

Short communication

Annual and seasonal rainfall variability in coastal district of Karnataka

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Indian agriculture is gambling with monsoon and major share of India’s food production is from rainfed agriculture. The annual and seasonal rainfall received and its variability directly influences the success or failure of crops through its beneficial or adverse effect on 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. The annual and seasonal rainfall data for the period between 1985 to 2009 for 25 years at Zonal Agricultural Research Station (ZARS), Brahmavar were studied for their variability and dependability.

The rainfall of 25 years (Table 1) ranged from 2827.1 to 4581.9 mm with a mean of 3771.7 mm. The standard deviation (SD), was higher (492.0) with a coefficient of variation of 13.0% indicating medium variability and dependability. During last 25 years in ZARS, Udupi, the rainfall during 1985 to 1989 (5 years) was lower ranging from 2827.1 to 4007.9 mm with a mean of 3438.7 mm and SD of 445.1 with medium CV of 12.9% which indicated not very high rainfall variation in the district. On the contrary during the next five years (1990-1994) the annual rainfall was high, ranging from 3375.5 to 4581.9 mm with a mean of 4110.9 mm and with SD (446.3) and CV (10.9%) indicating no significant variability and dependability.

The seasonal rainfall variability (Table 2) during the last 25 years (1985-2009) indicated that pre-monsoon season rains were deficit in 14 years and excess in 11 years (16.9 to 206.8%) as against the normal rainfall of 183.2 mm. During the months of South-West monsoon (SWM) season (June to September), the rainfall ranged from the lowest 2391.7 mm in 2002 to the highest 4084.7 mm in 1997 as against the normal rainfall of 3273.2 mm. Rainfall was sufficient to take up *kharif* crops and short duration *rabi* crops using seepage water in

all the years from 1985 (7.1%) to 2009 (24%) indicating no severe drought like conditions. Drought intensity was classified as per IMD (Normal (N) rainfall mean + 10%; slight drought (-11 to -25% of N); Moderate drought (-26 to -49%) and severe drought (-50% and above). Rainfall intensity was not changed during *kharif* season indicating minimum variation in rainfall (-3 to -26.9%) (Halikatti *et al.*, 2010). The intensity and frequency of rainfall during post-monsoon season is highly fluctuating which may affect the rabi and summer crops. Variations in post monsoon rainfall were observed in 11 years during the study period (-19.8 to -72.4%), while excess for 10 years (15.1 to 129.8 %). Similarly, Parmar *et al.* (2005) and Krishnakumar and Prasad Rao (2008) reported rainfall variability in Gujarat and Kerala state, respectively. Halikatti *et al.* (2010) observed rainfall variability in Karnataka state.

The results revealed that the rainfall pattern and seasonal distribution has not changed over time. This information is helpful in the planning and preparation of suitable cropping plans and management practices to cope up with changing weather for enhancing the productivity of agricultural and allied sectors more so in rainfed coastal areas.

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Table 1: Annual rainfall (mm) variability between 1985-2009 at ZARS, Brahmavar

Period	Range	Mean	S.D.	CV (%)
I. 1985-2009	2827.1 – 4581.9	3771.7	492.0	13.0
II. 1985-1989	2827.1 – 4007.9	3438.7	445.1	12.9
III. 1990-1994	3375.5 – 4581.9	4110.9	446.3	10.9
IV. 1995-1999	3060.4 – 4487.6	3989.2	490.6	12.3
V. 2000-2004	3274.2 – 4220.0	3616.0	368.2	10.2
VI. 2005-2009	3267.0 – 4232.7	3703.8	367.2	9.9

Table 2: Seasonal rainfall variability during 1985 to 2009 at ZARS, Udupi

Seasons Years	Yearly total		I. Pre-monsoon (January – May)		II. SW-monsoon (June-September)		III. Post-monsoon (October-December)		Category
	Rainfall (mm)	Deviation (%)	Rainfall (mm)	Deviation (%)	Rainfall (mm)	Deviation (%)	Rainfall (mm)	Deviation (%)	
Normal	3771.7	-	183.2	-	3273.2	-	262.8	-	N
1985 *	3131.1	-15.8	142.6	-22.16	2685.9	-17.9	302.6	15.1	SLD
1986 *	3352.2	-9.9	6.2	-90.62	2968.6	-9.3	377.4	43.6	N
1987 *	2827.1	-24.0	6.7	-98.3	2568.8	-21.5	251.6	-4.3	SLD
1988	4007.9	7.8	140.8	-23.14	3708.1	13.3	159.0	-39.5	N
1989	3875.0	4.2	116.6	-36.4	3485.6	6.5	272.8	3.8	N
1990 **	4564.4	22.7	562.0	206.8	3743.0	14.4	259.4	-1.3	E
1991	3946.9	6.1	126.3	-31.1	3629.6	10.9	191.0	-27.3	N
1992	4085.8	9.9	19.8	-89.2	3740.2	14.3	325.8	24.0	N
1993 *	3375.5	-9.2	30.2	-83.5	3174.9	-3.0	170.4	-35.2	N
1994 **	4581.9	23.2	135.5	-26.0	3886.8	18.7	559.6	112.9	E
1995	4017.3	8.0	245.0	33.7	3569.2	9.0	203.1	-22.7	N
1996 *	3060.4	-17.7	15.6	-91.5	2841.0	-13.2	203.8	-22.5	SLD
1997 **	4487.6	20.7	7.8	-95.7	4084.7	24.8	395.1	50.3	E
1998 **	4262.9	14.6	43.2	-76.4	3856.7	17.8	363.0	38.1	E
1999 **	4118.0	10.7	558.6	204.9	3348.6	2.3	210.8	-19.8	E
2000	3853.1	3.60	375.1	104.7	3364.4	2.8	113.6	-56.8	N
2001 **	4220.0	13.5	327.4	78.7	3535.4	8.0	357.2	35.9	E
2002 *	3274.2	-12.0	278.5	52.0	2391.7	-26.9	604.0	129.8	SLD
2003 **	3278.4	11.9	38.2	-79.1	3083.0	-5.8	157.2	-40.2	E
2004	3454.5	-7.1	365.4	99.5	2848.8	-13.0	240.3	-8.6	N
2005 *	3316.1	-10.8	154.5	-15.7	2970.7	-9.2	190.9	-27.4	SLD
2006	3903.5	5.0	388.4	112.0	3152.1	-3.7	363.0	38.1	N
2007	3794.5	2.0	145.6	-20.5	3536.7	8.1	112.2	-57.3	N
2008 *	3267.0	-12.1	214.2	16.9	2980.4	-8.9	72.4	-72.4	SLD
2009 **	4237.7	13.9	257.7	40.7	3497.4	6.8	482.6	83.6	E

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* Deficit rainfall years
 ** Excess rainfall years
 N: Normal rainfall years
 E: Excess rainfall years

IMD Classification

N: Normal rainfall (mean \pm 10%)
 SLD: Slight drought (-11 to -25% of N)
 MD: Moderate drought (-26 to -49%)
 SD: Severe drought (-50% and above).

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