Journal of Agrometeorology 12 (2): 248-250 (Dec 2010)

Short Communication

Onset, end and duration of rainy season in two districts of North Bihar

SUCHIT K. RAI and K. A. SINGH
Indian Grassland and Fodder Research Institute, Jhansi (UP)-284003

Food production and cropping strategies are influenced by the variability of the onset and end of rainy season. Farmers generally opt for sowing their crops, when there is sufficient amount of first rainfall to moisten the top soil so that agricultural operations such as land preparation could be made. Hence the length of the growing season of rainfed crops in any region will be determined by the time between first effective rainfall and end of rainfall, although dry spell can occur in between this period. Keeping this in view, onset and end of rainy season was determined for two locations Pusa and Madhepura in north Bihar region.

The rainfall data for the period of 52 years (1953-2004) and 30 years (1974-2004) at Pusa, Samastipur (25.98 ^{0} N and 85.67 ^{0} E) and Madhepura (25.93^0 N latitude and 86^0 E longitude) of north Bihar have been used respectively for analysis. Onset of the rainy season was computed from weekly rainfall data following Morris and Zandstra (1979). In this method weekly rainfall was summed by a forward accumulation until a certain amount of rainfall is accumulated. Similarly the end of rainy season was determined by backward accumulation of rainfall (48+47+46+.. +36 weeks) data. Similarly daily rainfall was added by a forward accumulation (145+146+…+202 Julian day) for Pusa and (135+136+… +182) for Madhepura for computation of onset of rainy season. End of rainy season was determined by backward accumulation of (330+329+…265 Julian day) daily rainfall data for both the locations. An amount of 100 mm accumulated rainfall for onset of rainy season was considered for the locations as it is sufficient for land preparation and sowing of crops (Maize) . Accumulation of 30 and 25 mm were chosen to identify the end of rainy season for Pusa and Madhepura respectively.

At Pusa, onset of effective monsoon (OEM) varied from 24 to 31 SMW with mean of 26th SMW (Standard meteorological week) and standard deviation of 1.6. Similarly, end of effective monsoon (EEM) varied from 36 to 45th SMW. Mean week of EEM was found to be 40th SMW with a standard deviation of three weeks (Table 1). Mean duration of rainy season was of 15 weeks, which varied from 9 (in the year 1957, 1992 and 1994) to 24 weeks (1986) with a standard deviation of 3.5 weeks. At 75 % probability level, 100 mm rainfall occurred during 26th SMW.

The OEM, EEM and duration varied from 152 to 202 Julian days (JD), 255 to 307 JD and 85 to 146 days, respectively (Table 2). Amount of rainfall varied from 538.2 to 1699.5 mm at Pusa. The mean date of OEM and EEM were 166 (15 June) and 283 (10 October) Julian days. The earliest and latest probable (P= 68%) onset is 4 June (155 Julian day) and 26 June (176 Julian day). Similarly, the earliest and latest probable EEM monsoon is 30th September (272 Julian day) and 22nd October (295 Julian day).

The analysis of rainfall at Madhepura revealed that mean onset of monsoon is 24th SMW with a standard deviation of 1.6 week. Earliest and latest onset of monsoon was occurred in 21st (1994 & 2001) and 28th SMW (1999). Similarly, mean EEM (standard deviation) of monsoon is 43rd (3.8 week) SMW. Earliest and latest EEM were in 38th SMW (in the year 1981 and 1994) and 48th SMW (in the year 1995). Mean duration of rainy season is 19 week that varied in the range of 15 to 27 weeks (Table 1). A 100 mm of rainfall at 75 % probability level occurred in 25th (18 to 24 June) SMW, indicating that pre monsoon showers during first or second week of June i.e. 23rd or 24th SMW helps in seed bed preparation and sowing of prevalent crop seeds.

