RESEARCH PAPER:

Rainfall distribution pattern in Aurad taluka of Bidar district (Karnataka)

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SUMMARY

Rainfall during monsoon season and its variability govern the cropping system in the Aurad region. Daily rainfall data of thirty four years (1976-2009) have been analyzed for establishing the long term averages of monthly, seasonal and annual rainfall and its variability. The over all mean annual rainfall at Aurad region was 846 mm, which was distributed as 673.7 mm, 101.6 mm, 60.2 mm and 10.7 mm in monsoon (June- September), post monsoon (October - December), summer (March - May) and winter (January - February), respectively. The coefficient of variation of 28.7 indicated that rainfall was more or less stable over the years. Monthly rainfall had unimodel peak, August received maximum mean rainfall of 212.3 mm followed by July (188.5 mm). The study also revealed that the rainfall and rainy days during monsoon season ranged from 386.4 to 1129.5 mm and 25 to 64 days, respectively.

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Agriculture being mainly rainfed in Aurad Taluka region of Bidar district, Karnataka state, India is characterized by uneven and erratic distribution of rainfall. Since rainfall is the only source of moisture, the spatio-temporal distribution of rains holds the key in determining the fate of entire crop productivity in the region. Knowledge of average monthly, seasonal and annual rainfall is helpful in understanding the general picture of the particular region.

Agriculture will be adversely affected by an increase or decrease amount of rainfall and shifting of time of rainfall. The annual and seasonal rainfall received and its variability directly influences the success or failure of crops through its beneficial or adverse effect their growth and yield. Therefore, the study of variability of annual and seasonal rainfall is essential in selection of suitable crops and to take appropriate mitigating measures based on rainfall characteristics. Aurad, the Taluka of Bidar district, Karnataka, India, is predominantly a rainfed region. South west monsoon is the predominant monsoon in the region. The agricultural crop productivity largely depends on the rainfall distribution and its intensity during the rainy season. Rainfall analysis for crop planning was carried out in different regions of the country as reported by Marviya *et al.* (1991), Karthikeyan *et al.* (2008) and Singh *et al.* (2009), Suchit and Singh (2009), Parvender *et al.* (2008). A similar attempt was made at Agriculture Research Station, Bidar, to analyze the rainfall distribution pattern in monthly, seasonally and annually for Aurad region.

MATERIALS AND METHODS

Daily rainfall data for the past 34 years (1976-2009) were collected from District Statistical Office, Bidar, for analysis. The rainfall data were critically examined for annual, seasonal and monthly values following the procedure of Panse and Sukhatme (1985). The standard deviation (SD) and coefficient of variance (CV) of rainfall were worked out for the above said periods.

RESULTS AND DISCUSSION

The daily rainfall data for the period from 1976 to 2009 were analyzed and the results were presented under different heads for mean, standard deviation (mm) and coefficient of variance (%) of annual and seasonal rainfall and the per cent of different seasonal rainfall *vis-à-vis* annual rainfall (Table 1). The highest and lowest rainfall (mm) recorded in annual and in different seasons was also presented as shown in Table 2. The coefficient of variability

Table : 1 Monthly mean, highest and lowest rainfall (mm) and rainy days along with SD and CV at Aurad (1976-2009)

Month	Rainfall						Rainy days				
	Lowest (mm)	Highest (mm)	Mean (mm)	S.D. (mm)	C.V. (%)	Per cent of annual RF	Lowest (mm)	Highest (mm)	Mean (mm)	S.D. (day/s)	C.V. (%)
January	0	75.8	8	16.2	202	0.9	0	2	0.6	0.7	116
February	0	29.4	2.7	5.9	218	0.4	0	3	0.4	0.6	150
March	0	67.8	12.0	21.2	176	1.5	0	4	0.8	1.1	137
April	0	50.0	15.0	13.2	88	1.7	0	4	1.6	1.2	75
May	0	198.5	33.3	46.2	138	3.9	0	12	2.5	2.6	104
June	20.4	285.3	122.8	65.7	53	14.5	2	15	7.8	2.9	37
July	40.5	492.1	188.5	105.1	55	22.3	3	18	10.5	3.4	32
August	45.7	498.5	212.3	115.6	54	25.0	4	20	11.2	3.7	33
September	12.0	427.0	150.3	105.6	70	17.8	2	19	8.4	4.4	52
October	0	225.8	76.8	61.7	80	9.0	0	10	4.5	2.8	62
November	0	161.0	18.6	33.9	182	2.2	0	6	1.3	1.4	107
December	0	34.8	6.3	13.6	215	0.8	0	4	0.5	0.9	180

