Journal of Agrometeorology 10(2) : 228-230 (Dec. 2008)

Short communication

Analysis of drought intensity and frequency in two districts of north Bihar

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Knowledge of the frequency and intensity of drought of a given region is of importance for assessing the crop production potential of that region. Drought may be defined as an extended period i.e. a season, a year or more of deficient rainfall relative to the statistical multi-year average for a region. Bhalme and Mooley (1980), Gregory and Parthsarathy (1986) have studied large-scale droughts over India. Gore and Sinha Ray (2001) have worked on spatial coherence of occurrence of droughts over Maharashtra. Jat *et al.* (2005) studied the spatial spread and decay of drought over Rajastahn during the year 1987. Patel and Sastri (2004) suggested management of rainfed rice under drought situations.

In north Bihar two places viz., Pusa (25.98 ^{0}N and 85.67 ^{0}E) and Madhepura (25.93^o N and 86^o E) were chosen for assessment of drought intensity and frequency. The historical rainfall data used for Pusa is of 52 years (1952-2004) and for Madhepura is of 30 years (1974-2003). Drought intensity has been analyzed based on the criterion for classification (annual rainfall deficit from normal) as given in Table 1.

Mean annual rainfall of Pusa varied from 509.3 mm in 1992 to 1978.7 mm in 1974 with a mean of 1222.3 mm with a standard deviation (SD) of 328.4 mm and coefficient of variation (CV) 26.9 %. The maximum and minimum number of rainy days recoded at Pusa are 79 (1971) and 38 days (1991). Mean annual rainfall of the Madhepura district was computed as 1546.3 mm and varied from extremes of 903 mm (in the year 1975) to 2274 mm (in the year 1999). Standard deviation and coefficient of variation of annual rainfall was 385.6 mm and 24.3 %, respectively. Number of rainy days varied between 56 (1994) to 126 (2000).

Droughts of different intensities at Pusa are presented in table 2. Fifty four percent (28 years) of the years received rainfall less than mean rainfall at Pusa. The maximum rainfall deficiency (58.3 %) occurred during 1992, which was characterized as disastrous drought year. While severe droughts (1972 and 1994) occurred once in 26 years and large drought occurred once in 13 years (Table 2). Eleven years received more than 20 % rainfall than mean rainfall during the period of 52 years (1953 2004). Similarly, 5 to 20 % excess rainfall occurred in 11 years at Pusa (Fig.1). The wettest year was 1974 that received 62 % excess annual rainfall (1978.7 mm) than the mean (1222.3 mm).

At Madhepura, the year-to-year percent deviation of annual rainfall from its mean has been depicted in Fig. 2. The years under different categories of drought intensity have been worked out (Table 2). Fifty percent of the years received excess rainfall in the range of 8.6 % in the year 1996 to 47 % in the year 1999 and rest 50 % of the years received deficit of rainfall in the range of 5.7 % in the year 1976 to 41.2 % in the year 1975. Since, 1995 onwards, it is evident that none of year has experienced drought year. Maximum number (six) of years experienced moderate to large intensity of drought during the period 1982 to 1994. The maximum rainfall deficit of more than 38.0 % occurred in the year 1986 and 1989. It is interesting to note that no disastrous drought occurred at Madhepura during that

Table 1: Criterion for drought intensity

Departure of rainfall from normal	Drought Intensity
0-20%	Nil
21-30%	Moderate
31-40%	Large
41-50%	Severe
>50%	Disastrous

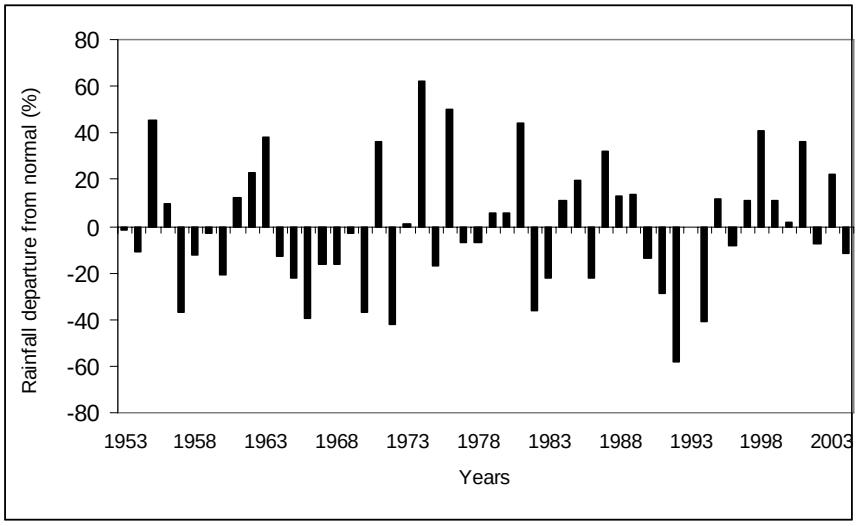

Fig. 1: Rainfall deviation during different years from normal at Pusa

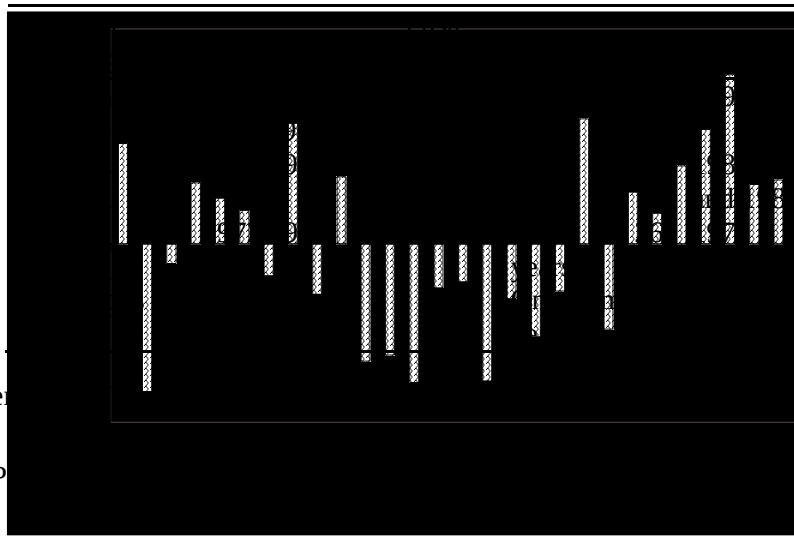

Fig. 2: Rainfall deviation during diffe

Table 2: Frequency of drought of different intensity at P

last 30 years. The 1975 drought was one of severe drought, with an overall rainfall deficiency of 41.2 percent.

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Received: October 2007; Accepted: August 2008