RESEARCH PAPER:

Analysis of annual and seasonal rainfall behaviour of Bhalki Taluka (Karnataka)

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SUMMARY

The historical rainfall data of thirty four years (1976-2009) of Bhalki Taluka were used to analyze the monthly, seasonal and annual variability of rainfall. The thirty four years average annual rainfall of the region was 874.7 mm with average rainy days of 51 days. In case of seasonal rainfall, the per cent contribution to the total rainfall was 76.9, 13.8, 7.8 and 1.5 per cent for monsoon, post monsoon, summer and winter seasons, respectively with the lowest coefficient of variation in monsoon (26 %), post monsoon (72%), followed by summer (74%) and winter (166%) seasons. August was the wettest month with mean rainfall of 211.6 mm. The study also revealed that the coefficient of variation was lowest from June to October months.

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Key words : Rainfall, Rainy days, Seasonal rainfall

The weather and its variability are well known to the farming community and have great impact on crop production. The economy of the farmer is well influenced by weather. The greatest risk to crop yields in Indian agriculture is attributed to the variability of seasonal rainfall and the uncertainty in the amount and its distribution in a given season. Rainfall pattern largely decides the crop planning in dry farming tracts. Amount, distribution and intensity of rainfall mainly determine the choice of any particular crop species and agronomic practices. Scientific study on the quantum and distribution of rainfall if made would enable the farming community to adjust or modify the cropping programmes as well as the cultural operations.

Agriculture, especially in developing countries, is a sector which is vulnerable to risks of various types. Most importantly, weather related risks play a major role in affecting agricultural income. These would include extreme rainfall events which result in floods/ droughts, as well as extreme temperature events. Poor and small farmers are especially susceptible to income variability because of weather – related risks to their crops.

Rainfall, being considered as the prime input for agriculture has its own erratic behaviour in terms of amount and distribution. For better crop planning, a detailed study on rainfall behaviour is vital. Rainfall variability, both in time and space influences the agricultural productivity and sustainability of a region, as opined by Virmani (1994). Bhalki, one of the Taluka of Bidar district, Karnataka, India, is predominantly a rainfed region. South west monsoon is the predominant monsoon in the region and pigeon pea and sugarcane cropping system prevails. 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 Chaudhury and Tomar (1999); Sastri *et al.* (1999) Sarma *et al.* (1996); Tiwari *et al.* (1992) and Sahoo *et al.* (1991). In this context, an attempt was made at Agriculture Research Station, Bidar, to analyze the rainfall variability in monthly, seasonally and annually for Bhalki 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 (S.D.) and Coefficient of Variance (C.V.) of rainfall were worked out.

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RESULTS AND DISCUSSION

The daily rainfall data for the period from 1976 to 2009 was 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) recorded in annual and in different seasons have been presented in Table 2. The coefficient of variability (C.V.) indicates the dependability or reliability on rainfall for any period. Lower values of C.V. 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 211.6 mm distributed in 11 mean rainy days followed by September (173.4 mm) in 9 rainy days. Monthly rainfall during November to May remained lowest in the range of 5.1 to 32.9 mm. The highest rainfall of 540.6 mm reported in the July month. It is also observed that there was higher dependability of rainfall from the months of June to September (C.V. less than 65%) (Table 1 and Fig. 1 and 2).

Seasonal rainfall :

South west (SW) monsoon season (June - September) contributed 76.9 per cent of mean annual rainfall. Rainfall during this period varied between 420.7

Table 1: Monthly mean, highest and lowest rainfall (mm) and rainy days along with S.D. and C.V. at Bhalki (1976-2009)

Months	Rainfall						Rainy days				
	Lowest (mm)	Highest (mm)	Mean (mm)	S.D. (mm)	C.V. (%)	Percent of annual RF	Lowest (mm)	Highest (mm)	Mean (mm)	S.D. (day/s)	C.V. (%)
January	0	98.5	8.6	20.1	233	0.9	0	3	0.5	0.8	160
February	0	35.6	4.3	8.7	202	0.5	0	3	0.4	0.7	175
March	0	99.6	12	23.2	193	1.4	0	4	0.9	1.4	155
April	0	112	23.8	26.0	109	2.8	0	5	2	1.5	75
May	0	255	32.9	46.5	141	3.7	0	11	2.3	2.2	95
June	8.5	297.4	118	76.6	64	13.5	1	14	8	2.7	33
July	31	540.6	169	103.3	61	19.4	5	19	10.2	3.4	33
August	54.4	446.3	211.6	112.0	52	24.2	5	21	11.6	3.9	33
September	17.3	337.6	173.4	100.9	58	19.8	3	18	9.5	4.0	42
October	0	260.4	96	86.6	90	10.9	0	9	4.3	2.9	67
November	0	105.8	20.3	30.1	148	2.3	0	8	1.5	2.0	133
December	0	44.1	5	10.6	212	0.6	0	3	0.5	0.8	160

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

Year	Particulars	Lowest (mm)	Highest (mm)	Mean (mm)	S.D.	C.V. (%)	Per cent of annual rainfall
Annual	Rainfall	538.0	1362.3	874.7	200 mm	22.8	-
	Rainy days	35	74	51.3	8.5 days	16.5	-
Winter	Rainfall	0	98.5	12.8	21.3 mm	166	1.5
	Rainy days	0	4	0.8	1.2 days	150	-
Summer	Rainfall	0	255.0	68.7	51.5 mm	74	7.8
	Rainy days	0	11	5.2	2.4 days	46	-
Monsoon	Rainfall	420.7	1074.1	671.9	17.7 mm	26	76.9
	Rainy days	23	54	39.2	7.9 days	20	-
Post	Rainfall	2.8	268.7	121.4	87.9 mm	72	13.8
monsoon	Rainy days	1	14	6.2	3.3 days	53	-

