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Study of rainfall variability of Humnabad taluka (Karnataka)

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ABSTRACT

Rainfall data for the period 1976 - 2009 were used to analyze monthly, seasonal and annual variability of rainfall. The mean annual rainfall was 797 mm with 27 per cent variability; with standard deviation of 216 mm, spread over 50 mean rainy days. August being the wettest month (average rains- 172.7 mm) with coefficient of variation of 50 per cent and with the highest annual rainfall contributing month (21.7%) and mean rainy days (10.3). Rainfall of June to September months showed lower coefficient of variation. The study also revealed that the monsoon contributed 74.6 per cent of annual rainfall with a mean rainfall of 594.7 mm followed by post monsoon (13.9 % and 111.3 mm) season. The rainy days during monsoon season ranged from 25 to 57 days with a mean of 37 days. The coefficient of variation for rainfall and rainy days was highest during winter season when compared to other seasons.

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Key words : Rainfall, Rainy days, Seasonal rainfall

INTRODUCTION

India's economy is dependent on the agricultural production, which in turn is dependent on the monsoon rainfall and its distribution. The year to year fluctuation in rainfall as well as the fluctuation within the monsoon season governs the crop growth, development and yield. Even in monsoon months the crops are subjected to moisture stress due to occasional dry spells. Although the rainfall is high, the distribution is erratic making the crop vulnerable even during monsoon.

The success or failure of the crops in any year is always viewed with great anxiety as they are closely linked with the behavior of the south west monsoon rains received during June to September. Thus for a rainfed crop, rainfall is the only source of water and thereby any fluctuation in rainfall pattern adversely affect the crop production and it tilts the food security of the country. Water is one of the crucial inputs in crop production and its excess or deficit availability/application adversely influences the yield. Rainfall analysis for crop planning was carried out in different regions of the country as reported by Ahmed *et al.* (2009) in the Barak valley zone of Assam and Sarma *et al.* (1996) in the hills zone of Assam. Saha *et al.* (2004) reported rainfall distribution pattern of Cuttack and its implication in rainfed rice and other crop planning for coastal Orissa. Manorama *et al.* (2007) reported rainfall analysis and crop planning for the Nilgiris. Mahale and Dhane (2003) reported rainfall analysis for Panvel region. In this context, a similar attempt was made at Agriculture Research Station, Bidar, to analyze the rainfall variability in month, season and annual wise for Humnabad 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 co-efficient of variance (CV) of rainfall were worked out.

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. The highest and lowest rainfall (mm) were recorded in annually in different seasons and are presented in Table 2. The coefficient of variability (CV) indicates the dependability or reliability on rainfall for any period. Lower values of CV indicate better reliability (Ramana Rao, 1988).

Annual rainfall :

The mean annual rainfall was 797.0 mm spread over 50 rainy days. The maximum annual rainfall (1176.7 mm) was recorded in the year 1998 and was 47.6 per cent above normal and occurred in 66 rainy days. The lowest

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

Month	Rainfall						Rainy days				
	Lowest (mm)	Highest (mm)	Mean (mm)	SD (mm)	CV (%)	Percent of annual RF	Lowest (mm)	Highest (mm)	Mean (mm)	SD (mm)	CV (%)
January	0	103	8.3	20	240	1	0	2	0.5	0.7	140
February	0	88	5.5	16.1	292	0.7	0	3	0.5	0.9	180
March	0	103.2	14.1	24.3	172	1.8	0	5	0.9	1.2	133
April	0	79.9	22.5	19.0	84	2.8	0	5	2	1.6	80
May	0	219.3	41	49.0	119	5.2	0	13	3.3	2.8	84
June	28	295.6	113.4	63.0	55	14.2	4	15	7.6	2.5	32
July	24.2	262	145.3	88.8	61	18.2	3	17	9.5	4.1	43
August	52	405.8	172.7	87.7	50	21.7	2	18	10.3	3.7	35
September	24.2	451.5	163.3	100.9	61	20.5	4	18	9.8	4.3	43
October	1.2	235.6	83.8	64.6	77	10.5	0	11	4.8	3.1	64
November	0	139.1	23.3	33.8	145	2.9	0	6	1.5	1.5	100
December	0	23.2	4.2	7.3	173	0.5	0	3	0.5	0.8	160

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

Year	Particulars	Lowest (mm)	Highest (mm)	Mean (mm)	SD (mm)	CV (%)	Per cent of annual rainfall
Annual	Rainfall	454.3	1176.7	797	216	27	-
	Rainy days	33	66	50.7	8.7	17	-
Winter	Rainfall	0.0	103.0	13.7	25.2	183	1.7
	Rainy days	0	4	0.9	1.1	122	-
Summer	Rainfall	2.0	244.4	77.5	55.6	71	9.8
	Rainy days	0	13	6.1	3.3	54	-
Monsoon	Rainfall	280.8	1012.3	594.7	186	31	74.6
	Rainy days	25	57	37.1	7.6	20	-
Post monsoon	Rainfall	17.4	249.4	111.3	70.2	63	13.9
	Rainy days	2	14	6.8	3.3	48	-

Annual : January – December Winter : January – February Summer : March- May
Monsoon : June - September Post monsoon : October - December
SD : Standard Deviation CV : Coefficient of variation

rainfall of 454.3 mm was recorded in the year 1987 in 46 rainy days and was 42.9 per cent below normal. During the reported period, in 18 years the rainfall was above normal and in 15 years it was below normal and in one year it was equal to the normal (Table 2). The number of rainy days per year ranged from 33 - 66 days.

