.2	3.8	3.6	3.9	3.3	2.1	1.1
	C.V.	578.3	357.3	354.3	224.4	176.9	44.7	49.0	48.5	44.5	74.1	176.7	317.7
Karjat	Mean	0.1	0.1	0.3	0.4	1.3	5.8	6.2	5.6	7.8	4.5	1.0	0.3
	S.D.	0.3	0.4	0.6	0.9	2.0	3.2	3.1	3.5	4.4	3.1	1.6	0.9
	C.V.	380.6	325.8	228.2	191.4	157.1	56.2	50.5	61.8	56.1	68.7	161.3	290.4
Kopergaon	Mean	0.1	0.1	0.3	0.3	0.7	5.4	7.3	5.8	6.6	3.3	0.9	0.3
	S.D.	0.3	0.4	1.1	1.4	1.3	3.0	3.4	3.1	4.0	2.5	1.5	0.7
	C.V.	337.4	512.6	399.2	516.4	198.6	55.3	45.8	52.7	60.6	77.3	166.7	242.4
Newasa	Mean	0.1	0.0	0.3	0.2	0.8	6.4	6.5	6.3	7.5	3.4	1.1	0.4

	S.D.	0.5	0.2	0.6	0.5	1.7	3.0	3.8	3.2	4.1	2.8	1.6	1.3
	C.V.	405.3	547.7	228.2	367.8	213.0	46.2	57.8	50.5	54.3	82.9	147.5	313.2
Parner	Mean	0.1	0.0	0.1	0.3	1.3	6.5	7.2	5.8	7.8	4.3	1.3	0.4
	S.D.	0.3	0.1	0.5	0.5	2.2	3.2	3.5	3.4	4.1	3.1	2.1	1.0
	C.V.	404.3	781.0	392.9	195.7	174.4	48.6	48.6	58.5	53.2	71.1	160.3	270.3
Pathardi	Mean	0.2	0.2	0.2	0.6	1.0	6.4	6.6	6.2	7.9	3.5	1.0	0.2
	S.D.	0.7	0.4	0.5	1.0	1.6	3.0	3.2	3.4	4.4	3.0	1.6	0.7
	C.V.	291.1	298.9	323.5	175.6	170.1	46.7	47.9	54.9	55.5	84.7	165.5	310.3
Rahata	Mean	0.3	0.0	0.2	0.0	0.4	7.0	7.0	6.2	7.0	3.4	0.9	0.1
	S.D.	0.7	0.2	0.6	0.0	0.7	3.8	3.4	2.3	3.3	2.6	1.7	0.3
	C.V.	270.3	489.9	382.2	0.0	172.5	53.7	49.1	37.6	46.9	75.7	190.1	338.8
Rahuri	Mean	0.1	0.1	0.2	0.3	0.8	5.3	5.6	4.9	7.4	3.7	1.0	0.3
	S.D.	0.4	0.4	0.5	0.6	1.6	3.0	2.9	2.9	4.1	2.7	1.8	1.0
	C.V.	402.6	322.1	295.3	217.4	195.5	56.3	51.5	58.5	55.1	72.5	193.4	298.4
Sangamner	Mean	0.2	0.1	0.2	0.3	0.8	5.6	6.3	5.6	7.0	3.6	1.5	0.3
	S.D.	0.9	0.3	0.5	0.6	1.8	3.0	2.8	2.7	3.6	2.7	2.1	0.6
	C.V.	480.3	380.6	318.5	229.8	213.1	53.3	44.3	48.6	50.8	73.4	138.4	242.4
Shevgaon	Mean	0.1	0.0	0.3	0.3	0.5	6.6	6.9	6.3	8.3	4.3	0.7	0.1
	S.D.	0.5	0.2	0.8	0.7	0.9	3.3	4.5	2.8	3.9	3.2	1.3	0.3
	C.V.	358.7	489.9	257.4	270.3	192.8	49.1	65.5	44.3	46.6	74.2	188.4	338.8
Shrigonda	Mean	0.1	0.1	0.2	0.3	1.3	6.0	6.1	5.3	7.5	4.8	1.1	0.2
	S.D.	0.5	0.2	0.5	0.7	1.8	3.2	3.2	2.9	4.3	3.1	1.9	0.6
	C.V.	354.3	443.4	298.4	198.6	134.4	52.6	52.5	54.1	57.9	64.1	169.7	312.2
Shrirampur	Mean	0.2	0.1	0.2	0.1	0.9	6.1	6.5	5.9	6.2	3.0	1.0	0.4
	S.D.	0.4	0.4	0.6	0.3	1.9	3.1	3.0	3.3	3.9	2.4	1.6	0.9
	C.V.	253.5	614.4	298.2	471.6	203.1	50.1	45.8	55.7	63.7	81.1	162.3	253.3
Ahmednagar District	Mean	0.1	0.1	0.2	0.3	0.9	6.3	6.9	6.1	7.6	3.9	1.1	0.3
	S.D.	0.5	0.3	0.6	0.7	1.6	3.2	3.6	3.3	4.0	2.9	1.8	0.8
	C.V.	397.5	486.1	303.6	252.0	184.8	51.9	51.6	52.9	53.3	75.9	167.0	297.5

4. Conclusions

The mean annual rainfall for Ahmednagar district was 562.69 mm. It showed variations from 455.7 mm at Sangamner to 709.3 mm at Jamkhed. Akole tehsil showed the highest deviation, 261.5 mm, with 39.98 per cent variation, whereas the lowest was observed at Sangamner, 129.2 mm, with 28.35 per cent variation**.** Ahmednagar district receives its average rainfall in 34 mean rainy days. where the highest rainy days (83) were observed in Akole tehsil in 2021 with 36.75 per cent variation and the lowest (8) in Rahuri tehsil with 33.09 per cent variation.

Maximum monthly rainfall for Ahmednagar district was observed in September which contribute mean rainfall 143.2 mm with 68.5 per cent variation and average mean annual rainy days was 33.7 from which September contributes the most with (8 days) with 22.5 per cent variation and minimum monthly rainfall observed in month of February.

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