Table 2: Characteristics of seasonal rainfall (mm) and rainy days at Aurad (1976-2009)

Year	Particulars	Lowest (mm)	Highest (mm)	Mean (mm)	S.D.	C.V. (%)	Per cent of annual rainfall
Annual	Rainfall	453.5	1337.7	846	243 mm	28.7	-
	Rainy days	30	69	49.4	9.2 days	18.6	-
Winter	Rainfall	0.0	75.8	10.7	18.1 mm	169.1	1.2
	Rainy days	0	4	0.8	1.1 days	137.5	-
Summer	Rainfall	3.0	198.5	60.2	46.9 mm	77.9	7.1
	Rainy days	1	12	4.8	2.8 days	58.3	-
Monsoon	Rainfall	386.4	1129.5	673.7	218.5 mm	32.4	79.6
	Rainy days	25	64	37.6	8.1 days	21.5	-
Post monsoon	Rainfall	3.2	279.2	101.6	66.0 mm	64.9	12.0
	Rainy days	1	13	6.2	2.9 days	46.7	-

Annual : January – December Winter : January – February Summer : March- May
Monsoon : June - September Post monsoon/north east monsoon : October - December
S.D. : Standard Deviation C.V. : Coefficient of variation

(CV) indicates the dependability or reliability on rainfall for any period. Lower values of CV indicate better reliability (Ramana Rao, 1988).

Monthly rainfall :

Rainfall quantum and distribution during different months have been shown in Fig. 1. It is evident that monthly rainfall had unimodal peak. August month received maximum mean rainfall of 212.3 mm distributed in 11 mean rainy days followed by July (188.5 mm) in 10 rainy days. Monthly rainfall during November to May remained lowest in the range of 2.7 to 33.3 mm. The highest rainfall of 498.5 mm was reported in the August month followed by July 492.1 mm. The highest coefficient

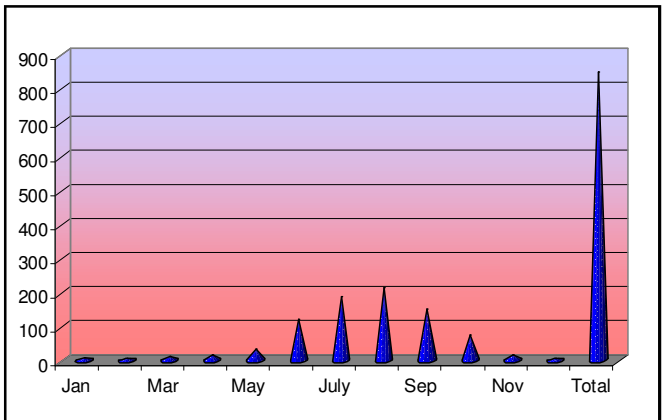

Fig. 1: Monthly average rainfall (mm) recorded at Aurad

of variation was noticed during the start of the year *i.e.* from January to May and November – December. The lowest coefficient of variation was confined to monsoon season indicate the dependability and reliability of rainfall during monsoon season (Table 1, Fig. 1 and 2).

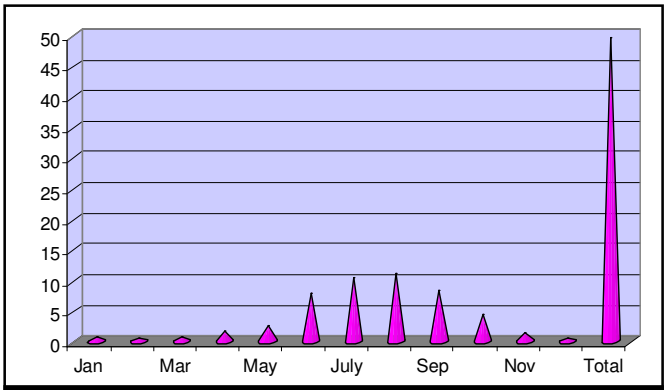

Fig. 2: Monthly average rainy days recorded at Aurad

Seasonal rainfall :