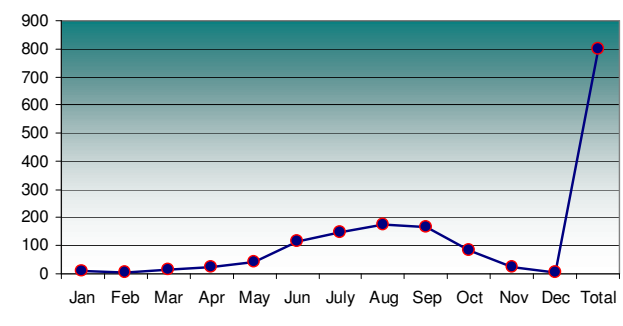

Fig . 1 : Monthly average rainfall (mm) recorded at Humnabad

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. The highest rainfall was received during monsoon season (594.7 mm) followed by post monsoon season (111.3 mm) and the lowest by winter season (103 mm). The per cent contribution of seasonal rainfall to the total annual rainfall was 74.6, 13.9, 9.8 and 1.7 by monsoon, post monsoon, summer and winter seasons, respectively with the lowest CV during monsoon (31 %), followed by post monsoon (63 %) and summer (71 %) seasons. As Humnabad region is highly benefited through southwest monsoon rainfall, the CV of the mean monthly rainfall during monsoon

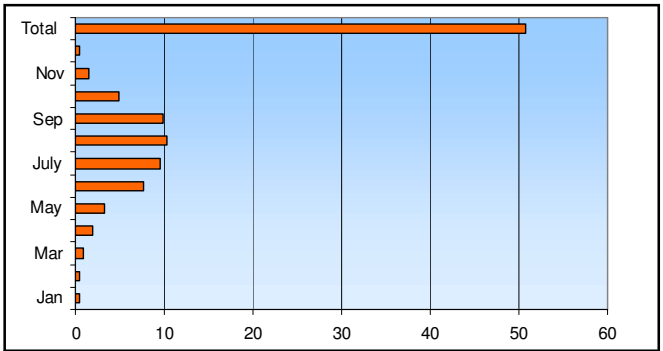

Fig . 2 : Monthly average rainy days recorded at Humnabad

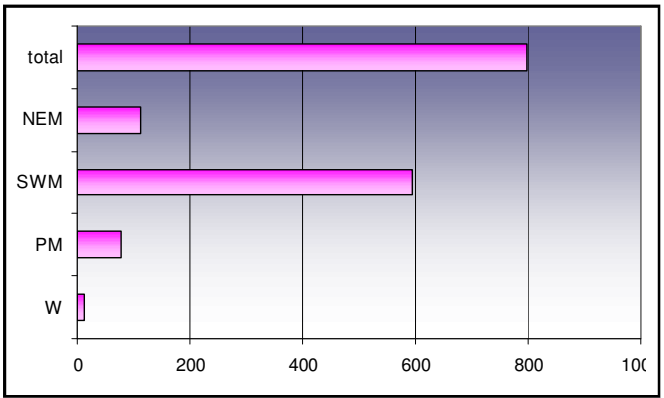

Fig . 3 : Average season wise rainfall as observed at Humnabad

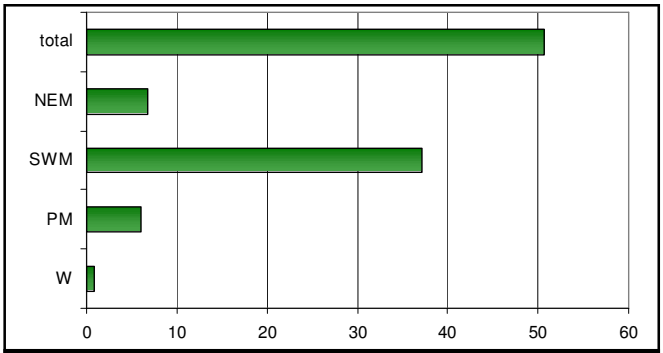

Fig. 4 : Average season wise rainy days as observed at Humnabad
W : winter PM : pre monsoon SWM : South west monsoon NEM (post monsoon) : north east monsoon

season was the lowest.

The average rainfall during monsoon season (594.7mm) with its highest contribution of 74.6 per cent to the total annual rainfall revealed that during the season, a major part of rainfall amount was generally lost through runoff which can be stored through water harvesting structures such as farm ponds and lakes and used during the winter season for growing *Rabi* crops. Also it can be utilized as life saving irrigation particularly in years of low rainfall. During post monsoon season, which contributed to 13.9 per cent of the total annual rainfall, an average amount of 111.3 mm rainfall could satisfy the cultivation of less water requiring crops such as pulses (chickpea), sunflower, safflower crops. About 9.8 per cent of total annual rainfall received during summer season (March-May) would be helpful for land preparation particularly for summer ploughing operation during the season.

Monthly rainfall :

From Table 1 and Fig. 1 and 2 it could be observed that rainfall in this region increased from April month onwards, attained a peak during August and then fell down reaching the lowest value of 4.2 mm during December month. Mean monthly rainfall was highest in August (172.7 mm) with its contribution of 21.7 per cent to the total annual rainfall. It was observed that there was higher dependability of rainfall from the month of June to October (CV < 78 %). Hence, a successful cultivation of pigeonpea based cropping system under rainfed condition with medium or long duration varieties is possible during that period.

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