Table 1: Start, end and duration (standard meteorological weeks) of rainy season at locations

Locations	Start of rainy season				End of rainy season				Duration (in weeks)			
	Early (SMW)	Late (SMW)	Mean (SMW)	CV (%)	Early (SMW)	Late (SMW)	Mean (SMW)	CV (%)	Min	Max	Mean	CV (%)
Pusa	24	31	26	6.6	36	45	40	5.5	9	20	14	21
Madhepura	21	28	24	6.6	38	48	42	6.4	15	27	19	13

CV: Coefficient of variation; Min: Minimum; Max: Maximum

Table 2: Onset, (OEM) end (EEM) and duration of rainy season and total amount of rainfall at Pusa

Year	OEM (JD)	EEM (JD)	Duration (in Days)	Rainfall (mm)	Year	OEM (JD)	EEM (JD)	Duration (in Days)	Rainfall (mm)
1953	173	275	102	1052	1979	165	278	113	1070.3
1954	165	274	109	1006.9	1980	163	292	129	1135.4
1955	162	284	122	1699.5	1981	179	264	85	1558.9
1956	163	306	143	1222.4	1982	155	258	103	693.5
1957	175	268	93	625.1	1983	160	270	110	817.6
1958	173	294	121	1025	1984	157	262	105	1209.8
1959	155	300	145	1034.6	1985	167	291	124	1346.5
1960	167	275	108	842.7	1986	179	290	111	721.6
1961	162	288	126	1274.2	1987	160	269	109	1572.7
1962	167	278	111	1411.7	1988	164	279	115	1268.1
1963	160	306	146	1536.5	1989	168	273	105	1186.6
1964	165	283	118	956.4	1990	184	273	89	949.5
1965	202	293	91	859	1991	184	287	103	771.9
1966	153	294	141	538.2	1992	192	287	95	393.6
1967	152	277	125	902.3	1993	177	307	130	1029.6
1968	152	278	126	997.9	1994	179	264	85	586.5
1969	189	280	91	968	1995	168	290	122	1263.5
1970	169	281	112	569.6	1996	153	278	125	1033.3
1971	160	289	129	1469.8	1997	170	272	102	1169.8
1972	185	281	96	608.4	1998	171	291	120	1556.7
1973	164	286	122	1074.6	1999	163	293	130	1256
1974	156	298	142	1925.1	2000	158	285	127	1018.3
1975	168	292	124	916.2	2001	152	285	133	1468.5
1976	155	279	124	1597.3	2002	165	298	133	990.5
1977	170	286	116	903.9	2003	154	300	146	1250
1978	153	281	128	986.8	2004	156	255	99	824.9

Table 3: Date of onset, withdrawal, duration of rainy season and amount of rainfall at Madhepura

Year	OEM (JD)	EEM (JD)	Duration (in Days)	Rainfall (mm)	Year	OEM (JD)	EEM (JD)	Duration (in Days)	Rainfall (mm)
1974	152	306	154	1612.8	1989	159	306	147	736.6
1975	162	306	144	674.4	1990	174	306	132	1022.6
1976	158	306	148	1176.1	1991	180	306	126	792.9
1977	159	306	151	1554.9	1992	158	306	148	1161.4
1978	166	308	142	1358.9	1993	151	308	157	1855.2
1979	171	306	135	1448.4	1994	163	306	143	981.0
1980	158	306	148	1214.8	1995	168	315	147	1681.7
1981	172	306	134	1520.1	1996	151	306	155	1564.5
1982	153	306	153	1240.3	1997	173	306	133	1660.1
1983	159	306	147	1541.5	1998	170	327	157	1766.9
1984	154	316	162	871.4	1999	182	363	181	2270.9
1985	159	306	147	797.4	2000	157	306	149	1507.6
1986	160	306	146	704.8	2001	153	306	153	1568.9
1987	153	317	164	1234.5	2002	156	306	150	1128.0
1988	156	306	150	1211.9	2003	154	306	152	1577.1

It can be seen from the Table 3 that the onset of monsoon fluctuated from 151 to 182 Julian days and the mean onset of monsoon is 161(10th June). The earliest and latest probable (P= 68%) OEM is 1st June (152 Julian day) and 19th June (170 Julian day) on the basis of mean values. The mean date of EEM varied from 306 to 327 Julian days (Exception during 1999, in which monsoon ends on 363 JD) with a mean of 310 (6 November), the earliest and latest probable EEM (P= 68%) is 25 October (299 Julian day) and 17 November (321 Julian day). Duration of rainy season, amount of rainfall during the rainy season and intensity of rainfall varied from 126 to 181 Julian day and 674.4 to 2270.0 mm , respectively at Madhepura (Table 3)

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Received: July 2008; Accepted: July 2010