The average seasonal rainfall along with rainy days and its variability during the seasons winter (January – February), summer (March- May), Monsoon (June - September) and Post monsoon (October – December) are presented in Table 2 and Fig. 3 and 4. South west (SW) monsoon season contributed 79.6 per cent of mean annual rainfall. Rainfall during this period varied between 386.4 mm to 1129.5 mm with mean value of 673.7 mm. Mean number of rainy days during SW monsoon season was 37 days. Total amount of rainfall received during north east (NE) monsoon was 12.0 per cent of the mean annual rainfall. The mean rainfall during this period was 101.6 mm. Pre-monsoon season (March - May) contributed 7.1 per cent (60.2 mm) of the mean annual rainfall. The winter rainfall contributed 1.2 per cent (10.7 mm) to the mean annual rainfall (Table 2, Fig. 3 and 4).

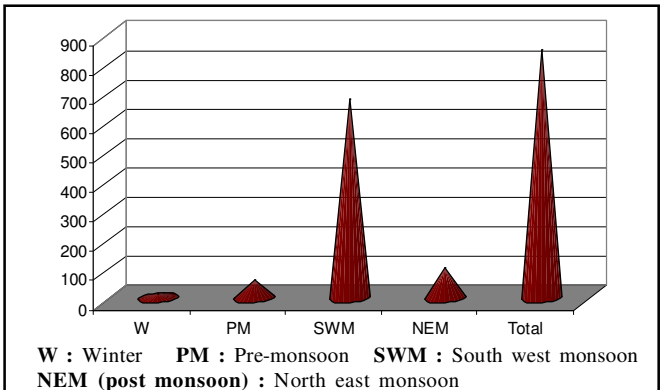

Fig. 3: Average season wise rainfall as observed at Aurad

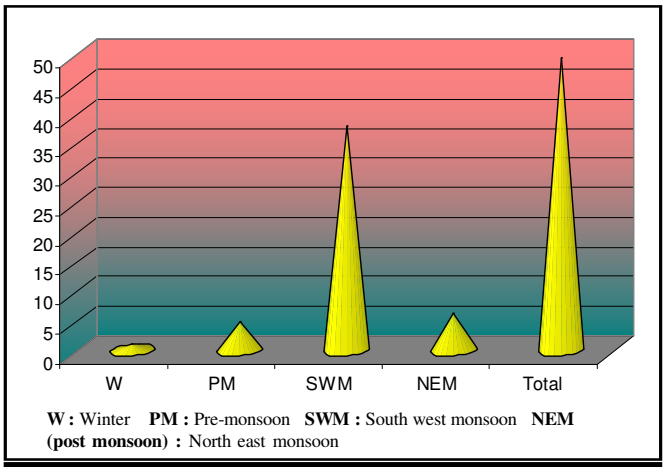

Fig. 4: Average season wise rainy days observed at Aurad

Annual rainfall :

The overall mean total annual rainfall of Aurad region for the past thirty four years (1976-2009) was 846.0 mm spread over 49 rainy days. The lowest and highest rainfall and rainy days recorded were 453.5 and 1337.7 and 30 and 69, respectively. The standard deviation and coefficient of variation for annual rainfall were 243 mm and 28.7 per cent where as for annual rainy days it was 9.2 days and 18.6 per cent, respectively (Table 2).

Crop planning:

Based on the above analysis, the following recommendations for the region could be made to increase the crop production per unit area under rainfed conditions. About 79.6 per cent of the total average annual rainfall coincided with the monsoon season and was received during a short time span of two to three months between June to September due to south-west monsoon in less number of rainy days. Rainfall received during summer (March-May) season can be utilized for summer ploughing to make the land ready for final field preparation. With normal onset of rainfall, sowing of main crop like pigeonpea + jowar or sole sunflower in shallow soils and pigeonpea + blackgram in medium and deep soils can be taken up. In the event of mid season drought, mulching will help in reducing soil evaporation and conserving moisture in top layers of the soil. In the event of terminal drought, receding soil moisture conditions, crop requires supplementary irrigation.

The major portion of monsoon rainfall is generally lost through runoff which can be stored through the construction of suitable water harvesting structures on-farm reservoirs which will be utilized for giving crop saving irrigation for *Rabi* crops.

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