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

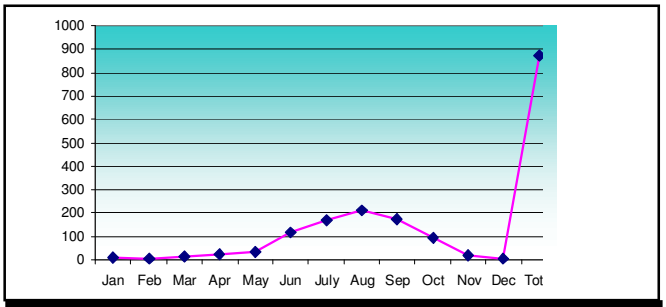

Fig. 1: Monthly average rainfall (mm) as recorded at Bhalki

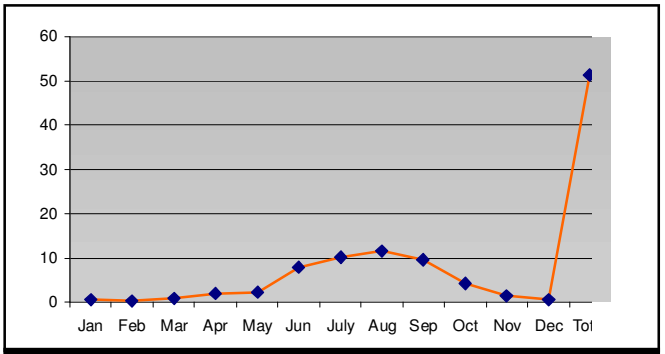

Fig. 2: Monthly average rainy days as recorded at Bhalki

mm to 1074.1 mm with mean value of 671.9 mm. Total amount of rainfall received during north east (NE) monsoon (October – December) was 13.8 per cent of the mean annual rainfall. The mean rainfall during this period was 121.4 mm. Pre-monsoon season (March - May) contributed 7.8 per cent (68.7 mm) of the mean annual rainfall. The winter rainfall contributed 1.5 per cent (12.8 mm) to the mean annual rainfall. Mean number of rainy days during SW monsoon season was 39 days (Table 2 and Fig. 3 and 4).

Annual rainfall :

The overall mean annual rainfall for the past thirty four years (1976-2009) was 874.7 mm with a standard

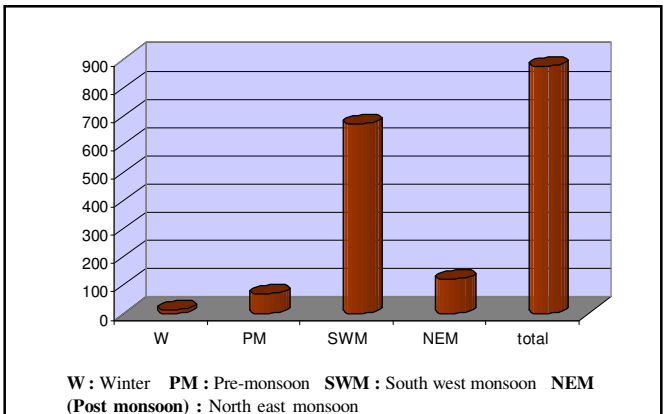

Fig. 3: Average season wise rainfall as observed at Bhalki

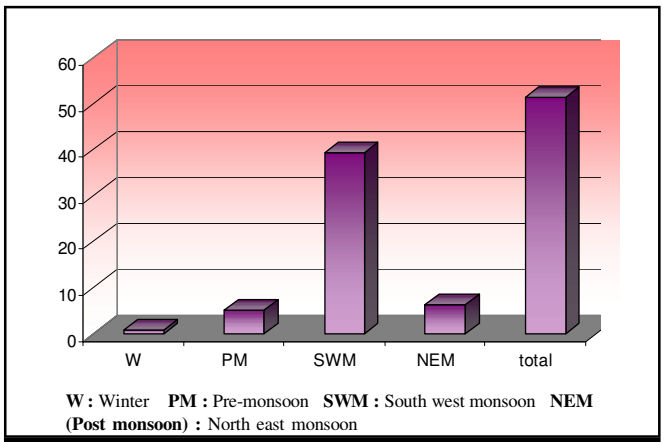

Fig. 4: Average season wise rainy days as observed at Bhalki

deviation (SD) of 200 mm and coefficient of variation (CV) 22.8 per cent. The maximum annual rainfall of 1362.3 mm and the lowest rainfall of 538 mm were recorded. The over all mean rainy days was 51 days (range: 35 to 74) with a standard deviation (SD) of 8.5 mm and coefficient of variance (CV) 16.5 per cent (Table 2).

Crop planning :

Based on the present study, the following recommendations could be made to increase the land productivity in the region. During the summer season, as the rainfall receipt was too low for crop cultivation, it is recommended to go for land preparation, especially summer ploughing and make the soil fit for cultivation during the succeeding year. Or else, less water requiring short duration crops such as millets, forage crops etc. can be grown with supplement irrigation practices. During *Kharif* season, arable short duration crops like pulses, sunflower, millets, maize can be grown. In uplands and in the embankments of water harvesting structures, cultivation of vegetables like cucumber and fruit crops like water melon can be done after the cessation of northeast monsoon rains for effective utilization of land and other resources.

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